EQCMeeting2of2DOC20050203

# Part 2 of 2

# OREGON

# ENVIRONMENTAL QUALITY

# COMMISSION MEETING

# MATERIALS 02/03/2005

State of Oregon
**Department of Environmental Quality**

11-27-01

Attachment EE A10

EXHIBIT

tabbies

10

Photo NO. 1

phase 2
928 Valley View

Photo No. 2

Phase 2
928 Valley View
11/27

Photo No. 3

Phase 2
Valley View
11/27


Photo No. 4

Phase 2
928 Valley View


Photo. No. 5

Phase 2
928 Valley View

Photo NO. 6

Gilbert creek
11/27

Photo NO. 7

Gilbert Creek
11/27/01

Photo NO. 8

Gilbert Creek
Upstream
11/27/01

Photo No. 9

Gilbert Creek
Downstream
11/27/01

Attachment EE A11

# Warning - Notice of Violation

Notice Is Given to: William Ferguson 944-2929 772-9545

Laurelridge Subdivision Morgan Lane/Valley View Drive
*Location (or Address) of Violation* *Map/Tax Lot*

**You are hereby notified you are in violation of the Grants Pass Municipal Code section(s) summarized and marked herein. If the violation is COMPLETELY corrected by the date and time noted below, this notice will be considered a warning. If it is not corrected within the time specified, you will be cited into Circuit Court. The maximum fine is $500 for each violation. Failure to correct the violation can result in a citation for each day the violation continues.**

☒ **5.12.070 Nuisances** - No person may deposit on public or private property any substance which would detract from the cleanliness or safety of such property or would be likely to injure any animal, vehicle or person traveling upon any public way.

☒ **5.12.020 Water Pollution** - No person may allow substances to be placed on or near a body of water, ditch or stream that will cause harmful material to pollute the water.

☐ **5.36 Obstructing Passageways** - No unauthorized person shall deposit any earth, gravel or debris upon any street or sidewalk.

☒ **5.70 Offensive Substances** - It is unlawful for any person in possession or control of any land to allow offensive substances to befoul, pollute or impair the quality of any creek, drainage ditch or waterway.

☐ **6.06 Damaging Sidewalks and Curbs** - Temporary driveways may not be constructed without a permit. Drivers may not drive across sidewalks or curbs except at driveways.

☐ **8.56 Drainage Maintenance** - Owners of properties adjoining any existing waterway shall keep such drainageway open and free from obstruction through the property of each owner.

☒ ~~Other~~ Note: Multiple violations where sediments are being discharged into drainage system; failure of sediment/erosion control devices - Sediment discharge to Gilbert Creek

**WASHING MATERIAL OFF SURFACES AND INTO STORM DRAINS OR WATERWAYS IS NOT AN ACCEPTABLE METHOD OF CLEANUP AND MAY RESULT IN FURTHER PENALTIES.**

**THIS VIOLATION MUST BE CORRECTED BY:** November 26, 2001 1:00pm

*For Office Use Only*

I hereby certify I served a copy of this "Warning - Notice of Violation" by: Called left message on machine 3:15 pm MS

☐ Posting it on-site ☐ Having it delivered in person ☒ Mailing it

Recipient Info *(Person and/or mailing address)*: William Ferguson 5200 Pigeon Rd Medford OR 97501

Martin Seybold — 1:00pm Nov 21, 2001
*For the City of Grants Pass* *Date and Time*

Follow-up investigation by: _____ _____
*Date and Time*

Disposition: ☐ Violation cleared ☐ Referred for citation ☐ Referred to _____

Note: _____

Attachment EE A12

EXHIBIT 12 A

# EROSION CONTROL REVISIONS/CORRECTIONS LAURAL RIDGE PHASE 11 GRANTS PASS, OREGON

For: Ms. Kathy Staley
City of Grants Pass
101 N.W. "A" Street
Grants Pass, Oregon 97526

By: THE GALLI GROUP
612 NW Third Street
Grants Pass, OR 97526
(541) 955-1611



02-2026-03
December 15, 2000

| Post-it® Fax Note 7671 | Date 7/14 | # of pages ▶ |
|---|---|---|
| To JENINE | From MARTIN SEYBOLD | |
| Co./Dept. DEQ | Co. CITY OF GRANTS PASS | |
| Phone # | Phone # 541/474-6355 | |
| Fax # 503/229-6762 | Fax # | |

THE GALLI GROUP
Geotechnical Consulting

02-2026-03
December 15, 2000

Kathy Staley
City of Grants Pass
101 N.W. "A" Street
Grants Pass, Oregon 97526

Subject: **EROSION CONTROL REVISIONS/CORRECTIONS**
**LAUREL RIDGE PHASE II**
**GRANTS PASS, OREGON**

Ms. Staley:

In accordance with the request from the City of Grants Pass, we have visited the site and observed erosion control methods being used. Our visit and this report were requested by the City due to changes made to the subdivision since erosion control installation last year. The following pages outline 1) our site observations, 2) identified erosion control problems, 3) recommended methods to install proper erosion control throughout the subdivision, and 4) plan sheets which help graphically explain the required erosion control.

## SITE OBSERVATIONS

Our Principal Engineer, William Galli, P.E., visited the site on December 8, 2000. During this site visit we observed all lots, access roads and right-of-way areas adjacent to the paved streets in Phase II of the Subdivision. In all areas we found the following general conditions/problems that cause excessive erosion at the site.

1. All roadside ditches, ditches at toes-of -slope and other collection ditches were unlined granite conveyances.
2. Most access areas to unsurfaced lots and roads had no crushed rock or crushed shale entrance area to prevent mud tracking.
3. Many fill slopes were created with loose granite soils placed at steeper inclinations than recommended in the Geotechnical Report.
4. Most cut slope areas adjacent to streets allow runoff to flow over the soil and then onto the street.

5. Many areas of the site allow concentrated surface flow to flow over the edge and down fill slopes causing significant erosion rills and gulleying.
6. Most catch basins are not protected and allow entrance of silt and sand into the storm drain system.
7. Large areas of disturbed or stored granite soils are not encircled on the low side by silt fencing.

A few other types of problems were encountered and will be described in detail in the next section of this report.

## SPECIFIC EROSION PROBLEMS

The following list is a point-by-point account of each erosion problem we observed that should be corrected. Specific correction methods will be discussed after each item is listed.

- Fill slope area on Lot 53 has small erosion gully with flow moving down onto Crown. See Photo 1 in Appendix A.

  Close off water access over crest, fill top of gully and mulch the rest; include grass seed.

- Steep cut slope adjacent to Crown below lot 54 has numerous places where water flows over crest and down slope. Much erosion and sloughing is covering rock beside sidewalk with mud. Granite is being washed across sidewalk onto Crown. See photo 2 and 3.

  Cut off water flow from above, channel it to a rock-lined ditch or protected catch basin. Install hay bale or equivalent sand and silt block across the entire area between slope and street to trap silt and sand behind it. Fill in upper portion of eroded gulleys and mulch with seed included.

- Flow off of lots 53, 54 and Parcel 1 of Phase I channel water alongside the paved entrance road between Lot 54 and 55. This area has only a small ditch-like depression along the upslope side of the asphalt, Photo 4. This area is unlined and the water already carrying sediment from the area above is scoured out and contributes silt and sand into the catch basin at the bottom of this driveway. See Photo 5.

  Enlarge the drainage ditch area along the asphalt and line it with crushed shale, crushed rock or concrete. Use small check dams to collect silt from above. Install a silt fence and hay bale enclosure at top entrance to ditch to trap sediment off of lot. Install a crushed rock entrance pad at top of driveway to help trap sediment and clean mud off tires.

- Catch basin at base of access driveway between Lots 54 and 55 is unprotected. See Photo 6.

Cover soil areas around catch basin with asphalt, concrete or crushed rock. Protect catch basin from sediment by installing a hay bale "V" or other trap upslope of basin or surround basin with hay bales.

- Water coming out of wooded area above access road between Lots 54 and 55, running over the cut bank on upslope side of driveway, causing much erosion of this bank.

  Collect water above the bank and convey to bottom of cut bank in a conduit or over rock-covered, concrete-covered area.

- Large reworked surface area (20 X 80 feet or more) near northwest quadrant of intersection of Sunburst and Morgan (Lot 55). Seems most of this disturbed granite soil is due to utility vault and utility conduit installations. See Photo 7.

  Cover area with mulch or straw and seed. Provide a hay bale or other closure across low side of area to prevent migration of sediment while area becomes vegetated. Prior to erosion protection measures, grade area such that surface flow is channeled into sediment trap listed above.

- Wide area of loose uncompacted granite soil fill was placed along most of downslope side of Sunburst Way. Heavy rains will cause much of these areas to erode and carry sediment into the Lots below Sunburst ( Lot No. 55, 56 and 57). See Photo 8.

  Need to compact these soils. Install a silt fence along the low side of this fill area. Cover entire area with straw or mulch and seed. Reshape so water does not go over edge of fill.

- Long, narrow to wide area of disturbed granite soils exists along the north side of Crown, just behind the sidewalk in front of Lots 67 and 68. Most of this is due to utility installation work. See Photo 9 and 10.

  The entire area should be shaped to channel the water towards hay bale or silt fence sediment traps (install 1 or 2). Mulch the entire area with straw or other mulch and seed. Install second sediment trap downslope and towards the east end of Lot 67, just prior to the runoff flowing into the gutter.

- Access drive to Lots 60, 61, 62 and 63 is paved to the end. It has had much loose granite fill soils placed along its downslope side. In heavy rains this soil will erode and move down onto Lots 62, 63, 64 and 67. See Photo 11.

  Compact soil fill and install a silt fence along the downslope edge of the fill soils. Shape so water will not go over the edge.

- The access drive above has a very narrow drainage area along the upslope side of the asphalt. This narrow area is granite and water flow erodes the invert. See Photos 12 and 13.

  Widen and deepen this area into a small roadside ditch. Line this area with crushed rock, asphalt or concrete.

- The base of the access drive above has a catch basin at its downslope end on the south side. This catch basin is unprotected. See Photo 14.

  Cover area around the catch basin with crushed rock, concrete or asphalt to protect this immediate area. Also install sediment trap upslope of catch basin by means of hay bales and/or silt fencing. Install small rock check dams across the ditch to dissipate energy and catch sediment.

- Roadway "start", which exits towards the northwest, extends approximately 100 feet in asphalt, then another 100+ feet of disturbed granite soil and granite cut slope. There is a silt fence across part of this area, but the sediment-laden water moving off the granite area is getting around this prevention measure. See Photo 15.

  Install a silt fence/hay bale wall entirely across this area to prevent sediment from moving into the asphalt. Install a crushed rock or crushed shale area leading off the asphalt to decrease mud tracking onto the asphalt street.

- This area above also has a catch basin installed at the base of the roadway which is not protected. See Photo 16.

  Install hay bale enclosure for sediment trap around the catch basin to protect catch basin.

- Area to south and downslope of the road "start" listed above has large bare granite soil area, much on a slope. See Photo 16.

  Area needs to have its final slope finished then covered with straw or mulch and seed.

- Second street "start" leading out towards the west, and which will go downslope, extends a short ways as asphalt then has several hundred feet of loose granite piled down the slope. See Photos 17 and 18.

  Entire area needs to have the low side of all the disturbed soil areas lined with a silt fence. Add a second silt fence downslope in any area where concentrated flow off these loose soils on the slope could overwhelm one silt fence.

- A third road "start" extends towards the south, (the extension which will lead towards the end of Starlite Place) has no rock covering and causes significant tracking onto the asphalt. See Photo 19.

Install a crushed rock pad at start of this soil surface roadway to prevent mud tracking.

- Narrow and wide disturbed soil area extends from the end of Crown area past Lots 69 and 70 to the intersection of Crown with the access road to Lots 46 and 47. This disturbed area has sediment-laden runoff proceeding downslope to a catch basin near the roadway intersection. See Photo 20.

  Slope area and compact loose soil. Install at least two silt fence sediment traps and hay bale barriers to this downslope flow. One should be close to the downslope catch basin.

- Catch Basin with drop vault is intercepting sediment-laden runoff. See Photo 21.

  Install silt fence upslope across this sloping area (existing one has flow moving around ends) and protect catch basin with hay bales.

- Disturbed soil area around catch basins at access road connection to Crown.

  Mulch and seed the area. Photo 22.

- Access roadway to Lots 46 and 47 has a small depression between asphalt and cut bank above. This is acting as a ditch for runoff and it has a granite base. See Photo 23.

  Deepen and widen slightly this area to create a small roadside ditch. Line this new ditch area with crushed rock, asphalt or concrete.

- Towards the end of this access road on Lot 46, a large loose pile of granite soil has been pushed down on the slope. See Photo 24.

  Install a silt fence around the downslope edge of the entire disturbed soil area. (Removal of the soil would be better.) Mulch and seed entire exposed soil area.

- One area on the downslope side of the access road to Lots 46 and 47 collects water and allows the concentrated flow to run down the fill bank and onto Lot 66. This has created an 18 inch deep erosion gulley on the slope. See Photo 25.

  Shape the area alongside the access road to prevent water from running over the edge in concentrated flow area. Fill up the erosion gulley with crushed rock or shale with a soil topping. Mulch and seed the area.

- Lots 51 (2), 65 and 66 have been regraded into "benches". There is a high, very steep fill slope of loose granite which runs along the rear of these lots. A small fill slope of similarly loose, steep granite fill runs across the center of the lots. There is also another one up closer

to Crown (will be addressed in later statement). These areas are eroding both towards Lot 52 and toward lots to the rear. See Photos 26, 27, 28 and 29.

Need to extend hay bale walls across the lot benches to slow down flow and trap sediment. Install Silt fencing across toe of fill slope at rear of lot to prevent migration of sediment onto lots to the east.

- These Lots (66, 65 and 51) also show tension cracks at the top of the loose steep fill slope closest to Crown. This area may slough off in heavy rains. Photos 30 and 31.

Surround base with a silt fence or rework fill to 2H:1V slope and dense surface.

- There is much erosion on Lots 51 and 65, much of which is carried to a granite ditch which discharges through the curb into the gutter on Crown. See Photos 32, 33, 34 and 35.

Install blocks to concentrated flow, channel through sediment traps and line ditch full length with rock, concrete or asphalt.

- Lot No. 49 has a large bare soil area in what appears to be an area used for access. Some silt fence but not enough to stop erosion. Runoff carrying eroded granite across sidewalk and into the gutter. Photo 36.

Needs a wider Silt Fence. Also needs a row of hay bales by sidewalk to block movement of soil off site. Bare soils should be mulched with seed included.

- Lot No. 48 has a moderately large historic drainage swale running across the lot. Much of the swale is disturbed and mounded granite soils (even buried the hay bales). There is a drop structure catch basin at the low end by the sidewalk area. Minimal protection with a small pile of 3 inch to 6 inch stones. The granite is washing through the large voids and into the catch basin. Photos 37, 38 and 39.

Entire swale area and other disturbed areas need to be mulched and seeded. (Slope swale to move water to catch basin first). Install at least two continuous silt fences across the swale. Protect catch basin with hay bale enclosures and have hay bale settling pond upslope of CB. May also need to line bottom of swale with shale if it carries concentrated runoff.

- Lot No. 47 has a shallow flat swale feature running through it towards the south boundary. The darker upper soil zones are cut steeper than recommended and will begin sloughing with heavy rains.

Would be best to intercept flow before it gets to top of bank. Alternatively (but not as effective) install a silt fence or hay bale enclosure across flow path below the

potential failure area to keep granite from reaching the street. Need to infill eroded area above slope with rock then mulch and seed the area. Photo 40.

- Lot No. 43 has an access driveway "cut" into the bank. This entire area is bare granite and has several erosion rills started. This eroded soil may continue across the rock strip and flow into the gutter. Photo 41.

  Need to have bare soil area mulched or covered with crushed rock. Seed all areas that will not be in the driveway. Need to cut off flow of soils laden water at base of driveway with silt fence or hay bale dam that will not allow flow around the ends.

- Lot No. 44 has a large disturbed area along the front all around this sharp bend in Valley View. There are also large bare and disturbed soils back on the lot, some on steeply sloping sideslopes. Photo 42.

  All bare soil areas need to be mulched and seeded. Protect any potential flow paths with hay bale lines and silt fence breaks. Block flow onto street with hay bale or silt fence near street.

- Along access to Lot No. 45 there has been a settling pond excavated and built out of loose granite dikes. This feature has loose granite on the sides and in the bottom (foot traffic creates 2-inch deep footprints). This "pond" area drains directly into storm drain by way of a 12-inch pipe whose invert sits on the loose granite bottom of the "pad". No erosion protection of this pond or the large (2,000 to 3,000 square feet) disturbed area around it with numerous piles of limbs and stumps. It should also be noted that this settling pond appears to be entirely outside the property boundary of this subdivision. Photos 43 and 44.

  The settling basin/catch basin should be moved onto the Laurel Ridge Phase II parcel. The entire area around it should be mulched and seeded. The basin itself should have at least two silt fences run across the swale upslope of it and it should be lined with angular shale over non-woven filter fabric. The outfall should be above the base to allow for settling of eroded material. Alternatively, install a settling basin upslope of catch basin and discharge to CB with a pipe. This area will be a major area of erosion and may cause clogging of the storm drain if not properly protected.

- Paved access road off the south side of Valley View (may be outside of Laurel Ridge Phase II) has granite ditches with no erosion protection and no protection of the catch basin. Photo 45.

  Needs to have ditches lined with rock. Needs check dams or hay bale "V's" to catch silt and sand. Needs enclosure around catch basin to keep eroded material out. Also needs a block across area to keep eroded material from coming across sidewalk and into the gutter.

- Bare disturbed soil areas along the south side of Valley View.

  Need to mulch and seed the area and establish a block against eroded material reaching the gutter prior to vegetation growth.

- Bare and disturbed soil on the north side of Valley View. Photo 46.

  Same as above for erosion control. Keep eroded material from entering roadside ditch below the project.

- Rear of Lot Nos. 41 and 42 have erosion rills from concentrated flow.

  Need to block these areas with hay bales or silt fences. Allow water to disperse.

- Bare disturbed soil areas scattered about on Lot Nos. 41 and 42.

  These need to be mulched and seeded. Break up flow lines with hay bales or silt fence.

- Lot No. 44 rear angle pt. by Lot 33 (Phase I) has the end of a 12-inch storm drain discharging in the gulley. Area only protected with stumps and limbs. Much erosion all around this area from steep loose fill slopes and the storm drain. Much granite is washing down gulley towards irrigation ditch. Photos 47, 48, 49 and 50.

  Discharge area and below in gulley needs to be protected from erosion and scour by angular rock over a non-woven filter fabric. Rock must be large where water falls out of pipe end. Slopes all around this area need to be mulched and seeded. Silt fences should be placed along base of slopes. Bigger flow paths on slopes should be interrupted by hay bale "V's". Silt fence already in place above this area on Lot No. 40 needs to be extended and maintained.

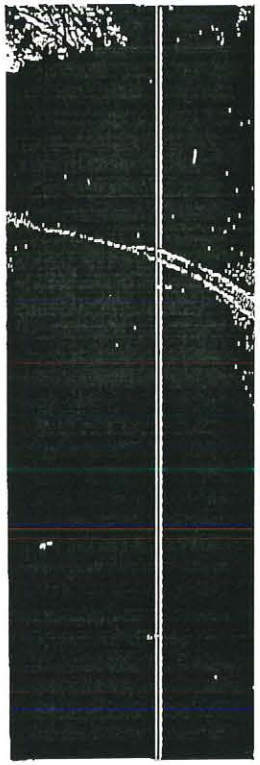
- Lot Nos. 39 and 40 have several shallow erosion gulleys/rills established due to concentrated flow from no protection. Small silt fence is not wide enough and need more locations blocked. The rear of these lots form a steep fill slope down to a bench-like area that all slope towards southwest along west side of Lot No. 34. This area will have concentrated flow and will have much erosion. Photos 51 and 52.

  Need to break up the lineal flow areas with hay bale V's and silt fence blocks. This should be done at several locations along these gulley/rill features. Bare areas need mulch and seed.

- Upper area of Lots 40, 41 and 42 was created by a fill up to street grade. Much of this fill appears to have been tracked in with a dozer or front end loader. Steep fill slope runs across middle to front 1/4 of lots. This slope is very loose and steeper than 70%. Top of fill slope

has moderate to large (1½") tension cracks indicating progressive fail re will cause a great deal of bare soil exposure and subsequent erosion.

Need to block all potential erosion paths along top of fill and belo fences or hay bale lines. If an area "fails" the mud flow-like wast must be surrounded with a silt fence and exposed area mulched ar l s anticipate these failures to take place similar to those that occurre Phase I, two years ago).



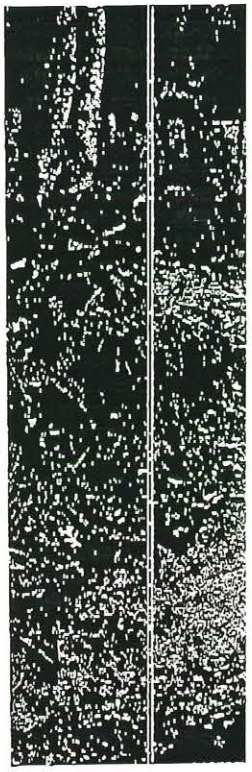
- Front of Lot Nos. 38, 39 and 40 have bare disturbed soil in wide area 39 will have off-site migration onto Lots 34 and 35 (Phase I).

These areas need to be mulched and seeded to prevent erosion. P

- Lot No. 39 also has some fill placed on it. This fill slope is loose and ıa the top.

Put silt fence around the base of the fill to stop eroded material if

Any other erosion control items noted (while installing the above-listed e ɔs measures) that need to be repaired or stabilized should be added to this li control measures need to be maintained on an ongoing basis to ensure pr ɔc. Careful installation and maintenance of these measures will significantly ed migration off-soil and suspended solids in stormwater runoff.



Respectfully Submitted,
**THE GALLI GROUP**

William F. Galli, P.E.
Principal Engineer

PH

Attachment EE A13

EXHIBIT tabbies 13 Not offered

# INCIDENT REPORT

Grants Pass Department of Public Safety
101 NW 'A' Street, Grants Pass, Oregon 97526
Telephone (541) 474-6370 Fax (541) 476-8527

INCIDENT: **Violation City Ordinance** CASE#: **2002-01277**

COMPLAINANT: **Kathy Staley** DOB: PHONE: **541-474-6355**

ADDRESS: **101 NW A Street**

DATE/TIME/DAY COMMITTED: **02-07-02 1400**

WHERE COMMITTED: **1964 NW Crown St.**

VENUE: **GRANTS PASS, JOSEPHINE COUNTY, OREGON**

REPORTED TO: **Marci Haack** DATE/TIME: **02-07-02 1600**

ASSIGNED OFFICER: **Haack/ 41055** SHIFT: **Days**

ROUTE COPIES TO: **Ulys Stapleton**

EVIDENCE: **NO** PHOTOS TAKEN: **YES**

## SUMMARY

On 02/07/02, Mr. Phillips was cited for drainage maintenance and offensive substance.

## CASE STATUS

Closed by citation. Referred to City Attorney for pursuit of charges.

## SUSPECT

Phillips Jr., Richard A DOB 05/09/67
6'4 215 lbs.
1107 NW Laurelridge Pl
Grants Pass, OR 97526

## CITATION

GPP21213 - 1964 NW Crown St./ Drainage maintenance and offensive substance.

## ATTACHMENTS

Photos

| Post-it® Fax Note 7671 | Date 7/15 | # of pages ▶ 4 |
|---|---|---|
| To JENINE | From MARTIN SEIBOLD | |
| Co./Dept. DEQ | Co. CITY OF GRANTS PASS | |
| Phone # | Phone # 541/474-6355 | |
| Fax # 503/229-6762 | Fax # | |

INCIDENT: **Violation City Ordinance** CASE: **2002-01277**

---

**DETAILS**

On 02/07/02 at about 1600, I was contacted by Kathy Staley from the City Engineering Division. She had inspected the site at 1964 NW Crown St. Several violations were found and photos were taken. The property owner had been previously warned. Mr. Phillips received one citation with two offenses.

M. Haas
02-08-02
1330

eport number: 2002-01277 Incident number: 2002017352

| | |
|---|---|
| Location | 1964 NW CROWN |
| Apt / lot | |
| Building | |
| Nature | VCO-VIOL CITY/CO ORDINANCE |
| Date | 02/08/02 |
| Time | 12:08:22 |
| Shift | 1 |
| Phone | |
| Priority | 5 |
| Grid | 101 |
| Method | 1 |
| Call taker | DMS |
| Dispatcher | DMS |
| Disposition 1 | RPT |
| Disposition 2 | |
| Primary unit | P47 |
| Primary officer | 41055 |
| Time dispatched | 12:09:50 |
| Time arrived | |
| Time cleared | 12:10:00 |
| Vehicle tag | |
| Vehicle state | |
| Vehicle color | |
| Backup units | |
| Backup officers | |
| Time dispatched | |
| ime arrived | |
| ime cleared | |
| Complainant name | STALEY, KATHY |
| Complainant address | |
| Complainant phone | 4746355 |
| Location occurrence | |
| Suspects name | |
| Location name | |
| Location name 2 | |
| Entry made | |
| Elapsed time | |
| Suspect description | |
| Suspect number | |
| Suspects vehicle | |
| Direction travel | |
| Animals | |
| Fenced | |
| Track molest | |
| Weapons | |
| Physical/verbal | |
| Intoxicated/drugs | |
| Others | |
| Bus open/Res home | |
| Number hostages | |
| Valid alarm | |
| Injuries | |
| Officers name | |
| Description | |
| exit doors | |
| ctivity | |

eneral Notes :

Notes

| | |
|---|---|
| CITATION ISSUED TO PHILLIPS, RICHARD FOR DRAINAGE (DMS) | 12:09:17 |
| MAINTANENCE AND OFFENSIVE SUBSTANCE (DMS) | 12:09:27 |
| Assigned report number: 2002-01277 (DMS) | 12:09:53 |

M. Hack

02-08-02

#41055

# OREGON UNIFORM CITATION AND COMPLAINT

POLICE RECORDS GP21213

Use for All Violations or Crimes Where Separate Complaint Will Not Be Filed/ORS 153.045 or 133.069

☐ CRIME(s) (See A on Back) ☐ OR ☐ No Bail ☒ VIOLATION(S) (See B on Back) ☐ Traffic ☐ Other ☐ Wildlife ☐ Boating ☐ Commercial Fishing

STATE OF OREGON
CITY/OTHER PUBLIC BODY
COUNTY OF Josephine

Docket No.
Court: ☐ Municipal ☐ Justice ☐ Juvenile ☒ Circuit

## DEFENDANT

THE UNDERSIGNED CERTIFIES AND SAYS THAT THE FOLLOWING PERSON

| ID Type | ID No. | State | Tel No. |
|---|---|---|---|
| DL | 3388d03 | OR | |

Name: Last: Phillips First: Richard MI: A

Address: 1107 NW Lauvetridge Pl — License Class — ☐ Employed to drive

City: Grants Pass State: OR Zip Code: 97526 — Def Is: ☐ Passenger ☐

| Sex | Race | DOB | Height | Weight | Hair | Eyes |
|---|---|---|---|---|---|---|
| M | W | 15-04-67 | 64 | 215 | | |

## VIOLATION

AT THE FOLLOWING TIME AND PLACE IN THE ABOVE-MENTIONED STATE AND COUNTY:

Offense Date on or about: Month 02 Day 07 Year 02 Time 0940 ☒ AM ☐ PM ☐ Highway ☐ Premises open to public

At or near Location: 1964 NW Crown St

## VEHICLE INFO

INVOLVING THE FOLLOWING:

Type | Regis/VIN/ID No. | State

☐ Accident ☐ Injury ☐ Property Damage ☐ Endanger others

Vehicle year, make, model, style, color, OR Other: describe

☐ Driver not Reg. Owner ☐ Commercial Veh. ☐ Haz Material

Other

## OFFENSE(S)

DID THEN AND THERE COMMIT THE FOLLOWING OFFENSE(S):

1. Violated (cite ORS/ORD/rule) | Describe | Alleged Spd | Designated Spd | ☐ Posted Limit ☐ VBR | ☐ Radar ☐ Pace ☐ Laser | ☐ Paid Sch Zn ☐ Hwy Wk Zn ☐

☐ Intentional ☐ Knowing ☐ Reckless ☐ Criminal negligence ☐ No culpable mental state | 1. Base Fine:

1. Violated (cite ORS/ORD/rule): 8.56 | Describe: Drainage maintenance

☐ Intentional ☐ Knowing ☐ Reckless ☐ Criminal negligence ☒ No culpable mental state | 1. Base Fine: 295-

2. Violated (cite ORS/ORD/rule): 5.70 | Describe: Offensive substance

☐ Intentional ☐ Knowing ☐ Reckless ☐ Criminal negligence ☐ No culpable mental state | 1. Base Fine: 295-

## OTHER

Expl.

I certify under ORS 153.045 and 153.990 and under other applicable law and under penalties for false swearing, do swear/affirm that I have sufficient grounds to and do believe that the above-mentioned defendant/person committed the above offense(s) and I have service the defendant/person with this complaint.

Officer(s) Agency ID: GP Police

02-08-02 Date Issued — M Haack 1st Officer Signature — 1st Officer ID No.: 41055

Print 1st Officer Name: M. Haack — 2nd Officer ID No.:

2nd Officer of Arresting Person (If Not Officer) — Signature — Print Name

YOUR COURT APPEARANCE DATE, TIME AND LOCATION ARE

| Mo/Day/Year | Time | Location |
|---|---|---|
| 03/05/02 | ☒ AM ☐ PM 0900 | Courthouse 500 NW 6th G.P. OR 97526 |

11:32:10 07-14-03
From port: 550 by: SCHMIDT, DAWN M Page 2

Report number: 2002-01277 Incident number: 2002017352

Officers name ..... :
Description ..... :
exit doors ..... :
Activity ..... :
General Notes :

Notes

CITATION ISSUED TO PHILLIPS, RICHARD FOR DRAINAGE (DMS) 12:09:17
MAINTANENCE AND OFFENSIVE SUBSTANCE (DMS) 12:09:27
Assigned report number: 2002-01277 (DMS) 12:09:53

| Post-it® Fax Note 7671 | Date 7/15 | # of pages ▶ 1 |
|---|---|---|
| To JENINE | From MARTIN SEYBOLD | |
| Co./Dept. DEQ | Co. CITY OF GRANTS PASS | |
| Phone # | Phone # 541/474-6355 | |
| Fax # 503/229-6762 | Fax # | |

EXHIBIT tabbies 14 A


# Ferrero Geologic

760 Oak Street, Ashland, Oregon 97520
541-488-2452 (ph) 541-488-6473 (FAX)
Email: ferrerogeo@mindspring.com

ASSOCIATION OF ENGINEERING GEOLOGISTS MEMBER


To: City of Grants Pass Community Development Department
101 NW A Street
Grants Pass, Oregon 97526

and

Bill Ferguson
F & L Ltd.
5200 Pioneer Road
Medford, Oregon 97501

Date: 12/06/01

Subject: Erosion control/slope stability inspection, Phase 3, Laurelridge Subdivision, Grants Pass, Oregon

**Previous Inspections/Background Issues**

In my original Phase 3 geologic report dated 09/29/00, I expressed concern that the alignment of Starlight Place was too close to the steep drainage headwalls on the west side of the ridge, placing proposed fills on the steep headwall slopes. I recommended moving the road northeasterly to allow for elimination of fills in the draws. I also recommended maximum fill slopes of 2 to 1 and no placement of fills on slopes exceeding 40%. My recommendations were incorporated in design plans by the project engineer.

On 07/12/01, I was called to the site to inspect grading. Although most the fills appeared to be well compacted, I found that my fill slope and placement criteria had been exceeded along the entire west side of the development. Greater than 2 to 1 sloping fills were placed on slopes exceeding 40%. It is my understanding that this was done in order to facilitate on-site disposal of excavation waste, thereby not having to haul it off site. I was especially concerned about the potential for substantial sedimentation in the northernmost draws, where very large fills were placed in extremely steep headwalls. I presented my findings in a report dated 07/14/01, with site maps

showing in detail where the grading was in non-compliance (maps included in the back of this report; inspection findings in dark font). I saw Cathy Staley on Phase 2 that day and informed her about my findings.

How the decision to construct the fills out of spec was made is not clear to me, due to contradictory statements by supervisors on site. I suspect that a contributing factor was the common, and erroneous, opinion that unreinforced or unarmored 1.5 to 1 +/- (angle of repose) fill slopes in granitic materials are stable. 1.5 to 1 granitic fills are often stable until the first heavy rain, when they begin to slough off the outer portion that is steeper than 2 to 1. I have seen this occur on numerous sites, which is why I recommended maximum 2 to 1 fill slopes.

On site (07/12/01) and in the report dated 07/14/01, I stated that attempting to move equipment into the steep draws and remove the excess fill material down the to toes of the fills would result in more damage than benefit. As a compromise solution, in order to reduce the volume of potentially unstable material on the fill slopes, I recommended pulling back the upper portions of the oversteep fills with a large excavator, reaching as far down the slopes as possible, and regrading the reachable portions to a 2 to 1 slope.

On 10/25/01, I was called to the site to formulate erosion control plans. At that time, I noticed that although some of my recommended regrading had been completed, there were many fills that still exceeded 2 to 1 clear to the top. I restated my concerns about the fills. I also concluded that it was too late in the year to continue grading and that erosion and sediment control measures were top priority.

I verbally recommended installation of sediment traps consisting of silt fences and/or hay bale barriers across the draws at the toes of the fills, and additional traps further down slope far enough to catch any overflow from the fill toe traps, and any sediment from the spur ridge grading areas. Because of site grading, I was sure that the fills would slough substantial material during storms, and so the goal was to trap sediments before they could flow off the property and down into Blue Gulch. I also recommended installation of continuous sediment barriers adjacent to the sidewalks along both sides of Starlight Place, to prevent sediments from washing out onto the road during storms.

I also recommended numerous specific traps, drains and flow dissipating measures scattered over the ridge top areas and on one dozer trail on lot 73, on the east side of the ridge.
On 11/06/01, I was again called to the site to inspect grading and erosion control measures. I met on site that day with Bill and Dan Ferguson, Gary Wicks, Cathy Staley and representatives of Copeland. I restated the non-compliance of the grading, and the need to finish erosion control work before the winter rains increase. I discussed various details of the erosion control plans with Dan Ferguson, who is doing the erosion control work, primarily relating to the down-draw traps, which had not been completed yet on 11/06/01. He agreed to call me in a few days when he finished his erosion control work, for a final inspection. The 11/06/01 meeting and discussion were documented in my report dated 11/10/01.

In my 11/10/01 report, I summarized geologic fill slope and erosion issues as follows.

> "Most of the fill slopes are at or close to 1.5 to 1, which is steeper than my recommended 2 to 1. 1.5 to 1 is in the range of marginal stability, meaning that some fills are stable at that angle, but some are not. Stability at that slope range depends on fill material type, compaction, organic matter content and underlying native slope angle and preparation.
>
> The material in the fills is granitic. It is highly erosive and subject to failing along the outer edges of the tops of the fills during wet weather, when steeper than 2 to 1. I have been told that the fills were well compacted, with testing data to back up that assertion. I was not on site during compaction and have not seen the testing data. I did not see how underlying native slopes were prepared before installing fills. I do know that some of the fills were placed on steep headwalls contrary to my recommendations.
>
> Based on examination of fill surfaces and exposures where driveways were cut into fills, organic matter content of fills does not appear to be a problem.
>
> The marginal character of the fill slopes on the west side of the ridge means that significant failures may not occur if the site is monitored during rain storms and drainage and erosion control measures are immediately applied where necessary. I often watch over my projects in

Ashland during every storm, with or without a contract to do so. However, I live too far from Grants Pass to voluntarily "baby sit" the site. Some sort of contract for my monitoring services aided by a crew of laborers to dig drainage channels and move bales, etc. during storms, or some other arrangement agreeable to all concerned should be established.

Even with close monitoring of the site, some fill failures may occur, given the known and unknown conditions of the fills. That is why the downslope sediment barriers are important. Luckily, there are no homes directly downslope of the site. However, failures will result in sedimentation of the stream west of the ridge unless adequate sediment traps are installed.

The erosion control along the ridge top road was installed without my input. During my inspection on 10/25/01, I suggested silt fencing along the full length of both curbs, but that was not done. The existing angled silt fences with hay bale filters at the curbs and drop inlets [should be adequate], but will probably need upgrading somewhat based on performance during ... storm[s].

The bermed pads with 8-inch drop inlet drains along the west side of the ridge...will work if maintained. However, sediments and straw will clog the small inlets during storms if they are not constantly monitored. Clogged drains will result in significant erosion and possibly mass failures during severe storms.

A large supply of hay bales (covered with tarps to prevent saturation) should be stockpiled on site in preparation for storms."

I was again called to the site on 11/20/01 to inspect erosion control measures, which included the following.

1) Numerous silt fences and hay bale barriers along Starlight Place and driveways.
2) Berms and drains on upper, west slope ridge pads
3) Downstream silt fences just below the road fills and further down in the draws to the west.

The downstream barrier was missing from two of the draws. Dan Ferguson agreed to install them.

In the 11/20/01 report, I stated the following.

> "The primary routes of sediment flow off-site are to the west where there are no homes. The stream gradients decrease substantially a short distance down from the property, making it unlikely that sediments from the site will travel as far as the main channel of Blue Gulch. Maintenance of the downstream sediment barriers after storms will be essential. Installation of additional barriers below filled or failed barriers may be necessary."

**Most Recent Inspection/Meetings**

Meetings involving myself, Bill Ferguson and representatives of Copeland, and later that entire group with city staff, occurred on 12/05/01. The grading non-compliance and erosion control issues were discussed. It was concluded that this report with recommendations for ongoing erosion control and grading as necessary should be submitted as part of the documentation for final subdivision approval.

After the meetings, I inspected the fills and erosion control measures installed throughout Laurelridge Phase 3. My inspection followed the first major storm period of the wet season. As I had anticipated, there were numerous failures across the entire west side of the development, from fills located in the draws and on the spur ridges. The failures were all on slopes exceeding 2 to 1. The portions of slopes regraded to 2 to 1 had not failed.

Much of the failed material was scattered over the slopes just below the fills, especially from spur ridge fills. A substantial volume of sediment had entered the headwalls and stream channels adjacent to the toes of the fills. Some sediment had flowed down the channels out of sight. It did not appear that so far enough sediment to overwhelm down slope traps had flowed down the channel. One fill toe trap, on lot 104, was completely buried by a substantial failure of the steepest fill in one of the steepest headwalls. This is also the only draw where the property line is very close to the toe of the fill, and so sediments have most likely crossed over onto the adjacent property.

I told Dan Ferguson that his erosion control efforts would most likely be a winter long struggle. I told him that I anticipate continuing fill failures with each storm event. The primary goal is to prevent the flow of sediments onto

Starlight Place and off the property with redundant traps. He will also be installing jute erosion control matting on some of the most unstable fills. Although this may or may not be successful, I agreed that the attempt was worth the effort.

I stressed to Dan the need to maintain down stream sediment traps before existing ones fill to capacity, and add additional traps in draws where they are missing. I told him that I prefer hay bale traps because in low flow, head wall channels the trapped sediments and bales eventually stabilize in place as vegetation takes hold, eliminating the need to remove geotextile silt fences. I suggested that he construct a three or four bale wide and high sediment dam, stake down with rebar, across the draw about 100 feet below the toe of the most unstable fill on lot 104. This may involve crossing the property line. If so, he should seek approval of the neighboring property owner. Another standard one bale high or silt fence barrier should be installed well down slope of the bale dam, if one is not already in place or has been filled to capacity.

During the recent storm, the sediment traps along Starlight Place, especially along the east side of the road, overflowed sediment laden water onto the roadway. I restated my recommendation to install sediment barriers along both sides of the entire roadway margin. Once again, I suggested bales rather than silt fences. Dan told me that one inspector at the city does not like hay bales because some fines can penetrate, allowing cloudy water to flow out onto the roadway and into storm drains. My answer to that is that when you have substantial sediment laden storm flow, to try to filter out cloudy fines will slow the flow capacity of the system to the point of decreasing its ability to handle peak events. This condition contributed to some the existing trap failures. In this case especially, where cloudy water will not flow into storm sewers, but instead will flow out from the toes of the fills into already sediment laden channels with redundant sediment traps, to decrease the ability of sediment barriers in order to capture cloudy fines is counterproductive.

For the long term, I recommend the following activities:

1) Vigorously maintain erosion control efforts all winter Continue the ongoing attempts to stabilize fill slopes with jute matting and maintenance of sediment traps (including installation of additional traps). The current crew of just Dan and one helper is not adequate to keep up with the work. I recommend initially increasing the crew to six workers to get caught up, and having a crew of four on-call to work during storms.

2) In the spring/summer, all of the fills that can be reached with a large excavator should be pulled back to a slope of 2 to 1 or less. Note that access to many of the fills will be across existing street paving, curbs and sidewalks. Precautions will have to be taken to prevent severe damage.

3) In the spring/summer, the fill on lot 104 should be support by a rip-rap toe buttress, constructed along the dozer trail that runs across the toe of the fill. Access to the toe buttress site is via the logging road that comes up through the neighboring property, and so permission to improve and use the road will have to be acquired. The road should be water barred after completion of the toe buttress.

4) The sediments that have been spread out over the slopes and into the draws should be seeded with native grasses.

5) The fill slopes should be seeded, matted and planted with woody stemmed, high root strength erosion control vegetation. A landscape professional should be retained to support this activity. The landscape plan should be evaluated by the project engineer and geologist before installation.

6) All seeding and installation of erosion control vegetation should be completed in the early summer, well before fall rains. The vegetation should be irrigated all summer to promote root growth with sprinklers, soaker hoses, etc.

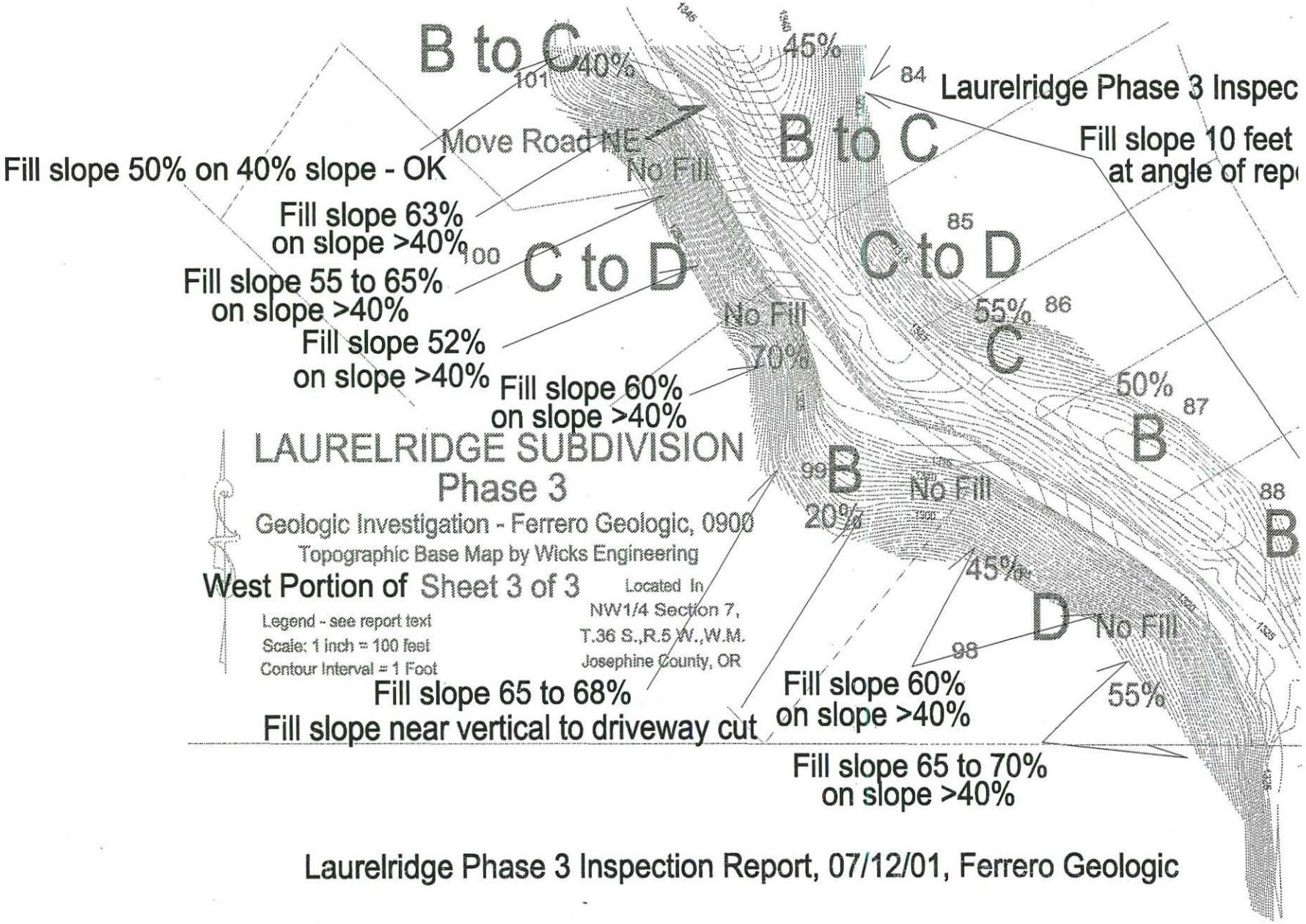
**Limitations**

This report is an attempt to make the best of a bad situation. I could have, and maybe should have from the standpoint of professional risk management, simply severed my relationship with the project when I first saw that the fills were out of spec. However, I decided to try to do what I could to reduce the negative impacts of the errant grading, for the benefit of all concerned. I would have definitely pulled the plug if there were developed propoerties down slope from the west side fills.

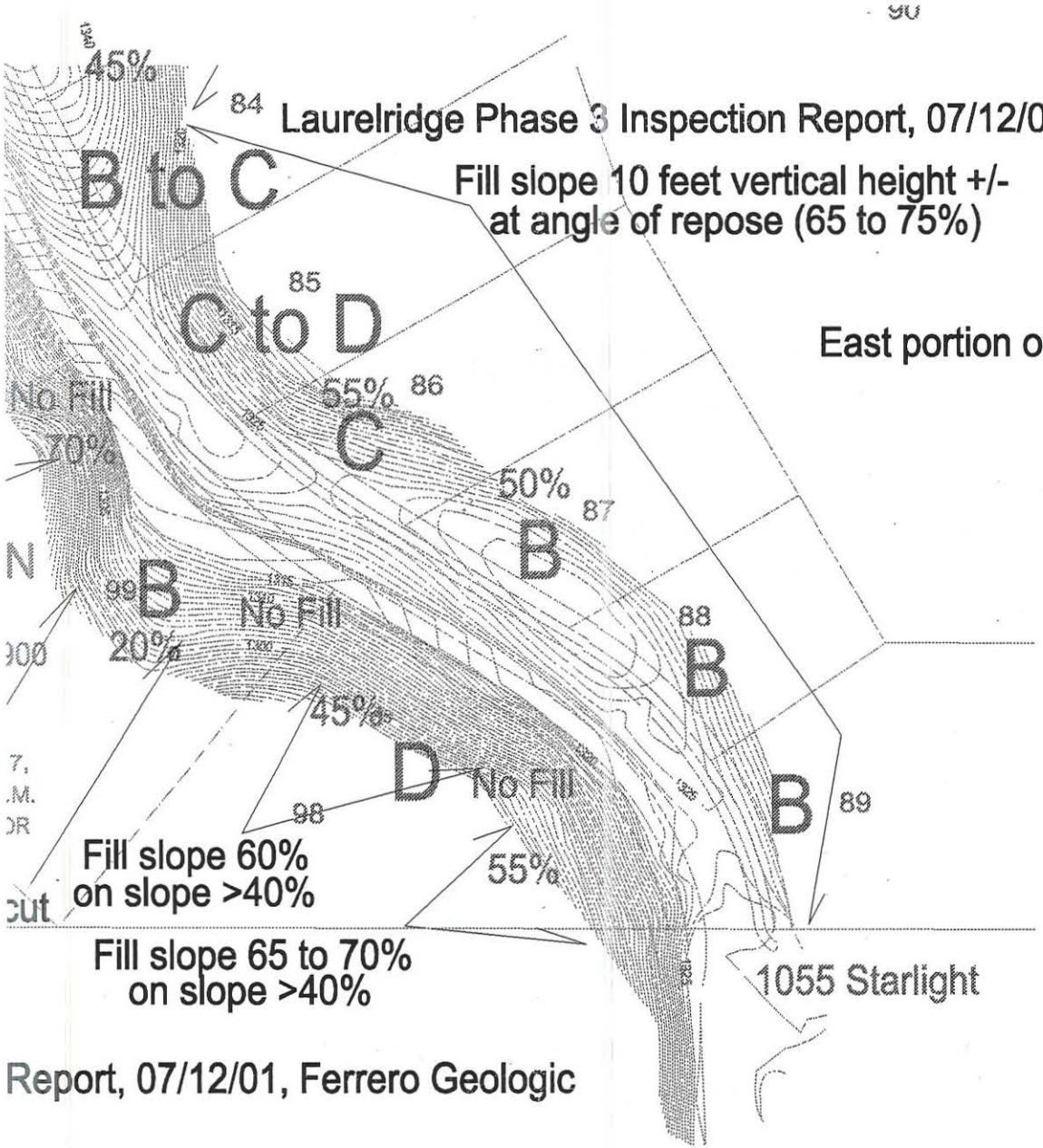
That said, I must stress that because grading on the site was not completed in compliance with my recommendations, Ferrero Geologic cannot be expected to assume any liability for environmental degradation or damage related to mass wasting and sedimentation from the project during this coming Winter/Spring. When the fills were pushed out onto the west slope contrary to

my recommendations, my ability to assure geologic stability and erosion/sedimentation control on this site was voided.

Respectfully,




Laurelridge Phase 3 Inspection Report, 07/12/01, Ferrero Geologic

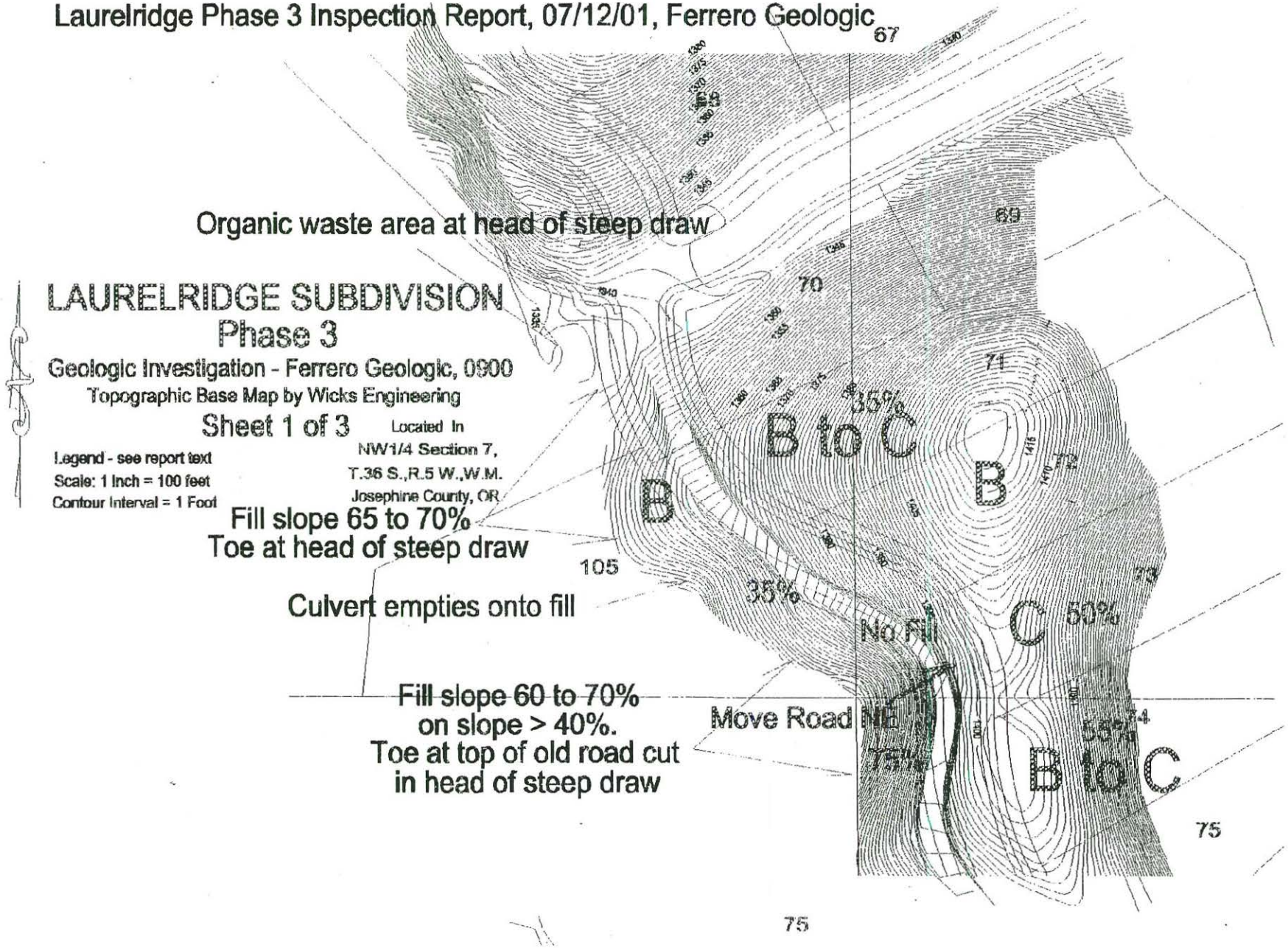


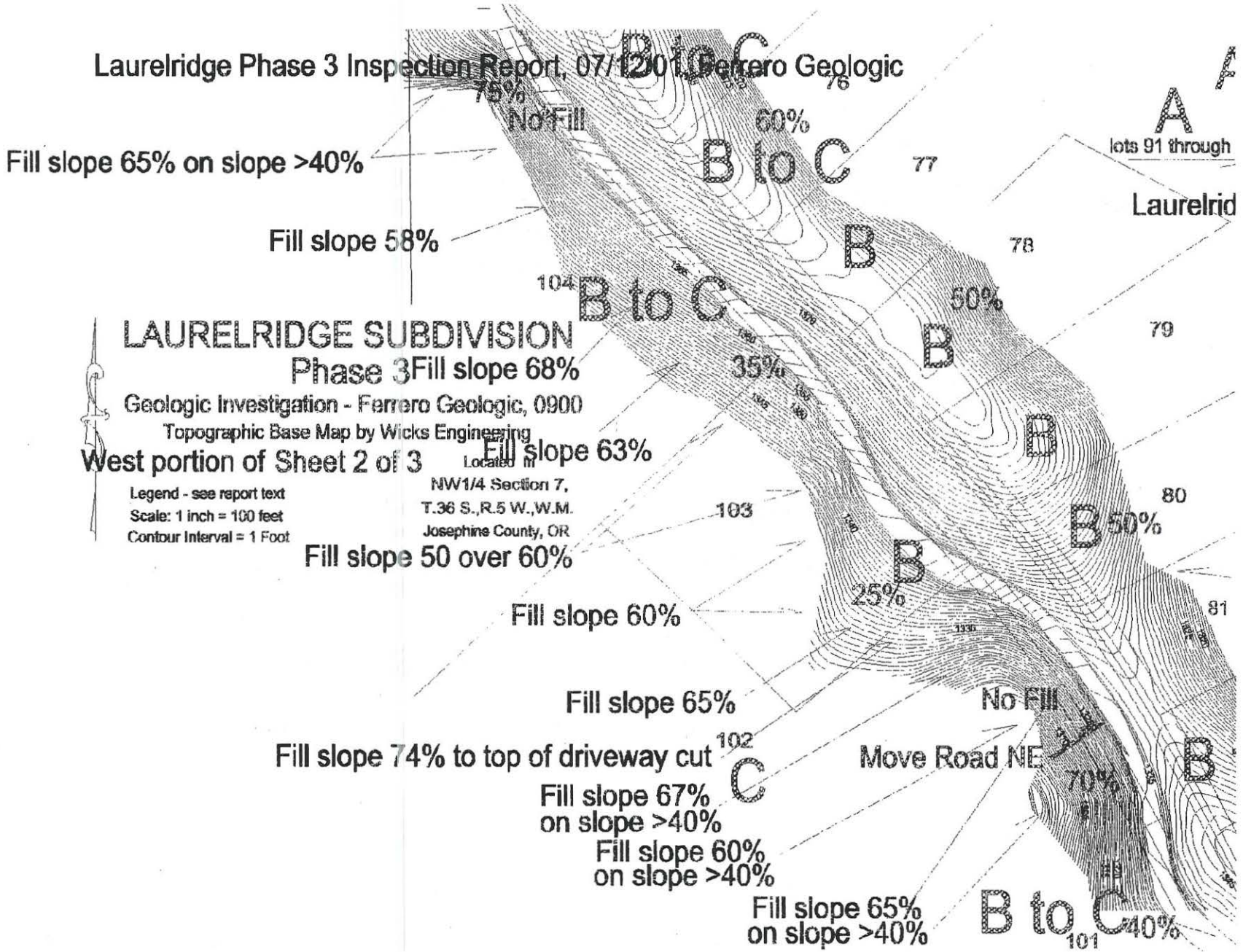

Laurelridge Phase 3 Inspection Report, 07/12/01, Ferrero Geologic

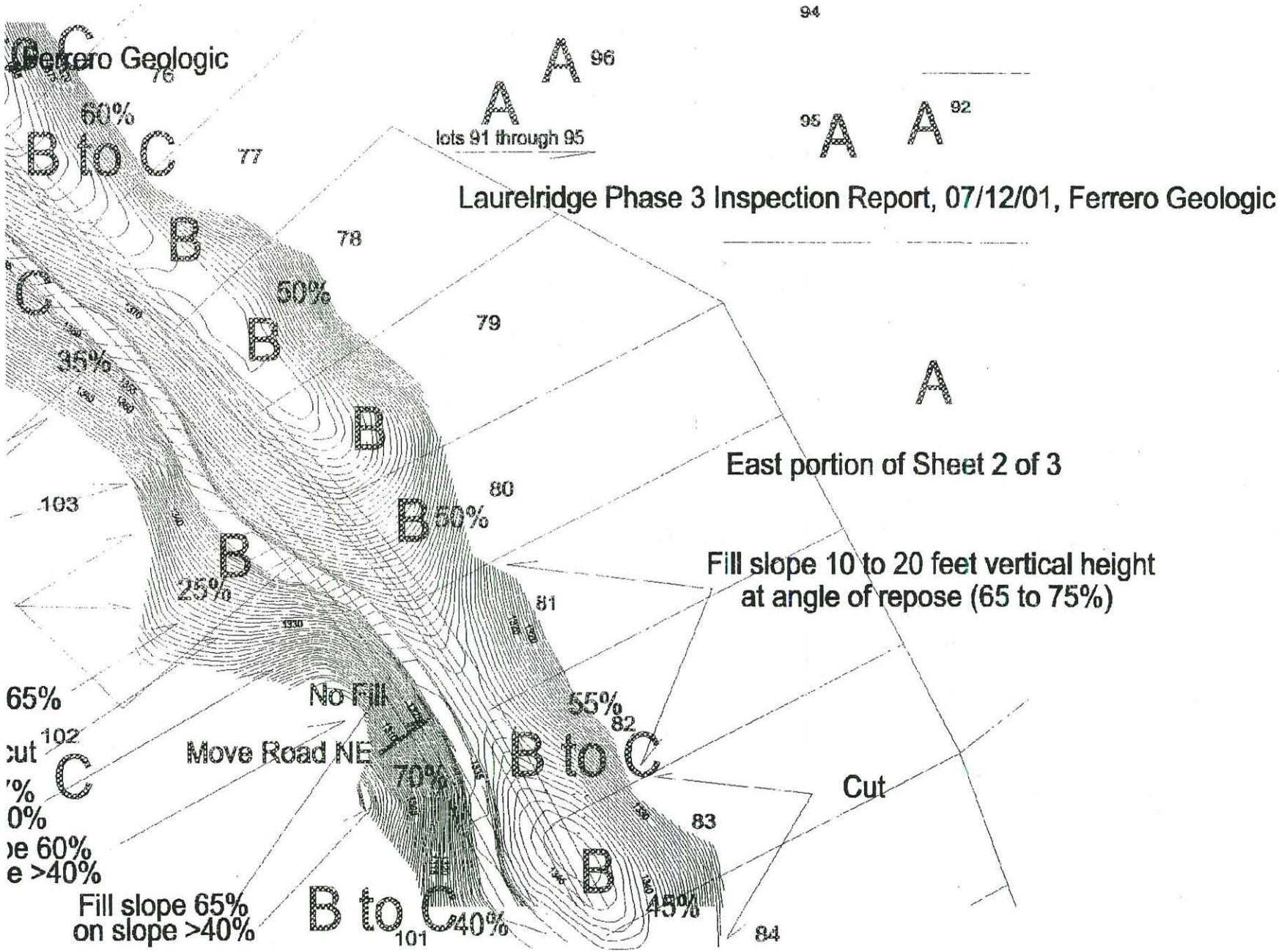
Fill slope 10 feet vertical height +/-
at angle of repose (65 to 75%)

East portion of Sheet 3 of 3

Report, 07/12/01, Ferrero Geologic


Organic waste area at head of steep draw
LAURELRIDGE SUBDIVISION
Phase 3
Geologic Investigation - Ferrero Geologic, 0900
Topographic Base Map by Wicks Engineering
Sheet 1 of 3
Located In
NW1/4 Section 7,
T.36 S.,R.5 W.,W.M.
Josephine County, OR
Legend - see report text
Scale: 1 Inch = 100 feet
Contour Interval = 1 Foot
Fill slope 65 to 70%
Toe at head of steep draw
Culvert empties onto fill
Fill slope 60 to 70%
on slope > 40%.
Toe at top of old road cut
in head of steep draw
No Fill
Move Road NE
67
69
70
71
74
75
105
B
C
35%
50%
75%


Laurelridge Phase 3 Inspection Report, 07/12/2010, Ferrero Geologic
LAURELRIDGE SUBDIVISION
Phase 3
Geologic Investigation - Ferrero Geologic, 0900
Topographic Base Map by Wicks Engineering
West portion of Sheet 2 of 3
Legend - see report text
Scale: 1 inch = 100 feet
Contour Interval = 1 Foot
Located in
NW1/4 Section 7,
T.36 S.,R.5 W.,W.M.
Josephine County, OR
B to C
75%
No Fill
60%
Fill slope 65% on slope >40%
B to C
77
Fill slope 58%
B
78
104
B to C
50%
B
79
35%
Fill slope 68%
Fill slope 63%
B
80
103
B
50%
Fill slope 50 over 60%
B
25%
81
Fill slope 60%
Fill slope 65%
No Fill
102
Fill slope 74% to top of driveway cut
C
Move Road NE
B
70%
Fill slope 67%
on slope >40%
Fill slope 60%
on slope >40%
Fill slope 65%
on slope >40%
B to C
101
40%
A
lots 91 through
Laurelrid


Ferrero Geologic
Laurelridge Phase 3 Inspection Report, 07/12/01, Ferrero Geologic
East portion of Sheet 2 of 3
Fill slope 10 to 20 feet vertical height
at angle of repose (65 to 75%)
lots 91 through 95
No Fill
Move Road NE
Cut
Fill slope 65%
on slope >40%
B to C
60%
50%
35%
25%
55%
45%
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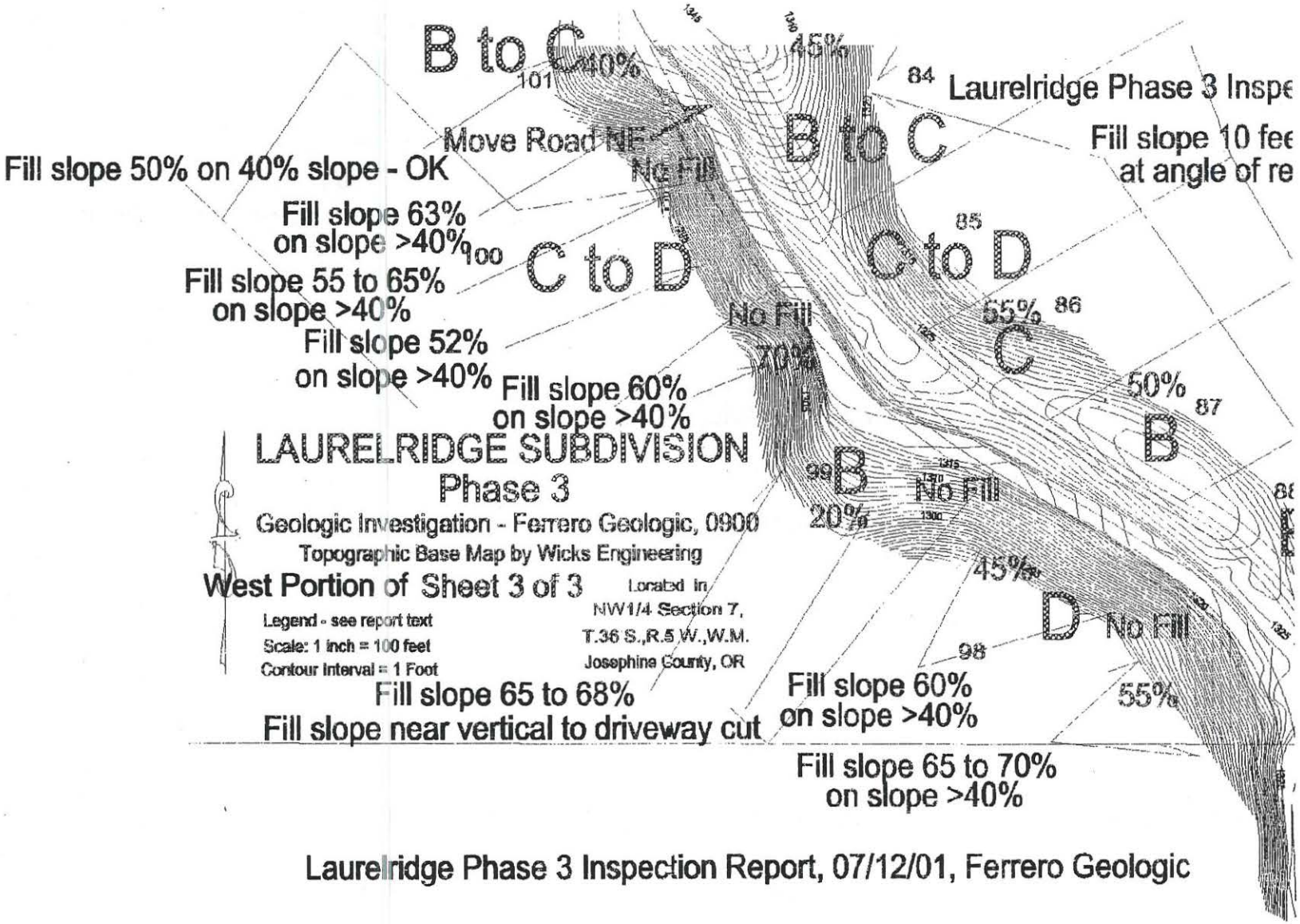
B to C
40%
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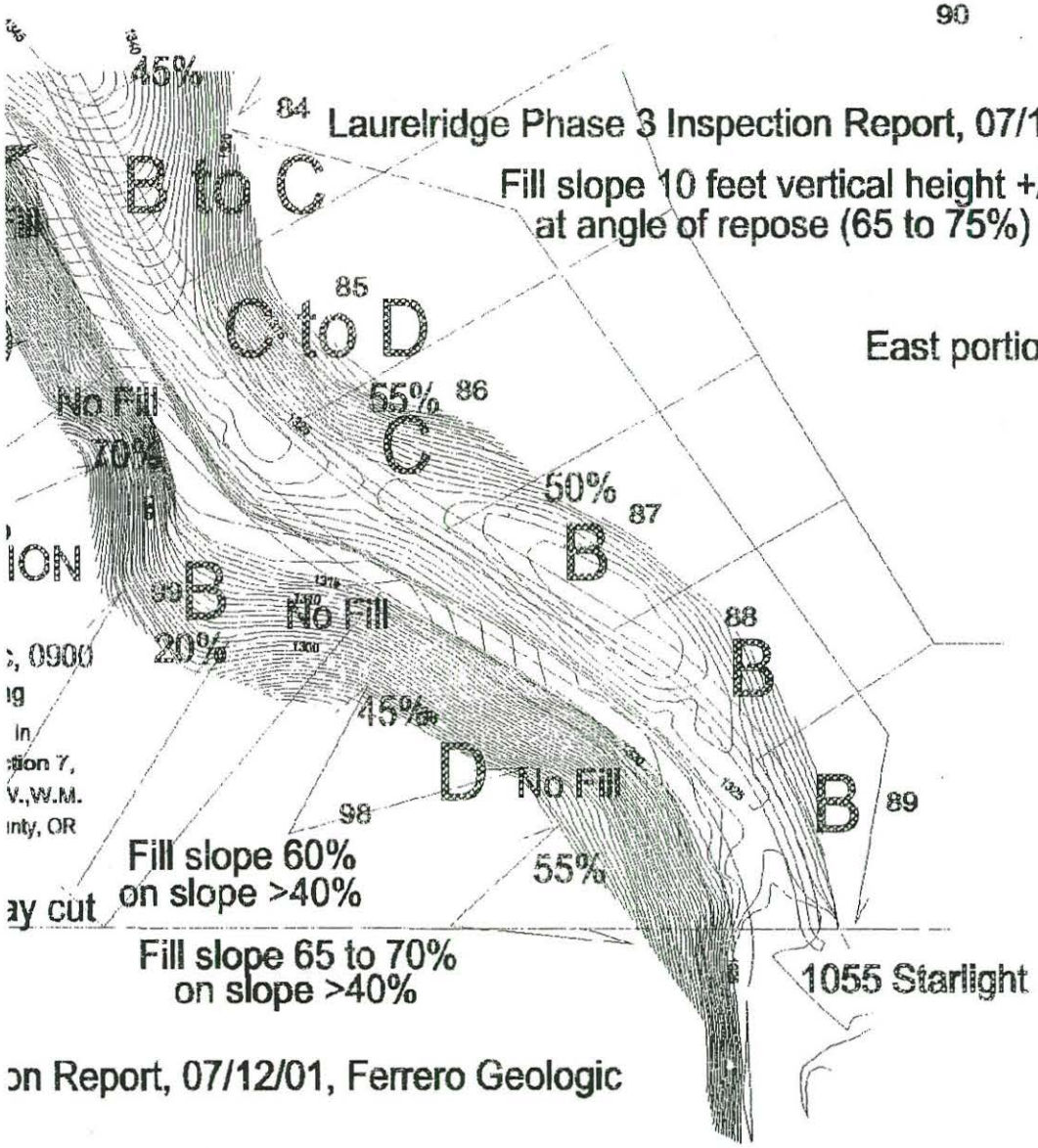
Laurelridge Phase 3 Inspe
Move Road NE
No Fill
B to C
Fill slope 10 fee
at angle of re
Fill slope 50% on 40% slope - OK
Fill slope 63%
on slope >40%
100
C to D
85
C to D
Fill slope 55 to 65%
on slope >40%
No Fill
70%
55%
86
C
Fill slope 52%
on slope >40%
50%
87
Fill slope 60%
on slope >40%
B
LAURELRIDGE SUBDIVISION
Phase 3
99
B
No Fill
20%
Geologic Investigation - Ferrero Geologic, 0900
Topographic Base Map by Wicks Engineering
West Portion of Sheet 3 of 3
Located in
NW1/4 Section 7,
T.36 S.,R.5 W.,W.M.
Josephine County, OR
Legend - see report text
Scale: 1 inch = 100 feet
Contour Interval = 1 Foot
45%
D
No Fill
98
Fill slope 65 to 68%
Fill slope near vertical to driveway cut
Fill slope 60%
on slope >40%
55%
Fill slope 65 to 70%
on slope >40%


Laurelridge Phase 3 Inspection Report, 07/12/01, Ferrero Geologic
Fill slope 10 feet vertical height +/-
at angle of repose (65 to 75%)
East portion of Sheet 3 of 3
B to C
C to D
No Fill
20%
55%
50%
B
No Fill
20%
45%
D
No Fill
55%
Fill slope 60%
on slope >40%
Fill slope 65 to 70%
on slope >40%
1055 Starlight
on Report, 07/12/01, Ferrero Geologic


12 13 2001

EXHIBIT
tabbies
10A

City of
Grants Pass
"Where The Rogue River Runs"

December 6, 2001

Mr. E. Andrew Ullrich
Oregon Department of Environmental Quality
201 West Main, Suite 2-D
Medford OR 97501

RE: Laurelridge Subdivision NPDES Permit File Number 109617

Dear Mr. Ullrich:

I am writing to complain about lack of compliance with the conditions of the NPDES permit for Laurelridge subdivision. I request DEQ take immediate enforcement action to protect waters of the community and State from poor erosion prevention and sedimentation control practices. The Laurelridge subdivision is located on steep unstable slopes, and I am concerned about slope failures, erosion and the sheer volume of sediments leaving the site and being directed into our storm system and streams.

Each new rain event brings additional damage to our community streams and storm drain facilities. Thus far, our attempt to gain compliance and correction by the developer have been met with feeble, ineffective and in some cases no response.

In order to gauge the effectiveness of the developer's erosion control practices, we requested copies of his inspection records as required in this NPDES permit. I have enclosed our letter to Mr. Ferguson of October 30, 2001. As of December 5, 2001 we have received no response to our request.

In my examination of the Laurelridge development, I see substantial violations of the NPDES discharge permit. Sediment laden stormwater is being discharged into the City's stormwater system, a natural drainway to the west, and to Gilbert Creek. Erosion control measures are inadequate, poorly installed or in some cases nonexistent.

The developer does not appear to have people on the job who have adequate knowledge of erosion prevention and sedimentation control devices and their application. Several examples follow:

- On Valley View, tax lot 146, the developer used sandbags to funnel silt-laden water from an uphill lot directly into a catch basin and then into our stormwater system. We advised him of the inappropriate method to control sedimentation. To correct the problem, he added more sandbags. We advised him again, and he finally added a sediment fabric around the catch basin. Uphill from this catch basin, erosion control is still inadequate or nonexistent.

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DEC 07 2001
DEQ - MEDFORD

101 Northwest "A" Street • Grants Pass, Oregon 97526 • (541) 474-6360 • Fax (541) 479-0812

- Further up Valley View, on tax lot 148 a catchment area on the developer's land is so silt clogged one cannot even find the outlet. The outlet line leading to the public system is now completely sediment filled.

- From tax lot 123, water overflows the sidewalk and spews out approximately two feet from a weep hole in the curb. Mud and silt are being funneled directly down the street into a stormwater catch basin and then into Gilbert Creek. The discharge point into Gilbert Creek is running muddy brown. Above the inlet, the water is clear enough to see the bottom of the stream.

  No silt fence or sedimentation fabric had been installed. Mud, granite, fine silt and decomposed granite are being discharged into our public drainage system, settling into the pipes, reducing capacity, and polluting Gilbert Creek. After repeated contact, a sediment fabric was installed incorrectly.

- On the upper portions of the development on Starlight, unprotected surfaces are shedding granite-laden water directly into the catch basins and then piped down the hill to overflowing sediment-fenced areas. Some inlets have no protection at their discharge point.

I have digital photographs to illustrate these and other violations of the Laurelridge subdivision NPDES permit.

Again, I request the Department of Environmental Quality take immediate action to enforce the conditions of the NPDES permit and protect our stormwater system and community streams.

Sincerely,

Martin Seybold
Director Field Operations

Enclosure: Letter to William Ferguson

| CODE | ACRES | ACCOUNT NO. | CONTROL |
|---|---|---|---|
| 1 | | 36 5 7 2 1 123 | 340606 |

# OFFICIAL RECORD OF REAL PROPERTY

JOSEPHINE COUNTY ASSESSOR

FORMERLY PART OF T.L. NO. 100

Attachment EE A17

| LINE NO. | TITLE OWNER'S NAME | TYPE OF INSTRUMENT | J.V. NO. DATE | DEED RECORD VOL. | DEED RECORD PAGE | ACRES REMAINING |
|---|---|---|---|---|---|---|
| 1 | ---FERGUSON, WILLIAM H. AND GWEN | PLAT | 12/31/98 | | | .6 |
| 2 | Exc. T.L. 138(340759) -0.20 Ac | PP | 4-29-99 | 1999 | -25 | 0.42 |
| 3 | Easement Over & Across | Ease | 5-14-01 | 01-8374 | | |
| 4 | R340606 | AUDIT: 06/07/02 | | | | |
| 5 | HAGERMAN, PAUL R | WD | 05/30/02 02-011293 | | | |
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* - - Property Data Selection Menu - -

Owner: HAGERMAN, PAUL R
Pr ID : R340606 (Real Estate) (61914) 1854 NW 6TH ST
Ma Tax Lot: 36-05-07-BA-000123-00 GRANTS PASS, OR 97526
Legal : PARTITION PLAT 1999-25, LOT ,PARCEL 8, ACRES 0.42

Situs : 928 VALLEY VIEW DR
GRANTS PASS, OR 97526
Year Built : 2002
Living Area: 3604
Name(s) :
Code Area : 01
Sale Info : 05/30/02 $105,000
Deed Type : WD
Instrument: 02-011293
2002 Tax Status * No Taxes Due *
Current Levied Taxes : 761.03
Special Assessments :
2003-04 SB125 Taxes :

2002 Roll Values

| | | | |
|---|---|---|---|
| Improvements | $ | 0 | (+) |
| Land | $ | 58,050 | (+) |
| Appraised | $ | 58,050 | (=) |
| Exemptions | $ | 0 | (-) |
| Taxable RMV | $ | 58,050 | (=) |
| M50 Assessed | $ | 54,840 | |

| | | | |
|---|---|---|---|
| (AD) Alt Disp | (Y) primarY | (S)econdary | (L)and/Impr |
| (G)en Appr | (O)wnership | (H)istory | (.) More |

Enter Option from Above or <RET> to Exit: __

DEFENDANT'S EXHIBIT 101 Admitted

Andy

SW - discharge

Runoff from Ph 3 running down into Ph. 2 + into G.C.

Ph. 3 Ridge

runoff on each side - to G.C. + intermittent

Ph. 2. WQ Issues - turbidity

One permit - same file number

Pictures muddy $H_2O$ in Stormdrains

* flowing down from ph. 3 to ph. 2
* 1 picture of SW drain on Ph. 2 turbid water flowing down Street - catch basin down Street

Andy - never hiked down to stream

Never viewed Stream

Cul de Sac from Ph. 3 - North end

SW drains flow to G.C.

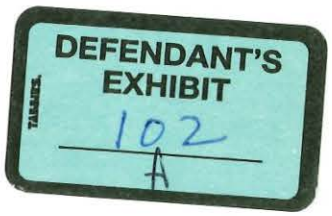
Plan to reissue

Gilbert creek - fish bearing swim

Director of Public Streets, Drainage

Oregon
John A. Kitzhaber, M.D., Governor

**Department of Environmental Quality**
Western Region - Salem Office
750 Front St. NE, Ste. 120
Salem, OR 97301-1039
(503) 378-8240
(503) 378-3684 TTY




December 29, 2000

William Ferguson
5200 Pioneer Road
Medford, Or 97501

Re: Cancellation of NPDES General Permit No. 1200C Assignment
File No. 109617
EPA No. ORR10-3126
Site Location: Laurelridge Subdivision, Morgan Lane/Valley View Drive, Grants Pass
Josephine County

Dear Mr. Ferguson:

We have received your request for cancellation of your assignment to the above referenced permit because you have completed permanent controls to eliminate sediment runoff. Therefore, the Department has canceled your assignment to General NPDES Permit Number 1200C.

While your site meets the criteria to have the permit assignment terminated, there are still areas at your site that have potential erosion concerns. Examples are seeded areas that have thin coverage, and bare cut faces along roadways. It is your responsibility to continue to monitor the site, and correct any erosion problems promptly. If problems are not corrected in a timely fashion, you may be required to obtain a new 1200-C permit, and develop and implement a new erosion control plan. You may also be liable for civil penalities

The Department is processing cancellation of invoice numbers WQREN01-0132 on your behalf.

Thank you for updating us on the status of your operation. Questions on fees and other administrative issues should be directed to Samantha Schaffer at (503) 378-8240 extension 292. If you need technical assistance, please contact Andy Ullrich in our Western Region-Medford Office at 541-776-6010, extension 246.

Sincerely,

Gary Messer
Water Quality Manager
Western Region

cc: Andy Ullrich, DEQ - Medford
Valerie Ross, HQ
Source File

LAURELRIDGE SUBDIVISION
RUNOFF ESTIMATES

8/29/97
(Revised 9/29/97 to 25 yr. storm)

1.) Watershed Areas:

The main basins and sub-basins within and upstream from the subdivision are shown on the accompanying plat.

2.) Design Assumptions:

a.) The runoff coefficient, C, was determined for a final buildout of the total area to a R-1-12 density ⇒ density ≈ 4 units/acre

From GP Storm Drainage Management Plan, Table 20
RL = 1 to 5 units/acre ⇒ C = 0.33

b.) Time of Concentration, $T_c$,

From ODOT Hydraulics Manual, pg. B-28 ⇒ Minimum $T_c$ = 10 min. for the first pipe run only

c) A 25 year storm frequency was used to determine pipe sizing.

d.) The rainfall intensity/duration curves per Fig. No.2 of the GP Storm Drainage Management Plan were used to obtain rainfall intensities.

3.) Design Equations

a.) Runoff: Rational Equation, $Q_{25} = C i_{25} A$

b.) Pipe Flow: Mannings Equation, $Q = \frac{6.134\,(10^{-4})}{n} d_i^{8/3} S^{1/2} \Rightarrow d_i = \left[\frac{1630\,Qn}{\sqrt{S}}\right]^{0.375}$

where $d_i$ = pipe diameter in inches
$S$ = pipe slope in ft/ft
$n$ = roughness coefficient ⇒ n=0.010 for PVC pipe
n = 0.012 for Concrete pipe

DEFENDANT'S EXHIBIT 104 A

REGISTERED PROFESSIONAL ENGINEER 13,283 Gary D. Wicks OREGON JULY 17, 1986 GARY D. WICKS

LAUREL RIDGE SUB DIVISION
RUNOFF ESTIMATES

## "A" LATERAL

| BASIN NO. | BASIN AREA (ac) | Σ AREA (ac.) | Pipe V (fps) | Pipe L (ft) | Flow Time (min) | $T_c$ (min) | $i_{25}$ (in/hr) | $Q_{25}$ (cfs) | Pipe Slope (%) | min. di (in) | DESIGN $D_i$ (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 2.352 | 2.352 | – | – | – | 10 | 2.1 | 1.63 | 14.3 | 4.9 | 6 |
| A2 | 0.861 | 3.213 | 14 | 60 | 0.07 | 10 | 2.1 | 2.23 | 24.2 | 5.0 | 6 |
| A3 | 0.849 | 4.062 | 18 | 210 | 0.19 | 10.3 | 2.1 | 2.81 | 8.3 | 6.7 | 10 |
| A4 | 0.668 | 4.731 | 13 | 210 | 0.27 | 10.5 | 2.1 | 3.28 | 6.3 | 7.5 | 10 |
| A5 | 0.338 | 5.068 | 13 | 100 | 0.13 | 10.7 | 2.1 | 3.51 | 8.1 | 7.3 | 10 |
| A6 | 0.314 | 5.382 | 15 | 165 | 0.18 | 10.8 | 2.1 | 3.73 | 11.3 | 7.7 | 10 |
| A7 | 0.404 | 5.786 | 18 | 180 | 0.17 | 11.0 | 2.0 | 3.82 | 5.0 | 8.3 | 10 |
| A8 | 0.666 | 6.452 | 12 | 55 | 0.08 | 11.1 | 2.0 | 4.26 | 4.0 | 9.0 | 12 |

## "B" LATERAL

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B1 | 1.234 | 1.234 | – | – | – | 10 | 2.1 | 0.86 | 5.0 | 4.7 | 12 |
| B2 | 0.559 | 1.793 | 13 | 100 | 0.13 | 10.1 | 2.1 | 1.24 | 12.7 | 4.6 | 12 |
| B3 | 1.984 | 3.777 | 21 | 334 | 0.27 | 10.4 | 2.1 | 2.62 | 9.8 | 6.3 | 12 |
| B4 | 1.929 | 5.706 | 16 | 230 | 0.24 | 10.6 | 2.1 | 3.95 | 7.4 | 7.8 | 12 |
| B5 | 0.674 | 6.380 | 16 | 230 | 0.24 | 10.9 | 2.1 | 4.42 | 7.4 | 8.1 | 12 |

## "C" LATERAL

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C1 | 2.303 | 2.303 | – | – | – | 10 | 2.1 | 1.60 | 8.47 | 5.4 | 12 |
| C2 | 4.181 | 6.484 | 17 | 260 | 0.25 | 10.3 | 2.1 | 4.49 | 8.47 | 8.0 | 12 |
| C3 | 1.568 | 8.052 | 17 | 265 | 0.26 | 10.5 | 2.1 | 5.58 | 15.0 | 7.8 | 12 |
| C4 | 0.530 | 8.582 | 23 | 104 | 0.08 | 10.6 | 2.1 | 5.95 | 15.0 | 7.9 | 12 |
| C5 | 1.764 | 10.346 | 23 | 350 | 0.25 | 10.8 | 2.1 | 7.17 | 7.47 | 9.7 | 12 |
| C6 | 2.720 | 13.066 | 16 | 100 | 0.10 | 10.9 | 2.1 | 9.05 | 7.47 | 10.6 | 12 |
| C7 | 0.562 | 13.628 | 16 | 50 | 0.05 | 11.0 | 2.0 | 8.99 | 15.48 | 9.2 | 12 |
| C8 | 0.446 | 14.074 | 23 | 100 | 0.07 | 11.1 | 2.0 | 9.29 | 9.24 | 10.3 | 12 |
| C9 | 1.077 | 15.151 | 18 | 90 | 0.08 | 11.1 | 2.0 | 10.50 | 9.24 | 10.8 | 12 |
| C10 | 0.571 | 15.722 | 18 | 115 | 0.11 | 11.3 | 2.0 | 10.90 | 9.24 | 10.9 | 12 |
| C11 | B=6.380 | 22.102 | 18 | 50 | 0.05 | 11.3 | 2.0 | 14.59 | 4.41 | 14.0 | 18 |
| C12 | 2.313 | 24.415 | 16 | 130 | 0.14 | 11.4 | 2.0 | 16.11 | 3.82 | 14.9 | 18 |

LAURELRIDGE SUBDIVISION
RUNOFF ESTIMATES

"D" LATERAL

| BASIN NO. | BASIN AREA (ac.) | Σ AREA (ac.) | Pipe V (fps) | Pipe L (ft) | Flow Time (min.) | $T_c$ (min) | $i_{25}$ (in/hr) | $Q_{25}$ (cfs) | Pipe Slope (%) | $d_i$ (in) | DESIGN $D_i$ (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D1 | 3.243 | 3.243 | - | - | - | 10 | 2.1 | 2.25 | 9.0 | 6.1 | 12 |
| D2 | 1.502 | 4.745 | | | | " | " | 3.29 | 8.0 | 7.2 | 12 |
| D3 | 0.792 | 5.537 | | | | " | " | 3.84 | 8.0 | 7.6 | 12 |

LAURELRIDGE SUBDIVISION
RUNOFF ESTIMATES
EVALUATION OF OFF-SITE PIPES

Drainage Basins were determined from the USGS Contour Map. Areas were determined by planimeter. (See the attached 1:2000 map)

1.) Total Watershed to Candler / Morgan
Total Basin = A4 + A5 + A6 = 14 + 21 + 14 = 49 Ac.

a.) Length of overland stormwater travel = 1400'
Average slope = $\frac{1640 - 1265}{1400}$ = 27%

From GPSDMP, Fig 22, p.127 flow velocity = 1.5 fps (Forest litter)
Time of flow = $\frac{1400}{1.5(60)}$ = 15.6 min.

b) Lengths of storm drain pipe flow in Cooke Estates

| Di (in.) | slope (ft/ft) | L (ft) | V (fps) | Time (min) |
|---|---|---|---|---|
| 15" PVC | 0.0497 | 114 | 15 | 0.13 |
| 15" PVC | 0.0572 | 236 | 16 | 0.25 |
| 12" PVC | 0.1090 | 200 | 19 | 0.18 |
| 12" PVC | 0.1417 | 138 | 22 | 0.10 |
| 15" PVC | 0.0899 | 345 | 20 | 0.29 |
| 15" PVC | 0.0283 | 298 | 12 | 0.41 |
| 15" PVC | 0.0744 | 267 | 19 | 0.23 |
| 15" PVC | 0.0091 | 226 | 7 | 0.54 |
| 15" CONC | 0.0281 | 245 | 10 | 0.41 |
| | | | Σ | 2.54 |

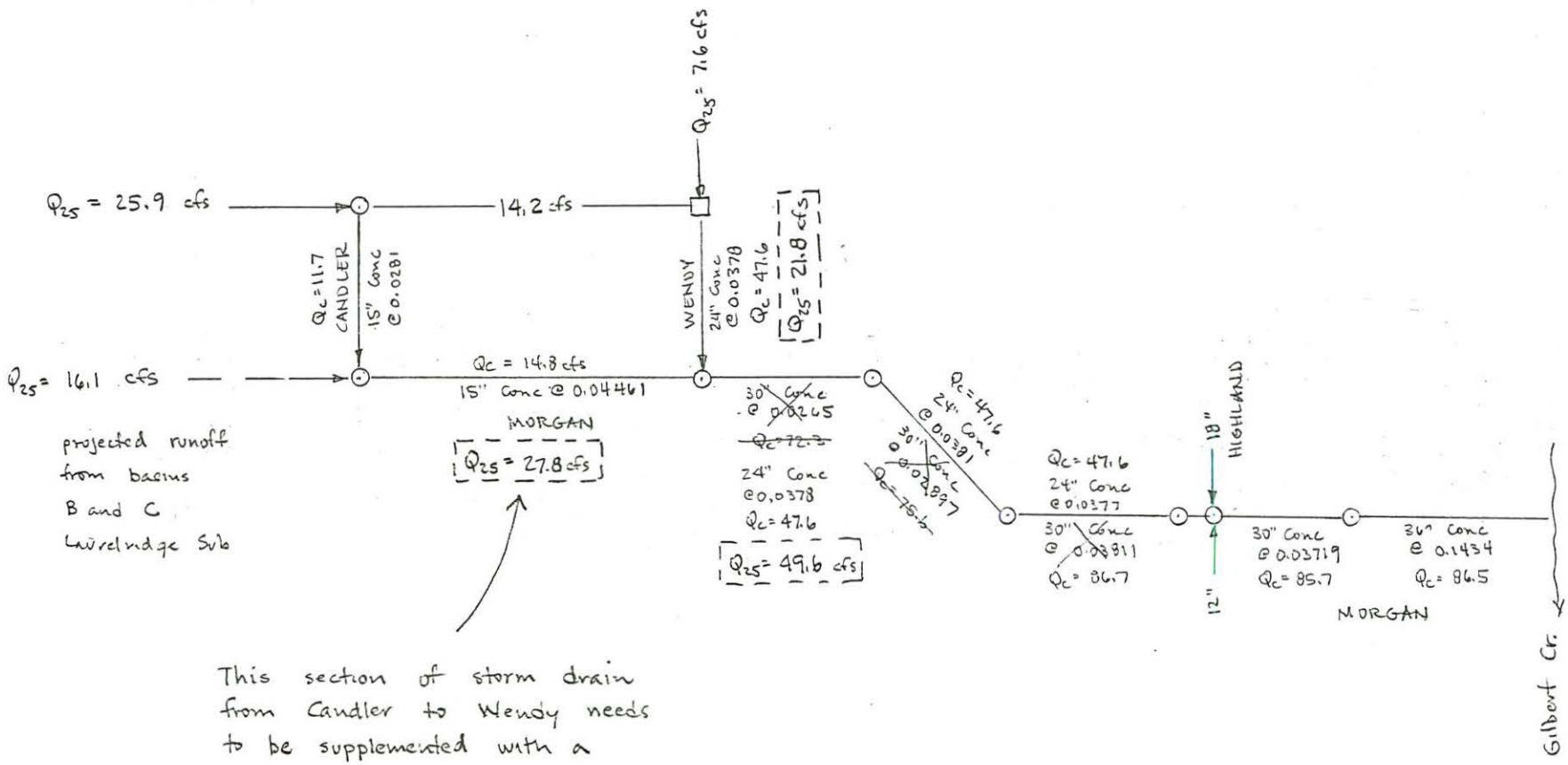
Total $T_c$ = 15.6 + 2.5 = 18.1 min ⇒ $i_{10}$ = 1.4 in/hr
1.9

$Q_{10}$ = 0.33 (1.4) 49 = 22.6 cfs 25.9

2.) Total Watershed to Wendy / Morgan
Total Basin = A3 + A8W = 5 + 6 = 11 ac
Assume $T_c$ = 10 min ⇒ $i_{10}$ = 1.9 in/hr
2.1

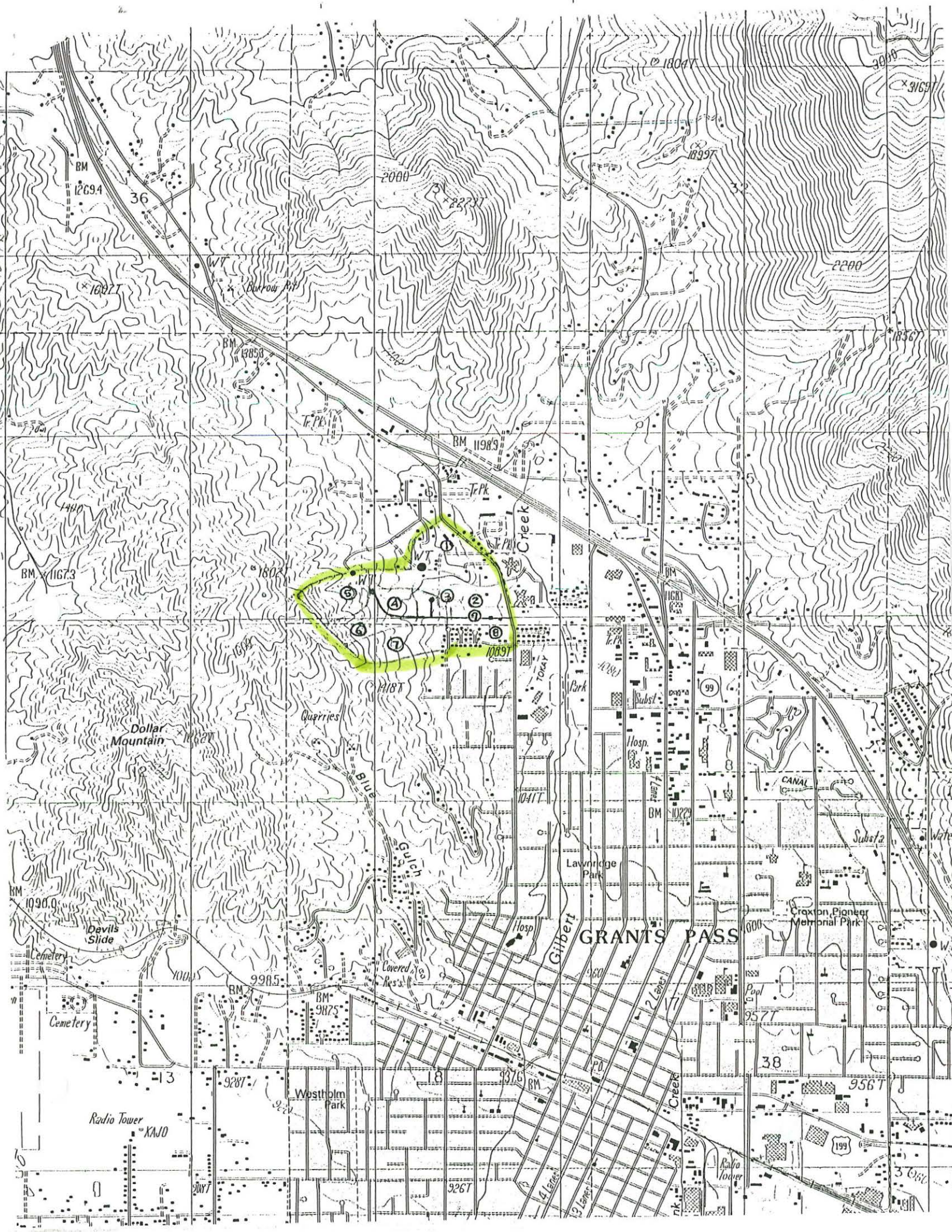
$Q_{10}$ = 0.33 (1.9) 11 = 6.9 cfs
7.6

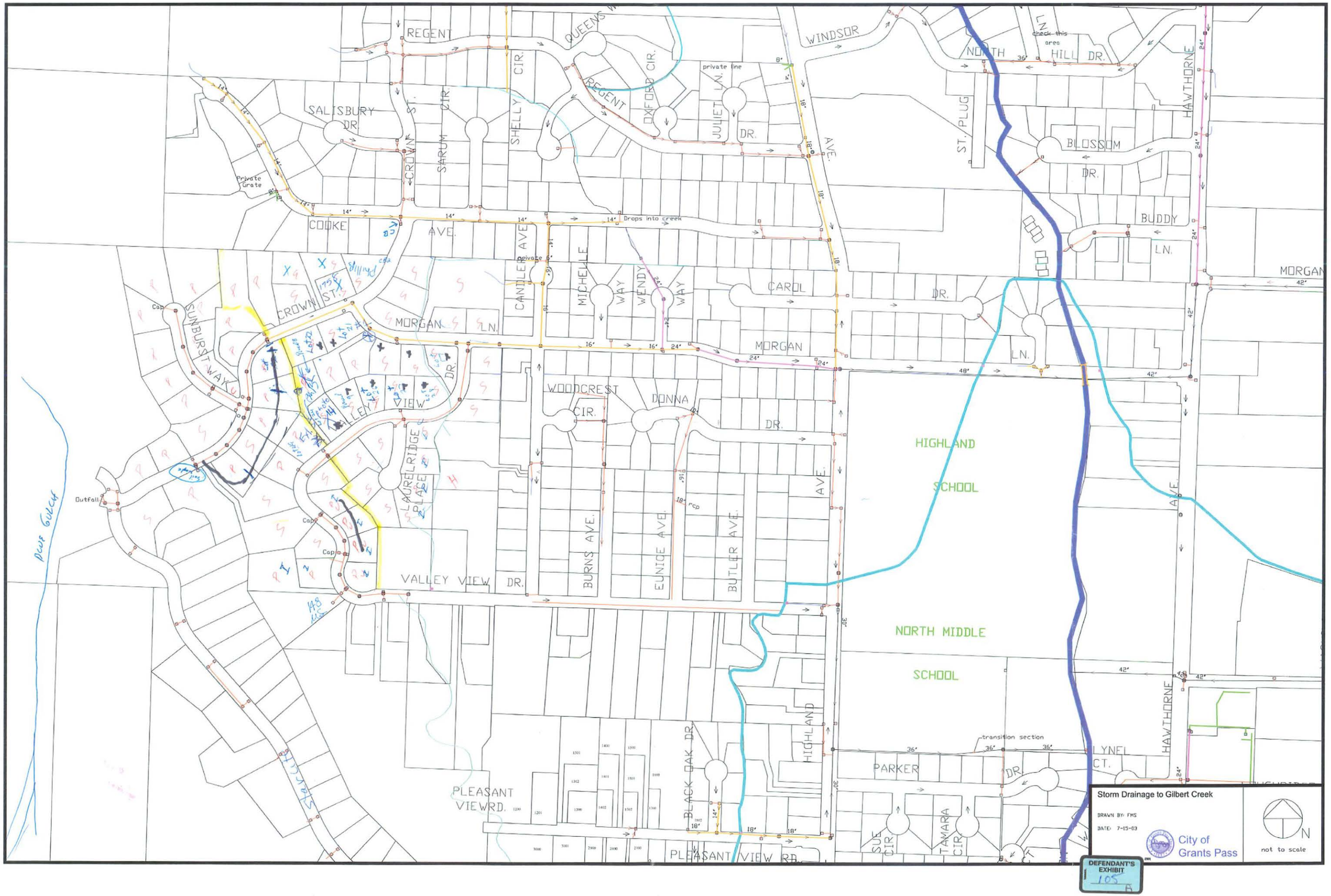
# LAUREL RIDGE SUBDIVISION
## RUNOFF ESTIMATES
## EVALUATION OF OFF-SITE PIPES

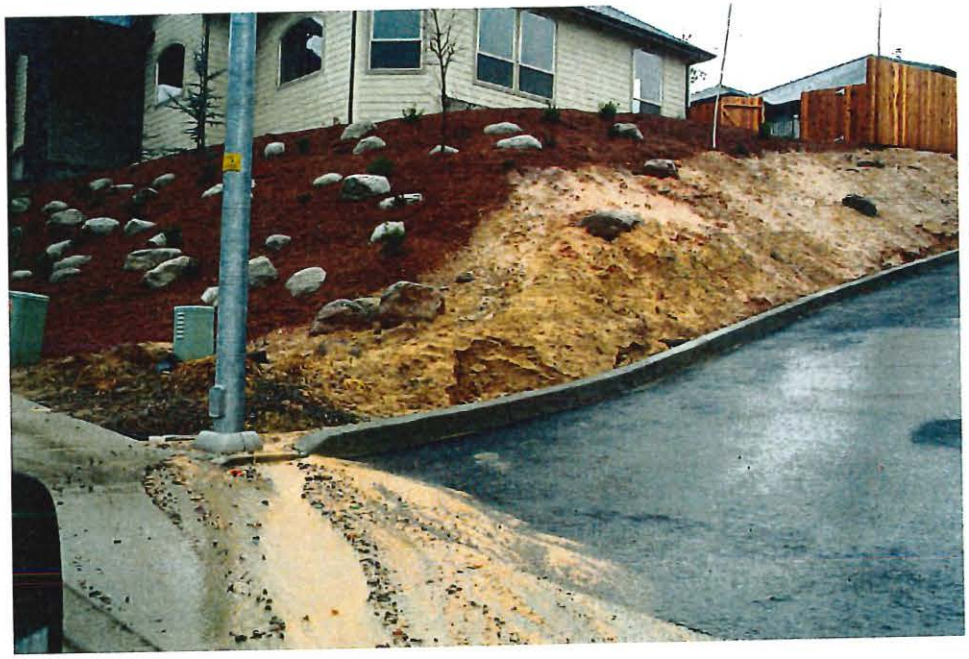



This section of storm drain from Candler to Wendy needs to be supplemented with a parallel 15" PVC pipe or replaced with a 24" PVC pipe

$Q_c$ for 15" PVC @ 0.04461 = 17.7 cfs
$Q_c$ for 24" PVC @ 0.04461 = 62.1 cfs


GRANTS PASS
Dollar Mountain
Devils Slide
Cemetery
Cemetery
Quarries
Blue Gulch
Gilbert Creek
Lawnridge Park
Croxton Pioneer Memorial Park
Westholm Park
Radio Tower
KAJO
Covered Res's
Hosp.
Hosp
Subst.
Subst a
Park
Pool
CANAL
Tr. Pk.
Tr. Pk
Burrow Pit
WT
BM 1269.4
BM 1385.8
BM 1198.9
BM 1167.3
BM 1090.0
BM 1022.9
BM 1016.1
BM 998.5
BM 987.5
BM 937.6
1804T
1899T
2237T
1822T
1856T
1803T
1689T
1118T
1162T
1041T
957T
956T
928T
926T
99
199
4 Lanes
2 Lanes
P.O.


REGENT
QUEENS
CIR.
REGENT
OXFORD CIR.
SALISBURY DR.
SARUM CIR.
SHELLY CIR.
JULIET LN.
DR.
WINDSOR
AVE.
private line
ST. PLUG
NORTH HILL DR.
check this area
HAWTHORNE
BLOSSOM DR.
BUDDY LN.
CROWN ST.
Private Grate
COOKE AVE.
Drops into creek
CANDLER AVE
private
MICHELLE WAY
WENDY WAY
CAROL DR.
MORGAN LN.
MORGAN
SUNBURST WAY
CROWN ST.
DR.
VIEW
WOODCREST CIR.
DONNA DR.
LAURELRIDGE PLACE
BURNS AVE.
EUNICE AVE.
BUTLER AVE.
AVE.
HIGHLAND SCHOOL
Outfall
Cap
VALLEY VIEW DR.
DEER GULCH
NORTH MIDDLE SCHOOL
HIGHLAND
BLACK OAK DR.
PLEASANT VIEW DR.
PLEASANT VIEWRD.
transition section
PARKER DR.
LYNEL CT.
SUE CIR.
TAMARA CIR.
Storm Drainage to Gilbert Creek
DRAWN BY: FMS
DATE: 7-15-03
City of Grants Pass
not to scale
N
DEFENDANT'S EXHIBIT
105
B



DEFENDANT'S EXHIBIT
106
A

1

2

3

4

5

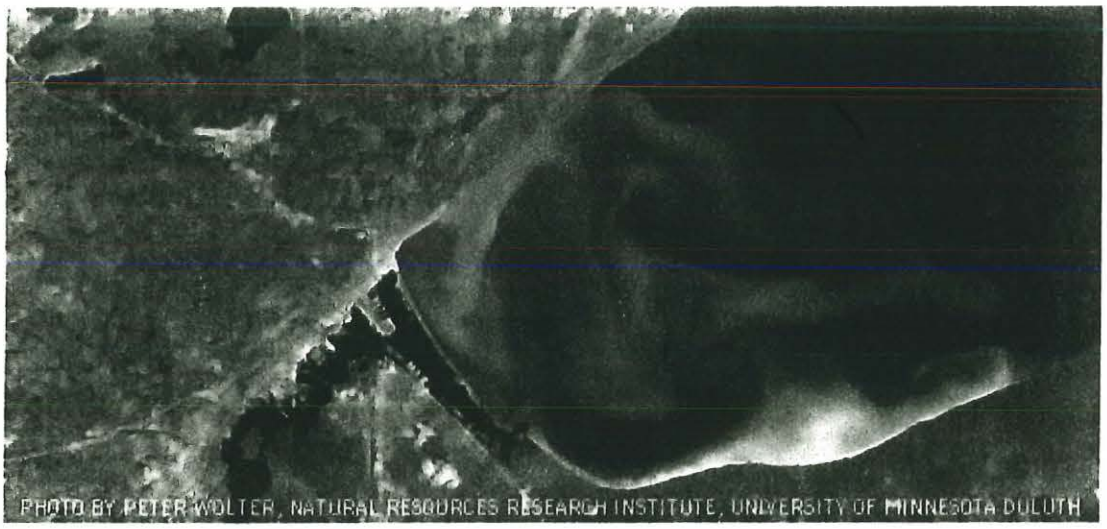
6

7


temperature
pH
dissolved oxygen
conductivity
turbidity
chlorophyll



# TURBIDITY



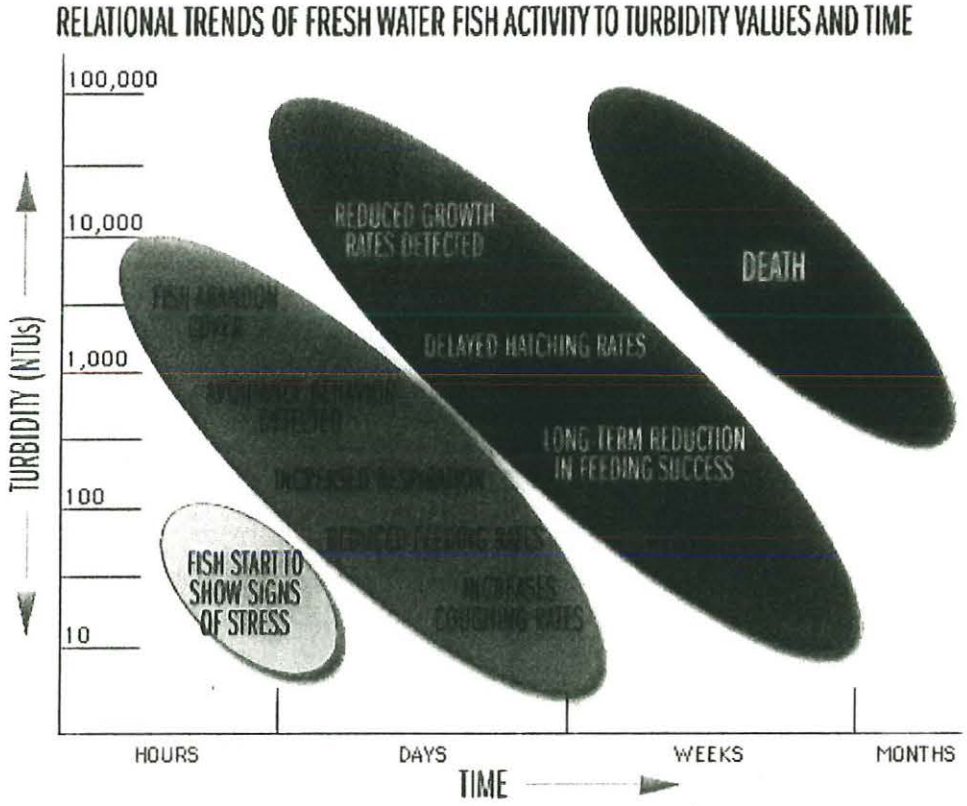

**Why Is it Important?**

Turbidity refers to how clear the water is. The greater the amount of total suspended solids (TSS) in the water, the murkier it appears and the higher the measured turbidity. The major source of turbidity in the open water zone of most lakes is typically phytoplankton, but closer to shore, particulates may also be clays and silts from shoreline erosion, resuspended bottom sediments (this is what turns the western arm of Lake Superior near Duluth brown on a windy day), and organic detritus from stream and/or wastewater discharges. Dredging operations, channelization, increased flow rates, floods, or even too many bottom-feeding fish (such as carp) may stir up bottom sediments and increase the cloudiness of the water.

High concentrations of particulate matter can modify light penetration, cause shallow lakes and bays to fill in faster, and smother benthic habitats - impacting both organisms and eggs. As particles of silt, clay, and other organic materials settle to the bottom, they can suffocate newly hatched larvae and fill in spaces between rocks which could have been used by aquatic organisms as habitat. Fine particulate material also can clog or damage sensitive gill structures, decrease their resistance to disease, prevent proper egg and larval development, and potentially interfere with particle feeding activities. If light penetration is reduced significantly, macrophyte growth may be decreased which would in turn impact the

organisms dependent upon them for food and cover. Reduced photosynthesis can also result in a lower daytime release of oxygen into the water. Effects on phytoplankton growth are complex depending on too many factors to generalize.

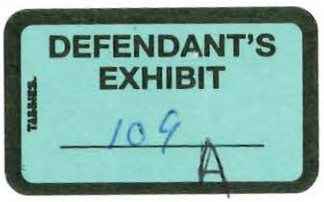
Very high levels of turbidity for a short period of time may not be significant and may even be less of a problem than a lower level that persists longer. The figure below shows how aquatic organisms are generally affected.




**Schematic adapted from "Turbidty: A Water Quality Measure", Water Action Volunteers, Monitoring Factsheet Series, UW-Extension, Environmental Resources Center. It is a generic, un-calibrated impact assessment model based on Newcombe, C. P., and J. O. T. Jensen. 1996. Channel suspended sediment and fisheries: a synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management. 16: 693-727.**

**Reasons for Natural Variation**

Algal turbidity varies seasonally and with depth in a complex manner as discussed previously in response to physical, chemical and biological changes in the lake. Inorganic and detrital particles from the watershed vary largely in response to hydrological events such as storms and snowmelt.




# PARTNERSHIP AGREEMENT FOR LAURELRIDGE DEVELOPMENT

THIS AGREEMENT is between WILLIAM H. FERGUSON, NOEL MOORE and GWEN FERGUSON, and executed on the date hereinafter set forth.

RECITALS.

The parties are engaged in the business of real property development and related activities.

The parties have been engaged in the business of real property development under the name of LAURELRIDGE DEVELOPMENT in the State of Oregon, pursuant to an agreement under which they share profits and losses equally, each as follows: 33 1/3% - WILLIAM H. FERGUSON; 33 1/3% - NOEL MOORE; and 33 1/3%- GWEN FERGUSON. The parties desire to form a partnership under said name, to define the terms of their association, and to commit their agreement to writing for future certainty.

NOW, THEREFORE, the parties agree to continue their partnership in accordance with the laws of the State of Oregon subject to the terms and conditions herein contained;

1. Name of Partnership.

The name of the partnership shall be LAURELRIDGE DEVELOPMENT and shall continue until it is changed by agreement of the partners.

Irrespective of the name the partnership bears, it is agreed that the partnership shall have no goodwill in an accounting sense.

2. Place of Business.

The principal office of business of the partnership shall be located at 5200 Pioneer Road, Medford, in the State of Oregon. The partnership shall not engage in business other than in Josephine County or Jackson County, Oregon.

3. Terms.

The partnership shall continue to operate under this Agreement from the date hereof until dissolved in accordance with the terms of this Agreement.

4. Purpose.

The partnership shall engage in real property development, ownership and management of property, and shall transact all business incidental to such activities or any lawful purpose as may

be mutually agreed to by the partners and is formed to develop the Laurelridge Subdivision in the city of Grants Pass, Oregon, in phases.

5. Capital Contributions.

The capital of the partnership shall be considered equal as of the date of the execution of this Agreement, and more specifically: Each partner shall contribute his or her 1/3 interest in that certain tract of land consisting of 77 acres more or less and commonly known as the Laurelridge subdivision property in Grants Pass, Oregon. In addition each partner agrees to contribute equally with the other partner up to the sum of $100,000.00 as may reasonably be necessary towards property development expenses. The partnership shall first pay the legal debts and obligations of the business. The percentage capital accounts shall next be equalized from any profits of the business in the same ratio as at the inception of this partnership as set forth above. At such time as the capital accounts have been equalized, any remaining profits may be reinvested in the business or distributed proportionately to the partners as set forth above. Upon dissolution, each partner shall receive a distribution in accordance with the percentage of his or her capital account or be responsible for losses unless otherwise agreed.

6. Changes in Capital Accounts.

The partners may, from time to time, withdraw their capital contributions, in whole or in part, or make additional contributions to capital, but only with the express consent of all partners. A partner loaning funds to the partnership shall be repaid prior to any distribution including interest at nine percent per annum.

7. Accounts.

An individual capital account shall be maintained for each partner. No partner shall be entitled to receive interest on his capital contribution.

8. Profits and Losses.

The profits and losses of the partnership shall be divided in the following manner:

| | |
|---|---|
| 33 1/3% | William H. Ferguson |
| 33 1/3% | Noel Moore |
| 33 1/3% | Gwen Ferguson |

9. **Management**

Each of the partners shall have an equal voice in the management and conduct of the partnership business. All decisions on the day-to-day operations of the partnership shall be by a majority vote and each partner shall be entitled to one vote. All decisions affecting the partnership other than those made in the ordinary course of the day-to-day operations of the partnership shall be by unanimous vote. Gwen Ferguson is not required to devote her time or expertise in day-to-day operations, and William H. Ferguson and Noel Moore shall not be compensated for their time or expertise in the development of said property.

10. **Admission of a partner.**

With the unanimous consent of all the partners a new partner may be admitted to the partnership during the existence of this Partnership Agreement. The terms upon which the next partner shall be admitted shall be stated by appropriate amendment to this Partnership Agreement.

11. **Withdrawals for disability.**

Any partner may execute a power of attorney designating the person or persons who shall act for and represent the partner during any period of disability which prevents the partner from acting on his or her own behalf. A duly appointed conservator shall have the same status.

In the event of the death of a partner the partnership shall continue and his or her legal representative shall act in the place of the deceased partner. Upon settlement of the deceased partner's estate the heirs succeeding to the deceased partner's interest shall have all of the rights and obligations of the decedent as to ownership and decision making.

12. **Withdrawal.**

If any partner wishes to withdraw from the partnership the withdrawing partner shall give written notice by certified mail to the other partners of his or her intention to withdraw. The partnership's accountant shall within ten days prepare an accurate up-to-date accounting which shall set forth the book value of each partner's interest in the partnership making all necessary adjustments for loans, advances and other credits and obligations.

The withdrawing partner shall then, within five days after the accounting, give written notice by certified mail to the other partners delineating a price at which the withdrawing partner will either sell the withdrawing partner's interest to the other partners, or will buy the interest of each remaining partner. This price can be above or below the calculated book value of the offered interest.

The remaining partners shall then have 15 days in which to buy the withdrawing partner's interest or sell to the withdrawing partner their interest at the offered price. This decision shall be communicated in writing by certified mail.

The transactions must then be completed by the deposit in escrow with a title company in Josephine County, Oregon, cash, within thirty days unless there is agreement for different procedures.

Upon the election of the buy or sell by the other partners, each partner agrees to do all acts necessary or advisable to complete the transaction, and all partners consider this agreement to constitute a bill of sale.

If the remaining partners do not respond in writing as herein provided, it shall be considered that they have elected to sell their interests at the offered price.

13. **Investments and Accounting.**

Each of the partners shall give, whenever required, a true account of all business transactions arising out of the conduct of the partnership. No partner shall employ either the capital or credit of the partnership in any other business.

No investments of partnership assets or money shall be made and no assets purchased or sold without the approval of all the partners, except that any partner may commit the firm to purchasers of professional development services and contractors in amounts aggregating no more than $5,000.00 with the approval of one other partner.

14. **Banking.**

The partnership shall maintain one or more bank accounts for partnership purposes only. The partnership may have as many accounts as the partners may deem from time to time necessary or proper. Checks shall be drawn on the partnership bank account or bank accounts for partnership purposes only. Checks may be signed by any two partners.

15. **Books of Accounts.**

The partnership shall maintain proper and complete books of account on a cash basis, open to inspection at any time by any of

the partners or by the legal representatives of any of the partners. The partnership books shall be closed annually at the end of each calendar year, and a profit and loss statement shall be prepared semi-annually after the first subdivision lots are sold.

16. Restrictions on Financial Matters.

No partner may without the consent of all the other partners, borrow money in the partnership name or for partnership purposes or utilize collateral owned by the partnership as security for partnership loans, assign, transfer, pledge, compromise or reduce claims of or debts due the partnership except upon payment in full; pledge or hypothecate or in any manner transfer his or her interest in the partnership, except as provided in this Agreement.

17. Files and Documents.

All files, documents, correspondence and records of the partnership shall be preserved either in the offices of the partnership or in storage for a period of at least ten (10) years. After the expiration of ten (10) years, the partners may elect to destroy some or all of the records and files.

18. Arbitration.

In the event of a controversy or claim arising out of this Agreement which cannot be settled by the partners or their legal representatives, it shall be settled by arbitration, in accordance with the rules of the American Arbitration Association, and judgment upon the aware may be entered in any court having jurisdiction.

19. Interpretation.

All provisions of this Agreement shall be construed in accordance with the laws of the State of Oregon and shall be binding on and benefit each of the partners and all future partners of this partnership who are admitted to the partnership in accordance with its terms and provisions. Each person executing this Agreement and all amendments or supplements to it, binds and obligates himself or herself, his or her spouse, his or her estate and all persons claiming by, through or under him or her. The paragraph headings used are for convenience only and shall not be resorted to for interpretation of this agreement. Whenever the context so requires, the masculine shall include the feminine and neuter and singular shall include the plural. If any portion of this Agreement is held to be void or unenforceable, the balance of the Agreement shall nevertheless be carried into effect. All notices provided for under this Agreement shall be in writing and shall be sufficient if sent by registered mail to the last known address of the party to whom such notice is to be given.

20. Amendments.

No amendment, supplement, or exhibit to this Agreement shall be effective unless it has received the unanimous approval of all partners then entitled to vote, is reduced to writing, and is executed by all partners.

21. Attorneys Fees.

If a suit, action or arbitration is brought by any part under this Agreement to enforce any of its terms, the prevailing party shall be entitled to recover, in addition to costs and disbursements, such reasonable attorney's fees in the arbitration, trial and appellate courts as those arbitrators or courts shall adjudge.

WHEREFORE, the partners have hereunto executed this Agreement this 16 day of Nov, 1994.

William H. Ferguson
WILLIAM H. FERGUSON

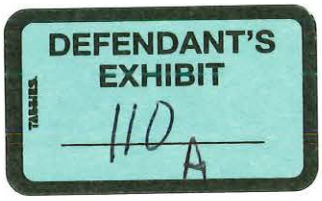
Noel Moore
NOEL MOORE

Gwen Ferguson
GWEN FERGUSON 11/30/94

# BEST MANAGEMENT PRACTICES FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES

DEQ

State of Oregon
Department of
Environmental
Quality




*Restoring, maintaining, and enhancing the quality of Oregon's water.*

**Guidance for Eliminating or Reducing Pollutants in Storm Water Discharges**

## DEQ Northwest Region Document

**January 2003**

**Background:** In the last few years, more and more species of fish have been listed as threatened or endangered through the Endangered Species Act with the U.S. Environmental Protection Agency. Many individuals and groups have blamed these declines in fish population on various causes, like loss of habitat, dams, increased stream temperatures, industrial pollution, sedimentation of spawning beds, turbidity of streams, etc. The Oregon Department of Environmental Quality (DEQ) has determined that the BMPs contained in this document can, if used properly, make a positive impact on the health and welfare of fish and humans.

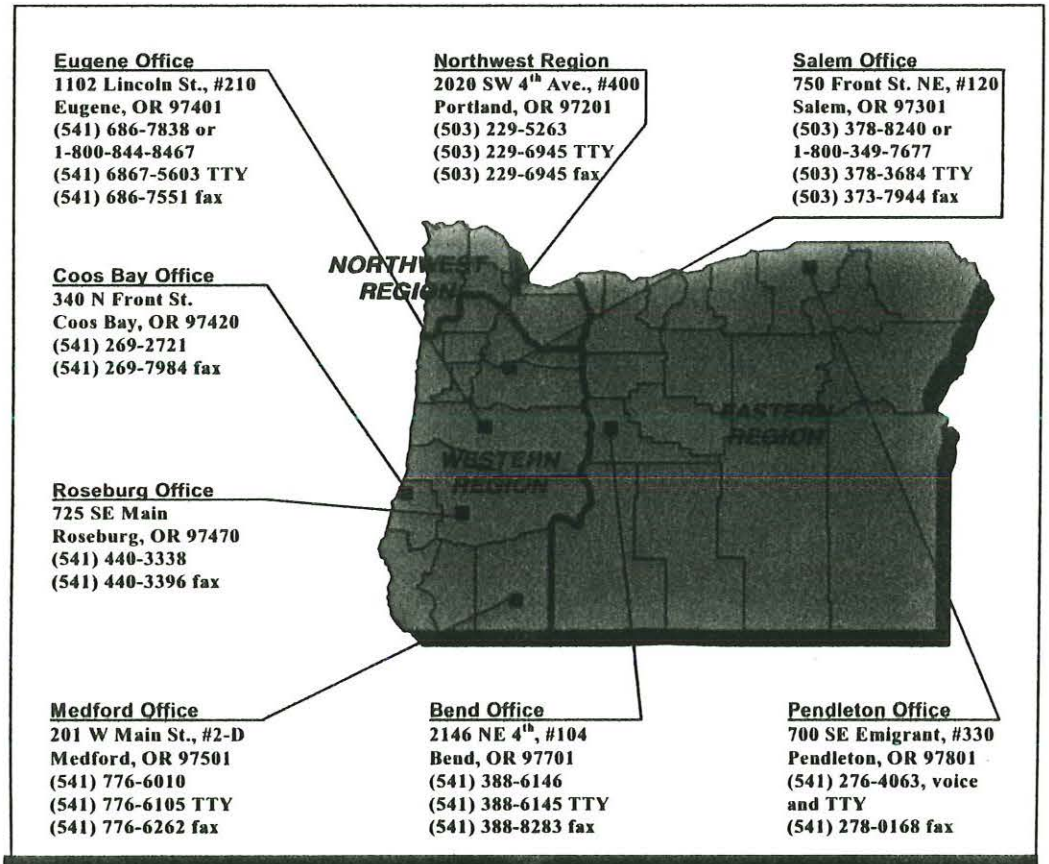
**Best Management Practices:** BMPs are practices or procedures that include methods to prevent toxic and hazardous substances and other pollutants from reaching receiving waters. They are designed to address the quality of a site's practices with respect to storm water leaving the site, and may ultimately affect the ability of the site to meet environmental water quality standards or benchmarks. They are most effective when organized into a comprehensive Storm Water Erosion Control Plan. Many different practices can be used to achieve similar environmentally protective results. With site-specific or activity-specific considerations, such as the effect of the pollutant(s) of concern, as the major consideration(s) in selecting appropriate BMP's, this flexibility allows a facility to tailor a Storm Water Erosion Control Plan to meet its needs using the capabilities and resources available.

The BMPs included in this document are to be considered a work-in-progress and are by no means to be considered a complete list of appropriate erosion control measures. New technologies are continually being developed and refined. Additional BMPs will be added periodically to this document as they are found to be reliable and effective.

**Best Usage:** The best way to use this guide is to assess your site and your storm water discharge(s). Determine the best BMPs for the site conditions that will have the most impact on the discharge(s). Select BMP(s) that will be most effective in controlling pollution in the storm water discharges for the resources and costs that will be required to implement those BMPs. Implement the BMPs selected and check the storm water discharges to verify the anticipated results of the BMP implementation and determine if more BMPs will be required in order to meet the benchmarks or water quality standards for the various pollutants of concern.

**Caution:** The efficiencies provided should be used as indicators of the potential effects the implementation of any particular BMP may provide. The efficiencies can be variable depending on a number of factors including soil characteristics, flow, maintenance of BMP, loading, site slope and other factors.

**Acknowledgments:** Partial funding for the writing, initial publishing, and revision of this document came from a Pollution Prevention Grant provided by EPA. This document was compiled by Carolyn Sharp and Dennis Jurries, Oregon DEQ.




NORTHWEST REGION

(County)

- Clatsop
- Columbia
- Tillamook
- Washington
- Multnomah
- Clackamas

WESTERN REGION

(County)

- Yamhill
- Polk
- Lincoln
- Lane
- Coos
- Jackson
- Marion
- Linn
- Clackamas
- Douglas
- Curry
- Josephine

EASTERN REGION

(County)

- Hood River
- Wasco
- Sherman
- Gilliam
- Morrow
- Umatilla
- Union
- Wallowa
- Jefferson
- Wheeler
- Grant
- Baker
- Deschutes
- Crook
- Klamath
- Lake
- Harney
- Malheur

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# BEST MANAGEMENT PRACTICES

# FOR

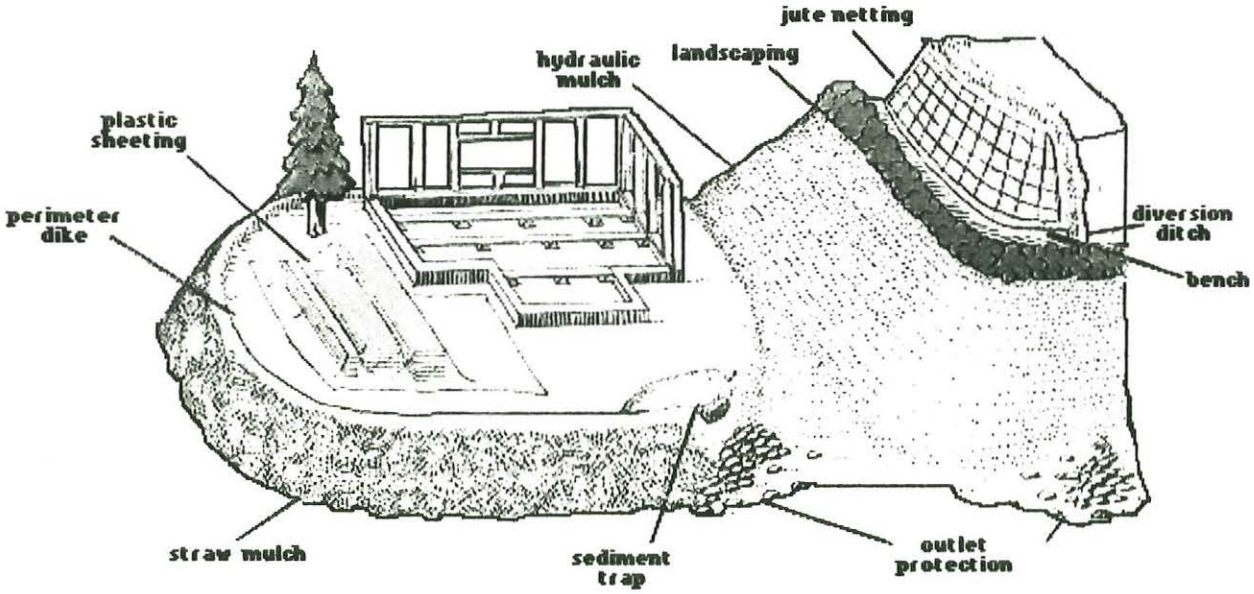
# STORM WATER DISCHARGES

# ASSOCIATED WITH CONSTRUCTION ACTIVITIES

## INTRODUCTION

Best Management Practices (BMPs) are instrumental in developing the Erosion Control Plan (ECP) required by the National Pollutant Discharge Elimination System (NPDES) General Storm Water Discharge Permits. The NPDES program was established by federal legislation as part of the Clean Water Act to improve the quality of storm water from industries, or industrial type activities. Under this legislation, all point source discharges of pollutants, including those from construction sites, to federal waters (lakes, rivers, wetlands, etc.) must be authorized by a permit. Discharges to waters of the State may not contain pollutants or characteristics in levels that would cause the receiving water body to fail to meet water quality standards. Construction sites with one acre or more of disturbed soil must obtain a General Construction Storm water Discharge Permit.

Rather than delineate particular practices that all sites should adhere to, the NPDES sets standards for minimum allowed pollution limits that allow the permittee to select technologies to meet those




standards. BMPs are measures or controls that reduce pollutants at the source to prevent the pollution of storm water runoff discharged from the site. These practices can also be used to divert runoff away from areas of exposure to pollutants, or to treat storm water runoff before discharge to receiving waters. In addition, BMPs can be used to direct polluted runoff to natural or other types of treatment. The storm water discharge permits do not require specific BMPs because the practices should be selected on a case-by-case basis depending on the particular conditions at the site. These factors include the quantity of rainfall reaching the site, the area of land available for constructing management practices, costs in

implementing the practices, site slope, soil type, etc.

In selecting a BMP for the site's storm water erosion control program, the permittee should choose "source reduction" practices as much as practicable. These are practices that reduce the amount of erosion that is generated at the site and prevent contaminants from being exposed to storm water. If this is not possible, practices that recycle or reuse the runoff on the site should be considered. Treating contaminated storm water to remove pollutants before the runoff leaves the site is the last option. Source reduction methods are the most desirable BMPs because they keep storm water away from pollutants and are frequently less costly than treatment alternatives.

There are a variety of mechanisms available for treating storm water. It should be noted that treatment mechanisms, in most cases, are not a substitute for the preventive BMPs. Storm water treatment mechanisms should be considered in instances where source reduction BMPs are not sufficient.

## STORM WATER BEST MANAGEMENT PRACTICES

The BMPs included in this guidance document are related to source reduction and treatment methods for specific processes and activities ongoing at construction sites. The permittee should consider the recommended practices in developing and/or revising their Erosion Control Plan if these activities are ongoing at the facility. In addition, the preventive measures mentioned may assist the facility in achieving storm water discharge benchmarks and limitations or water quality standards through pollution prevention.

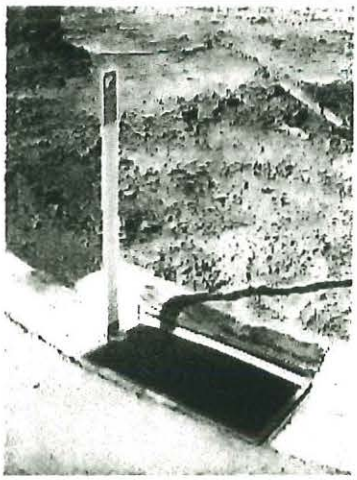
All of the BMPs recommended in this guidance are intended to complement, not conflict with, existing state and federal regulations regarding the handling, containment, or treatment of any material or waste.

**The most effective BMP for preventing erosion is to not expose soil to storm water by removing existing vegetation any sooner than is absolutely necessary.** Many contractors feel it is most cost effective to remove all of the vegetation and start grading the entire site due to the cost of set-up in bringing construction equipment to a site more than once. This in most cases is a false cost savings. The additional costs in erosion controls and treatment facilities to control erosion or turbid runoff from a site to meet State water quality standards and the fines for polluting in addition to possible negative publicity will be far more costly.

**Make sure controls are installed properly and able to handle expected volumes of water**. If the BMP is not installed correctly, they will not serve their purpose and will allow sediment to runoff into waters of the State. Likewise, if the mechanism is overwhelmed with excessive amounts of water, sediments will be allowed to pass into the receiving waters.

**Use BMPs in conjunction with one another to complement and support each other**. Pairing BMPs that prevent erosion with those that filter out sediments from runoff is a common and highly effective practice.

**Plan ahead for maintenance.** Some controls are less weather and time resistant than others and will require replacement or repair. Regular maintenance must occur on most controls to remove accumulated sediments, which if left in place will reduce effectiveness.



**Flagged poles or stakes** can be used to mark storm drains, catch basins, curb inlets, etc. This helps protect sediment controls from being hit by cars and street cleaners, buried under mounds of soil, or lost in fields of high grasses.

## Removal of temporary sediment and erosion control BMPs

At the conclusion of the construction project after vegetation is reestablished, temporary erosion and sediment controls such as sediment fences, straw bales, and biobags should be removed from the construction site. Prior to their removal, the up-gradient sediment trapped by the erosion control should be removed by Vactor Truck, shovel, sweeping, and/or etc. Failure to remove the retained sediment will result in a slug of sediment being released to the receiving stream and negate the reason for installing the controls in the first place.

## *Considerations in selecting a BMP*:

*Efficiency vs. Flow Volume* – Typically, one is sacrificed for the other. The higher the flow volume, the less sediments and turbidity will be reduced. Time is needed to allow sediments to settle out of water. Finer filters trap more sediment, but water also takes longer to pass through, or more filtration surface area is needed to meet the increased need for flow volume.

*Initial and Life Cycle Costs* –Some control mechanisms are expensive to install, but are low maintenance and long-lasting. Conversely, other BMPs are inexpensive to install but require frequent sediment removal or replacement. One must be aware of all the associated costs, from installation to maintenance and removal at job completion.

*Pollutants Involved* – Different BMPs are designed to remove different pollutants. Some will remove heavy metals or oils and grease, while others are only effective for sediments and larger particles. BMPs that prevent erosion from occurring in the first place are generally more efficient than those that treat runoff that has already been polluted with sediments.

## *Oregon Water Quality Standards*:

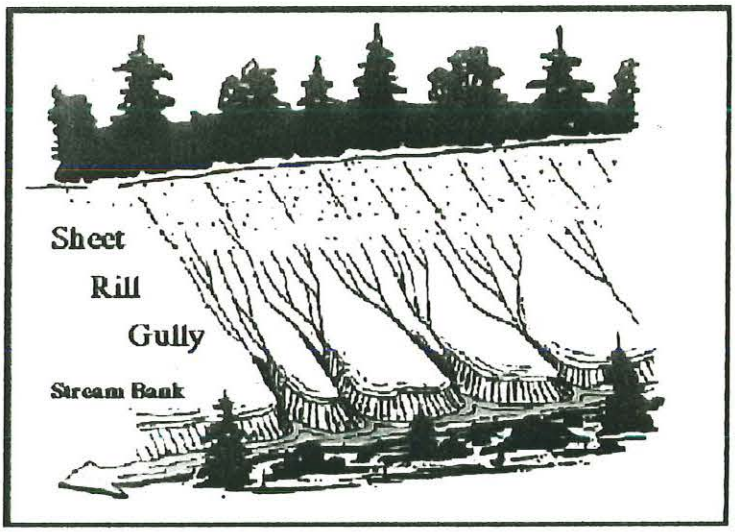
Oregon Administrative Rule 340-041-0445 states "**no more than a ten percent cumulative increase in natural stream turbidities shall be allowed**, as measured relative to a control point immediately upstream of the turbidity causing activity. However, limited duration activities necessary to address an emergency or to accommodate essential dredging, construction, or other legitimate activities and which cause the standard to be exceeded may be authorized provided all practicable turbidity control techniques have been applied." The following BMPs, when installed correctly and properly maintained will help reduce turbidity levels to acceptable standards.

# Erosion and Sediment Control

***Types of Erosion:***

Soil erosion is the process by which wind, ice, water and gravity wear away the land's surface. Natural erosion and soil formation are part of the geologic processes that shape the face of the earth and keep soil thickness fairly constant. Events such as floods, earthquakes, construction and agriculture speed up erosion, leading to a soil deficit. The typical construction site produces 100-500 tons of erosion/acre/year, 100 times greater than croplands and 2000 times greater than the natural rate. Four major factors determine the potential for soil erosion: soil type, presence of vegetative cover, topography (steepness of slope) and climate.

The loosened particles of soil are called sediment, and the deposition of this material in bodies of water is called sedimentation. Turbidity is the suspension of very light sediment fines in water. Sedimentation and turbidity associated with sediment-laden flows degrade water quality. Turbidity interferes with photosynthesis, encourages disease in fish and other aquatic life, interferes with fish breathing by clogging the gill passages, reduces the ability of fish to feed, and sediment settles in fish spawning beds smothering the eggs. Erosion also makes it more expensive to treat drinking water to acceptable standards, and increases the chances of floods by accumulating in and blocking culverts.

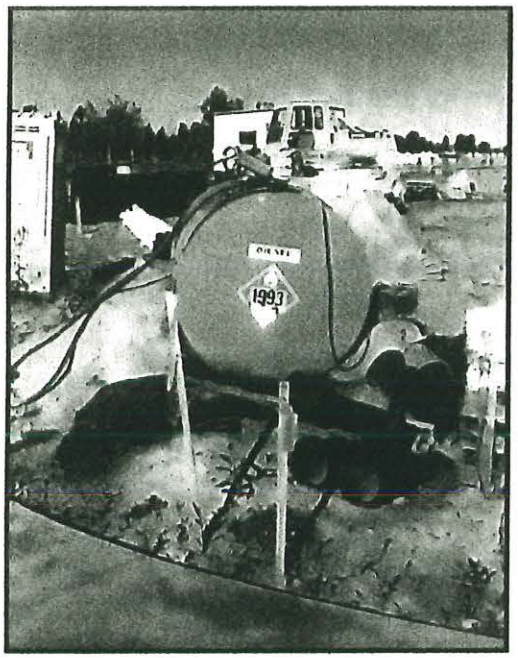



**Splash erosion**, caused by the impact of rain hitting the ground, is the most destructive type of erosion. Raindrops impact the earth at 20 miles per hour, 10-100 times faster than sheet flow, dislodging soil particles. **Sheet erosion** is characterized by shallow, uniform water flows. **Rill erosion** occurs when water begins to concentrate in small channels and leads to **gully erosion**, larger and deeper rills. **Channel erosion** is a result of higher velocity and flows of water, and is not easily repaired.

Raindrops falling on exposed soil can break off soil particles to be lost in run-off water.

Over time, erosion control is more effective than sediment control in preventing water quality problems. Erosion control is less subject to failure from high flows, requires less maintenance, and is also less costly. In some cases a combination of erosion control and sediment control may be required. The following best management practices can be used for areas on construction sites with exposed soil from steep slopes, soil stockpiles, and/or heavy equipment traffic. Regular inspection and prompt maintenance are critical to the success of all the practices in this section. The selection of an appropriate measure will depend on the degree of slope on the site, sensitivity of the area to the intended use, stream or wetland features in the area, and type of soil encountered.

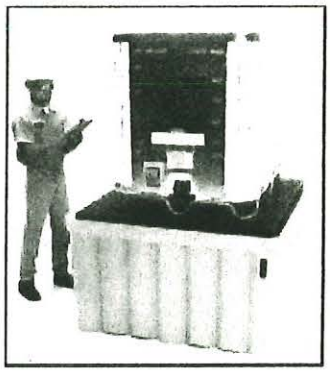
# BMP #1 - Above-ground Storage Tanks




***Description:***

Tanks used on construction sites to refuel construction vehicles need to have secondary containment. The tank shown on the left is held in place by earthen berms and is a single walled tank. Notice the darker stained soil in front of the tank. The hose needs to be inside of a contained area when not in use so that any residual fuel in the hose does not leak out into the soil and thus to storm water runoff.

A containment pallet similar to the one shown on the right could provide the secondary containment needed. The amount of rainfall on the small surface area involved with the tank and pallet would not accumulate significant amounts of storm water to be of concern.

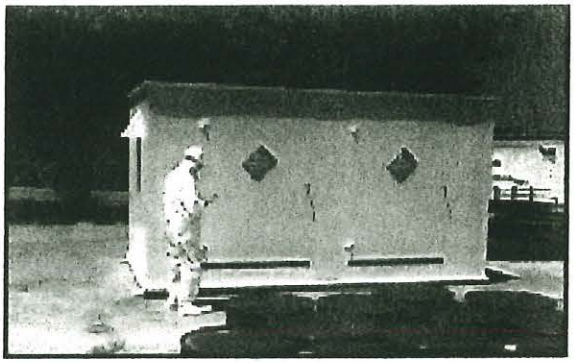


***Maintenance:***

- Check containers daily for leaks and spills. Replace containers that are leaking, corroded, or otherwise deteriorating.
- Collect all spilled liquids and properly dispose of them.
- Sweep and clean the storage area monthly if it is paved; **never** hose down the area to a storm drain.

## BMP #2 - Container and Waste Storage

***Description:***



This BMP refers to containers located outdoors and used to temporarily store materials, such as accumulated food wastes, paints, oils, vegetable or animal grease, solvents, and waste materials. If the construction site has container storage of materials in an outdoor location, consider using a portable building such as is shown on the next page. These storage buildings have secondary containment, can be sprinklered, and heated or cooled to control the temperature of the materials. The doors typically can be locked for secure storage. The fuel tank from the previous BMP could be placed in one of these buildings.

***Design Considerations:***

Segregate and securely store incompatible or reactive materials in separate containment areas in order to prevent the mixing of chemicals should spills occur.

***Maintenance:***

- Sweep the area regularly, if paved, to collect dirt and debris; **never** use water to hose down the area into a storm drain.

## BMP #3 - Concrete and Asphalt Production

***Description:***

Asphalt application can contribute high levels of toxic hydrocarbons, oils and greases, and heavy metal to runoff. Concrete pouring can contribute suspended solids and heavy metals to storm water runoff and cause pH increases in receiving waters.

***Basic Design and Construction:***

- Use drip pans, ground cloths and perhaps even heavy cardboard or plywood wherever concrete, asphalt and asphalt emulsion chunks and drips are likely to fall, such as beneath extraction points from mixing equipment.
- Place storm drain covers over all nearby drains at the beginning of the workday. All accumulations must be collected with a shovel for proper disposal at the end of the workday.
- Contain and collect the slurry from exposed aggregate washing, where the top layer of unhardened concrete is hosed or scraped off to leave a rough finish. Use a cover to protect storm drains.
- Designate a washout area on-site where cleaning of concrete trucks, troughs, and pumps can take place and were the rinse water is controlled in an infiltration sump on-site.
- If possible, portable asphalt mixing equipment should be covered with an awning to avoid contact with rainfall.
- A catch basin insert configured for sediment removal may remove some of the pollutants in runoff from the site.

***Maintenance:***

- Sweep the pouring area, if it is paved, at the end of each day to collect loose aggregate particles. Do not hose down the area to a storm drain.

## BMP #4 - Preserve Existing Vegetation

***Description:***

Preserving the existing vegetation on a construction site is frequently the best preventative measure for erosion. Vegetation limits the capacity of flowing water to detach soil particles and transport sediment by decreasing runoff volume and the velocity of raindrops as they hit the ground. Because native or existing vegetation is already established, it is usually a better cover species than introduced species. They are adapted to local climate and soil conditions and typically have fewer pests, minimizing the amount of maintenance.

***Basic Design and Construction:***

- All steep, unstable slopes should be left vegetated whenever possible.
- Do not remove any vegetation unless absolutely necessary.
- Mature trees, with their extensive root system and large canopy, serve important erosion control functions and should be preserved when at all possible.
- Compaction and grading of soils close to trees often will cause existing trees to decline and die. Soil should not be piled on top of roots, cutting off air and suffocating the tree. Compaction results from parking and/or driving too close to the tree, restricting the movement of gases and water.
- Where possible, establish "do not disturb" zones on your site by marking off areas with stakes and tape or fencing materials.
- When lowering the grade of the site, terrace around the tree and the support the soil with a retaining wall so that tree roots are not exposed.
- Avoid cutting off the root system by tunneling under the roots rather than trenching through them.

***Maintenance:***

- Irrigation in dry months.
- Monitor for the presence of pests or disease that will weaken the plant population.
- Minimize the impact of construction activities on existing vegetation.

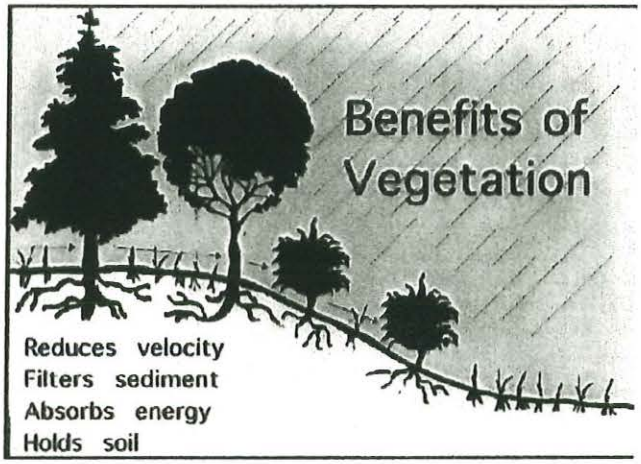
## BMP #5 - Reestablish Vegetative Cover

***Description:***

Vegetative cover acts as either a permanent cover or as a temporary measure prior to permanently stabilizing an area. Vegetation shields the soil from the direct impact of rainfall or runoff, increases soil porosity and water storage capacity of the soil, reduces the energy of the runoff, and physically holds the soil in place with the root system of the vegetation. Vegetative buffers or complete coverage can provide a significant reduction of erosion potential. This can be accomplished by seeding, seeding and mulching, seeding and matting, or sodding. Maintenance may be required to successfully vegetate an area. This practice is not suited for areas that carry heavy traffic.

***Basic Design and Construction:***

- Spread 4-6" of topsoil or compost over the site before seeding or planting.
- Fertilize according to soil test recommendations.
- Mulch with straw or other matting.
- Water as needed to keep soil moist.
- Use seed mix recommendations from local suppliers. Seed mixes should be based upon the time of year seeding is taking place. Use low maintenance, native grasses. If planting is done in July or August, irrigation will be necessary.
- Shrubs should be planted 2'-5' apart; Trees 6'-10' for wooded areas.




***Design Considerations:***

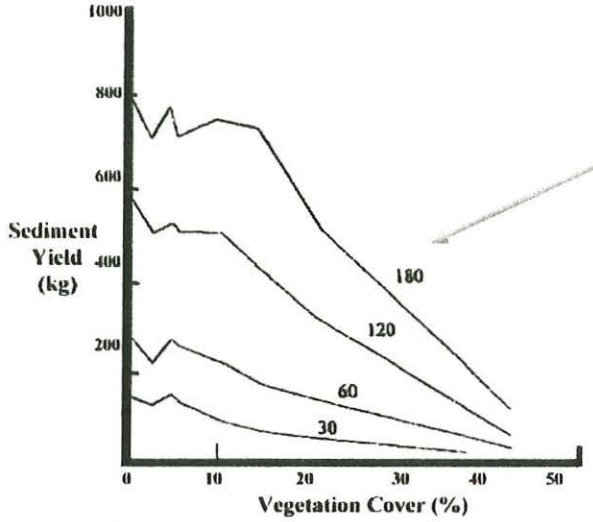
Mulching should be done in areas which cannot be seeded due to the season or other issues. They can also be applied to newly seeded areas to provide protection and cover until seed is established or to exposed soils that need immediate cover and protection. Suitable materials include straw, wood chips, corn stalks, and shredded bark. The material should be dry and free of weeds and seeds. In dry weather the mulch may need to be anchored with netting or a fiber and tackifier to prevent it from blowing away. All mulched areas should be checked periodically for spots where mulch has blown away or been pushed together.

***Maintenance:***

- Fertilize and water as recommended by supplier.
- Re-seed areas where adequate cover has not been established.

***Efficiency:***

(After vegetation has had time to establish a root system) – 90% (EPA, 1999)




Minutes of simulated rainfall for 10% slope

Rogers & Schumm 1991

# BMP #6 – Concrete Truck Washout and Cleanup

***Description:***

Cleanup from the chute and other equipment from a concrete truck after emptying can cause high pH in storm water runoff and can fill catch basins and storm sewer piping.

***Best Management Practice:***

Until recently the only Best Management Practice was to select an area of the site for the washdown activities from concrete truck. This area would have a shallow depression, in which the residual concrete, aggregate, and water would settle and infiltrate.

***Recycling System:***

A recycling system can be added to the concrete truck to catch the wash-down materials and pump them back into the truck for transport back to the concrete batch plant for recycling.

***Efficiency:***

With care to prevent or minimize loss from carryover or splash-over, the system can virtually eliminate this concern at construction sites. The added benefit gained is that the concrete trucks would not have to relocate from the pouring area to perform clean-up as they do in some case at present.

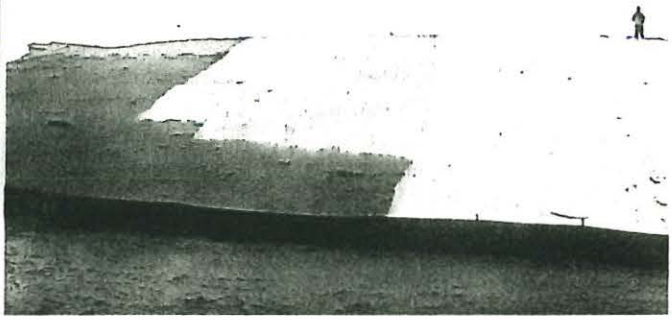
# BMP #7 - Erosion Control Blankets & Geotextiles

***Description:***

Rolled Erosion Control Products (netting, meshes, erosion control blankets, turf reinforcement mats) come in a variety of materials, including jute, coconut fiber, straw, synthetic materials, plastics or combinations thereof. Many are biodegradable. This is a short term measure designed to provide immediate protection until a more permanent stabilization measure can be implemented. Heavy traffic areas are not well suited to this type of protection. Some types of products are manufactured with seed incorporated into the matting, providing protection and moisture to the germinating seeds.

These options require close attention to installation procedures, and may be expensive in large scale applications. It can be very effective, however, if an appropriate medium is selected for a given site.

Geotextiles are permeable fabrics used to separate, filter, reinforce, protect or drain. Because of the versatility of the product, this technology has developed to include geogrids, meshes and cells with a wide range of applications. Geotextiles are commonly made from polypropylene, polyester or from natural material like coir, jute or straw. Depending on the desired use, they can be purchased with increasing degrees of porosity and permeability.



**Straw Matting (Above)**
**Coconut Matting (right)**

***Basic Design and Construction:***

- Prepare the soil by grading or raking the soil free of clods and large stones. If using fertilizer, add it to the soil before installing the mat.
- Blankets should overlap at both edges, and at the top and bottom.
- Make sure that the products are securely staked down with staples or stakes to prevent water from seeping under or around the matting. Matting should be toed in at the top of the slope to keep water from running between the matting and the soil. Jute fabric is reportedly better than coconut due to coconut fibers tendency to expand and cause the mat to pull up from the soil surface.
- Matting should be applied by rolling down the slope or in the direction of the water flow.

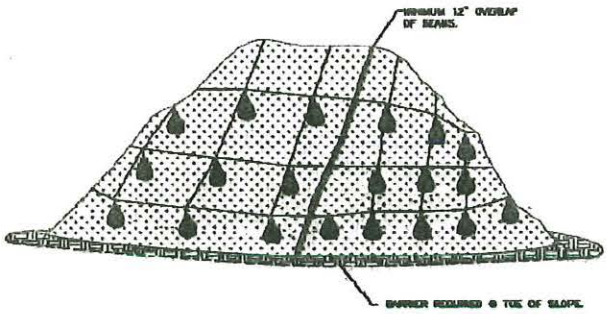
***Design Considerations:***

Where water infiltration is not desirable, for example on extremely unstable or steep slopes, an impermeable erosion blanket may be appropriate. In this situation, special care must be taken to provide a place where the energy the water has gained can dissipate, such as a slash windrow, brush sediment barrier, or rock blanket at the base of the slope.

***Maintenance:***

- Check regularly for rips or locations where the matting is no longer held in place.
- Verify after storms that runoff has not seeped under the matting.

## BMP #8 – Plastic Sheeting




PLASTIC SHEETING

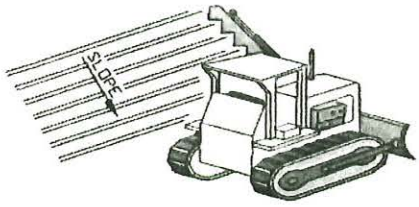
NOTES:
1. MINIMUM 12" OVERLAP OF ALL SEAMS REQUIRED.
2. BARRIER REQUIRED @ TOE OF STOCK PILE.
3. COVERING MAINTAINED TIGHTLY IN PLACE BY USING SANDBAGS OR TIRES ON ROPES WITH A MAXIMUM 10' GRID SPACING IN ALL DIRECTIONS.

Some type of plastic (visqueen) sheet should be used to cover all soil stockpiles. For sites that develop erosion problem areas in the middle of the wet season and are unable, due to the soft soil conditions, to get to the area with equipment to make a permanent repair or placement of other BMPs, should consider a temporary placement of plastic sheeting to protect the area and divert runoff away from the area of concern until a more permanent solution can be applied.

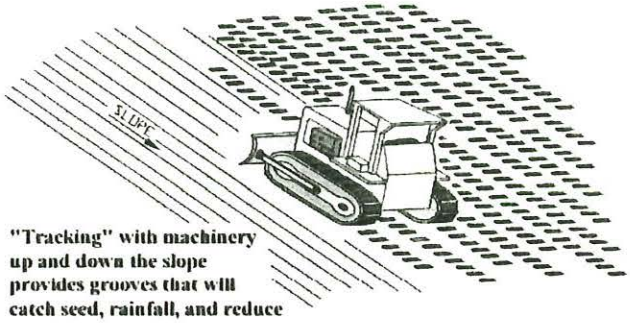
## BMP #9 - Hydroseeding, Tackifiers and Mulching

***Preparation:***

Grading and compaction of slopes should occur prior to hydroseeding. Ensure that the caterpillar tracks on slopes run perpendicular to the slope in order to provide a damming effect rather than a channeling of the runoff.




**Note:**
**Groove by cutting serrations along the contour. Irregularities in the soil surface catch rainwater, seed, mulch and fertilizer.**




**"Tracking" with machinery up and down the slope provides grooves that will catch seed, rainfall, and reduce runoff.**

### *Hydroseeding:*

Hydroseeding is the application of a mulch, seed and fertilizer slurry to establish vegetation and prevent erosion. This is a very economical option that stabilizes the slope until grasses and plants are able to sprout. Hydroseed provides water retention, soil retention, and protection for germinating seeds from sun and wind. A wide variety of seed mixes are commercially available to suit each site's needs. The mulch prevents seeds from washing away, retains up to 10 times its weight in water to keep the seeds moist, and adds nutrients to the soil as it decomposes.

### *Mulching:*

This practice is the application of plant material such as hay, straw or wood chips to the soil surface, and can be used alone, or as part of a hydroseeding mixture as discussed above. It reduces erosion by shielding the soil from the force of raindrop impact and reducing the velocity of runoff flowing over the soil. Hay and mulch should be applied at the rate of 1 ½ -2 tons per acre, or until the soil surface is not visible through the mulch. Mulch can also aid in seed growth by conserving moisture and shielding the young plants from extremes of heat, cold, or dry conditions. Mulch may need to be held in place by sprayed-on tackifiers or netting.

### *Tackifiers*:

Tackifiers are a biodegradable adhesive that can be applied directly to the soil, or over a layer of mulch. It acts as a glue to hold the soil in place or increase the holding power of the mulch. One tackifier used by a local company is a vegetable based adhesive made of guar gum which the import from India. Coagulants and flocculants (polymers) can be used. An interesting product call DriWater[tm] actually releases water as it biodegrades which immediately brings to mind an advantage when hydroseeding in late summer.

### *Maintenance:*

- As with reestablishing vegetation, regular watering of the seed in the first two weeks is of critical importance for healthy growth.
- Monitor for the presence of pests or disease that will weaken the plant population.

### *Efficiency:*

Improper cat tracking can cause an increase in erosion by as much as 20% or more while cat tracking perpendicular to the slope can decrease erosion by 10% or more by itself (Goldman et al., 1986). Mulch averages between 20% and 95% erosion reduction, depending on slope gradient, soil type and mulch material. As a method for applying seed to a site with slopes of 3:1 of less, this method requires at least twice as much seed as drill seeding and results in a significantly reduced germination and growth success rate when compared to drill seeding.

## BMP #10 – Compost Cover

***Description:***

The use of compost cover over newly graded soil can greatly reduce erosion and minimize sediment loss and turbid discharges of storm water from a construction site. The added benefit of having an excellent vegetative growth media in place when landscape vegetation is installed will greatly enhance the construction site.

***Basic Design and Construction:***

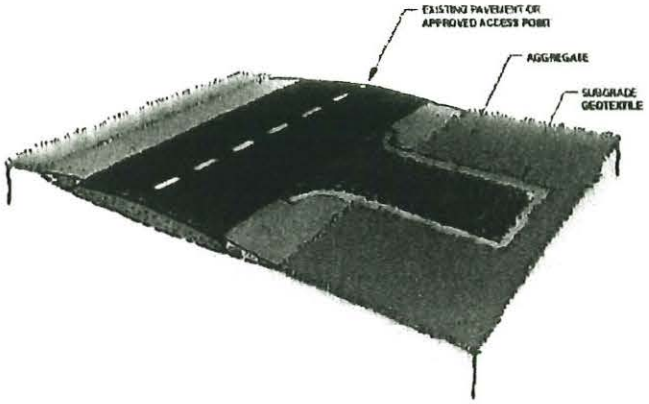
Prepare underlain soil by grading it smooth and ensure that the finished grades and slopes minimize the potential concentrating of any water runoff. Use of at least three inches of less than 50% moisture content three quarter minus compost on 50 % or less slopes has been shown to greatly reduce turbid runoff and enhance vegetation growth. The compost must extend at least 6 feet up onto the flat portion of a site or into the vegetated undisturbed area.

***Efficiency:***

Properly installed the use of a compost cover can eliminate turbid runoff from construction sites for all but the most intense storms. When grading and compacting of a site occurs during construction, the infiltration rate of the resulting soil is greatly reduced (depending on the soil type by as much as twenty percent of more). By tilling in the compost towards the end of the construction just prior to landscaping, the infiltration rate of the soil immediately is enhanced and quickly approaches that of native undisturbed soil in a reasonable amount of time. Without some type of soil enhancement, the infiltration rate for the vegetated areas of the site may not approach that of the site's natural undisturbed rate within a lifetime or more.

Tests conducted on Soil Dynamics EssentialSoil™, an enhanced compost, showed a reduction in runoff from compacted soil in lab tests of 77.12% and sediment leaving the test plots to be reduced by 98.17% for a clayey sand soil from that of bare compacted soil.

## BMP #11 - Gravel Construction Entrance

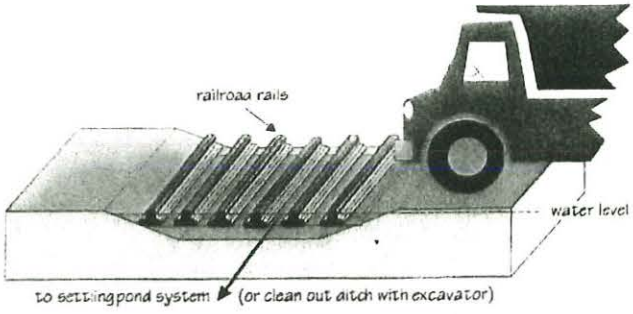



***Description:***

Paving or graveling of roadways and driveways to help reduce soil disturbance. Constructing paved or rocked roads or entrances can reduce the amount of mud and sediment that is tracked onto areas where the material could be washed into the storm drainage system.

***Basic Design and Construction:***

The gravel pad should extend to the structure (minimum of 50') and should be at least 4-6" deep. The aggregate should be large size rock 6 – 4 inch Quarry Spalls are best with little or no fines. Aggregate of this size will deform tires of vehicles thus reducing or eliminating the need for a wheel wash. If the pad is to be located in a future driveway, the existing ground can be excavated deep enough before installation so the final rock and pavement can be applied over the top. The turning radius of the entrance should be sufficient to accommodate larger trucks.




Wheel washes can also be installed at site exits to remove dirt and rocks from truck tires. A series of railroad rails spaced 2 to 8 inches apart can be used to shake dirt and rocks loose while the vehicle is driving through the wheel wash. Make sure that the water used to wash trucks is treated to remove solids and turbidity before being discharged from the site.

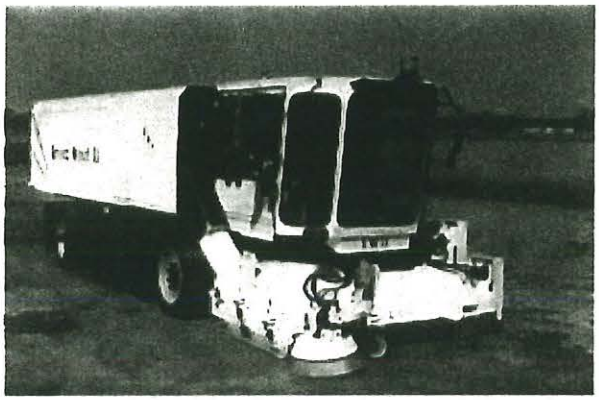
***Design Considerations:***

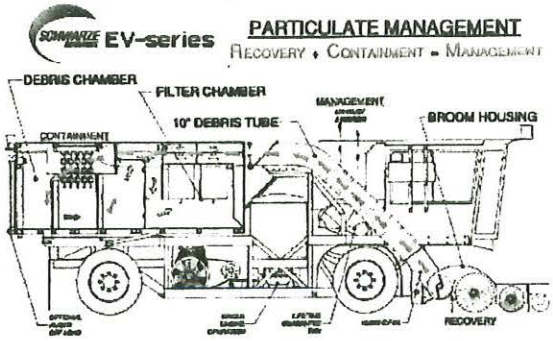
- Vehicle traffic should be restricted to only those locations fitted with a gravel entrance.
- The entrance should be located to provide for maximum utility by all construction vehicles.

***Maintenance:***

- Any material that makes it onto the road must be cleaned up immediately.
- Additional rock should be added periodically to maintain a clean surface.

# BMP #12 – Road Sweeping



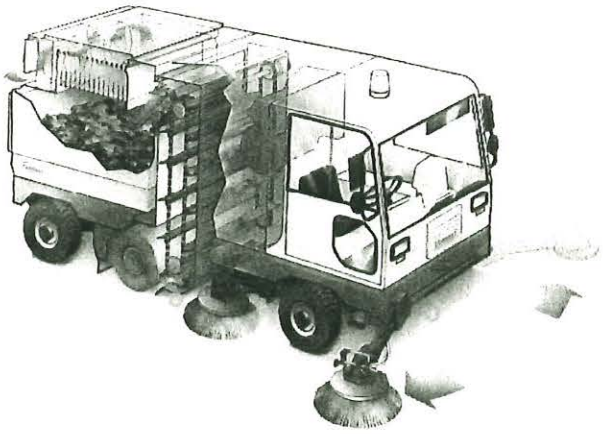



***Description:***

When roads through a construction site are paved, they can quickly become coated with sediments. A common, but harmful, practice is to wash down the surface with water. The sediment laden runoff then drains to the storm water system, polluting the receiving water. Operations involving heavy vehicle traffic also produce elevated metal levels in storm water from vehicle brake shoes or clutches (copper) and tire particles (zinc).

***Basic Design and Construction:***

Sweeping of paved roads, parking lots, and storage areas with a type of vacuum sweeper that incorporates HEPA filtration or other high efficiency method of filtration of the exhaust air from the sweeper to trap the very fine metallic particles found in road or parking lot dust can reduce these discharges to storm water. If the filter is not fine enough and well contained, materials that the vacuum picks up will be re-released into the air.



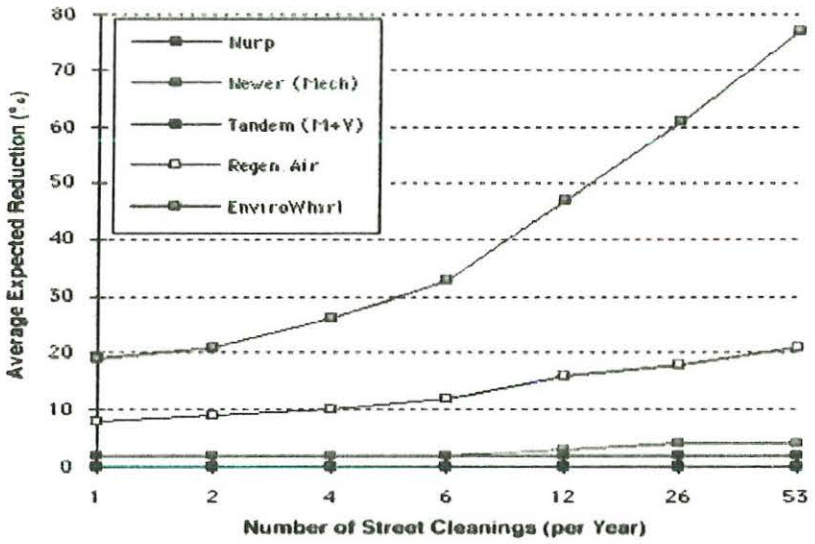
Tennant Company produces a series of sweepers (shown above), ranging from a small walk-behind model to as large as municipal street sized sweepers. The unique feature of Tennant's products is a stainless steel hopper built in to the sweeper to collect dust and debris as it is picked up from the floor and passed through a polyester filter. When the hopper is full, it can be emptied directly into a dumpster or dump truck, minimizing the chance of particulate matter being re-released into the air. Information from the manufacturer reports that the sweepers will retain particles 10 microns (0.01 mm) or larger. The smaller size of the model and four-wheel steering makes it easy to maneuver in small spaces that traditional sweepers would not fit.

***Design Considerations:***

Ensure that good control measures are implemented when dumping the contents of the sweeper and practice proper disposal methods for the emptied contents to ensure that there is no adverse environmental impact after spending so much effort in the initial clean-up.

***Efficiency*:**

The EV1 Sweeper is capable of collecting and containing up to 99.6% of particles as small as 2.5 microns in size. The elimination of particulates in storm water is related to the frequency of sweeping as is shown in comparisons of various types of sweepers in the graph on the preceding page.




## BMP #13 - Dust Control

***Description:***

In dry weather, soil is particularly prone to displacement by wind erosion on unpaved roads and construction sites. Use temporary controls such as palliatives, or chemical soil treatments that are applied as spray-on adhesives. The chemicals act to bind soil particles together and form a more durable, resilient ground surface. Common palliatives include calcium chloride, anionic asphalt emulsion, latex emulsion, and resin-water emulsions. Dust may also be controlled by reducing vehicular speeds, using street sweepers fitted with filters and vacuums, or planting vegetation cover. Irrigation is a temporary measure involving a light application of water to moisten the soil surface.

The correct amount of water must be applied because excess water could lead to further erosion.

***Basic Design and Construction:***

- Since certain chemicals may be inappropriate for some soil types or application areas, the permittee should check with the local government prior to application of the chemical treatments.
- Minimize soil exposure by temporary or permanent soil stabilization controls, such as mulching, seeding, applying topsoil, spreading coarse gravel or crushed stone, or planting trees. If existing vegetation on the site can be maintained, this will help in controlling dust.
- Install temporary or permanent windbreaks or barriers that reduce airborne particles by slowing wind velocities and causing the particles to drop. Large trees and shrubs left in place can provide wind barriers, while temporary measures include solid board fences, tarp curtains, sediment walls, crate walls, and bales of hay.
- Polymers can be used in tackifying and hydroseeding applications, either in temporary erosion control applications or as a part of a final revegetation project.
- In arid regions, use tillage or deep plowing of soil to provide dust control. Large clumps of soil are deposited on top of the dust particles, preventing their movement by wind or water.
- Use phased construction to expose only the minimum amount of soil necessary to wind and water.

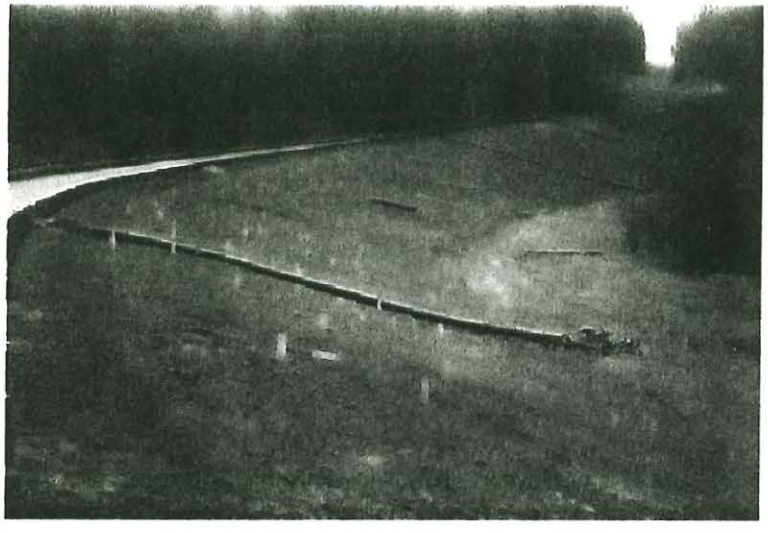
***Design Considerations:***

- Vehicles should not be driven over the treated area to prevent the tracking of the chemicals to other areas on or off the site.
- Watering is the most common method of dust control, but is also the most temporary. The use of chemicals to treat exposed surfaces generally provides longer dust suppression.
- Dust may also be minimized by limiting the speed of vehicles on the construction site.

***Maintenance:***

- Inspect the sites requiring dust controls frequently and reapply materials or controls as needed.

## BMP #14 - Pipe Slope Drains



***Description:***

A temporary slope drain is a structure used to convey water down the face of a cut or fill without causing erosion. Temporary slope drains are used in conjunction with berms along the edges of newly constructed slopes to prevent erosion. They are used along cut and fill slopes until permanent storm water drainage structures are installed. They can also be used to conduct water across a site without contamination. The inlets and outlets should be properly designed for adequate stabilization. The outlet area is particularly important, as the higher velocity water at the end of pipe can be an extremely erosive force. Outlet design and correct installation are the keys to the success of this type of control.

***Basic Design and Construction:***

- Plastic lining; fiber matting; wooden flumes; metal, rigid, or flexible plastic pipe; and half round pipe are commonly used. When plastic lining is used, a smooth, uniform ditch should be provided to prevent water from overflowing the sides. Fiber matting and plastic sheeting should not be used on slopes steeper than 4:1 except for short distances of 20 feet or less.
- The base for temporary slope drains should be compacted and concavely formed to channel the water or to hold the slope drain in place. Inlets should be properly constructed to channel water into the drain (see Figure 20, for example), and the drains anchored to withstand the force of the water. Anchoring can be accomplished by staking at approximately 10 foot intervals or by weighing down the drains with items such as riprap, sandbags, or compacted soil. Outlets should be constructed to reduce erosion downstream with items such as dumped rock, small sediment basins, or other approved devices.
- Temporary slope drains should be installed at frequent intervals along continuous unprotected slopes and at low points in the roadway profile grade. Each slope drain should not exceed 5 acres of drainage area. Pipe connections should be watertight and secure so joints will not separate. Pipe diameters should be calculated by a qualified engineer.

***Design Considerations:***

- Washout along the pipe/ matting/ flume due to seepage, piping, and/or overflow; a washout may occur because of inadequate compaction, insufficient fill, installation of drain too close to edge of slope, too steep a slope (open drains), too large a drainage area, or undersized conveyance channel.
- Overtopping of diversion caused by undersized or blocked pipe; drainage area may be too large.
- Overtopping of diversion caused by improper grade of channel and ridge; maintain positive grade.
- Erosion at outlet; pipe may not extended to stable grade or outlet stabilization structure may be needed.
- Displacement or separation of slope drain; the drain has inaccurate or insufficient anchorage.
- All temporary slope drains should be removed when no longer necessary and the site should be restored to match the surroundings.

***Maintenance:***

- Inspect temporary slope drains weekly and following rainfall events. Some critical points that should be checked at each inspection are as follows.
- Check inlet and outlet for sediment or trash accumulation; clear and restore to proper condition.
- Check the fill over the pipe for settlement, cracking, or piping holes (seepage holes where pipe emerges from dike); problems should be repaired promptly.

- Check conduits for leaks or inadequate lateral support; problems should be repaired promptly.

## BMP #15 - Diversion Ditches

***Description:***

A diversion is a berm (dike or ridge) and/or swale (excavated channel or ditch) used to prevent sediment-laden waters from leaving a site and to prevent off-site or upstream waters from entering a site. Diversion structures guide water around unstable areas to prevent both erosion and saturation with water. Typical diversions are combination berm/swale and may be temporary or permanent structures.

WHERE DIVERSIONS ARE USED

- At the toe of cuts or fills to direct sediment-laden runoff to sediment traps.
- At the top of cuts or around disturbed areas to divert clean runoff until the disturbed areas are permanently stabilized.
- At the top of steep slopes where excess runoff would cause erosion problems.
- At selected intervals on long, sloping routes to prevent erosion.
- Around a site to prevent entry of off-site runoff and to reduce flooding.

***Basic Design and Construction:***

- Diversions should not be used on drainage areas exceeding 5 acres, though stream diversions may exceed this, and diversions should be designed to handle the peak runoff from a 10-year storm.
- Berms should be constructed of compacted soil, should have a minimum top width of 2 feet, should have a minimum height of 1 foot (with or without a swale), and should allow for 10% settlement.
- When equipment crossing is necessary, diversions may be wider with flatter side slopes and/or lined with gravel to minimize erosion.
- When practical, minimize temporary diversions needed by constructing embankment ridges to slope to one side.
- Outlets should be stabilized to prevent erosion and convey runoff to a point where it will not cause damage.
- Vegetate diversion immediately after construction unless the diversion will be in place fewer than 30 working days.

***Design Considerations:***

- If the berm is not properly compacted, it could fail in a heavy storm.
- A steep grade requires protective liner or realignment to reduce grade.
- Sedimentation where channel grade decreases or changes course may cause overtopping. Realign or deepen channel to maintain grade.
- At a low point in berm where diversion crosses a natural depression, the berm will need to be built up.
- At vehicle crossing points, maintain berm height, flatten side slopes, and protect ridge with gravel at crossing point.

Sites that have clean water running from above or across the site picking up sediment from the site, should consider piping the water across the site or using diversion ditches lined with geotextile fabric. The ditch shown on the right is lined with geotextile fabric to prevent erosion and limit soil contact with storm water. This minimizes the storm water runoff that is of concern on the construction site.

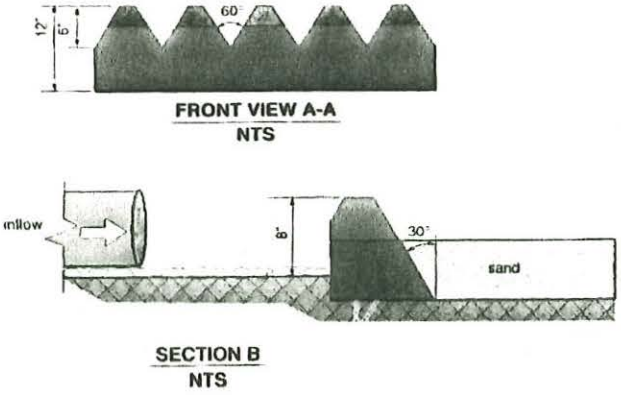
***Maintenance:***

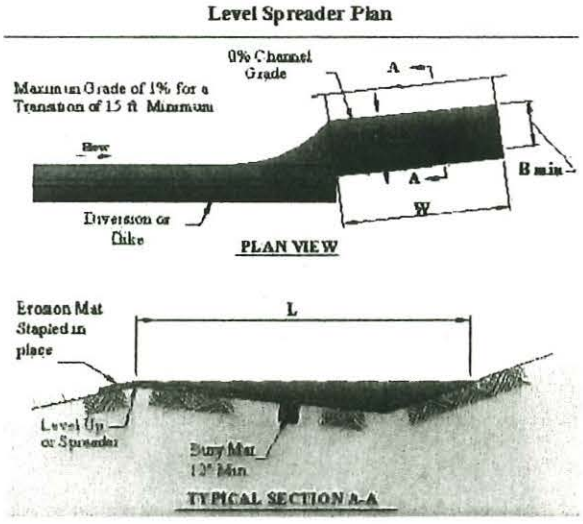
Permanent diversions should be checked following each rainfall until disturbed areas are stabilized. Inspect temporary diversions once a week and following each major rainfall event. Remove accumulated sediment from the channel. Check the dike, swale, and outlets and make necessary repairs immediately. Reseed areas that fail to establish a vegetative cover. Temporary diversions may be removed and blended with the natural topography when the area protected is permanently stabilized.

## BMP #16 - Level Spreaders

***Description:***

Level spreaders or interceptor dikes and swales are used on long, exposed slopes or at the tops of shorter slopes. They are used at outfalls or discharge pipes to assist with conversion of channelized flow to sheetflow in fairly level areas. The velocity of the runoff can be reduced, and flows diverted from exposed areas by utilizing this type of structural control. Level spreaders provide a moderate amount of infiltration by providing temporary storage of discharges and spreading runoff over a larger area for potential infiltration into the soil. They also dissipate the erosive potential of channelized water as the flow is discharged into a trench and then over a berm. The trench and berm are covered with gravel that disperses the water over a large area, preventing them from concentrating and resulting in erosion.




**Basic Design and Construction:**

- The spreader needs to be level across the top and bottom to prevent channelized flow leaving the spreader or ponding behind the spreader.
- The slope leading into the spreader should be less than or equal to 1%. Leaving the spreader, it should be less than 6%.
- The width of the spreader should be at least 6 feet, the height at least 6 inches.
- Material can be washed rock, concrete curb or wooden boards.

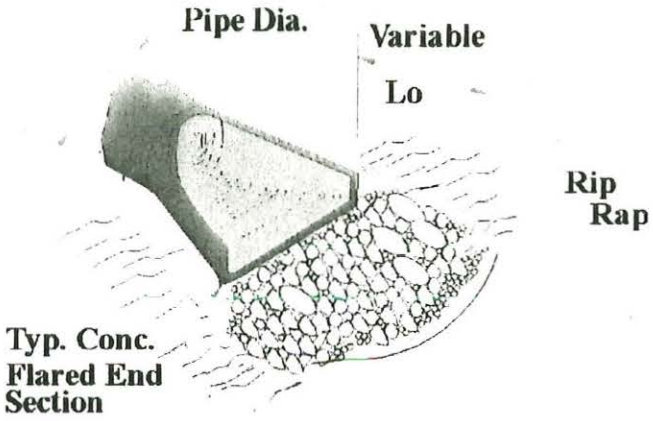
***Maintenance:***

- Spreader should be checked after every rainfall event to make sure it is level and functioning as intended.

## BMP #17 - Outlet Protection

***Description:***

Outlet protection involves the use of an energy-dissipating device at the outlet of a pipe or conduit to prevent excessive erosion (scour) from the discharge of runoff. Outlet protection is needed at outlets subjected to erosion and scour due to the exit velocity exceeding the allowable velocity for the soil discharged upon. Outlet protection structures take can be manufactured from a number of different materials.




***Basic Design and Construction:***

Concrete/Paved Outlet Protection: Concrete or paved outlet protection is a permanent form of structure and, therefore, should be designed by a qualified engineer. The design and installation of such a structure should follow plan specifications.

Riprap Outlet Protection: Excavate subgrade below design elevation to allow for thickness of filter and riprap. Compact any fill used in the subgrade to the density of the surrounding undisturbed material. When applicable, smooth the subgrade to prevent tears of the filter fabric. Even if not shown on plans, filter stone, fabric, or a blanket should be placed prior to placing the riprap to help prevent subgrade erosion. Filter fabrics should be of extra-strength quality and should be installed in continuous sections, placing the upstream section of fabric a minimum of 1 foot over the downstream section of fabric. Fabrics that are torn during riprap installation should be fully replaced.

Install riprap of the size and thickness as shown on plans to ensure a minimum thickness of 1.5 times the maximum stone diameter. Maintain final structure to the lines and elevations as shown in plans, taking care not to place stones above the finished grade.

Apron Installation:

Nondefined Channel: Apron should be constructed on a zero grade, aligned straight, and be long enough to adequately dissipate energy. There should be no restrictions or overfall from the apron end to the receiving grade.

Well-Defined Channel: Apron should be straight and properly aligned with the receiving stream. The apron should extend to the top of the bank and be long enough to adequately dissipate energy. There should be no restrictions or overfall from the apron end to the receiving channel.

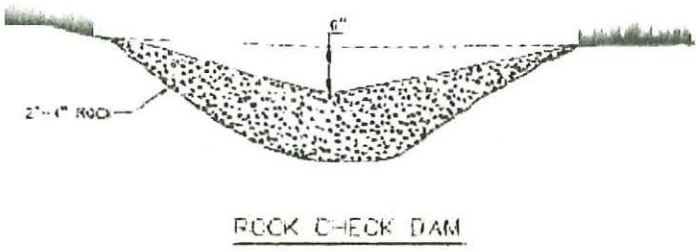
***Design Considerations:***

- If the foundation not excavated deep enough or wide enough, riprap will restrict flow across sections, resulting in erosion around apron and scour holes at outlet.
- If the riprap apron is not on a zero grade, erosion will result downstream.
- If the stones are too small or not properly graded, this results in movement of stone and downstream erosion.
- If riprap not extended far enough to reach a stable section of channel or adequately dissipate energy, there will be downstream erosion.
- If an appropriate filter is not installed under riprap, this may result in stone displacement and erosion of the foundation.

***Maintenance:***

- Riprap outlet structures do not require much maintenance when properly installed, but they should be checked after heavy rains for erosion at sides and ends of the apron and for stone displacement. Repair damage immediately using appropriate stone sizes.
- Modify size and depth as needed to prevent erosion and scouring.
- Check outsides of pad to verify that pad is wide and long enough to prevent erosion along the edges.

## BMP #18 - Check Dams




ROCK CHECK DAM

***Description:***

A check dam is a small dam constructed in a drainageway to reduce channel erosion by restricting the flow velocity. Dams can be built from stone, logs, gravel filled bags, and can be temporary measures or permanent installations. These structures also tend to act as sediment control structures, so it is important that they be inspected and maintained regularly to insure adequate performance. Check dams are appropriate for use in small drainage areas and are not for use in perennial streams.

Check dams are useful:

- In temporary swales and ditches where lining with non-erodible materials is not practical, but

erosion protection is necessary.

- When construction delays or weather conditions prevent timely installation of non-erodible lining.
- In either temporary or permanent ditches or swales which need protection during the establishment of grass linings.

***Basic Design and Construction:***

- Dams should be spaced so that the top of the downstream dam is at the same elevation as the toe of the upstream dam. It is important that the center section of the dam be lower than edges. If the edges are lower or at the same elevation as the center the chance for washouts at the ends increases dramatically.
- Check dams are usually constructed of 3"-6" riprap, logs, sandbags, and/or straw bales.
- The maximum check dam height should be 2 feet.
- Multiple check dams should be spaced so that the bottom elevation of the upper dam is the same as the top elevation of the next dam downstream.
- The center of the check dam should be a minimum of 6 inches lower than the ends to act as a spillway for runoff and prevent water from flowing around the check dam or eroding the bank.
- Overflow areas should be stabilized to resist erosion.
- Stone check dams should use 3 inch or larger stone with side slopes of 2:1 or flatter and should be keyed into the sides and bottom of the channel a minimum depth of 2 feet. The drainage area for a stone check dam should not exceed 50 acres.
- Log dams should be constructed with 4 to 6 inch diameter logs and should be embedded a minimum of 2 feet. The drainage area for a log check dam should not exceed 5 acres. Note that removal of a log check dam can result in more soil disturbance than removal of other types of check dam.
- Straw bales are effective with low flows and should be overlapped and embedded a minimum of 4 inches with stakes angled slightly upstream. The drainage area for straw check dams should not exceed 2 acres.

***Design Considerations:***

- Check dams are designed for velocity reduction and erosion control and are not intended to trap sediment, although sediment buildup will often occur. Sedimentation can clog the dam causing ponding which may kill the vegetative lining if submergence after rains is too long and/or siltation is excessive.
- If the overflow area not stabilized, downstream erosion may result. Stabilize the streambed and bank with riprap or equivalent. Extension of downstream embankments to stable grades is also effective.
- When overflow occurs at the abutments, the spillway will need to be lowered or enlarged.
- Check dams may be removed when their useful life has been completed. All stones should be removed from grass channels that require mowing. Care should be taken when removing check dams so as not to damage channels that are permanent.

***Maintenance:***

- Regularly inspect a check dam to ensure the dam has not been breached or otherwise damaged. The center elevation of the dam should be checked to ensure it is lower than the ends of the dam.
- Sediment accumulation behind the dam should be removed as needed to prevent damage to channel vegetation and to allow the channel to drain through the dam; otherwise remove sediment when it reaches half the dam's height.

- Repair a damaged check dam promptly so the check dam will be fully functional for the next runoff event.

## BMP #19 – Terracing

***Description:***

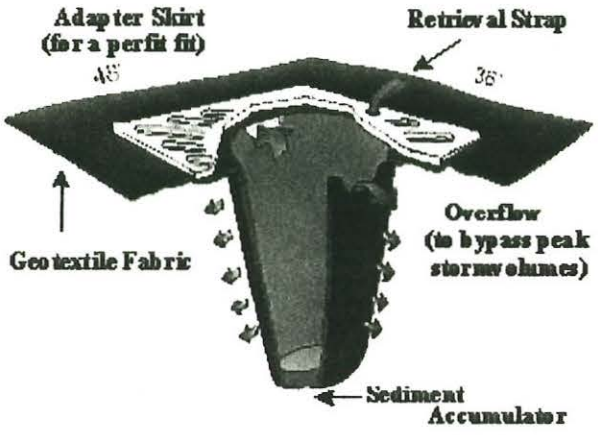
Terraces are constructed across slopes and form a series of channels and earthen embankments that reduce erosion by breaking the long slope into several shorter sections. The speed of the runoff is thereby reduced as is the amount of sediment loss. Runoff is collected in the terrace channel and can be stored for infiltration into the soil or diverted through some kind of erosion resistant outlet.

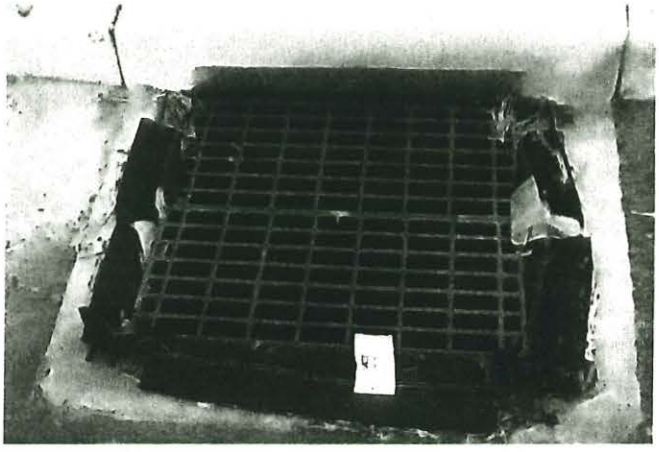
***Efficiency*:**

Soil loss can be reduced by 50 percent or more.

| Land Slope | Reduction in Erosion |
|---|---|
| 1-12% | 70% |
| 12-18% | 60% |
| 18-24% | 55% |

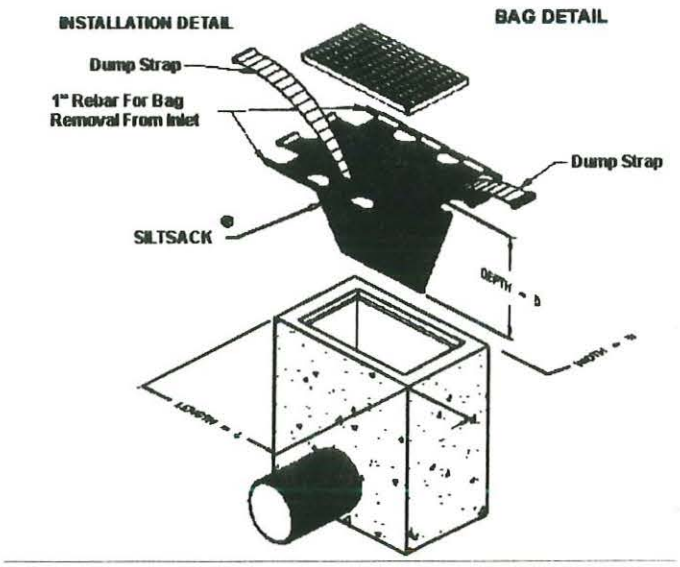
## BMP #20 - Catch Basin & Inserts



***Definition*:**

A catch basin is coupled with a sump and sediment traps. It may also be used with an inlet device, prefiltering insert and screens (see other facilities and retrofit). The inserts consist of several filtering trays suspended from the inlet grate. Common filters are charcoal, wood fibers or fiberglass. The catch basin will retain small particles, and is partially effective with high levels of particulate heavy metals, oil/grease, and TSS. However, few pollutants are associated with these coarser solids. Inserts are best in small basins and with treatment of highly turbid runoff prior to discharge to the catch basin.




***Basic Design and Construction:***

- Usually used with vaults, tanks, sumps or inverted (hood) inlet. Inlet can be coupled with a filtration system (see retrofit).
- Catch basins with a restrictor device (multiple orifice and weir/riser section) for controlling outflow provide minimal control for floatables and petroleum based products.
- Design the size of catch basin sump to handle the site runoff rate, TSS concentration in runoff and how often it will be cleaned out.
- To minimize groundwater pollution problems, be careful where infiltrating catch basins are used (residential areas) and pre-treat the infiltration water.

***Design Considerations:***

- Disadvantage: When 60% full the suspended solid deposition is in equilibrium with scour, and the capture efficiency is reduced to zero.
- Do not use on unstable or steep slopes

***Maintenance:***

- Maintenance is critical and must be at least semiannual. Require a maintenance schedule and plan for disposal of material removed by the catch basin.
- Insert maintenance is required quarterly and should be inspected more frequently during wet periods.

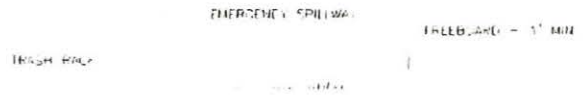
***Efficiency*:**

TSS up to 22%, and Turbidity up to 38%. **Catch basin inserts are the recommended method for sediment control, especially for street and lot catch basins after the first layer of pavement is installed.**

## BMP #21 - Sediment Basin

***Definition:***

A basin constructed above original ground surface to capture sediment from upland sources. Sediment basins are earthen embankments constructed across a minor watercourse to form a sediment trap and water detention basin. A perforated stand pipe is generally used to slow the release of water from the basin, thus allowing the suspended soil particles time to settle. The water passes from the stand pipe to a subsurface pipe which carries the water downslope to a stable outlet.



***Basic Design and Construction:***

- Basins should be located in low gradient reaches of stream.
- Build the basin large enough to control the expected volume of water runoff
- Use fill material free of sod, roots, and stones larger than 6 inches in diameter. It should also have correct moisture content for adequate compaction.

***Design Considerations:***

- Potential impacts of dam failure.
- Obtaining necessary permits from regulatory agencies.
- Once the sediment basin is constructed, accessibility of site by equipment and vehicles to remove accumulated sediment is limited.
- Availability of suitable spoil locations on-site and feasibility off-site spoil location (End-Hauling).
- Temporary stream flow diversion away from work area if operating in a perennial stream.
- Trees, stumps, rocks & boulders removed to construct the sediment basin should be replaced.

***Maintenance:***

- Excavate accumulated sediment regularly.
- Repair of grade structures or channel lining as needed.
- Remove obstructions which may plug outlet.
- Reseed and fertilize as necessary to maintain vegetative cover.

***Efficiency:***

Average – 70% percent removal of TSS (EPA, 1999)
Range – 55% - 100%

# BMP #22 - Vegetated Filter Strip

***Description:***

Vegetated filter strips (VFS) are land areas of either indigenous or planted vegetation, situated between a potential pollutant source area and a surface water body that receives runoff. They remove sediment and other pollutants from runoff and wastewater by infiltration, deposition, absorption, adsorption, and decomposition, reducing the amount of pollutant entering the surface waters. VFS are most effective in removing sediments. The longer the flow path of storm waters through vegetation, the better the pollutant removal.

***Basic Design and Construction:***

- All trees, brush, stumps, rocks and similar materials that can interfere with installing the filter strip should be removed.
- The appropriate size and shape of the filter strip is dependent on a number of factors: type and quantity of pollutant, soil characteristics, infiltration rate, permeability, percent slope, etc.
- The contributing area should be limited to 10 acres and slopes should be moderate to prevent channelized flow from forming. Length and width should be 50 feet and 20 feet at a minimum (EPA, 1996). A roughened surface is preferred to slow surface runoff and thus increase infiltration. VFS need the following elements to work correctly:
- A device such as a level spreader to ensure that runoff passes through as sheet flow.
- Plants selected for filter strips should have dense top-growth and provide good, uniform soil cover, and a fibrous root system for stability. The type of vegetation selected should be adapted to local soil and climatic conditions and have good regrowth following dormancy and cutting.
- Grasses are more effective than broadleaf plants for erosion control since they form a dense sod, have a fibrous root system and a more complete ground cover.
- Regrading may be necessary to ensure a gentle slope of no more than 5 percent.

***Design Considerations:***

- VFS are designed to be used under conditions in which runoff passes over the vegetation in a uniform sheet flow. Such a flow is critical to the success off the filter strip. If runoff is allowed to concentrate, it will be easily inundated and will not perform to its fullest capability.
- A filter strip is an edge-of-the-site BMP and should be used in conjunction with other BMPs that are designed to reduce soil loss.
- Quality of vegetation in the filter strip is an important factor in determining effectiveness. Poor quality vegetation may have increased amounts of sediment leaving the filter.

***Maintenance:***

- Frequent inspections are necessary the first few years until vegetation is well established.
- Periodic regrading and sediment removal may be necessary.
- Plant density should be encouraged by fertilizing and weeding periodically. Reseeding may also be necessary.
- Minimize the development of erosion channels within the filter. Even small channels may allow

runoff to bypass the filter.

***Efficiency:*** Average – 70% percent removal of TSS (EPA, 1999)
Range – 20% - 80%

## BMP #23 - Bioswales

**For further information on Bioswales see the Biofilters document at http://www.deq.state.or.us/nwr/stormwater.htm.**

***Description:***

Swales are shallow ditches with grass or other vegetation that act as filters for runoff from frequent storms. The principle form of treatment is the settling out of pollutants and the use of vegetation to take up the dissolved fraction. For best results a swale should be designed to deal with the peak runoff for a two year, 24 hour storm event. Bioswales do well with first flush runoff, are economically feasible, improve aesthetics and have minimum environmental impacts. The organic topsoil layer is good for degrading petroleum solvents, heavy metals, nutrients and hydrocarbons. They can be placed anywhere with careful site design, but are best when located where water can pond and settle out sediments, such as at a storm water outfall, commercial development or road side.

***Basic Design and Construction:***

- Critical design elements: size of drainage area to be treated, location of bioretention areas, sizing guidelines, calculate water budget
- Biofiltration is suitable for smaller sites 10 or less acres
- Needs a minimum width of 20 feet
- Must be graded to create sheet flow not a concentrated stream. Sheet flow decreases the chance of producing gully erosion and distributes contaminants over a wider area. Level spreaders (i.e. slotted curbs) can be used to facilitate sheet flow.
- Best when used for treatment and conveyance of storm water after a settling pond.

- Best at 200 feet in length, in tight spaces obtain more length by using a curved path. Should have a maximum bottom width of 50 feet. One foot high check dams should be installed every 50 feet starting 20 feet downstream from the inflow point.

***Design Considerations:***

- Do not use on steep, unstable slopes or landslides.

***Maintenance:***

- Vegetation in the bioswale should be trimmed every year or two to prevent woody species from taking over. Clippings from plants should be disposed of properly as they may have absorbed hazardous toxins.
- Regrading may be necessary to reshape the shallow-broad shape as sediments collect and form pools. As with plant waste, sediments should be removed and disposed of properly.

***Efficiency:***

Total Suspended Solids – 83 to 92%, Lead – 67%, Copper – 46%, Total phosphorus – 29 to 80%, Total zinc and aluminum – 63%, Dissolved zinc – 30%, Oil/grease – 75%, Nitrate-N – 39 to 89%

## BMP #24 - Constructed Wetlands


**For further information on Bioswales see the Biofilters document at http://www.deq.state.or.us/nwr/stormwater.htm.**

***Description:***

Constructed wetlands are man-made, engineered wetland areas created through a combination of excavation and/or berming. The basic types of constructed wetlands are shallow marsh, 2 or 3 celled pond/marsh, extended-detention wetland, and pocket wetland. Extended-detention and pocket wetlands are less effective in removal of some types of pollution than other types of wetlands. They are particularly good for the removal of nutrients and conventional pollutants such as oil and grease and some heavy metals.

***Basic Design and Construction:***

- Suitable for larger sites, up to 100 acres.

- Shape should be long, narrow and irregular since these are less prone to short circuiting, are more effective and maximize the treatment area.
- Soils should be tested to determine suitability. Best when located in clay loams, silty clay loams, sandy clays, silty clays and clays.
- The permanent pool depth should be between 3 to 6 feet, plus one foot of dead storage for sediment. Six feet is the maximum depth or the pond will stratify in summer and create low oxygen conditions which result in the re-release of phosphorus and other pollutants. In addition if the pond is deeper than 6 feet it will likely pollute the groundwater.
- Cannot be used in areas with shallow depth to bedrock or unstable slopes.
- Needs to have a shallow marsh system in association to deal with nutrients.
- Should be multi-celled preferably three of equal sizes, the first cell should be 3 feet deep to trap coarse sediments and slow turbulence. They need to be designed as a flow through facility, and the pond bottom should be flat to facilitate sedimentation.
- Side slopes should be 2:1, not steeper than 3:1, and 10 to 20 feet in width. A length to width ratio of 5:1 is preferred, with a minimum ratio of 2:1 to enhance water quality benefits. The longer length allows more travel time and opportunity for infiltration, biofiltration and sedimentation.
- Pond berm embankments over 6 feet should be designed by a registered engineer. Berm tops should be 15 feet wide for maintenance access and should be fenced for public safety.
- Baffles can be used to increase the flow path and water residence time.
- Should have an overflow system/emergency spillway to deal with a 100 year 24 hour flood, and a gravity drain.
- Access to the wet pond is to be limited with a gate and signs posted.
- For mosquito control either stock the pond with fish or allow it to be drained for short periods of time (do not kill the marsh vegetation).
- Constructed wetland is more complex, with more vegetation, and shallower with greater surface area, hydrologic factors (flow) play a larger part in siting.
- Selection of vegetation should be done by a wetland specialist.
- Oil/water separators can be used prior to the constructed wetland depending upon the surrounding land uses.
- Relatively low maintenance costs.
- Fence off for safety and to protect plants/wildlife.

***Design Considerations:***

- Constructed wetlands have larger land requirements for equivalent service compared to wet ponds.
- Relatively high construction costs.
- Delayed efficiency until plants are well established (1 to 2 seasons).
- Need a buffer width of 25 to 50 feet.
- Water level fluctuations can kill plants.

***Maintenance:***

Maintenance is of primary importance. The site must be responsible. A maintenance plan needs to address removal of dead vegetation (that release nutrients) prior to the winter wet season, debris removal from trash racks, sediment monitoring in forbays and in basin are likely to contain significant amounts of heavy metals and organics (regular testing is advised).

***Efficiency:****

| | |
|---|---|
| Heavy metals = 40-80% | Nitrate = 65% |
| Total Phosphorus = 40-80% | COD = 2 |
| Total Nitrogen = 40-60% | Total Copper, Lead, Zinc = 80-95% |
| Sol. Reactive Phosphorus = 75% | Ammonia = -43 |

*Higher efficiencies are associated with the use of larger pond/marsh area and volume. These efficiencies assume that the intensity of the storm water inflow does not exceed the capacity of the wetlands and that the pollutants are not in a concentrated form from a large spill or discharge.

## BMP #25 - Excavated Sediment Trap

***Description:***

Sediment traps allow sediments to collect in runoff across exposed ground to settle out before runoff is released from the site. They are placed on the downslope side of the exposed areas. Sediment must be removed periodically to maintain the effectiveness of the trap in capturing sand sized sediment from upland sources. Sediment traps should be located in natural deposition areas as evidenced by sediment deposits or an abrupt change in grade.

***Basic Design and Construction:***

- The stream channel above and below the proposed excavation should be generally stable.
- A stream profile survey and cross sections through the proposed excavation shall be done to determine limits of excavation, depth of cut, and excavation volume.
- The storage capacity of the basin should be sized according to anticipated rate of sediment accumulation and frequency of maintenance. The desired capacity of the sediment trap should be balanced with the need to conform the sediment trap to the surrounding topography.
- Excavated channel grade should not exceed channel grade immediately above excavation.
- The outlet elevation should not be greater than the original channel elevation. If the outlet elevation is to be raised see design for Impoundment Basin.
- Excavated side slopes should stable from erosion under ponded conditions.
- The sediment trap inlet and outlet shall be stable for a 50yr-24hr storm. The necessary stability can be achieved with the aid of channel stabilization measures including grade control structures and channel lining.

***Design Considerations:***

- Sediment traps are based on the amount of unstabilized area. Please consult local ordinances as to specific size requirements.
- When choosing a location for a trap, make sure that the site will be low enough to accommodate any diversion berms, dikes or pipes.
- The trap must discharge runoff onto a stabilized area.

***Maintenance:***

- Repair grade structures or channel lining as needed.
- Remove obstructions which may divert stream flow.
- Sediment must be removed when it reaches half of the total sediment storage area.
- The trap should be checked after all significant rainfall for effectiveness in trapping sediments and for repairs to the trap.

***Efficiency:*** Average 60% percent removal of TSS (EPA, 1999).

## BMP #26 - Continuous Berm

***Definition:***

A continuous berm is a 12" by 12" fabric encapsulated tube of sand, aggregate or native soil. Multi-purpose in application, it can be used to intercept and divert sheetflow runoff, detain and pond sediment laden storm water or reduce flow velocities. By choosing the appropriate geosynthetic fabric, the berm can be designed to filter or contain sheet flows. The continuous berm can be used in conjunction with or in lieu of silt fences, straw bales, and other sediment control structures. The advantages of the CBM are that it reduces labor and backfilling, and eliminating trenching and staking.

***Basic Design and Construction:***

Continuous Berm Machine is a material feeding and fabric rolling system that creates a berm by wrapping geotextile fabric around sand, aggregate, or soil. Trenching is not necessary because the flexibility of the material and fabric allows the berm to form a tight seal with slightly irregular soil surfaces. Neither is staking necessary because of the weight of the berm (100 lbs./ft$^3$).

- Use geosynthetic fabrics having a high mass per unit area and high elongation properties for forming a continuous berm. Non-woven needle punch, woven monofilament and spun bond materials are acceptable. A non-woven needle punch fabric is highly recommended for most construction site applications. Materials with open weave cannot be used in the CBM.
- Fill continuous berm with sand, aggregate, or local soil as specified.
- Drainage of ponded waters is dependent upon fabric flow rates, infill material, and modifications to drainage chambers, if any.
- When a continuous berm is to function as a sediment trap, it is sometimes advisable to construct the berm with one or more 3/4 to 1 1/2 inch (20 to 38 mm) diameter aggregate filled drainage chambers. Length of drainage chambers is variable, but typically 6 to 10 feet (1.8 to 3 m). Drainage chambers must be located at low points to effect adequate drainage of ponded waters.
- Accelerated discharge through non-woven fabric can be effected by cutting 2 to 4 vertical slits in the upstream side of a berm's drainage chamber and inserting a 2 inch (51 mm) diameter PVC pipe 4 to 6 inches (101-152 mm) into the drainage chamber on the downstream side.
- Once a continuous berm has been placed, additional sealing of the berm to underlying ground surface occurs by having someone walk along the top of the berm. When continuous berms are stacked one on top of another to create a higher barrier, it is advisable to use a small vibratory plate compactor over the top of each layer of berm to compact infill materials, and provide a very stable base for subsequent berm layers.

***Maintenance:***

- Maintenance of a continuous berm requires minimal effort.
- If evidence of piping is detected, compacting loose soil in the area of failure results in mitigating the problem.
- If vehicles run over the berm causing damage, the area is typically repaired by re-stapling the fabric. In the event of major damage, a new section of berm can be placed in front of the damaged section.

When the berm is no longer needed, removal is completed by slitting the berm, spilling the fill material and incorporating it into the existing soil, and removing the fabric. Alternatively, the berm may be cut into 10 to 14 foot sections, and after stapling section ends, removed for future use.

***Efficiency:***

The Continuous Berm is rated at up to 95% efficiency in sediment removal.

## BMP #27 – Compost Berm

***Definition:***

A compost berm is an efficient way of preventing sediment and turbidity discharges from a construction site. Yard debris compost is used to build a dike which filters the storm water runoff. Most sediment and colloidal soil particles are negatively charged. Compost is positively charged which tends to attract and hold the soil particles.

**For further information on Compost for Erosion Control see the Biofilters document at http://www.deq.state.or.us/nwr/stormwater.htm.**

***Basic Design and Construction:***

The basic compost berm consists of a 2 feet wide by 1 foot high continuous pile of compost. The compost should be yard debris, leaf, or composted biosolids from a sewage treatment plant. The compost grade can be either two-inch minus, one inch minus, or half-inch minus. The grade should be associated with the slope of the area behind the berm. Steeper slopes generally should call for larger sized compost. Sheet flow of runoff is a must upgradient of the berm. This may be established by the application of a 2 inch thick compost layer on the slope, a silt fence installation, straw bales, or some other method for dispersing or preventing concentrated flows from occurring. The down stream side of the berm should not be bare soil or the runoff will pick up sediment and turbidity after the berm.

***Maintenance:***

The berm should be regularly inspected to ensure that the berm does not blow out form concentrated flows and to ensure that the compost does not become saturated, plugged, or rendered ineffective by some other method. This is a visual observation that must be made during storm water runoff. Turbidity breakthrough will be evident by muddy water flowing through the berm.

***Efficiency:***

On a 34 % slope, test have shown that settleable and suspended solids reduction were reduced 91.9% and 95% respectively over that discharged through a silt fence.

## BMP #28 – Compost Sock

***Description:***

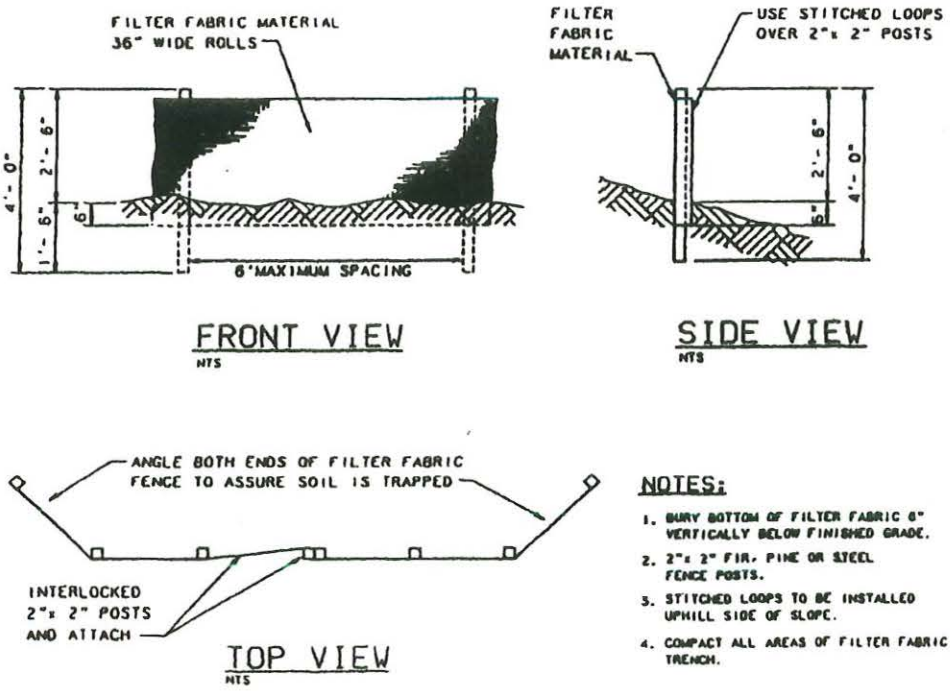
A Compost Sock is an approximate 12 inch diameter close weave sock either of synthetic or cotton fiber filled with mixed yard debris compost. It is heavy but can be moved. Deformation of the sock is sufficient to make a good seal between the sock and concrete or asphalt surfaces. It is blown on site to the desired length. The synthetic sock deteriorates in a couple of years and the cotton sock deteriorates in about a year. Seed can be blown in with the compost.

They can be staked and used as a check dam. A special sock tube is used which has a downstream skirt to protect the stream bed from any damage that may be caused from water overflowing the sock and undercutting the stream bed. The sock, when used as a check dam must be staked to prevent the water pressure from moving it.

***Efficiency:***

This is highly ineffective on turbidity and suspended solids. More than one sock may have to be used side-by-side.

# BMP #29 - Sediment Fences




***Description:***

Sediment fencing consists of a geotextile fabric usually 30 to 36 inches in width with regular spaced pockets for supporting posts. The weave of the fabric determines the size of the soil particle retained by the silt fence. As heavy large sized particles are retained, they create a build up effect, which will retain smaller sized particulate similar to the way an air filter becomes more effective as it retains dust. At some point the material behind a sediment fence becomes too efficient, causing the material to rise higher behind the fence and start the retention cycle all over again.

Sediment fencing cause heavy soil particles to be retained both through a filtering operation and through the creation of a small settling basin up slope of the fence through restriction and retardation of the runoff flow velocity.

Sediment fence spacing on slopes should be at no greater distance than:

| | Slope | Spacing |
|---|---|---|
| | <10% | 300 ft. |
| | <15% | 150 ft. |
| | <20% | 100 ft. |
| | <30% | 50 ft. |
| | <50% | 25 ft. |
| Stock Pile Slope | >50% | 25 ft. |

***Basic Design and Construction:***

- Sediment fence must be trenched at least 6" into the ground. The use of a "ditch witch" or other mechanical means is helpful.
- The sediment fence must be stretched tight between the posts. Do not allow the fence to sag or break away from the fence posts.

- More than one row of sediment fence may be required. Fencing should be located no more than 100' from the upper edge of a disturbed area. Space silt fencing in rows no greater than 100'.

***Design Considerations:***

Sediment fences are effective only in sheet flow conditions and should not be installed across streams or other concentrated flows. Turbidity reduction overall generally does not occur. The data indicates that a silt fence may in fact be detrimental in controlling turbidity. At best, a silt fence can be used to retain the heavy settleable solids while other erosion controls are necessary to reduce turbidity.

***Maintenance:***

Frequent removal of accumulated sediment and replacement of fabric should occur at least every six months when exposed to fine clay sediment runoff. A more proactive approach would be to replace the sediment fence every 30 days when exposed to clay-silt-loam runoff.

***Efficiency:***

This data indicates that sediment fencing can reduce TSS from 8 to 76% compared with no erosion control.

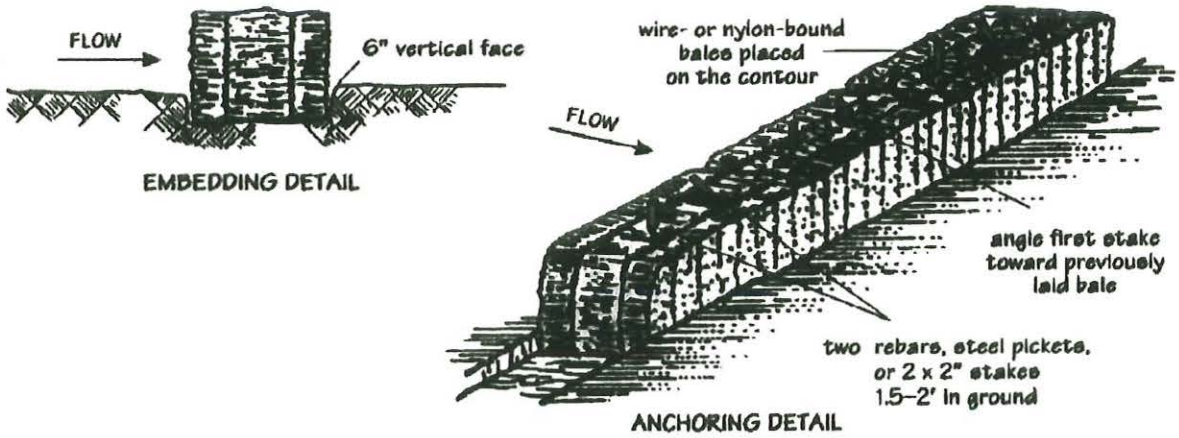
According to research conducted by Muson, 1991; Fisher et al, 1984; and Minnesota Pollution Control Agency, 1989, the following ranges of control can be obtained for TSS by using sediment fencing:

| | |
|---|---|
| Sand | 80% - 99% |
| Silt-Loam | 50% - 80% |
| Silt-Clay-Loam | 0% - 20% |

***Local Oregon Tests:***

| | Murray Boulevard | | | | St. Johns Landfill | | | |
|---|---|---|---|---|---|---|---|---|
| | Turbidity NTU | | Total Suspended Solids mg/l | | Turbidity NTU | | Total Suspended Solids mg/l | |
| Storm Date | Control | Sediment Fence | Control | Sediment Fence | Control | Sediment Fence | Control | Sediment Fence |
| 3/2/93 | 410.0 | 480.0 | 380.0 | 255.0 | 150.0 | 160.0 | 2,300.0 | 3,900.0 |
| 3/4/93 | 320.0 | 280.0 | 660.0 | 610.0 | 97.0 | 49.0 | 3,400.0 | 1,800.0 |
| 3/16/93 | 330.0 | 340.0 | 410.0 | 100.0 | 81.0 | 120.0 | 710.0 | 540.0 |
| 3/19/93 | 140.0 | **140.0** | 630.0 | 220.0 | 95.0 | 48.0 | 4,800.0 | 1,400.0 |
| 3/23/93 | 420.0 | **420.0** | 2,300.0 | 625.0 | 340.0 | 570.0 | 31,000.0 | 26,000.0 |
| Mean | **324.0** | **332.0** | 876.0 | 362.0 | **152.6** | **189.4** | 8,442.0 | 6,348.0 |
| Std. Dev. | **112.4** | **131.6** | 805.9 | 240.3 | 108.0 | 218.1 | 12,699.0 | 11,003.6 |
| Min. | 140.0 | 140.0 | 380.0 | 100.0 | 81.0 | 48.0 | 710.0 | 440.0 |
| Max. | 420.0 | 480.0 | 2,300.0 | 625.0 | 340.0 | 570.0 | 31,000.0 | 26,000.0 |
| Range | 280.0 | 340.0 | 1,920.0 | 525.0 | 259.0 | 522.0 | 30,290.0 | 25,560.0 |
| Median | **330.0** | **340.0** | 630.0 | 255.0 | **97.0** | **120.0** | 3,400.0 | 1,800.0 |

# BMP #30 - Straw Bales




***Description:***

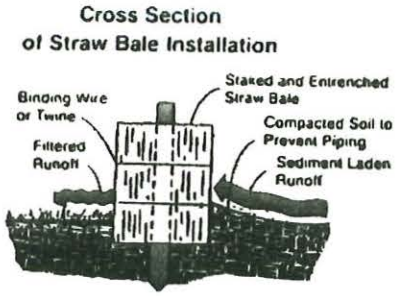
Straw bales can be used to filter out heavy sediments. The straw bales cause heavy soil particles to be retained both through a filtering operation and through the creation of a small settling basin up slope of the bales through restriction and retardation of the runoff flow velocity. There are two slightly different methods for installation. One is to place the bales in the ground so the straw is parallel to the ground and the other is to place the straw bales so that the straw in the bales is perpendicular to the ground. Filtering efficiency appears to be a bought the same in both installation methods. The installation method in which the straw bales are place with the straw perpendicular to the ground will protect the binding from rapid deterioration. In western Oregon the bales should be replaced approximately every six weeks during the wet season. During the wet season the wet bales deteriorate rapidly and become solid barriers which will no longer allow water to pass through them. The stock pile of replacement bales must be stored in a dry protected area to prevent them from deteriorating before they can be used.

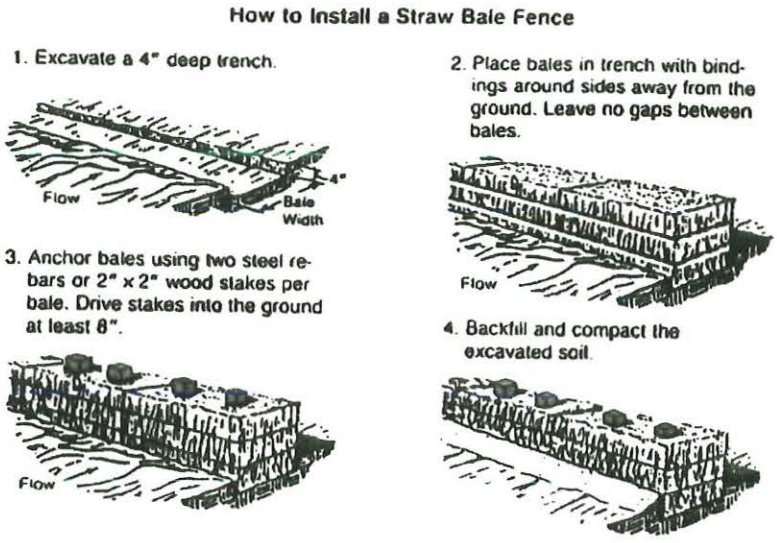
***Basic Design and Construction:***

Simply placing straw bales on the ground surface without proper anchoring and trenching will provide only minimal erosion control. Proper ground preparation, placement and staking are necessary to provide a stable sediment barrier. Straw bales must be properly installed to have the durability and effectiveness desired.

***Design Considerations:***

- Straw bales are most practical below disturbed areas where rill erosion occurs from sheet runoff.
- Straw bales may be used in minor swales where the drainage area is smaller than 2 acres and/or where effectiveness is required for less than 3 months.
- Straw bales used in conjunction with a check dam or filter berm constructed of sand and gravel provide more effective erosion control that requires less maintenance and can handle larger volume flows.
- Straw bales reduce the amount of dissolved oxygen in the storm water runoff as they decompose. This can be measured by the $BOD_5$ level increase as the decomposition increases.




***Maintenance:***

Maintenance of straw bales should be performed frequently as they become clogged with sediments. The sediment behind the bales needs to be removed regularly and replacement of the bales should be made as often as every thirty days depending on the amount of rainfall and sediment runoff. In no case should straw bales remain installed greater than 90 days without replacement with new straw bales.

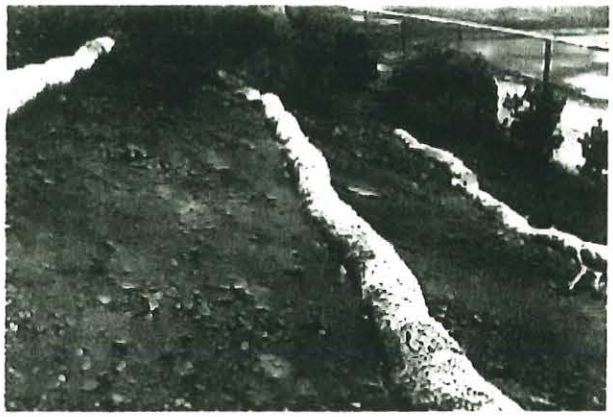
***Efficiency:***

TSS retention capacity averages about 70% according to Virginia, 1980 as cited by EPA, 1991.

## BMP #31 - Straw Wattles

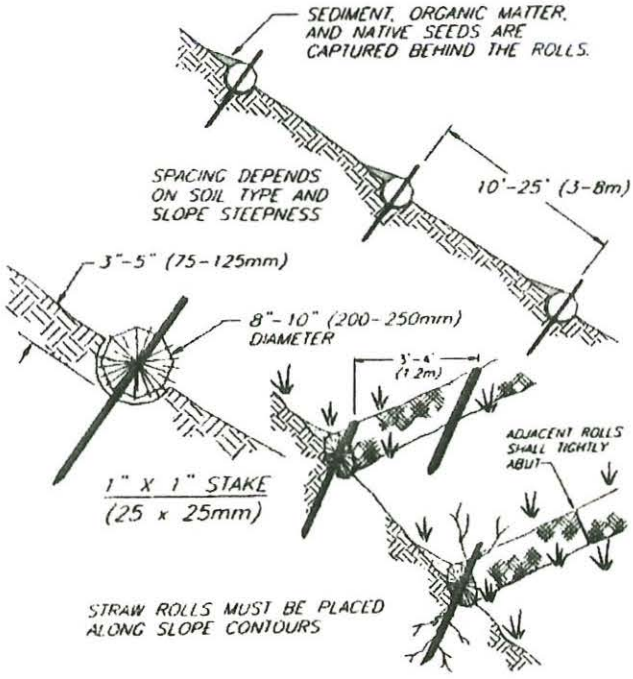
***Description:***

Straw wattles are manufactured tubular black plastic netting filled with rice straw. They are approximately nine inches in diameter and twenty-five feet long, weigh about 35 pounds and are easy to install. They can be installed on steep slopes and must be staked in position. Straw wattles act to disperse runoff laterally and trap sediments on the up-slope. If the soils are poor and need to be fertilized, the mini-terraces formed by the wattles encourage the nutrients to stay on the slope.



***Basic Design and Construction:***

- A trench should be excavated in which to lay the wattles, ensuring that water does not seep underneath the wattles.
- Wattles are placed along the contour of the slope to reduce water flows and trap sediments.
- Stakes should be driven in perpendicular to the slope.
- Make sure the wattle fits snugly against the adjoining wattle, without gaps or cracks.




***Maintenance:***

The sediment behind the wattles needs to be removed regularly and replacement of the wattles should be made every three years or when they appear to become plugged, i.e. water will not pass through.

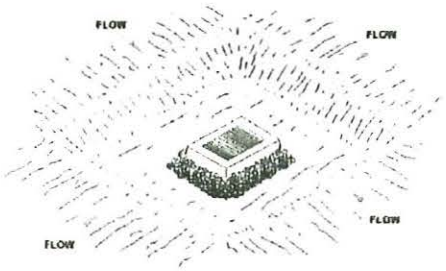
***Efficiency:***

When installed correctly they can equal the efficiency of straw bales at retaining sediments.

# BMP #32 - Catch Basin Inlet Protection

***Description:***

Inlet protection involves using a temporary barrier to prevent the inflow of settleable sediments and debris into a storm drain or other form of conduit. Inlet protection is used to prevent sediment from entering and clogging the storm drainage system prior to permanent stabilization of a construction area. This practice helps to keep the conveyance channel free from debris or sedimentation that could reduce the capacity of the channel.




***Basic Design and Construction:***

Several techniques of inlet protection currently exist. Each procedure may require excavation and/or the use of a dike or berm for establishment of a drop area. Drop areas are used to promote ponding that allows for settlement of sediment and to help prevent flow bypass of the inlet. Some inlet protection devices are designed for use on sites that have not been paved, while others, such as bio bags, are only effective when used on paved surfaces. Although other innovative techniques exist for accomplishing the same purpose, basic design and installation procedures for some of the most commonly applied processes are as follows:

## *Protection for Unpaved Surfaces:*

**Excavated Drop Inlet Protection**

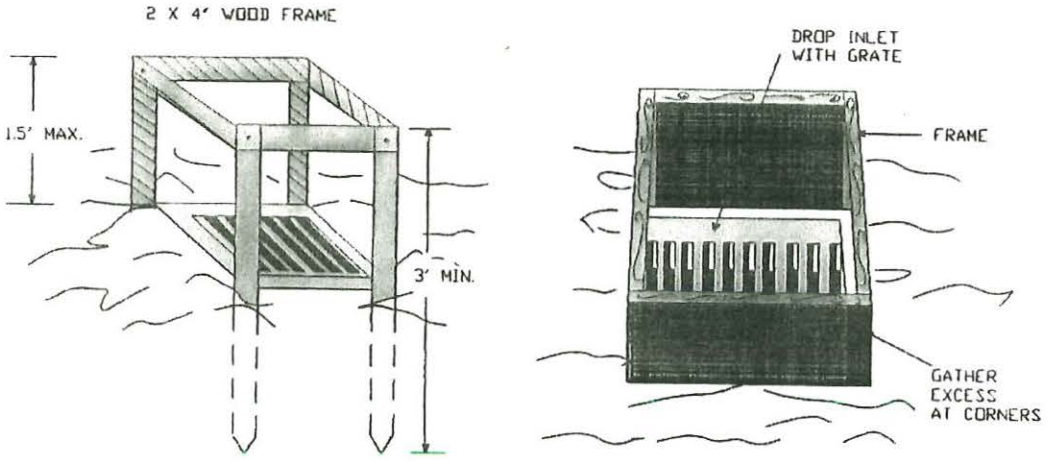
This process is limited to maximum drainage areas of 1 acre. The area is excavated 1 to 2 feet deep, as shown in the diagram on the preceding page, and wide enough to create a total storage volume of at least 35 cubic yards per acre. When possible, shape the basin to orient the longest dimension toward the largest inflow. Side slopes should be 2:1 or flatter.

Common inlet protection techniques for this method include placement of weep holes at the bottom of the basin to allow drainage of the trap, covering of weep holes with a wire mesh or hardware cloth, then covering with gravel to hold sediment in place. It is important that the openings in the mesh be slightly less than the minimum size aggregate used to prevent gravel from entering the inlet. A maximum 1 inch gravel size is suggested.

**Straw Bale Drop Inlet Protection**

This process is limited to maximum drainage areas of 1 acre. The straw bales should meet the requirements for a Straw Bale Barrier. Bales are placed in a 4 to 6 inch trench dug around the inlet and are staked in accordance to the requirements for a Straw Bale Barrier. Bales can be anchored in areas where trenching is not feasible, such as a finished road surface, by placing gravel around the base of the bales. Be sure to tightly chink spacing between bales with loose straw to prevent sediment-laden runoff from free flow.

**Filter Fabric Inlet Protection**




This process is limited to maximum drainage areas of 1 acre. The fabric should be of extra-strength quality and resistant to ultraviolet degradation if duration of use will exceed 60 days. A wire fence (14-gauge minimum with a maximum mesh spacing of 6 inches) may be necessary to support the fabric.

Support posts should be either steel fence posts or 2 x 4 inch wooden post, each at least 3 feet long. The structure should be able to support a 1.5 foot head of water and sediment without collapsing or undercutting. Posts should be driven approximately 1.5 feet and include, when necessary, top supports to prevent collapse of the structure.

Fabric should be a continuous sheet, trenched at least 1 foot to prevent undercutting, then backfilled and compacted with soil or crushed stone. Secure fabric to the post and/or support fence (when used), thus stretching fence to top level. The top should be level to help provide for uniform overflow.

## *Protection for Paved Surfaces:*

**Gravel Curb Inlet Sediment Filter**

The curb inlet should be covered with a wire mesh or filter fabric in excess of 12 inches over the top of the inlet cover and 12 inches past the inlet opening. Gravel is then placed over the wire mesh. This method should only be used if ponding will not cause damage to the adjacent areas.

***Design Considerations:***

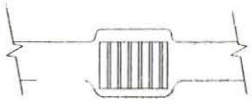
- Sediment fills the designated trap and enters the storm drain; the sediment-producing area is too large for installed trap or the inlet is not properly maintained and cleaned.
- Excessive ponding around inlet; the gravel or other appropriate filtering method may be clogged with sediment. Remove debris, clear sediment, and replace filter device being used.
- Sediment not removed from trap; failure to remove sediment may result in inadequate storage volume for next storm.
- Protection device not erected against inlet; this may result in erosion and undercutting of the inlet.
- Temporary dike below the inlet not maintained; this may result in flow bypassing the storm inlet.
- Post and fabric not supported at top; this may result in collapse of the structure.
- Fabric not properly buried at bottom; this may result in undercutting.

- Fabric barrier constructed too high; this may result in storm water bypassing the storm inlet or collapsing structure.
- Flooding and erosion due to blockage of inlet; install a trash guard.
- When the contributing drainage area has been stabilized, inspected, and approved, remove construction materials and any unstable sediment from inlet and dispose of them properly. When necessary, grade the disturbed area to the inlet elevation as shown on plans. Stabilize all bare areas immediately.

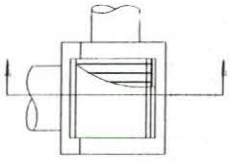
***Maintenance:***

The effectiveness of the inlet protection is dependent on follow-up maintenance. Inspect inlets following each storm event and remove accumulated sediment and debris. Make any needed repairs immediately.

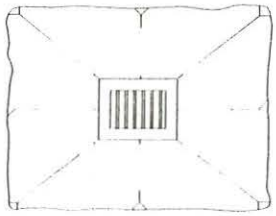
**Bio-Filter Bags**



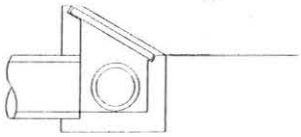
CATCH BASIN



PLAN



AREA DRAIN



DITCH INLET

***Description:***

Bio-filter bags (Biobags) are woven 12" by 9" by 40" nylon mesh bags containing bark and/or wood chips. There are at least two sizes of biobags. The most common size of biobag is approximately eighteen inches long. They are commonly used as an alternative to straw bales to remove energy from concentrated flows or for protection around catch basins. Biobags are much lighter than straw bales and must be staked down to keep them in place.

***Basic Design and Construction:***

Biobags can be used in a number of locations and in a variety of arrangements around the storm-drains. They should be positioned so that there are no gaps between the bags that could allow runoff to reach the stormdrains unfiltered. **Due to their high maintenance and potential for damage or displacement on paved areas, biobags should not be used on paved areas after the first layer of pavement is installed.**

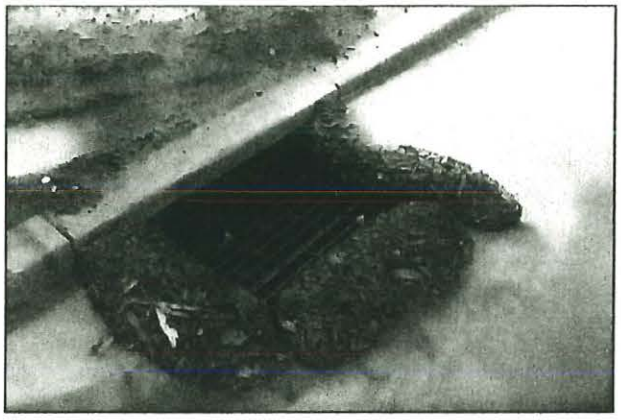
***Design Considerations:***

Biobags are more permeable than straw bales, but slow water sufficiently to trap sand, silt and clay.

They fit the contours of the land, avoiding the bridging problem of straw bales. They hold together better, and can therefore be removed more easily when saturated. Wildlife won't tear them apart to eat them and they will not introduce grass and weed seeds to the site.

***Maintenance:***

- Removing accumulated sediment from behind the biobag to ensure efficient sediment removal.
- Replace biobags whenever they become plugged with sediments or damaged, such as when vehicles run over or dislodge them. With their much more open voids and their ability to retain larger particle sizes of sediment, it is very important to replace the biobag when water can no longer pass through them.



***Efficiency:***

They have the least retention of any of the erosion controls but can serve a valuable purpose in retaining larger pieces of the sediment when properly maintained. Unfortunately, they are seldom maintained and are quite frequently damaged by traffic shortly after installation. Also, at the time of removal, very few are removed properly so that any sediment retained is also cleaned up. Biobag use on paved roads for catch basin protection is not a highly recommended practice.

## BMP #33 - Flocculants and Coagulants


***Description:***

Fine particles suspended in water give it a milky appearance, usually measured as turbidity or total

suspended solids. Their small size, often much less than 0.001 mm in diameter, give them a very large surface area relative to their volume. These fine particles typically carry a negative surface charge. Largely because of these two factors, small size and negative charge, these particles tend to stay in suspension for extended periods of time. Because of this, removal is not practical by settling alone. Polymers and inorganic chemicals speed the process of clarification. The added chemical destabilizes the suspension and causes the smaller particles to agglomerate. The process consists of three steps: coagulation, flocculation, and settling or clarification.

***The conditions under which clarification is achieved can affect performance.***

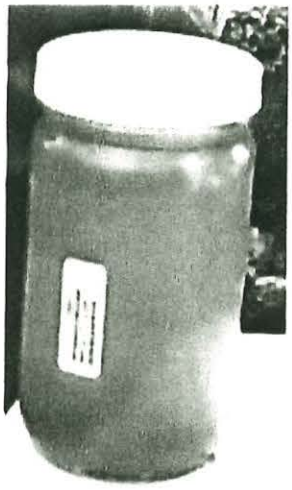
Currents can reduce settling efficiency. Currents can be produced by wind, by differences between the temperature of the incoming water and the water in the clarifier, and by flow conditions near the inlets and outlets. Calm water such as that which occurs during batch clarification provides a good environment for effective performance, as many of these factors become less important in comparison to flow-through clarification basins. One source of currents that is likely important in batch systems is movement of the water leaving the clarifier unit. Given that flocs are relatively small and light the exit velocity of the water must be as low as possible. Sediment on the bottom of the basin can be resuspended and removed by fairly modest velocities.

***Coagulants and flocculant-aids:***

Polymers are large organic molecules that are made up of sub-units linked together in a chain-like structure. Polymers that carry groups with positive charges are called cationic. Cationic polymers can be used as primary coagulants to destabilize negatively-charged turbidity particles present in storm water. Inorganic chemicals such as aluminum or ferric sulfate and aluminum or ferric chloride can also be used, as these chemicals become positively charged when dispersed in water.

Recently a flocculant has become available made from crab and shrimp shells call chitosan. This flocculate comes in a liquid or a paste. The paste form is packaged in a multichambered sock for placement inside of a pipe where the storm water runoff will flow around it dissolving the amount of flocculant needed to settle out sediments and turbidity. Settling is readily apparent after five minutes.

Chitosan Sock (Left) and Treated high turbidity sample after five minutes (Right)



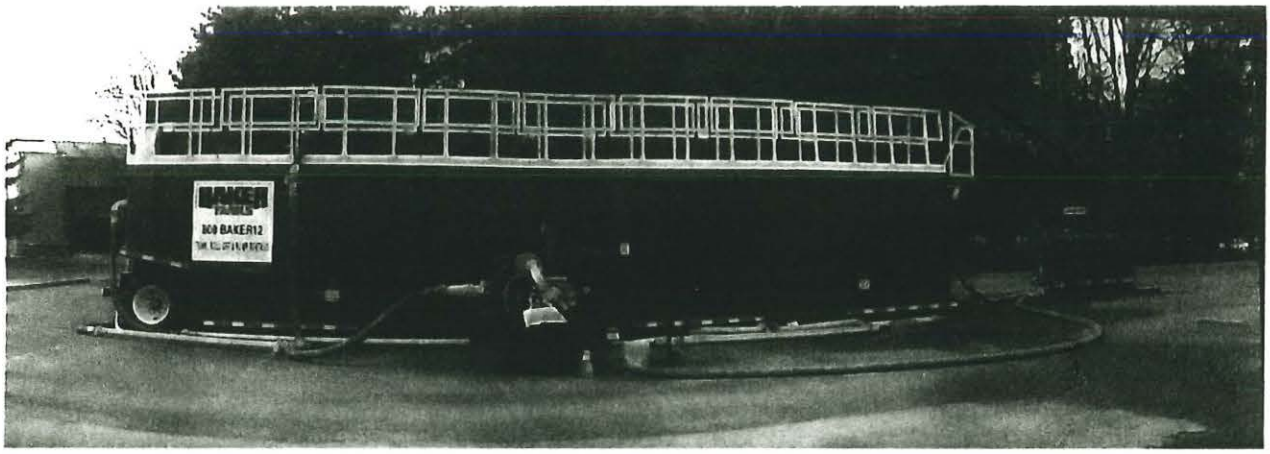
***Basin Design and Construction:***

In practice, the only way to determine whether a polymer is effective for a specific application is to perform preliminary or on-site testing. Polymer effectiveness can degrade with time and also from other influences. Thus, manufacturers' recommendations for storage should be followed.

Application of coagulants and flocculant-aids at the appropriate concentration or dosage rate for optimum turbidity removal is important for management of chemical cost, as well as for effective performance. The optimum dose in a given application depends on several site-specific features. The turbidity of untreated water is a primary determinant. The surface charge of particles to be removed is also important, as previously noted. Environmental factors that can influence dosage rate are water temperature, pH, and the presence of constituents that consume or otherwise affect polymer effectiveness (for example, color, oils). Preparation of working solutions and thorough dispersal of polymers in water to be treated is also important to establish the appropriate dosage rate.

Design engineers wishing to review more detailed presentations on this subject are referred to the following textbooks:

- Fair, G., J. Geyer and D. Okun, *Water and Wastewater Engineering*, Wiley and Sons, NY, 1968.
- American Water Works Association, *Water Quality and Treatment*, McGraw-Hill, NY, 1990.
- Weber, W.J, *Physiochemical Processes for Water Quality Control*, Wiley and Sons, NY, 1972.



**Baker Tanks Chitosan System with filtration**

Baker Tanks has put together a system using a frac tank and a filter package which is portable and employs the use of Chitosan very effectively.

***Design Considerations:***

The above discussion indicates that the design and operation of a polymer system should take into consideration the factors that determine optimum, cost-effective performance. It may not be possible to fully incorporate all of the classic concepts into the design because of practical limitations at construction sites. Nonetheless it is important to recognize the following:

- The right polymer must be used at the right dosage. A dosage that is either too low or too high will not produce the lowest turbidity. There is an optimum dosage rate. This is a situation where the adage "more is always better" does not apply.

- The coagulant must be mixed rapidly into the water to ensure proper dispersion.
- A flocculation step is important to increase the rate of settling, to produce the lowest turbidity and to keep the dosage rate as low as possible.
- Too little energy input into the water during the flocculation stage results in flocs that are too small and/or insufficiently dense. Too much energy can rapidly destroy floc as it is formed.
- Since the volume of the basin is a determinant in the amount of energy per unit volume, a basin can be too big relative to the size of the energy input system.
- Care must be taken in the design of the withdrawal system to minimize outflow velocities.

***Number and volume of treatment cells:***

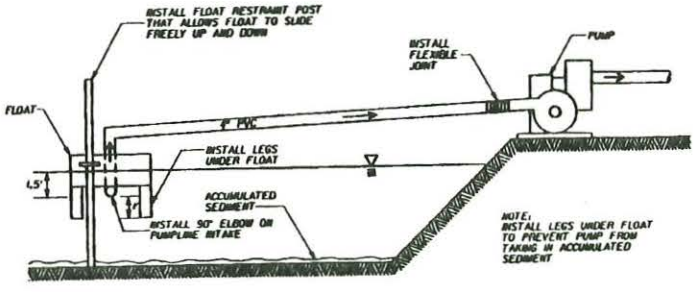
There are three reasons for having two rather than one treatment cell. First, if something goes wrong with the treatment of a particular batch, the contractor can continue treatment in the second cell while dealing with the problem in the first cell. The second reason is the uncertainty over the time required to achieve satisfactory clarification. If one had confidence that satisfactory settling could be achieved consistently within 30 to 60 minutes, it might be reasonable to conclude that only one cell is needed since turnover could occur rapidly. The third reason is the time to empty the cell after treatment. It therefore seems appropriate to use two cells.

The second consideration is the volume of the individual treatment cell. There are two opposing considerations in sizing the treatment cells. There is a desire to have a large cell- so as to be able to treat a large volume of water each time a batch is processed. However, the larger the cell the longer the time required to empty the cell. It is also possible that the larger the cell the less effective the flocculation process, and therefore the settling. The simplest approach to sizing the treatment cell is to multiply the allowable discharge rate by the desired draw-down time. The desired draw-down time is about four hours.

A four-hour draw-down time allows one batch per cell per eight hour work period. A batch can be prepared in the morning including an hour or so of flocculation followed by about two hours of settling followed by discharge, although discharge could occur after hours. Or a batch can be prepared in the afternoon, followed by settling overnight, with discharge the following morning. The main point is that it appears to be most logical to size the cell to fit the desired draw-down time, constrained by the allowable release rate.

***Configuration of the outlet device:***

The withdrawal device used for removing the liquid from the settling pond should be designed so that pulling settled sediments from the bottom of the treatment cell in the vicinity of the device does not occur. Whether this is a problem is not known but it should be evaluated. One approach is to place the discharge outlet near the area where treated water enters the cell. At this location there will be relatively little accumulation of solids because of the turbulence created by the incoming water. A second approach is to use the float configuration as shown in the diagram above. The use of four rather than one inlet pipe reduces the inlet velocity.




FLOATING PUMPLINE INTAKE (TYP.)

Reduced inlet velocity reduces the possibility that sediments will be picked up and discharged from the settling pond.

A third approach is to modify the float to include a square circular weir that the water enters before reaching the outlet pipe. A circular weir with, say, 10 feet of circumference would significantly reduce the overflow rates (velocity) over the weir. As an example, examine how exit velocities are kept as low as possible in water and wastewater clarifiers. These clarifiers include what is known as effluent launders. They are long troughs, placed at the outlet end the clarifier or around the outside circumference in the case of circular clarifiers, into which the water flows. Weirs reduce the exit velocity of the water leaving the clarification area of the clarifier.

The weir may provide at least one and possibly two benefits with the treatment of storm water. First, it may reduce the carry-out of floc that is still settling while the cell is being drawn down, could result in lower final effluent turbidities and/or allow a reduction in the settling time to achieve the same effluent turbidity. Secondly, the weir could reduce if not eliminate the tendency for the withdrawal pipe to suck-up previously settled sediment.

**FLOCCULATION SYSTEMS SHOULD BE DESIGNED BY KNOWLEDGEABLE PERSONNEL. A CONSULTANT SHOULD BE CONTRACTED TO DEVELOP AND IMPLEMENT A SYSTEM. OPERATING PERSONNEL NEED TO BE SPECIFICALLY TRAINED TO OPERATE THESE SYSTEMS.**

***Efficiency*:**

Mean turbidity reductions can be achieved in the 95.5% to 99.4% range using a flocculation system.

***Direct Soil Application of Flocculant:***

As an alternative to an extensive flocculation system, a polyacrylamide (PAM) could be applied to the bare soil surface to bind the soil particles together and minimize erosion, as well as promoting infiltration. PAMs are long chains of polymers synthesized from natural gas. Until recently, PAM has been used most frequently on agricultural land as a soil conditioner, but its use has expanded to include construction sites and industrial water treatment. Since it is a flocculant, it may cause silt deposition when it comes in contact with sediment laden waters downstream from the site. For this reason, runoff should be collected and treated to remove the chemical before releasing it from the site.

The City of Redmond, Washington has successfully tested this method on at least 2 construction sites of 3,000 square feet of clay soils. The PAM was applied at a rate of three pounds per acre, a level that was determined to be environmentally non-toxic, and spread dry with a hand held fertilizer spreader. The City of Redmond recommends that periodic bioassays be performed to confirm the absence of toxicity.

***Efficiency:***

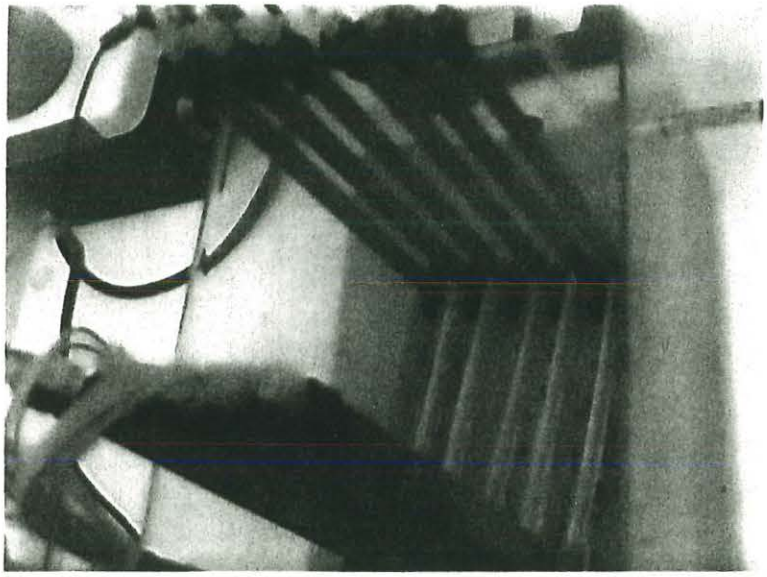
Left undisturbed, the compound proved to effectively work to reduce erosion for up to 6 weeks. However as soon as human or vehicular traffic disturbed the soil, the PAM needed to be reapplied. Redmond found that suspended solids in the water running off from the sites were reduced 67-84 %. Turbidity still remained fairly high, from 264-364 NTU, a reduction of 67-76%.

## BMP #34 – ElectroFloc

***Description*:**

Experiments with a process, tentatively called ElectroFloc indicates that it may be possible to use

electricity to floc dissolved metals, TSS, and turbidity from storm water runoff. By charging aluminum plates with about 40 volts DC in a batch process, it has been shown to create an approximately equal number of charged particles in suspension. These dissimilarly charged particles attract each other and due to aluminum ions present remain in contact with each other in as little as five minutes per liter. This works for TSS and turbidity in the lab and should work for dissolved metals as the metals usually are not really dissolved but submicron in size. Dissolved oxygen is increased in the water due to the splitting of the water molecule into hydrogen and oxygen in which the hydrogen leaves the water and the oxygen saturate the volume.



**Laboratory Test Cell**
Flocculated turbidity can be seen forming between the plates.

***Efficiency/Impact:***

Lab tests have repeatedly shown that TSS and turbidity can be reduced by 98% and the dissolved oxygen content can be increased to around 16 mg/l. To date, no tests have been performed on heavy metals.

## REFERENCES


1. California Straw Works. (1999). "*Straw Wattles.*" [On-line]. Available: http://www.strawwattles.com.

2. Clark County Home Builders Association. (1998*). "A Builder's Guide to Erosion Prevention and Sedimentation Control.*"

3. Cluer, M.G. (1999). "*Bioswales.*" University of Washington. [On-line]. Available: http://weber.u.washington/~mgcluer/bioswales.html

4. Goff, K. (1999). "*Fugitive dust*". *Erosion Control.* 3, 86-95.

5. Gullywasher. (1999). "*Catch Basin Inserts.*" [On-line]. Available: http://www.gullywasher.com.

6. Fifield, J.S. (1999). "*Using continuous berms to control sediment from disturbed lands.*" Presented at 1995 SWCS Conference, Des Moines, Iowa. [On-line]. Available: http://www.mbw.com/cbmtech.html.

7. Kostielney, J.L. (1999). "*Just because it's temporary doesn't mean it's bad*". *Erosion Control.* 5, 66-75.

8. Leeds, R., L.C. Brown, M.R. Sulc, L. VanLieshout. (1999). "*Vegetated Filter Strip: Application, Installation & Maintenance.*" Ohio State University Extension Fact Sheet AEX-467-94. [On-line]. Available: http://ohioline.ag.ohio-state.edu/aex-fact/0467.html.

9. Mat, Inc. (1999). *Soil Guard.* [On-line]. Available: http://www.soilguard.com.

10. Minton, G. (1999). "*Use of Polymers to Treat Construction Site Storm water*". Resource Planning Associates. [On-line]. Available: http://www.ieca.org

11. New Hampshire Department of Environmental Services. (1999). "*Soil Erosion and Sediment Control on Construction Sites.*" Environmental Fact Sheet WD-WEB-12. [On-line]. Available: http://www.des.state.nh.us/web-12.htm.

12. Nighman, D.M. (1999). "*Infiltration practices for flood control*". *Land and Water.* 2, 13-15.

13. Norman, D.K., P.J. Wampler, A.H. Throop, E.F. Schnitzer & J.M. Roloff. (1988). "*Best Management Practices for Reclaiming Surface Mines in Washington and Oregon.*" Washington Division of Geology and Earth Resources and Oregon Department of Geology and Mineral Industries.

14. North Carolina State University Water, Soil & Hydro-Environmental Decision Support System. (1999). "*Best Management Practices for Nonpoint Source Pollution Control.*" [On-line]. Available: http://www.h2osparc.wq.ncsu.edu/info/bmps.html.

15. Oklahoma State University Cooperative Extension Service. (1999). "*Using vegetation for erosion control on construction sites.*" Extension Facts: F-1514.

16. Oregon Department of Environmental Quality. (1997). "*Recommended Best Management Practices*

*for Storm Water Discharges.*"

17. Purdue University. (1999). "*Terracing*". [On-line]. Available: http://abe.www.ecn.purdue.edu/~agen521/epadir/erosion/terraces.html.

18. Resource Planning Associates with HoweConsult. (1999). "*Polymer Assisted Clarification of Storm water from Construction Sites.*" Prepared for the City of Redmond, Washington.

19. Trinity County Resource Conservation District. (1999). "*Excavated Sediment Traps*". [On-line]. Available: http://www.snowcrest.net/tcrcd/pt-sc-es.htm.

20. Unified Sewerage Agency. (1999). "*Storm water Pollution Control Manual: Best Management Practices for Businesses.*"

21. University of California-Santa Barbara School of Science and Environmental Management. (1999). "*Bioswales*". [On-line]. Available: http://128.111.100.231/research/Group_Projects.

22. University of Nebraska-Lincoln. (1999). "*Terrace systems for Nebraska*". [On-line]. Available: http://www.ianr.unl.edu/pubs/soil/g750.htm.

23. Tennessee-Knoxville. (1986). "*Soil erosion prevention and sediment control: reducing non-point source water pollution on construction sites.*" [On-line]. Available: http://www.engr.utk.edu/research/water/erosion/figure29.htm.

24. US Environmental Protection Agency. (1999). "*Management measure for vegetated treatment systems.*" [On-line]. Available: http://www.epa.gov/OWOW/NPS/MMGI/Chapter7/Ch7-2c.html.

25. W&H Pacific with CH2M-HILL. (1993). "*Demonstration Project Using Yard Debris Compost for Erosion Control.*" Presented to Metropolitan Service District.

26. Metro. (June 1994). "*Summary of Projects Using Yard Debris Compost for Erosion Prevention and Control.*" Solid Waste Department, Planning Department, 600 NE Grand Ave., Portland, OR 97232-2736, (503) 797-1695.

27. Glacier Northwest Inc., 1050 N. River Street, Portland, OR 97227-1719, Doug Hale (503) 335-2600.

28. Crop Science Society of America, Crop Science, Vol. 38 No. 4 July-August, 1968, pages 1042-1045, "*Erosion of Natural and Man-Made Erosion Control Materials*"

29. San Diego State University Soil Erosion Research Laboratory, SDSU/SERL Project Reference No. 2000-01-SD, November 22, 2000, "*Results from a Study of the Soil Dynamics, Inc. EssentialSoil™ Formulation: Runoff Characteristics and Sediment Retention Under Simulated Rainfall Conditions*"

30. BioCycle Magazine, January 2001, "*Compost Filter Berms and Blankets Take on the Silt Fence*"

31. Journal of Soil & Water Conservation, Spring Issue, 2000, "*Are Green Lots Worth More Than*

*Brown*", Martha Herzog and Jon Harbor, Department of Earth & Atmospheric Services, Purdue University.

32. DriWater, http://www.driwater.com

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696
TTY (503) 229-6993

December 18, 2002

DEFENDANT'S EXHIBIT 117 A

Bill Ferguson
5200 Pioneer Road
Medford, Oregon 97501

Re: Notice of Assessment of Civil Penalty
No. WQ/SW-WR-02-015
Jackson County

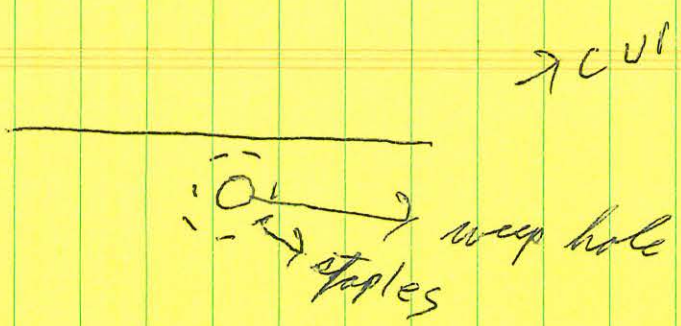
Dear Mr. Ferguson:

Thank you for meeting with Andy Ullrich and me on December 4, 2001, for an informal discussion of the above case. The Department appreciates your cooperation and your willingness to discuss this case in person. However, the Department feels that the civil penalty in this case is accurate as it was originally drafted.

At the informal, you stated that your construction project was not the only source of turbid water in Gilbert Creek and that some of this turbid water was coming from construction on two properties on Crown Street. The Department contacted the City of Grants Pass (City) and discussed this issue. The Department learned from the City that these two properties totaled less than three-fourths of an acre, and that the construction on these properties was minimal in comparison to the construction performed on your property. Further, the storm water flowing off your property was very turbid. I examined the photographs and the color of the storm water that flowed off your property was the same color as the storm water that entered Gilbert Creek. As a result, the Department believes that the storm water that flowed off your property caused pollution to Gilbert Creek.

You also explained during the informal that you submitted on December 31, 2001 a new erosion and sediment control plan for Phase 3 to the Department. On December 6, 2001, Ferrero Geologic submitted to the City a document entitled Erosion Control/Slope Stability Inspection, Phase 3, Laurelridge Subdivision, Grants Pass, Oregon. The City faxed a copy of the document to DEQ. The Department does not consider this document a sufficient plan, because it contains only general narrative on possible control measures. It does not detail specific locations to install controls, nor construction details of the controls.

Please submit to the Department a revised plan based on current site conditions. As required in Schedule A of your permit, this plan must state the specific controls you installed this year on Phase 2 and Phase 3 and will be installing over the winter and spring months to prevent turbid water runoff. The plan must include a site map that shows the major site contours, and the locations of the existing and proposed control measures. Construction details for each type of




DEFENDANT'S EXHIBIT
112
A

Attachment EE A112

Attachment EE A113a

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DEFENDANT'S EXHIBIT 114 A

FORM CD-64
REVISED)
PRESCRIBED BY
D.A.O. 201-17

U. S. DEPARTMENT OF COMMERCE

Asheville, N.C.

I CERTIFY that the attached are authentic and true copies of meteorological records on file in the NATIONAL CLIMATIC DATA CENTER, ASHEVILLE, NORTH CAROLINA.

Charles a. Thomas

for AUGUST L. SHUMBERA
RECORDS CUSTODIAN
DATA ADMINISTRATOR
(Official Title)

. . . . . .

I HEREBY CERTIFY that AUGUST L. SHUMBERA RECORDS CUSTODIAN, who signed the foregoing certificate, is now, and was at the time of signing, DATA ADMINISTRATOR, NATIONAL CLIMATIC DATA CENTER, and that full faith and credit should be given his certificate as such. I further state that I am the person to whom the said custodian reports.

IN WITNESS WHEREOF, I have hereunto subscribed my name and caused the seal of the Department of Commerce to be affixed on this date: JUL 2 9 2002

For the SECRETARY OF COMMERCE:

Vernell M. Wolder

for

THOMAS R. KARL
DIRECTOR
NATIONAL CLIMATIC DATA CENTER
(Certifying Officer)

WS FORM B-91
(12-93)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

# RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

(Local) KAJO GRANTS PASS (River Station, if different) | MONTH NOV | 19 2001

OREGON | COUNTY JOSEPHINE | RIVER ROGUE

(Local) OF OBSERVATION RIVER | TEMP. 07W | PRECIPITATION 07W | STANDARD TIME USE P

E OF RIVER GAGE | ELEVATION OF RIVER GAGE ZERO Ft. | FLOOD STAGE Ft. | NORMAL POOL STAGE Ft.

| DATE | TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX. | MIN. | AT OBSN. | PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (ins. and hundredths) | Snow, ice pellets, (ins. and tenths) | At Ob. Snow, ice pellets, hail, ice on ground (ins.) | Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M. 1 2 3 4 5 6 7 8 9 10 11 / 1 2 3 4 5 6 7 8 9 10 11 | WEATHER (Calendar Day) Mark 'X' for all types occurring each day. Fog | Ice Pellets | Glaze | Thunder | Hail | Damaging Winds | Time of observation if different from above | RIVER STAGE CONDITION | GAGE READING AT ___ A.M. | TENDENCY | REMARKS (Special observations, etc.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 65 | 44 | 48 | | | | | | | | | | | | | | |
| 2 | 62 | 40 | 44 | | | | | | | | | | | | | | |
| 3 | 69 | 34 | 39 | | | | | | | | | | | | | | |
| 4 | 63 | 36 | 38 | | | | | | | | | | | | | | |
| 5 | 60 | 39 | 44 | .04 | | | | | | | | | | | | | |
| 6 | 56 | 45 | 47 | | | | | | | | | | | | | | |
| 7 | 61 | 19 | 23 | | | | | | | | | | | | | | |
| 8 | 58 | 21 | 24 | | | | | | | | | | | | | | |
| 9 | 60 | 23 | 26 | | | | | | | | | | | | | | |
| 10 | 59 | 26 | 30 | | | | | | | | | | | | | | |
| 11 | 62 | 39 | 40 | | | | | | | | | | | | | | |
| 12 | 60 | 44 | 47 | .36 | | | | | | | | | | | | | |
| 13 | 58 | 41 | 44 | .13 | | | | | | | | | | | | | |
| 14 | 53 | 47 | 50 | .13 | | | | | | | | | | | | | |
| 15 | 67 | 45 | 49 | .03 | | | | | | | | | | | | | |
| 16 | 58 | 48 | 49 | 1.01 | | | | | | | | | | | | | |
| 17 | 53 | 40 | 45 | .22 | | | | | | | | | | | | | |
| 18 | 55 | 38 | 42 | | | | | | | | | | | | | | |
| 19 | 56 | 43 | 49 | .02 | | | | | | | | | | | | | |
| 20 | 61 | 38 | 44 | .27 | | | | | | | | | | | | | |
| 21 | 52 | 37 | 42 | .26 | | | | | | | | | | | | | |
| 22 | 45 | 45 | 47 | .54 | | | | | | | | | | | | | |
| 23 | 55 | 35 | 40 | .12 | | | | | | | | | | | | | |
| 24 | 48 | 38 | 42 | .24 | | | | | | | | | | | | | |
| 25 | 42 | 38 | 40 | .55 | | | | | | | | | | | | | |
| 26 | 49 | 33 | 39 | .08 | | | | | | | | | | | | | |
| 27 | 46 | 27 | 35 | | | | | | | | | | | | | | |
| 28 | 44 | 34 | 39 | .36 | | | | | | | | | | | | | |
| 29 | 46 | 39 | 41 | 1.99 | | | | | | | | | | | | | |
| 30 | 51 | 35 | 40 | .02 | | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | | | | | | |
| SUM | | | SUM | 6.37 | | | | | | | | | | | | | |

CHECK BAR (For wire-weight) NORMAL CK. BAR

| | Fog | Ice Pel. | Glaze | Thund. | Hail | Dam. Winds | | | |
|---|---|---|---|---|---|---|---|---|---|
| | X | X | X | X | X | X | X | X | X |

| READING | DATE |
|---|---|
| | |
| | |
| | |
| | |

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER

SUPERVISING OFFICE

STATION INDEX NO 35-3345-3

WS FORM B-91
(12-93)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

# RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

(Official) KAJO GRANTS PASS (River Station, if different) | MONTH DEC | 19 2001

(Official) OR | COUNTY JOSEPHINE | RIVER ROGUE

(Official) OF OBSERVATION RIVER | TEMP. 0700 | PRECIPITATION 0700 | STANDARD TIME IN USE P

TYPE OF RIVER GAGE | ELEVATION OF RIVER GAGE ZERO Ft. | FLOOD STAGE Ft. | NORMAL POOL STAGE Ft.

| DATE | TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX. | MIN. | AT OBSN. | PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (ins. and hundredths) | Snow, ice pellets, (ins. and tenths) | At Ob. Snow, ice pellets, hail, ice on ground (ins.) | Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. 1 2 3 4 5 6 7 8 9 10 11 NOON P.M. 1 2 3 4 5 6 7 8 9 10 11 | WEATHER (Calendar Day) Mark 'X' for all types occurring each day. Fog | Ice Pellets | Glaze | Thunder | Hail | Damaging Winds | Time of observation if different from above | RIVER STAGE CONDITION | GAGE READING AT ___ A.M. | TENDENCY | REMARKS (Special observations, etc.,) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 49 | 40 | 45 | .58 | | | | | | | | | | | | | |
| 2 | 52 | 35 | 37 | .49 | | | | | | | | | | | | | |
| 3 | 43 | 35 | 39 | .89 | | | | | | | | | | | | | |
| 4 | 50 | 31 | 34 | .11 | | | | | | | | | | | | | |
| 5 | 45 | 35 | 39 | .63 | | | | | | | | | | | | | |
| 6 | 47 | 41 | 43 | .17 | | | | | | | | | | | | | |
| 7 | 57 | 29 | 34 | | | | | | | | | | | | | | |
| 8 | 42 | 33 | 37 | | | | | | | | | | | | | | |
| 9 | 42 | 35 | 37 | .24 | | | | | | | | | | | | | |
| 10 | 48 | 27 | 32 | | | | | | | | | | | | | | |
| 11 | 42 | 32 | 34 | .10 | | | | | | | | | | | | | |
| 12 | 48 | 33 | 40 | .02 | | | | | | | | | | | | | |
| 13 | 49 | 38 | 42 | .12 | | | | | | | | | | | | | |
| 14 | 52 | 35 | 39 | 1.14 | | | | | | | | | | | | | |
| 15 | 45 | 32 | 38 | .04 | | | | | | | | | | | | | |
| 16 | 43 | 41 | 42 | .09 | | | | | | | | | | | | | |
| 17 | 53 | 31 | 35 | .65 | | | | | | | | | | | | | |
| 18 | 50 | 32 | 34 | | | | | | | | | | | | | | |
| 19 | 43 | 38 | 39 | .06 | | | | | | | | | | | | | |
| 20 | 47 | 35 | 39 | .16 | | | | | | | | | | | | | |
| 21 | 46 | 37 | 39 | | | | | | | | | | | | | | |
| 22 | 47 | 29 | 37 | .21 | | | | | | | | | | | | | |
| 23 | 48 | 38 | 39 | .19 | | | | | | | | | | | | | |
| 24 | 49 | 30 | 36 | | | | | | | | | | | | | | |
| 25 | 42 | 32 | 34 | | | | | | | | | | | | | | |
| 26 | 53 | 34 | 38 | .01 | | | | | | | | | | | | | |
| 27 | 47 | 34 | 39 | | | | | | | | | | | | | | |
| 28 | 46 | 33 | 36 | .21 | | | | | | | | | | | | | |
| 29 | 50 | 33 | 44 | .46 | | | | | | | | | | | | | |
| 30 | 54 | 42 | 42 | | | | | | | | | | | | | | |
| 31 | 50 | 42 | 45 | .42 | | | | | | | | | | | | | |
| SUM | | | SUM | 6.94 | | | CHECK BAR (For wire-weight) NORMAL CK. BAR | Fog | Ice Pel. | Glaze | Thund | Hail | Dam. Winds | | | | |

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage
F. Shore ice.
G. Floating ice.
H. Pool stage.

| READING | DATE |
|---|---|
| | |
| | |
| | |
| | |

OBSERVER

SUPERVISING OFFICE

STATION INDEX NO. 35-3345-3

STATION (Climatological) KAJO (River Station, if different) GRANTS PASS | MONTH FEB | 19 2002

STATE OREGON | COUNTY JOSEPHINE | RIVER ROGUE

TIME (local) OF OBSERVATION | TEMP. 0700 | PRECIPITATION .0700 | STANDARD TIME IN USE P

TYPE OF RIVER GAGE | ELEVATION OF RIVER GAGE ZERO Ft. | FLOOD STAGE Ft. | NORMAL POOL STAGE Ft.

WS FORM B-91 (12-93)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

# RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

| DATE | TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX | MIN. | AT OBSN. | PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (Hs. and hundredths) | Snow, ice pellets, (Hs. and tenths) | At Ob. Snow, ice pellets, hail, ice on ground (Ins.) | WEATHER (Calendar Day) Fog | Ice Pellets | Glaze | Thunder | Hail | Damaging Winds | Time of observation if different from above | RIVER STAGE CONDITION | GAGE READING AT ___ A.M. | TENDENCY | REMARKS (Special observations, etc.,) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 44 | 35 | 39 | .02 | | | | | | | | | | | | | |
| 2 | 51 | 30 | 37 | .02 | | | | | | | | | | | | | |
| 3 | 53 | 39 | 41 | .27 | | | | | | | | | | | | | |
| 4 | 57 | 29 | 31 | | | | | | | | | | | | | | |
| 5 | 47 | 28 | 31 | | | | | | | | | | | | | | |
| 6 | 48 | 30 | 33 | .02 | | | | | | | | | | | | | |
| 7 | 57 | 42 | 45 | .44 | | | | | | | | | | | | | |
| 8 | 50 | 32 | 35 | 1.21 | | | | | | | | | | | | | |
| 9 | 52 | 30 | 34 | | | | | | | | | | | | | | |
| 10 | 52 | 30 | 32 | | | | | | | | | | | | | | |
| 11 | 58 | 27 | 31 | | | | | | | | | | | | | | |
| 12 | 56 | 29 | 33 | | | | | | | | | | | | | | |
| 13 | 61 | 36 | 39 | | | | | | | | | | | | | | |
| 14 | 66 | 24 | 27 | | | | | | | | | | | | | | |
| 15 | 61 | 24 | 28 | | | | | | | | | | | | | | |
| 16 | 63 | 34 | 41 | | | | | | | | | | | | | | |
| 17 | 56 | 36 | 38 | | | | | | | | | | | | | | |
| 18 | 53 | 38 | 41 | | | | | | | | | | | | | | |
| 19 | 57 | 45 | 47 | .14 | | | | | | | | | | | | | |
| 20 | 50 | 44 | 47 | .84 | | | | | | | | | | | | | |
| 21 | 59 | 46 | 49 | .03 | | | | | | | | | | | | | |
| 22 | 62 | 41 | 49 | | | | | | | | | | | | | | |
| 23 | 61 | 44 | 47 | .13 | | | | | | | | | | | | | |
| 24 | 58 | 43 | 43 | .08 | | | | | | | | | | | | | |
| 25 | 57 | 28 | 32 | | | | | | | | | | | | | | |
| 26 | 60 | 29 | 33 | | | | | | | | | | | | | | |
| 27 | 67 | 27 | 31 | | | | | | | | | | | | | | |
| 28 | 67 | 24 | 27 | | | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | | | | | | |
| SUM | | | SUM | 3.20 | | | | | | | | | | | | | |

Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M. 1 2 3 4 5 6 7 8 9 10 11 1 2 3 4 5 6 7 8 9 10 11

Mark 'X' for all types occurring each day.

CHECK BAR (For wire-weight) NORMAL CK. BAR

| READING | DATE |
|---|---|
| | |
| | |
| | |
| | |

Fog | Ice Pel. | Glaze | Thund. | Hail | Dam. Winds

OBSERVER

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice [illegible] above gage.
E. Ice gorge below gage
F. Shore ice.
G. Floating ice.
H. Pool stage.

SUPERVISING OFFICE

STATION INDEX NO. 35-3345-3

Attachment EE A114b

A114

Ex 115 A

1/31/05

Commissioners,

Please see the attached motion and response briefs for the Ferguson contested case that you'll be considering on Thursday. Also, please see Larry Knudsen's email below, which describes how we will handle this at Thursday's meeting. If you have any questions, please let me know.

Thanks,
Mikell Mikell O'Mealy
(503) 229-5301

-----Original Message-----
**From:** OMEALY Mikell [mailto:Mikell.Omealy@state.or.us]
**Sent:** Wednesday, January 26, 2005 11:46 AM
**To:** Knudsen Larry; OMEALY Mikell; PRICE Anne; Perry Lynne; CAMILLERI Jenine
**Subject:** RE: Ferguson

Thanks, Larry. We'll get the motion and DEQ's response out to the EQC as soon as possible, with copies to you of course.

Mikell

-----Original Message-----
**From:** Knudsen Larry [mailto:larry.knudsen@doj.state.or.us]
**Sent:** Wednesday, January 26, 2005 11:36 AM
**To:** OMEALY Mikell; PRICE Anne; Perry Lynne
**Subject:** Ferguson

I spoke with Mark Reeve today regarding recent Ferguson's motion to reopen the record. He indicated that, given the late date, he doesn't want me to send a formal written response from the Commission to Stark. Rather, we will just handle the motion at the beginning of the hearing. He would like the Department to prepare a short written response to the motion for the file. (Both the motion and response should be mailed or faxed to the Commissioners.) Assuming that DEQ intends to object, the response should set out the relevant provisions of the rule. (I discussed this issue in an earlier email to Anne and Lynne.)

I'll plan to assist the Commission with its consideration of the motion and will recommend that this issue be addressed first, or either as a stand alone item or in tandem with consideration of Ferguson's argument that the case should be dismissed or remanded based on the missing portion of tape.

I assume that Stark is not expecting anything other than the Department's response to the motion. If you have any reason to believe he is expecting confirmation of the EQC's receipt of the motion, let me know and I'll call him.

**STARK AND HAMMACK, P.C.**
ATTORNEYS AT LAW
201 WEST MAIN STREET, SUITE 1B
MEDFORD, OREGON 97501

RICHARD A. STARK
LARRY C. HAMMACK
ERIC R. STARK

(541) 773-2213
(541) 779-2133
FAX (541) 773-2084
ras@starkhammack.com

January 20, 2005



Ms. Mikell O'Mealy
Assistant to the Commission
Environmental Quality Commission
811 SW 6th Avenue
Portland, OR 97204

RE: Motion to Open Record
The Matter of William H. Ferguson, Respondent
OAH Case No. 107491 Department Case No. WQ/SW-WR-02-015
Issued December 10, 2003, by Teresa Hogan, Administrative Law Judge
Our File No.: RP 3045

Dear Ms. O'Mealy:

Enclosed please find a ***MOTION TO OPEN RECORD*** filed on behalf of the Respondent with supporting Affidavits and pictures.

Thank you for your attention to this matter.

Respectfully yours,

STARK AND HAMMACK, P.C.

Richard A. Stark
Counsel for Respondent
William H. Ferguson

RAS:df
Enc.
cc: Jenine Camilleri
client

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION

OF THE STATE OF OREGON

| | |
|---|---|
| IN THE MATTER OF: | No. WQ/WS-WR-02-015 |
| WILLIAM H. FERGUSON | MOTION TO OPEN RECORD |
| Respondent. | |

COMES NOW the Respondent, William H. Ferguson, through his attorney and moves the Commission for an order opening the record to allow the admission into the record of six photographs that were recently discovered which were taken on November 27, 2001, which is one of the dates in question, showing the condition of Gilbert Creek above and below where the storm drain in question enters Gilbert Creek.

This Motion is based on the Affidavit of William H. Ferguson which is attached hereto marked Exhibit "A" and by this reference incorporated herein, and the Affidavit of Brandon Schulzke which is attached hereto marked Exhibit "B" and by this reference incorporated herein.

Attached to this Motion is Exhibit "1" consisting of six photographs which are described in the Affidavits presented.

Respondent conferred with Jenine Camilleri, the attorney for the Department of Environmental Quality, in connection with this Motion, and Ms. Camilleri opposes the Motion.

RK & HAMMACK, P.C.
TORNEYS AT LAW
. MAIN ST., SUITE 1B
MEDFORD, OREGON 97501
(541) 773-2213
(541) 779-2133
(541) 773-2084 FAX

DATED this 19th day of January, 2005.

Respectfully submitted,

STARK AND HAMMACK, P.C.

By: _____
Richard A. Stark, OSB #69164
Of Attorneys for William H. Ferguson,
Respondent

'K & HAMMACK, P.C.
TORNEYS AT LAW
√. MAIN ST., SUITE 1B
MEDFORD, OREGON 97501
(541) 773-2213
(541) 779-2133
(541) 773-2084 FAX

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION

OF THE STATE OF OREGON

| | |
|---|---|
| IN THE MATTER OF: | No. WQ/WS-WR-02-015 |
| WILLIAM H. FERGUSON | AFFIDAVIT OF RESPONDENT WILLIAM H. FERGUSON |
| Respondent. | |

STATE OF OREGON )
)ss.
County of Jackson )

I, William H. Ferguson, being first duly sworn, depose and say:

That I am one of the owners of property in Grants Pass, Oregon, that is subject to a complaint about water run off during heavy rain fall storms on November 21, 2001, and November 27, 2001. These dates were also the dates of citation issued by the Medford Department of Environmental Quality (DEQ) Office.

That on November 27, 2001, I was on the property and saw someone taking pictures of the water on the property exiting an undersidewalk weep hole designed to allow run off to go to the city storm water system. The amount was very small, about the same as a garden hose turned on about 2/3 volume.

That I took some pictures with a digital camera I have purchased from Brandon Schulzke. I also went to the city storm drain exit at Gilbert Creek to see the water flow there. There was a very large amount of water entering Gilbert Creek as was usual during a heavy rain. I took pictures of the storm drain and also of the upside of the creek where

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both had a large run off of water that was the same color both showing the usual color after a heavy rain. I also took pictures of Gilbert Creek as it joined the Rogue River and of the Rogue River in Grants Pass.

The water entering from the storm drain was the same color as the water above the storm drain entrance. The water entering from Gilbert Creek was also less turbid than the Rogue River which always colors during heavy rainfall. I have visited Gilbert Creek several times since the visit above mentioned and have always found the color of the storm drain water about the same color as Gilbert Creek and less than the Rogue River where they joined. As I was unfamiliar with digital cameras or computers, I asked Mr. Schulzke to download and print the digital pictures I had taken. I did not know that I did not get all the pictures I had taken printed because of the time lapsing between the picture taking and their downloading shortly before the hearing. Recently Mr. Schulzke working on my camera asked if he should save, before junking the camera and selling me a new one, the pictures taken on it. I asked him to save all pictures and print them and once done found that he had not downloaded all the pictures I had taken on November 27, 2001.

At the hearing I could not find pictures that I thought I had taken that would show the condition of Gilbert Creek above the city storm drain entrance. I was suspicious of the DEQ pictures as they did not square with my observations and the pictures the DEQ said were taken on two different dates appeared to be identical.

I discovered the picture of Gilbert Creek taken on the date of the second storm above the entrance of the city storm drain that was what I had remembered the water to look like whenever there is a very heavy rainfall in Grants Pass. Upon discovery I gave those pictures to Mr. Stark and they are attached to this affidavit as Exhibit "A". The pictures show that the water in Gilbert Creek is the same color during the second storm as the water from the city storm drain which I have found has always been the case when I have inspected over the last few years.

STARK & HAMMACK, P.C.
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I believe the DEQ pictures of Gilbert Creek that have been testified to be taken above the storm drain entrance on two different dates were, in fact, taken sometime later after the storms had passed and both at the same time. I believe those pictures were an afterthought that a pictures above the storm drain entrance was necessary for the DEQ to establish their case and hence taken on a clear day after heavy runoff had ceased.

Further Deponent sayeth not.

William H. Ferguson

STATE OF OREGON )
)ss.
County of Jackson )

This instrument was acknowledged before me this 17th day of January, 2005, by William H. Ferguson.

OFFICIAL SEAL
RICHARD A. STARK
NOTARY PUBLIC-OREGON
COMMISSION NO. A373493
MY COMMISSION EXPIRES NOV. 27, 2007

Notary Public for Oregon
My Commission Expires: 11-27-07

Submitted by:
Richard A. Stark, OSB#69164
Stark & Hammack, P.C.
201 West Main Street, Suite 1B
Medford, Oregon 97501
(541) 773-2213
FAX: (541) 773-2084

STARK & HAMMACK, P.C.
ATTORNEYS AT LAW
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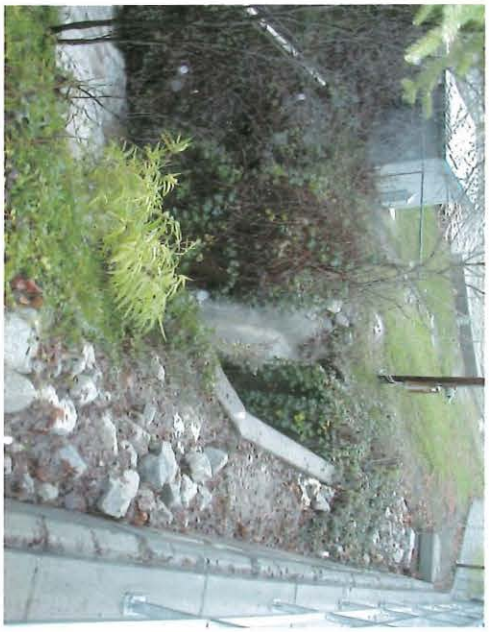
(541) 779-2133
(541) 773-2084 FAX






**EXHIBIT*A* of Exhibit A**
***Page 1 of 1***

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION

OF THE STATE OF OREGON

| | |
|---|---|
| IN THE MATTER OF: | No. WQ/WS-WR-02-015 |
| WILLIAM H. FERGUSON | AFFIDAVIT OF BRANDON SCHULZKE |
| Respondent. | |

STATE OF OREGON )
)ss.
County of Jackson )

I, Brandon Schulzke, being first duly sworn, depose and say:

That I sold to William H. Ferguson a digital camera that he used to take pictures of some water in Grants Pass, Oregon.

That just before the hearing, and as he was unfamiliar with computers or digital cameras, he asked me to download and print pictures from the camera that he had taken some months before of water taken in a dispute over water runoff from a property he had an interest in in Grants Pass.

That I downloaded and printed some of the pictures and gave them to him for use at the time of hearing.

That I thought I had downloaded all pictures; but, recently, and long after the hearing, I discovered when I was working on his camera, which had since broken, that there were a couple of pictures that had either not been downloaded or for some reason did not print.

STARK & HAMMACK, P.C.
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(541) 773-2084 FAX



**EXHIBIT B**
***Page 1 of 3***

That I downloaded the additional pictures and gave to William Ferguson for the first time. Copies of those pictures are attached to this affidavit.

Further Deponent sayeth not.

Brandon Schulzke

STATE OF OREGON )
)ss.
County of Jackson )

This instrument was acknowledged before me this 13TH day of January, 2005, by Brandon Schulzke.

OFFICIAL SEAL
DIANA L. FELLOWS
NOTARY PUBLIC-OREGON
COMMISSION NO. 373484
MY COMMISSION EXPIRES OCT. 08, 2007

Notary Public for Oregon
My Commission Expires: 10-08-2007

Submitted by:
Richard A. Stark, OSB#69164
Stark & Hammack, P.C.
201 West Main Street, Suite 1B
Medford, Oregon 97501
(541) 773-2213
FAX: (541) 773-2084

STARK & HAMMACK, P.C.
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MAIN ST., SUITE 1B
ORD, OREGON 97501
(541) 773-2213
(541) 779-2133
(541) 773-2084 FAX



**EXHIBIT B**
***Page 2 of 3***

**EXHIBIT B**
*Page 3 of 3*

Photo 06 - Picture taken 11/27/2001 by William Ferguson standing on Gilbert Creek Bridge where storm drain enters viewing downstream.

**EXHIBIT 1**

Photo 07 - Picture taken 11/27/2001 by William Ferguson standing on Gilbert Creek Bridge where storm drain enters viewing downstream.

Photo 08 - Picture taken 11/27/2001 by William Ferguson standing on Gilbert Creek Bridge where storm drain enters viewing downstream facing approximately west showing storm drain entrance.

Photo 09 - Picture taken 11/27/2001 by William Ferguson standing on Gilbert Creek Bridge viewing upstream.


Road - Photo 1 - Picture taken 11/27/2001 by William Ferguson showing water cascading over the road unprotected.

**EXHIBIT 1**


Road - Photo 2 - Picture taken 11/27/2001 by William Ferguson showing water cascading over the road unprotected.

**EXHIBIT 1**

CERTIFICATE OF MAILING

I hereby certify that on the 20th day of January, 2005, I served the foregoing:

**MOTION TO OPEN RECORD**

on the following:

Ms. Jenine Camilleri
Oregon Department of Environmental Quality
Office of Compliance and Enforcement
811 SW Sixth Avenue
Portland, OR 97204

by mailing a true copy thereof contained in a sealed envelope with postage fully prepaid thereon, addressed to the above individual at the address indicated, and deposited in the United States Mail at Medford, Oregon.

DATED this 20th day of January, 2005.

STARK AND HAMMACK, P.C.

By: _____
Richard A. Stark, OSB #69164
Of Attorneys for William H. Ferguson, Respondent

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Oregon
Theodore R. Kulongoski, Governor

Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390
503-229-5696
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January 31, 2005

CERTIFIED MAIL 7004 0550 0000 7975 6643

Environmental Quality Commission
c/o Mikell O'Mealy, DEQ-Assistant to the Director
811 SW 6th Avenue
Portland, OR 97204

Re: The Matter of William H. Ferguson, Respondent
Proposed Order
OAH Case No. 107491
DEQ Case No. WQ/SW-WR-02-015

Dear Commission:

Enclosed please find the Department of Environmental Quality's response to Mr. Ferguson's January 24, 2005 motion to open the record in the above proceeding.

Sincerely,

Jenine Camilleri

Jenine Camilleri
Environmental Law Specialist
Office of Compliance and Enforcement

cc: Richard Stark, Stark & Hammack, P.C., Attorneys at Law, 201 W. Main Street, Suite 1B, Medford, Oregon 97501.

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION

OF THE STATE OF OREGON

| | |
|---|---|
| IN THE MATTER OF:<br>WILLIAM H. FERGUSON,<br><br>PETITIONER/RESPONDENT. | DEPARTMENT'S OBJECTION TO PETITIONER/RESPONDENT'S MOTION TO OPEN THE RECORD<br>NO. WQ/SW-WR-02-015<br>JACKSON COUNTY |

On January 24, 2005, Petitioner/Respondent, Mr. William Ferguson, moved the Commission to reopen the record for the introduction of additional photographs. Mr. Ferguson's appeal of the Proposed Order in this matter is on the agenda for the Commission's February 3, 2005 meeting. The Department objects to the motion as both untimely and unsupported by good cause.

## I. APPLICABLE LAW

Oregon Administrative Rule (OAR) 340-011-0575(6) provides that

> "[a] request to present additional evidence must be submitted by motion and must be accompanied by a statement showing good cause for the failure to present the evidence to the administrative law judge. ***The motion must accompany the brief filed under subsection (5)(a) or (b) of this rule*** **[i.e. Exceptions and Brief or Answering Brief].** If the commission grants the motion or decides on its own motion that additional evidence is necessary, the matter will be remanded to an administrative law judge for further proceedings." (Emphasis added.)

## II. ARGUMENT IN OPPOSITION TO MOTION

### A. Mr. Ferguson's motion is untimely.

OAR 340-011-0575(6) requires that motions to present additional evidence be filed with the Exceptions and Brief. Mr. Ferguson's motion was not submitted with his Exceptions and Brief in March 2004, or with his Amended Exceptions and Brief in July 2004. Indeed, had Mr. Ferguson not asked for a last-minute delay of the scheduled Commission hearing, the Commission would have already addressed his appeal two months ago, at its December 2004 meeting. Mr. Ferguson has not met the timelines in the Commission's rules and, for that reason alone, the Commission should dismiss the motion.

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**B. Mr. Ferguson's motion does not demonstrate good cause.**

Even if the motion had been filed in time, OAR 340-011-0575(6) also requires that a motion to present additional evidence be accompanied by a statement showing good cause for failure to present the evidence to the administrative law judge. Mr. Ferguson claims that his delay was caused by the fact that he didn't know how to operate his camera and that he forgot he had the photographs in the camera. (Motion, Ex. A, page 2, lines 9-15.) Simply put, carelessness does not constitute "good cause."

Moreover, and perhaps more importantly, neither the motion nor the attached affidavits state precisely *when* Mr. Ferguson discovered the photographs. Interestingly, Mr. Ferguson asserts only that the photographs were discovered "recently." (Motion, page 1, line 15; Ex. A, page 2, line 12; Ex. B., page 1, line 24.) Given that the contested case hearing was held over four days in July and August 2003, "recently" tells the Commission nothing. Relatively speaking, the Exceptions and Brief and Amended Exceptions and Brief were also submitted "recently." Thus, in addition the motion does not demonstrate good cause for not presenting the photographs with the briefs.

Finally, this is not really new evidence. Although Mr. Ferguson styles his motion as an effort to present recently discovered photographs, he also takes great liberty in presenting new testimony about his observations of the color of the water in Gilbert creek by way of his affidavit. (Motion, Exh. A, page 1, lines 24-26, and page 2, lines 1-6.) Assumedly, Mr. Ferguson would also have remembered and could have presented testimony about those observations during the four-day hearing because much of the hearing centered on the quality of these waters. The motion does not demonstrate good cause for not providing or eliciting testimony about the condition of the creek at the hearing. Thus, Mr. Ferguson's attempt to bootstrap new testimony at this late date with "new" photographs does not justify reopening the record.

In sum, Mr. Ferguson's motion meets none of the requirements of OAR 340-011-0575(6). It is untimely and it is not supported by good cause. Therefore, the Department requests that the Commission dismiss this motion and proceed directly with this appeal.

///

## III. ARGUMENT AGAINST REMAND

Pursuant to OAR 340-011-0575(6), the Commission has authority to decide on its own motion that additional evidence is necessary. For the reasons stated above, Mr. Ferguson could have presented testimony regarding the color of the water at the hearing had he believed it necessary. He did not. If, however, the Commission makes its own motion to reopen the record, the Commission cannot merely evaluate the photographs and the testimony provided in the affidavit in conjunction with the appeal before it, but must remand the case to the administrative law judge for further contested case proceedings. See OAR 340-011-0575(6). Mr. Ferguson's motion simply does not justify further contested case proceedings and the consequent delay.

## IV. CONCLUSION

Mr. Ferguson's motion is untimely, is unsupported by a showing of good cause, and does not purport to add substantively to the existing record. The Department requests that the Commission dismiss the motion and proceed directly with the appeal.

1-31-05
Date

Jenine Camilleri
Jenine Camilleri
Environmental Law Specialist

CERTIFICATE OF SERVICE

I hereby certify that I served the Objection to Mr. Ferguson's Motion to Open the Record on the 31st day of January, 2005 by PERSONAL SERVICE upon

The Oregon Environmental Quality Commission
c/o Mikell O'Mealy, Assistant to the Commission
811 SW Sixth Avenue
Portland, OR 97204

and upon

William H. Ferguson
5200 Pioneer Road
Medford, Oregon 97501

Richard Stark
Attorney at Law
201 West Main Street, Suite 1B
Medford, Oregon 97501

by faxing a true copy of the above and mailing it in a sealed envelope, with postage prepaid at the U.S. Post Office in Portland, Oregon, on January 31, 2005.

Amy Smotherd 1-31-05

State of Oregon
Department of
Environmental
Quality

# Umatilla Chemical Demilitarization Program
# Status Update
# Environmental Quality Commission
# February 3, 2005
## (Agenda Item B)

## Umatilla Chemical Demilitarization Program

### Permit Modification Requests (PMRs)

Since the last Umatilla project update, the Department has received a PMR related to monitoring chemical agent in the discharge airlock of the metal parts furnace at the Umatilla Chemical Agent Disposal Facility (UMCDF). The normal operating temperatures in the discharge airlock prevent accurate agent detection and measurement by the ACAMS (automatic continuous air monitoring system).

On January 19, the Department approved the PMR to reflect a single Army Permittee (U.S. Army Umatilla Chemical Depot), pursuant to the Army's organizational changes that have taken effect subsequent to the start of chemical agent operations. Washington Demilitarization Company (WDC) remains on the permit as co-operator of UMCDF and official submittals to the Department will continue to be signed by the Depot Commander, the Army's UMCDF Site Project Manager, and WDC's Project General Manager.

### Agent Operations

UMCDF resumed chemical agent operations on December 23, 2004 following a three-week safety stand-down. During the stand-down the site performed a root cause analysis and implemented corrective measures to address issues arising from the breaching of a chemical agent boundary in the filter vestibule (for the heating and ventilation system carbon filters) and other incidents involving miscommunication and inadequate recognition of hazards by the WDC work force.

On December 22, 2004, the Department gave its written approval to resume chemical agent operations at UMCDF, based upon the Department's review of immediate corrective actions that had been implemented and additional corrective actions to be implemented in the near future by UMCDF. The Department observed one of the supplemental training sessions regarding agent boundaries that were provided to WDC's work force. DEQ staff continue to observe the additional UMCDF management oversight of operations to ensure more precise communications and adherence to all applicable compliance requirements (i.e., environmental permit conditions, safety procedures, and facility standard operating procedures). The Department has observed that communication procedures in the Control Room have improved since resumption of chemical agent destruction and rocket processing.

During the safety stand-down, UMCDF made modifications to the chemical agent drain system that had been an ongoing problem preventing sustained rocket processing on the A-line. Indications to date are that the modifications were successful and the site has processed rockets on several days where feed rates in excess of 30 rockets per hour were sustained for several hours, integrating the processing on both lines.

In comparison with Anniston Chemical Agent Disposal Facility, the first 4+ months have been a slower progression of agent operations at UMCDF. Due to the need for safety stand-downs and resolution of ongoing mechanical system problems, there have been more than 60 days since the start of agent operations when no rockets were destroyed in the deactivation furnace system (DFS) nor was any GB agent processed in the liquid incinerator # 1 (LIC1). In the first 145 days of agent operations, 20 or fewer rockets were processed on 105 days. However, in the past 30 days UMCDF has averaged 85 rockets/day (as compared to an average of 23 rockets/day in the previous 60 days).

UMCDF has now begun rocket processing on the night shift and is continuing operations across shift changes (plant personnel work 12-hour shifts). On four days since January 13, the facility processed more than 300 GB rockets in a single day. On January 17, UMCDF processed 551 GB rockets, operating for a period of approximately 19 hours. This was the first time in the history of the chemical demilitarization program that a facility in the continental U.S. had processed more than 550 rockets in a single day (the demilitarization facility on Johnston Island had destroyed more than 550 rockets/day on 14 occasions).

As of midnight January 30, 2005, UMCDF had processed a total of 4,838 GB rockets in the DFS. The site had also destroyed 46,000 lbs. (approximately 5,000 gallons) of GB agent in LIC1. The site is now operating LIC1 and the DFS simultaneously. However, due to restrictions imposed by the chromium content, the feed rate of chemical agent to LIC1 is limited to less than 170 lbs/hour to ensure compliance with the current permitted feed rate for chromium. The Department is working with UMCDF to resolve the situation, so that agent feed rates supportive of sustained operations can be achieved while assuring compliance with existing permit limits for metal emissions.

Two igloos of GB rockets have been emptied at UMCD.

The site continues to process on-site all brines generated from the destruction of GB rockets and liquid GB agent. Dried salt and DFS ash are being shipped off-site to Chemical Waste Management's hazardous waste landfill near Arlington.

**Agent Trial Burns**

Five GB agent trial burns are scheduled to be conducted this year. The first is the drained rocket agent trial burn in the DFS, which UMCDF hopes to conduct in late March or early April. The tentative schedule presently anticipates the GB agent trial burn for LIC1 to be conducted in late May or early June. The gelled rocket agent trial burn in the DFS is planned for July. UMCDF hopes to conduct the GB agent trial burn for the metal parts furnace in late August or September. The final GB agent trial burn in 2005 will be the liquid incinerator #2, possibly in September.

In mid- to late February, UMCDF is hoping to conduct their EPA-required trial burn to demonstrate compliance with the federal Toxic Substances Control Act (TSCA) requirements for destruction of PCBs (some of the GB rockets' shipping and firing tubes contain PCBs). On January 30, the site conducted a mini-burn in preparation for the TSCA trial burn.

## Umatilla Chemical Depot (UMCD)

### Hazardous Waste Storage Permit

UMCD's hazardous waste storage permit was issued on January 31, 2005. It establishes comprehensive conditions for the management and storage of hazardous waste, both chemical agent items and conventional non-agent related wastes, at UMCD. The permit is based upon a revised permit application submitted by UMCD on May 15, 2002. The draft permit was issued for public review and comment on July 14, 2003. The public comment period concluded on October 15, 2003. The final permit incorporated changes to the draft permit that included a "whistleblower" provision that is the same as the provision added to UMCDF's hazardous waste permit pursuant to Judge Marcus' ruling in the GASP III litigation. Another noteworthy change is a requirement for close-in downwind chemical agent monitoring of an opened igloo during response activities (e.g. identification and overpacking of leaking munitions inside an igloo) to verify that no releases of chemical agent are occurring. Also, a condition was added that requires UMCD to notify the Department of potential worker exposures to chemical agent.

### Closure of Building 659

On January 24, 2005 the Department approved the closure of Building 659 at UMCD. Building 659, also known as the "Mustard Shed" is where 2,635 ton containers of the blister agent, mustard, were stored before their relocation into igloos in March 2002. Approval of the closure of Building 659 releases the building from regulation as a hazardous waste management unit and UMCD intends to utilize the building as a staging or storage facility for transport vehicles used for loading and transfer of munitions to UMCDF.

Pursuant to a closure plan approved by the Department on December 3, 2003, UMCD cleaned the building to remove any remaining hazardous waste residues or constituents that might pose a continuing threat to human health or the environment. Sampling and analyses were performed to confirm that waste removal was successful and the building could be released for other uses. A Certification of Closure, signed by an independent professional engineer was provided to the Department on November 11, 2004, confirming that all closure activities were performed in conformance with the approved plan. Based upon the Department's on-site observations of closure activities and its review of the Certification of Closure and other documentation of closure activities, the Department approved the closure of Building 659.

## Department of Defense Directive for Army to Consider Relocation of Chemical Weapons

On December 21, 2004 the Department of Defense issued a memo requiring the Army to develop alternatives to achieve compliance with the 2012 Chemical Weapons Convention deadline for destruction of the U.S. stockpile of chemical weapons. In that memo, the Army was directed to "address safeguarding the chemical weapons stockpile, as needed, to minimize any additional risk incurred, including relocation if necessary among sites."

In a press release from the Army's Chemical Materials Agency (CMA) on January 19, 2005, CMA confirmed that it was initiating "an investigation that considers and evaluates relocation of some of the chemical weapons stockpile."

Although an earlier law enacted by Congress prohibited the Army from even studying the issue of moving chemical weapons across state lines, that law has expired. However, another federal law (the National Defense Authorization Act of 1995) still expressly prohibits the transport of chemical munition stockpiles across state lines. In addition, provisions of DEQ regulations and the hazardous waste permits for UMCDF and UMCD prohibit the receipt and processing of chemical agent and munitions containing chemical agent from offsite locations.

On January 26, 2005 Governor Kulongoski sent a letter to Dr. Francis J. Harvey, Secretary of the Army, expressing his strong opposition to any proposal that would allow chemical weapons to be brought in to the State of Oregon from other states.

On January 26 a bill was introduced in the U.S. Senate that states "Funds available to the Department of Defense may not be obligated or expended for any study related to the transportation of chemical munitions across State boundaries." The bill was introduced by Senators Allard and Salazar of Colorado. It has been co-sponsored by Senator Wyden, in addition to Senators McConnell and Bunning of Kentucky and Senator Shelby of Alabama.

The Department will continue to monitor any developments regarding the Army's study of weapons relocation and keep the Commission advised.

## Other Demilitarization Facilities

### Aberdeen Chemical Agent Disposal Facility (ABCDF)

Since beginning chemical agent operations in April 2003, ABCDF has neutralized 80% of its stockpile of mustard agent stored in ton containers.

On January 7, 2005, ABCDF began operation of the Ton Container Cleanout Facility (TCC) where the drained containers will be cleaned, decontaminated, and cut in half. The TCC uses high temperature water sprayed at high pressure to remove residual solids from drained containers. The automated system then cuts the steel containers in half for additional cleaning and eventual recycling as a non-hazardous solid waste.

### Anniston Chemical Agent Disposal Facility (ANCDF)

On January 6, 2005, operations were halted at ANCDF following a small fire in an area used to process explosives. Two empty burlap bags used to collect secondary waste caught on fire, apparently from an ember from the deactivation furnace system feed chute. The fire was extinguished by an automated fire suppression system.

As of January 24, 2005, ANCDF had destroyed all of its 42,762 GB rockets and 3,179 of its GB 8-inch projectiles. The site has destroyed 52,551 gallons (470,789 lbs.) of liquid GB.

**Tooele Chemical Agent Disposal Facility (TOCDF)**
On December 31, 2004, TOCDF destroyed the last VX nerve agent-filled spray tank and began destruction of Deseret Chemical Depot's (DCD) stockpile of more than 22,000 VX land mines. Destruction of the land mines will complete the elimination of all VX agent-filled munitions at DCD. TOCDF anticipates completion of its VX campaign in the Spring of 2005.

After the VX campaign, TOCDF will perform a plant changeover to prepare for its last major destruction campaign: the munitions containing mustard blister agent.

**Newport Chemical Agent Disposal Facility (NECDF)**
In the wake of ongoing delays in identifying a viable option for processing the hydrolysate from processing bulk storage containers of VX at NECDF, the Army is considering the possibility of beginning agent neutralization prior to resolution of where and how the hydrolysate will be processed.

The Army has been waiting since October 2004 for the results of a study by the Centers for Disease Control and Prevention (CDC) related to transportation of the hydrolysate from Newport to New Jersey. The Army hopes to have the CDC study results by mid-February. Regardless of the results of the CDC study, there continues to be significant local opposition in New Jersey and Delaware regarding the receipt of VX hydrolysate from NECDF.

**Pine Bluff Chemical Agent Disposal Facility (PBCDF)**
The Army hopes to begin chemical agent destruction at PBCDF on February 28, 2005. PBCDF was unable to meet its anticipated schedule to start up in 2004 due to an extension of plant testing and personnel training.

**Blue Grass Chemical Agent Disposal Facility (BGCDF)**
The future status of activities at BGCDF is somewhat uncertain due to proposed funding reductions for the project and the Defense Department's directive to the Army to consider possible relocation of chemical weapons among demilitarization sites.

**Pueblo Chemical Agent Disposal Facility (PUCDF)**
Although work is still underway for site preparation, including the construction of an office building and a power substation to support activities at PUCDF, last fall the Pentagon stopped the design work related to construction of the actual demilitarization facility while it re-evaluated its options for PUCDF. The Army's site manager for PUCDF reported that he had received a letter from the Defense Department in January telling him to halt all work for 90 days while the Army studies "transportation options."

Approved___
Approved with Corrections___

Minutes are not final until approved by the Commission.

# Oregon Environmental Quality Commission
# Minutes of the Three Hundredth and Twenty Third Meeting

## December 9-10, 2004
## Regular Meeting[1]

At 10:00 a.m. on December 9, prior to the regular Environmental Quality Commission (EQC, Commission) meeting, the Commission held an executive session to review and evaluate the employment-related performance of the Director pursuant to standards, criteria and policy directives previously adopted by the Commission[2]. The executive session was held in Room 3B of the Department of Environmental Quality (DEQ, Department) Headquarters building, located at 811 SW Sixth Avenue in Portland.

The following Commissioners were present for the regular meeting, which was held in Room 3A of the DEQ Headquarters building.

Mark Reeve, Chair
Lynn Hampton, Vice Chair
Deirdre Malarkey, Member
Ken Williamson, Member

Chair Reeve called the regular meeting to order at approximately 1:10 p.m., and introduced the Commission members, DEQ Director Stephanie Hallock, Assistant Attorney General Larry Knudsen, and Commission Assistant Mikell O'Mealy. Agenda items were taken in the following order.

**A. Contested Case No. WQ/SW-WR-02-015 regarding William H. Ferguson**

Chair Reeve stated that Richard Stark, the attorney representing William H. Ferguson in this case, had requested a continuance of the case due to illness. Chair Reeve granted the request and stated that the case would likely be heard by the Commission at the February 3-4, 2005 EQC meeting. Chair Reeve asked staff to confirm a new hearing date with Mr. Stark.

**B. Action Item: Request for Dismissal of Contested Case No. AQ/AB-NWR-03-196 regarding United Gem & Carpets, Inc.**

The Commission considered a request from the DEQ to dismiss a petition for review and uphold a proposed order on an enforcement action taken against United Gem & Carpets, Inc., because the petitioner did not file exceptions to the order as required by rule (OAR 340-011-0132(3)). Chair Reeve asked whether anyone was present in the audience to represent United Gem & Carpets, Inc. No one was present. After discussion, Commissioner Hampton moved that the EQC grant the request for dismissal of the case. Commissioner Malarkey seconded the motion and it passed with four "yes" votes.

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[1] The staff reports for this meeting can be viewed and printed from DEQ's Web site at http://www.deq.state.or.us/about/eqc/eqc.htm. To request a copy to be sent by mail, contact DEQ, Office of the Director, 811 SW Sixth Avenue, Portland, Oregon 97204; phone: (503) 229-5990.
[2] This executive session was held pursuant to ORS 192.660(1)(i).

**C. Action Item: Request for Dismissal of Contested Case No. AQ/AB-ER-03-128 regarding Palmers & Sons Construction Inc.**

The Commission considered a request from the DEQ to dismiss a petition for review and uphold a proposed order on an enforcement action taken against Palmers & Sons Construction, Inc., because the petitioner did not file exceptions to the order as required by rule (OAR 340-011-0132(3)). Chair Reeve asked whether anyone was present in the audience to represent United Gem & Carpets, Inc. No one was present. After discussion, Commissioner Malarkey moved that the EQC grant the request for dismissal of the case. Commissioner Williamson seconded the motion and it passed with four "yes" votes.

**D. Rule Adoption: Enforcement Procedure and Civil Penalties, OAR Chapter 340, Divisions 12, 150 and 200**

Anne Price, DEQ Office of Compliance and Enforcement Administrator, and Jane Hickman, DEQ Environmental Law Specialist, proposed changes to DEQ rules governing the enforcement of Oregon's environmental regulations and statutes, including civil penalty assessments and orders. Ms. Price explained that in 2001, the Department began a comprehensive review and update of the enforcement rules to ensure that the DEQ's enforcement program would continue to be equitable, consistent, and understandable to Oregonians. Ms. Hickman described the changes to the proposed rules. Commissioners discussed various needs related to implementation of the rules with Ms. Price and Ms. Hickman, including training for DEQ staff, updating DEQ policies and enforcement guidance, developing a centralized compliance database, measuring the effect of the proposed rules, and beginning the next phase of enforcement rule revisions.

After consideration, Commissioner Williamson moved that the EQC adopt the proposed rules as presented in the Department's staff report. Commissioner Malarkey seconded the motion and it passed with four "yes" votes.

**E. Action Item: Consideration of a Pollution Control Facility Tax Credit Request for the Independent Spent Fuel Storage Installation**

DEQ Director Stephanie Hallock, DEQ Deputy Director Paul Slyman, and Maggie Vandehey, DEQ Pollution Control Facilities Tax Credit Manager, presented the Department's recommendation on a Pollution Control Facilities Tax Credit application for the Independent Spent Fuel Storage Installation (ISFSI). Director Hallock explained that the Commission had granted preliminary certification of the ISFSI as a pollution control facility in September 2000, and was now considering final certification of the facility. Mr. Slyman and Ms. Vandehey described the history of the facility and the factors the Commission must consider for final certification. David Stewart-Smith, Secretary for Oregon's Energy Facility Siting Council, described the purpose of the facility and the amount of pollution it was designed to control. Mr. Knudsen explained the legal considerations associated with the Commission's options for action on the tax credit application. Commissioners discussed the ISFSI with the presenters.

Chair Reeve invited representatives of Portland General Electric Company (PGE) to present information. Stephen Quennoz, PGE Vice President of Nuclear and Thermal Operations, Wayne Lei, PGE Director of Environmental Policy, and Denise Saunders, an attorney representing PGE, explained the reasons for constructing the ISFSI and asked the Commission to grant the final tax credit certification. Commissioners discussed the proposed tax credit with the PGE representatives.

After thorough discussion of the options presented, Commissioner Hampton moved that the EQC uphold the preliminary certification of the ISFSI and grant the final certification. Commissioner Williamson seconded the motion and it passed with three "yes" votes. Chair Reeve voted "no."

Ms. Vandehey then explained the Department's recommendation that the EQC certify the cost of the four ISFSI components as presented in Attachment A of the staff report, which would provide PGE a tax credit of $21,132,149. Commissioner Williamson moved that the Commission certify the cost of the ISFSI as proposed in the staff report. Commissioner Hampton seconded the motion and it passed with four "yes" votes.

Chair Reeve adjourned the meeting for the evening at approximately 5:20 p.m.

At 8:00 a.m. on December 10, prior to the regular meeting, the Commission held an executive session to consult with counsel concerning legal rights and duties regarding current and potential litigation against the DEQ. The executive session was held in Room 3B of the DEQ Headquarters building, pursuant to ORS 192.660(1)(h). Chair Reeve called the regular meeting to order at approximately 9:10 a.m. and agenda items were taken in the following order.

**F. Adoption of Minutes**

The Commission reviewed draft minutes of the October 21-22, 2004 EQC meeting. Commissioner Malarkey moved that the Commission approve the minutes as drafted. Commissioner Hampton seconded the motion and it passed with four "yes" votes.

**G. Director's Dialogue**

DEQ Director Stephanie Hallock discussed current events and issues involving the Department and the state with Commissioners.

**H. Action Item: Consideration of Pollution Control Facility Tax Credit Requests**

DEQ Deputy Director Paul Slyman and Maggie Vandehey, DEQ Tax Credit Program Manager, presented Pollution Control Facilities Tax Credit applications to the Commission. Ms. Vandehey recommended that the EQC approve final certification on 19 facilities that control air pollution and water pollution, reduce nonpoint source pollution, and recover material from solid waste. Ms. Vandehey also recommended that the EQC transfer of 23 tax credit certificates, revoke three certificates and reissue two certificates as presented in the staff report. Ms. Vandehey stated that two of the applications that the Department had recommended be denied were pulled from the meeting agenda by the applicant, who wished to provide additional information to the Department.

After consideration, Commissioner Malarkey moved that the EQC approve final certification for 19 facilities as recommended by the Department. Commissioner Williamson seconded the motion and it passed with four "yes" votes. Commissioner Hampton moved that the EQC transfer 23 tax credit certificates, revoke three certificates and reissue two certificates as presented in the staff report. Commissioner Malarkey seconded the motion and it passed with four "yes" votes.

**I. Rule Adoption: Medford-Ashland $PM_{10}$ Attainment and Maintenance Plan as a revision to the State of Oregon Clean Air Act Implementation Plan, including supporting rule revisions in Divisions 200, 204, 224, 225 and 240**

Andy Ginsburg, DEQ Air Quality Division Administrator, and David Collier, DEQ Air Quality Senior Planner, recommended that the Commission adopt an air quality attainment and maintenance plan for particulate matter measuring 10 micrometers or smaller ($PM_{10}$) for the Medford-Ashland area, including supporting rules. Mr. Ginsburg explained that the DEQ worked with residents of Oregon's Rogue Valley for years to reduce $PM_{10}$ pollution to meet federal air quality standards, and the communities of Jackson County, Ashland, Phoenix, Talent, Medford, Jacksonville, Central Point, White City and Eagle Point were all involved. He stated that the area now meets federal standards and the proposed plan acknowledges the efforts of these communities. Mr. Collier described key aspects of the proposed plan and summarized the public input received. Commissioners discussed the plan with Mr. Ginsburg and Mr. Collier.

After discussion, Commissioner Williamson moved that the EQC approve the attainment and maintenance plan and supporting rules as proposed. Commissioner Malarkey seconded the motion and it passed with four "yes" votes.

**J. Rule Adoption: Portland Area Carbon Monoxide Plan Maintenance Plan as a revision to the State of Oregon Clean Air Act Implementation Plan, including supporting rule revisions in OAR 340-200-0040, 340-204-0090 and 340-242-0440**

Mr. Ginsburg and Dave Nordberg, DEQ Air Quality Planner, recommended that the Commission adopt a proposed Portland Area Carbon Monoxide (CO) Maintenance Plan and supporting rules, as presented in the Department's staff report. Mr. Ginsburg explained that the plan would repeal a requirement for oxygenated fuel on October 31, 2005, amend motor vehicle emission budgets, modify transportation control measures, and incorporate expected future changes to DEQ's Vehicle Inspection Program. Mr.

Nordberg explained the purpose of the plan and described public input received. Commissioners discussed the plan with Mr. Ginsburg and Mr. Nordberg, including the proposed repeal of the oxygenated fuel requirement. The Commission received a significant amount of public comment requesting that the oxygenated fuel requirement be continued to provide an added margin of safety for CO pollution and to support various other efforts related to ethanol production and use in Oregon.

After discussion, Commissioner Hampton moved that the EQC approve the Portland Area Carbon Monoxide Maintenance Plan and supporting rules, with a repeal of the oxygenated fuel requirement on October 31, 2007, instead of October 31, 2005. Commissioner Malarkey seconded the motion and it passed with four "yes" votes. DEQ Director Hallock stated that the Department was planning to brief the Commission at the February 2005 EQC meeting on climate change initiatives in Oregon and in the region, at which time some of the issues related to the use of oxygenated fuel could be discussed in greater depth.

**Public Forum**
At approximately 11:30 a.m., Chair Reeve asked whether any members of the audience wished to provide public comment to the Commission. The following people testified.

Gaylene Hurley, a resident of the Rogue Valley and member of the Rogue Valley Citizens for Clean Air group, expressed her concern about air quality issues in the Rogue Valley and her appreciation to the Commission for acting to keep $PM_{10}$ protections in her area.

Kathryn Van Natta, representing the Northwest Pulp and Paper Association, expressed concerns about the compliance and enforcement rules adopted by the Commission at the December 9 meeting, and urged the Commission to consider comments from her association during the next phase of the enforcement rulemaking.

Steve Grasty, Harney County Judge and Chair of the Advisory Committee that guided the Onsite Wastewater Treatment System rules, complimented the DEQ staff who worked on the rules for their commitment and skill in working with stakeholder interests.

**K. Rule Adoption: Onsite Wastewater Treatment System Rules**
Holly Schroeder, DEQ Water Quality Division Administrator, Mark Cullington, DEQ Water Quality Program Manager, and Uri Papish, DEQ Onsite Program Coordinator, recommended that the Commission adopt revised rules for Oregon's Onsite Wastewater Treatment System program. Ms. Schroeder explained that onsite systems serve approximately one third of Oregon's population in mostly un-sewered, rural areas. In 2002, the Department surveyed onsite system installers and pumpers and identified several opportunities for improving customer service, simplifying permitting requirements, and modernizing the onsite program. Mr. Papish explained the rulemaking process and the role of the advisory committee in developing the proposed rules. Commissioners discussed the rules with Mr. Cullington and Mr. Papish, including minor corrections as noted by Commissioner Malarkey and Ms. Schroeder, and a delayed effective date of March 1, 2005.

After consideration, Commissioner Malarkey moved that the EQC adopt the rules as proposed and corrected. Commissioner Williamson seconded the motion and it passed with four "yes" votes. Commissioners commended the presenters for their work on this rulemaking and their development of an effective implementation plan to put the rules in place.

Chair Reeve invited Harlan Levy, a Senior Staff Attorney for the Oregon Association of Realtors and a member of the Onsite Rule Advisory Committee, to provide comments to the Commission. Mr. Levy thanked Judge Grasty and the DEQ staff involved in this rulemaking for their hard work and dedication to make the rulemaking a positive and productive process. Mr. Levy also thanked the EQC for adopting the rules.

**L. Informational Item: Update on the Status of the Umatilla Chemical Agent Disposal Facility**
Dennis Murphey, DEQ Chemical Demilitarization Program Administrator, gave the Commission an update on the status of recent activities at the Umatilla Chemical Agent Disposal Facility (UMCDF), including worker errors and the facility's analysis of the root cause of the errors. In August, the Commission gave

approval to start chemical weapons destruction at the facility, and Mr. Murphey stated that DEQ's Chemical Demilitarization Program continues to provide close oversight of UMCDF work.

**M. Action Item: Annual Approval of Director's Financial Transactions**

Paul Slyman, DEQ Deputy Director, presented a summary of DEQ Director Stephanie Hallock's 2004 financial transactions, as required by state accounting and DEQ policy. Mr. Slyman explained that in 2001, the Oregon Department of Administrative Services adopted a policy requiring Commission-level review and approval of agency Directors' financial transactions, including monthly time reports, vacation pay, travel expenses, and state credit card use. In September 2001, the Commission delegated review and approval of these transactions to the DEQ Management Services Division Administrator, with annual Commission review of the approved transactions. Mr. Slyman presented the transactions on behalf of Helen Lottridge, DEQ Management Services Division Administrator, who was unable to attend the meeting. Commissioners discussed the transactions with Mr. Slyman, and Commissioner Malarkey moved that the Commission approve the transactions. Commissioner Hampton seconded the motion and it passed with four "yes" votes.

**N. Action Item: Proposed Settlement of *Northwest Environmental Defense Center et al. v. Oregon EQC et al.***

Holly Schroeder, DEQ Water Quality Division Administrator, and Debbie Gorham, Program Administrator for the Oregon Department of Agriculture (ODA), presented a proposed settlement agreement for the case *Northwest Environmental Defense Center et al. v. Oregon EQC et al.* pertaining to Confined Animal Feeding Operation (CAFO) program rules and implementation. Ms. Schroeder explained that in October 2003, a number of groups filed a petition for judicial review of rules adopted by the Commission and the ODA for the CAFO wastewater permit program. The parties involved recently reached a settlement agreement, and Ms. Schroeder and Ms. Gorham recommended Commission approval of the settlement. After discussion, Commissioner Hampton moved that the EQC authorize the Chair to approve the settlement on the Commission's behalf. Commissioner Malarkey seconded the motion and it passed with four "yes" votes.

**O. Commissioners' Reports**

Commissioner Hampton stated the need for the Commission to pay close attention to recent worker errors at the Umatilla Chemical Agent Disposal Facility, and her intent to read the facility's root cause analysis report carefully.

Commissioner Malarkey reported on her recent attendance at a 2050 planning session that looked at community infrastructure needs in the context of projected population growth in Oregon over the next 45 years.

Commissioner Williamson encouraged DEQ to look closely at issues relating to biofuels, including the environmental impacts of using biodiesel and ethanol, and the need for economic stimulus in rural Oregon communities.

Chair Reeve adjourned the meeting at approximately 3:15 p.m.

State of Oregon
# Department of Environmental Quality Memorandum

**Date:** January 13, 2005

**To:** Environmental Quality Commission

**From:** Stephanie Hallock, Director S. Hallock

**Subject:** Agenda Item E, Informational Item: Oregon's Greenhouse Gas Reduction Strategy
February 3-4, 2005 EQC Meeting

The purpose of this item is to provide the Environmental Quality Commission (EQC) a summary of the recommendations of the Governor's Advisory Group on Global Warming and discuss potential future roles for the Department of Environmental Quality (DEQ) and the EQC in implementing recommendations related to motor vehicles, waste reduction, and landfills.

On December 17, 2004 the Governor's Advisory Group on Global Warming unanimously adopted the Oregon Strategy for Greenhouse Gas Reductions. These recommendations will be presented to the Governor for his consideration in early 2005. Several recommended strategies could affect DEQ if the Governor chooses to move forward with implementation. Provided below is a brief description of "greenhouse gases," the Governor's efforts on climate change, and the agency's potential role in implementing recommendations of the Global Warming Advisory Group.

## I. Greenhouse Gases:

**Carbon Dioxide ($CO_2$):** $CO_2$ is a primary product of fuel combustion. $CO_2$ emissions created from the combustion of fossil-fuels (petroleum, gas, coal, plastics, etc.) contribute more to climate change than $CO_2$ emissions from the combustion of non-fossil (renewable) materials such as wood.

**Methane ($CH_4$):** Sources include combustion, fermentation, and waste decomposition.

**Nitrous Oxide ($N_2O$):** Sources include fuel combustion, fertilizer use, and animal wastes.

**Halocarbons:** These include select compounds used in manufacturing - perfluorcarbons (PFC's), hydrofluorcarbons (HFC's), and sulfur hexafluoride (SF6).

Each greenhouse gas has its own global warming potency. For example, the halocarbon sulfur hexafluoride (SF6) is 23,900 times more powerful than carbon dioxide ($CO_2$) in its global warming potential. Methane is 23 times more potent than $CO_2$. Carbon Dioxide ($CO_2$) is the least potent greenhouse gas in terms of its global warming effect, but it is by

far the most abundant global warming pollutant. The scientific community has developed a method to compare all greenhouse gases on a uniform scale. This uniform scale uses $CO_2$ as the standard measure. The amount of more potent greenhouse gases like methane, nitrous oxide, and halocarbons are adjusted (increased) to reflect an equivalent amount of $CO_2$ (i.e. how much $CO_2$ would be needed to have the same global warming potential). The result is that for global warming analysis, methane, nitrous oxide, and halocarbon emissions are expressed and counted as Carbon Dioxide Equivalents ($CO_2E$) [1].

As noted above, methane, nitrous oxide, and halocarbons are significant greenhouse gases, but the pollutant of greatest concern is carbon dioxide ($CO_2$) because it occurs in the highest quantity. In 2000, approximately 84% of Oregon's greenhouse gas emissions came from $CO_2$, 7% from methane, 6% from nitrous oxide, and only 3% from total halocarbons. Total greenhouse gas emissions in 2000 were about 68 million metric tons of $CO_2E$.

The draft report[2] of the Governor's Advisory Group on Global Warming (Attachment C) describes specific impacts to human health and Oregon resources that are likely to occur from climate change. The long term impacts on Oregon's citizens, businesses, and environment are likely to be extensive and destructive. Scientists at Oregon and Washington universities project the consequences of global warming in the Pacific Northwest to include increased coastal flooding and erosion, less snow pack, lower river flows in summer, increased river flooding in winter, impacts on farm and forest productivity, higher energy costs, public health effects, and increased pressures on many fish and wildlife species.

## II. Initiatives for Greenhouse Gas Reduction:

### West Coast Governors' Initiative on Global Warming

Oregon's contribution to the *global* problem of climate change is relatively small. However, if greenhouse gas emissions from California, Washington, and Oregon were counted as a single nation, our three states (combined) would be the seventh largest global emitter of $CO_2$. Action is needed from all contributors of greenhouse gas emissions. Fortunately, many states and counties are embarking on greenhouse gas reduction efforts in parallel with Oregon. Oregon is a partner with California and Washington in the West Coast Govenors' Initiative on Global Warming, which seeks to reduce greenhouse gas emissions at a state and regional level[3]. Six New England states

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[1] Particulate pollution, including "carbon black" (soot released from burning fossil fuels) can also potentially affect global warming. These effects are only just beginning to be understood. Carbon soot also comes from burning wood or coal.

[2] The adopted greenhouse gas strategy report is being finalized by the Advisory Group's drafting committee and will be available shortly.

[3] This means that the West Coast states will proceed in parallel and sometimes in joint efforts to reduce GHG emissions.

and five Eastern Canadian Provinces have also committed to a Regional Climate Change Action Plan[4]. The New England states, along with New York, New Jersey, and other Mid-Atlantic states are cooperatively designing regulations to cap emissions from the electricity sector. In addition, many of Oregon's trading partners in Europe and Asia, as well as Canada, are parties to the Kyoto Protocol on greenhouse gas reductions. To support these partnerships and develop Oregon's strategy on global warming, Governor Kulongoski convened the Governor's Advisory Group on Global Warming.

## III. Governor's Advisory Group on Global Warming

The Governor's Advisory Group was chaired by Mark Dodson of NW Natural and Dr. Jane Lubchenco of Oregon State University. Mr. Dodson has served as NW Natural's President and Chief Executive Officer since January 2003 and is currently chair-elect of the Portland Business Alliance, chair of the Mayor's Business Roundtable, and a member of the executive committee of the Associated Oregon Industries. Dr. Lubchenco is an environmental scientist and marine ecologist who is engaged in teaching, research, synthesis, and communication of scientific knowledge to citizens and policy makers. Dr. Lubchenco is president of the International Council for Science, and past president of the American Association for the Advancement of Science and serves on the U.S. National Science Board.

The Governor's Advisory Group met five times between February and December of 2004. It consisted of business, community, and public leaders who were asked by the Governor to develop a strategy for reducing greenhouse gases in Oregon. A list of members is included as Attachment B. The group's recommendations, Oregon Strategy for Greenhouse Gas Reductions, will be presented to the Governor in early 2005. These recommendations are advisory only, and will take effect only if adopted by the Governor, as well as by local governments, private businesses, and other organizations. Some recommendations would require state administrative action; others would require or benefit from legislative approval. Where there are fiscal or workload impacts on state agencies, the Governor and agency heads will need to determine where these recommendations fit in relation to other priorities.

## IV. Greenhouse Gas Reduction Goals

The Advisory Group discussed Oregon's current goals for greenhouse gas reduction and a variety of strategies for achieving those goals. Oregon Benchmark #76 sets a goal of holding carbon dioxide ($CO_2$) emissions at or below 1990 levels. The Advisory Group

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[4] Currently, Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont are participating in the Regional Climate Change Action Plan. Key partners for Oregon include the Conference of New England Governors and Eastern Canadian Premiers (EEG/ECP); which include Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Brunswick, Prince Edward Island, New Foundland and Labrador, Nova Scotia, and Quebec.

believes that Oregon should strive to meet this benchmark for $CO_2$ reduction, although it doubts the reductions can be achieved by 2010 as targeted.
The Advisory Group has proposed the following supplemental goals to achieve measurable progress in reducing $CO_2$ emissions.

1. Near-Term Goal: By 2010, arrest the growth of Oregon's greenhouse gas emissions (including but not limited to $CO_2$) and begin to reduce them, making measurable progress towards meeting the existing benchmark of not exceeding 1990 levels.

2. Intermediate Goal: By 2020, achieve a 10 percent reduction below 1990 greenhouse gas levels.

3. Long-Term Goal: By 2050, achieve a "climate stabilization" emissions level at least 75 percent below 1990 levels.

The Advisory Group believes that these goals offer a pathway to climate stabilization that requires vigorous action but also allows the time necessary for citizens and businesses to adjust.

## V. Strategies for Greenhouse Gas Reduction

The Advisory Group's report articulates nine overarching principles that guide the development of Oregon's greenhouse gas strategy. The principles recognize the need to develop meaningful and cost-effective strategies that serve both the goal of climate stabilization and the long-term economic well being of Oregon. One important principle is that the cost of greenhouse gas reduction strategies should be viewed as an investment in Oregon's environmental and economic future. These investments range from improving energy efficiency in homes, farms, factories, appliances, and automobiles to developing new non-polluting energy sources such as wind, solar, agricultural biomass, and other renewable resources. This investment also includes avoiding or reducing the costs of potentially destructive storms, floods, and forest fires that are projected to accompany global warming.

The Advisory Group recommends a list of significant actions in seven major areas:

- Integrating Actions (aligning state policies with the greenhouse gas strategy)
- Energy Efficiency
- Electric Generation and Supply
- Transportation
- Biological Sequestration
- Materials Use, Recovery, and Waste Disposal
- Government Operations

The report recommends two categories of actions: *Category I- Significant Actions for Immediate State Action.* These actions are expected to produce the most significant

greenhouse gas benefits and are technically feasible today. *Category II-Other Actions for Immediate State Action.* These actions make sense for Oregon to undertake immediately but will produce less significant greenhouse gas benefits.

For quick reference, a list of Category-I (high priority) actions is included as Attachment A. All recommendations (Categories I and II) can be found in Appendix A to the Oregon greenhouse gas strategy report (Attachment C).

## VI. Potential Roles for DEQ and the EQC in Implementing Greenhouse Gas Recommendations

Particularly relevant to the agency are recommendations related to transportation emissions and materials reduction/waste recovery.

### TRANSPORTATION

There are 14 recommended actions under the transportation category. These can be found on pages 28-42 of Appendix A to the attached draft greenhouse gas strategy report *(Attachment C)*. Three of these actions most likely affect the agency:

**Action TRANS-1:** ***Convene an interim working group to recommend a proposal for the Governor, Environmental Quality Commission, and the Legislature to adopt emission standards for vehicles.*** This includes adopting California's Low Emission Vehicle (Cal LEV-II) and $CO_2$ (per California AB 1493 "Pavley") tailpipe emission standards. This is a Category-I (high priority) action. (See page 32 of Appendix A of the greenhouse gas strategy report).

### California Emission Standards for Vehicles

Overview

The State of California has established progressively more stringent motor vehicle emission standards. The Low Emission Vehicle standards were initially established to reduce emissions that contribute to ground-level ozone pollution. These standards, known as LEV-II, went into effect in the 2004 model year. California recently revised the LEV-II program to reduce greenhouse gas emissions from passenger cars and trucks. The greenhouse gas emission standards, known as Pavley, will go into effect in the 2009 model year.

The State of California is the only state permitted by Congress under the Clean Air Act to establish emission standards for automobiles. In other states, vehicles must meet federal emission standards, known as Tier-II, established by the U.S. Environmental Protection Agency. States may either rely on the federal standards or copy (i.e. "opt in" to) California standards; no other option is permitted by the Clean Air Act. Oregon currently relies on federal (Tier-II) vehicle emission standards.

LEV-II (Low Emission Vehicle)

The LEV-II emission standards were developed to control the ozone forming emissions of volatile organic compounds (VOC) and oxides of nitrogen (NOx), but have the secondary benefit of reducing particulate matter[5], carbon monoxide, and air toxics. LEV-II creates several classifications for low, ultra-low, and zero emission vehicles. LEV-II requires reductions in tailpipe and evaporative emissions and increases engine durability standards. LEV-II standards went into effect with the 2004 model year and will phase-in through 2010. While California has required special gasoline blends (reformulated fuel) to enhance LEV-II reductions, LEV-II certified vehicles achieve substantial emission reductions using conventional gasoline (i.e. LEV-II reductions are not contingent on using California reformulated gasoline). Engine efficiencies gained through LEV-II standards may also reduce greenhouse gas emissions by about 2.5 percent.

The California Air Resources Board (ARB) estimates that LEV-II adds approximately $150 to $250 to the cost of an average vehicle. Because ozone is a serious problem in the Northeastern United States, seven states in that region have "opted in" to California's LEV-II standards[6].

"Pavley" Standards (Greenhouse Gas Reductions)

In September 2004, the California ARB adopted new vehicle emission standards to reduce multiple greenhouse gas emissions ($CO_2$, methane, nitrous oxide, and halocarbons). Known as "Pavley" (named for State Assemblywoman Fran Pavley who introduced the enabling legislation), the standards address greenhouse gas emissions resulting directly from vehicle operation, including the vehicle's air conditioning system. In California, the Pavley standards have been incorporated into the LEV-II program and are scheduled to go in effect starting with the 2009 model year. ARB expects these standards to reduce greenhouse gas emissions from motor vehicles by 17% in 2020 and 27% in 2030.

The California Air Resources Board (ARB) estimates that Pavley standards will increase vehicle cost an average of $325 in 2012 and $1050 in 2016, but those costs are expected to be offset by lower fuel consumption. Of the seven Northeastern states that opted into LEV-II standards, New York and Massachusetts have also adopted the Pavley requirements.

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[5] Secondary reduction in carbon "soot" (particulate) may also benefit global warming.

[6] The states of Connecticut, Maine, Massachusetts, New Jersey, New York, Rhode Island, and Vermont have opted into LEV-II and are at various stages in evaluating the Pavley standards.

State Opt-in Option

Under the Clean Air Act, all states except California are prohibited from adopting vehicle emissions standards that differ from federal standards. However, once EPA acknowledges California's standards are at least as stringent as the national requirements, other states are allowed to "opt in" to California's standards.

When opting in, states must adopt the California standards exactly and may not create any state specific variation of the standards, forcing automakers to design a vehicle to meet a third standard that is different than California or federal requirements. When California's Pavley standard takes effect in model year 2009, California standards will include both the LEV-II and greenhouse gas standards. Consequently, an opt-in state must adopt the whole package. The Oregon Attorney General's office has conferred with the State of New York and reviewed several federal cases regarding the "opt-in" provision and concurs with this conclusion. However, further research would be needed to evaluate implementation issues should adoption of California's motor vehicle emission standards be pursued by Oregon.

Under Governor Locke, the state of Washington convened a stakeholder advisory group to evaluate greenhouse gas reductions strategies. One key recommendation is that the Washington legislature adopt the California LEV-II and Pavley standards. Governor Locke included adoption of LEV-II/Pavley in his 2005 legislative agenda. The states of Washington and Idaho will be interested in how Oregon proceeds with LEV-II/Pavley since automobile markets could be affected across state borders.

Challenges to Pavley

$CO_2$ is emitted from vehicles in direct proportion to the amount of fuel that a vehicle consumes. As a consequence, most of the technologies that reduce greenhouse gas emissions under Pavley also reduce fuel consumption. Federal law prohibits states from regulating fuel efficiency, reserving that role only to the federal government. An alliance of automobile manufacturers is suing to invalidate California's Pavley standards on the grounds that Pavley regulations are an attempt to regulate motor vehicle fuel economy. Pavley supporters are expected to respond that while most techniques for complying with Pavley do improve fuel efficiency, that effect is incidental to the actual purpose of setting emission standards to reduce greenhouse gases. If the auto alliance's legal challenge succeeds, all states will be prevented from adopting the Pavley requirements because they would no longer be part of the California motor vehicle emission standards package.

**DEQ's Potential Role:** If the Governor decides to proceed with a workgroup to consider the adoption of California standards, DEQ could be asked to play a role in convening and/or staffing the workgroup. Resources to staff such an effort were not included in DEQ's 2005-07 budget request, so the agency would have to shift priorities or be provided additional resources.

**EQC Action/Authority**: The EQC has the authority (ORS 468A.350) to adopt emission standards for passenger and light duty vehicles. However, since the first step in implementing this recommendation would be to convene a work group, no specific EQC action is needed at this time.

**Action TRANS-9**: ***State and local governments should switch to "clean diesel" fuel, vehicle purchases, and diesel retrofits.*** (See page 38 of Appendix A of the greenhouse gas strategy report). This is a Category-II recommendation. Specific actions under this recommendation include supporting DEQ's efforts to promote diesel engine and school bus retrofits to reduce particulate ("carbon soot") emissions and establishing a state contract requirement for low-emission fleets and construction equipment. One example of this strategy would be to require, as a condition of the state contract, that contractors working on state construction projects install diesel retrofit technology and reduce diesel engine idling.

**DEQ's Role**: DEQ will continue its clean diesel strategy to promote and support the retrofitting of existing diesel engines with emissions control technology. DEQ could also be affected by the advisory group's recommendation that the state establish a contract requirement for low-emission fleets and construction equipment. DEQ would likely be in an advisory role to the Department of Administrative Services (DAS) regarding state contract requirements. Workload impacts are unknown at this time.

**EQC Action/Authority**: DEQ is currently implementing the clean diesel strategy though voluntary measures and incentives, so no specific EQC action is needed at this time. The EQC already took action supporting this strategy when it amended the Pollution Control Tax Credit in 2001 to include diesel retrofit technology.

**Action TRANS-11:** ***Set and meet goals for reduced truck idling at truck and safety stops.*** (see page 39 of Appendix A, the greenhouse gas strategy report). This is a Category-II recommendation. Specific actions include (but are not limited to):

- Establish a core network of facilities along the West Coast Interstate (I-5) corridor that will enable truck drivers to rest or "overnight" without idling their truck engines.
- Support the Oregon Solution's Team on truck idle reduction.
- Support the West Coast Diesel Emissions Reduction Collaborative.

**DEQ's Role**: DEQ will continue to work with Oregon Solution Team partners to evaluate the effectiveness of installations of the truck stop electrification systems, and will work to secure financial resources to allow a more extensive network to be built throughout the state. DEQ will continue to coordinate these efforts with adjoining states, and to expand the truck stop electrification effort beyond the I-5 corridor to the outskirts of major urban areas and other major interstate routes.

The greenhouse gas impact of materials use, recovery, and waste management is multi-faceted and more complex than energy conservation and transportation measures. Emissions and emission offsets vary by type of material (aluminum, steel, various plastic resins and grades of paper, etc.) and area of the state. Categories of emissions and offsets include energy and non-energy emissions from industrial processes; transportation; carbon storage in wood products, forests, landfills, and agricultural soils; methane emissions from landfills; emissions from controlled and uncontrolled waste combustion; and offsets from reductions in fossil fuel use resulting from energy recovery of wastes and landfill methane.

**Action MW-1:** ***Achieve Waste Generation and Recovery Goals in Statute.*** (See page 56 of the greenhouse gas strategy report, Appendix A) This Category I measure consists of two separate sets of goals: waste generation and recovery rates.[8] The existing statutory goals are:

*Generation*

- By 2005 and in all subsequent years, no increase in per-capita waste generation.
- By 2009 and in all subsequent years, no increase in total waste generation.

*Recovery*

- 45 percent recovery rate in 2005
- 50 percent recovery rate in 2009

Oregon has made good progress at increasing its recovery rate, from 27% in 1992 to 47% in 2003. In contrast, waste generation has not improved. Per-capita waste generation grew approximately 20 percent between 1992 and 2003.[9] Under a "business as usual" scenario, by the year 2025, per-capita waste generation is projected to increase by approximately 35% from current levels, almost doubling greenhouse gas emissions from this category between 2003 and 2025, when coupled with projected population growth. Waste generation goals established by the 2001 Oregon legislature, together with recommendations from the Governor's greenhouse gas strategy (if implemented), will help to reverse this trend.

Greenhouse gas strategies for this category involve reducing the energy consumption and emissions generated by the creation, use, and disposal of a wide array of manufactured consumer products, as well as organic wastes (yard debris, food). Greenhouse gas emissions are generated at multiple points throughout a given product's life-cycle (from

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[8] Waste generation is a measure of total discards (recycling, composting, and disposal). The recovery rate is the fraction of discards that are "recovered" (recycled, composted, and in certain instances burned for energy).

[9] Officially, Oregon's per-capita waste generation grew 34% between 1992 and 2003. However, roughly one-third of that can be attributed to changes in reporting of recycling as part of DEQ's annual material recovery survey. These "bookkeeping" changes have increased waste recovery and generation rates. Waste generation rates might also have increased due to reductions in on-site burning and disposal of waste; as more waste shifts from on-site management (which isn't counted) into the formal solid waste management system (which is counted), waste generation numbers increase. DEQ is planning further evaluation in 2005 to better understand the causes of increased per-capita waste generation.

resource extraction and production through disposal). However, for most products, the majority of greenhouse gas emissions are produced at the front end of product life, during resource extraction and manufacturing. Achieving the waste generation goals is projected to result in a much higher reduction in greenhouse gas emissions in 2025 than accomplishment of the waste recovery goals[10].

**DEQ's Role:** DEQ is already working toward these existing goals. DEQ has a number of pilot programs in various stages of development to address waste generation and will be developing a waste generation plan in 2005. We are also supporting waste prevention and recovery through several other initiatives, including solid waste grants, compost rulemaking, education, and implementation of the opportunity-to-recycle requirements in rule. Oregon's Solid Waste Management Plan is also due for revision in 2005. It is not known at this time whether the waste generation or recovery goals can be achieved without additional regulation or cost, but at a minimum the Governor's Advisory Group's report recommends that both sets of goals be achieved to the extent they can be accomplished cost-effectively. If the Governor wants quicker action by DEQ on this item than is currently planned, we will need to adjust priorities or be provided with new resources.

**EQC Action/Authority:** No specific EQC action is needed at this time although several related rule revisions (compost facility regulation and recovery goals) are already on DEQ's rule-making agenda for 2005-2006. DEQ may also ask the EQC to adopt an updated State Solid Waste Management Plan in 2006-2007. The Plan would update Oregon's framework and priorities for state, local, and private activity in solid waste and resource management.

**Action MW-2:** ***Modify Alternative Final Cover Requirements at Larger Landfills*** and **Action MW-3:** ***Provide Incentives to Collect and Burn Methane.*** These Category I (high priority) actions both involve large landfills of municipal solid waste (MSW). MSW landfills are significant sources of methane, a product of waste decomposition and a potent greenhouse gas. Levels of methane collection vary widely among Oregon's larger MSW landfills, from minimal collection with flaring to large-scale gas collection with energy recovery.

MSW landfills are normally closed using an impermeable cover (geomembrane barrier) to reduce rainwater infiltration and runoff. Impermeable covers also help to reduce the uncontrolled release of methane gas (a by-product of waste decomposition). DEQ currently approves alternative designs in dry climates as long as they perform as well as geomembranes in two criteria: reducing water infiltration and reducing runoff.

Under **action MW-2** (page 58 of Appendix A to the greenhouse gas strategy report), DEQ would revise its guidance for landfills and require that alternative covers also

[10] This is in part because Oregon is already very close to achieving the recovery goals, while achieving the new generation goals will involve addressing a much larger quantity of material. In 2003, Oregon achieved a waste recovery rate of 47.3 percent.

perform in a way comparable with conventional (geomembrane) covers in regard to a third criterion: reducing greenhouse gas emissions. Such change would affect four landfills in Eastern Oregon. No new legislation would be needed. Greenhouse gas reductions at these landfills would be sustained for decades because of slower waste decomposition (and methane release) in the drier eastern Oregon climate. This recommendation would increase landfill costs by approximately $1 million per year between 2010 and 2025. Assuming those costs are passed on to landfill customers, the strategy would increase garbage costs for users of these four landfills.[11] Users of other landfills in Oregon would not see any new rate impacts as their landfills are already using or planning to use the more protective (greenhouse gas reducing) geomembrane covers.

**Action MW-3** (page 59 of Appendix A to the greenhouse gas strategy report) would leverage existing incentives and provide additional funding, if needed, to encourage larger landfills to collect and destroy even more methane emissions generated by landfills. The Advisory Group's report does not identify the source of the additional funding.

**DEQ's Potential Role:** DEQ could be asked to convene a stakeholder advisory group to help formulate the details of the revised guidance for alternative final covers (MW-2), or we could provide staff support to an advisory committee convened by others. We believe, however, that if the Governor wants to proceed with this action item it makes the most sense for DEQ to convene the committee, and we would need to evaluate what priorities could be shifted or whether we would need new resources to staff the committee.

Implementation of action MW-3 would be more complicated and would require careful design of an incentive program so that new incentives both compliment existing incentives and only pay for "new" methane collection (as opposed to collection that would occur in the absence of the new incentive). If the Governor supports this action and directs DEQ to develop it further, DEQ would work with a stakeholder advisory group or a private consultant to better define the incentive. Implementation of this incentive would require new resources.

**EQC Action/Authority:** No EQC action is anticipated in the immediate future; rules would be needed if a new methane control incentive were established.

**Action MW-4:** ***Provide incentives to increase salvage of reusable building materials.*** (See page 60 of the greenhouse gas strategy report, Appendix A) This is a Category II measure that would have a relatively small greenhouse gas benefit but other environmental and social benefits.

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[11]Oregon counties that currently rely on these landfills as their primary solid waste disposal sites include Multnomah, Clackamas, Washington, Hood River, Wasco, Sherman, Wheeler, Gilliam, Grant, Deschutes, Morrow, and Umatilla. Several of these landfills also accept significant quantities of solid waste from out-of-state sources.

**DEQ's Potential Role:** DEQ is already providing limited financial assistance to support salvage of reusable building materials through our larger solid waste grants program, and it is anticipated that this program will continue.

**EQC Action/Authority:** This activity will be accomplished through voluntary measures and incentives. For example, DEQ has recently provided grants to support the expansion of reusable building material depots in several Oregon communities. Homeowners and contractors use these facilities because they save money on purchasing and disposal, gain access to higher value materials, and gain favorable tax treatment. EQC involvement is not anticipated at this time.

**Action MW-6:** ***Develop statewide recovery infrastructure for consumer electronics waste ("e-waste"), with shared responsibility among producers, retailers, NGOs, and government.*** (See pages 61-62 of the greenhouse gas strategy report, Appendix A) This is another Category II measure. Increasing recovery of consumer electronics, particularly reuse of computers, can reduce greenhouse gases.

**DEQ's Potential Role:** DEQ recently participated in the SB 867 Task Force that evaluated several options for designing and funding a statewide program in Oregon for reusing and recycling "e-waste" (including used computers, monitors, televisions, and peripherals). It is expected that interested stakeholders will bring forward one or more proposals for an Oregon e-waste management program in the 2005 Legislative Session. In the spirit of product stewardship, it is likely that responsibilities will be shared between manufacturers, consumers, and government. DEQ's role in implementing or supporting the new e-waste management program will depend on the outcomes of these Legislative proposals. We expect to provide Fiscal Impact Statements for any legislation that affects DEQ.

**EQC Action/Authority:** Unknown at this time.

**Action MW-8:** ***Increase public awareness to discourage on-site burning of garbage, especially fossil-carbon materials.***[12] (See page 63 of the greenhouse gas strategy report, Appendix A) This is a Category II measure that could include additional education of households and businesses and the development of model ordinance language to make it easier for local governments to adopt their own burning restrictions. Reduced burning of wastes can have significant public health benefits, as burning of wastes is a major source of air toxics.

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[12] "Fossil-carbon materials" are materials that include carbon derived from fossil fuel sources, such as plastics, tires, and synthetic fabrics. Burning of these materials releases carbon in the form of carbon dioxide and represents a net transfer of carbon from the earth to the atmosphere (just as combustion of gasoline or oil does). In contrast, burning of wood is considered less of a concern from a greenhouse gas perspective, as it is part of an ongoing cycle of carbon transfer between the atmosphere and the biosphere. Burning of all waste materials (both fossil-carbon derived and bio-based) can also be a major source of air toxics.

**DEQ's Potential Role**: The burning of waste materials (such as garbage and plastic) is already prohibited under the Department's current open burning regulations (air quality rules), and in many local ordinances across the state. DEQ would continue work with local communities to reduce illegal open burning. Additional resources would be needed to expand the Department's open burning education and outreach effort to emphasize air toxics and greenhouse gas emissions from open burning waste materials. DEQ's open burning program is funded with general fund dollars, and experienced budget cuts in the 2003-2005 biennium.

**EQC Action/Authority:** EQC action is not anticipated at this time.

**Action MW-9:** ***Continue landfill regulation with additional reporting and analysis.*** (See pages 63-64 of the greenhouse gas strategy report, Appendix A) This Category II measure would require minimal new reporting from landfills, improve management of landfill gas data within DEQ, encourage landfill operators to collect actual data on gas generation, and ultimately allow users of landfills to have greater confidence in gas emissions estimates.

**DEQ's Potential Role:** DEQ would clarify new reporting requirements, improve internal data management, encourage and support better collection of gas generation data, and estimate gas collection efficiencies for landfills. Implementation of this action can be accomplished with existing resources.

**EQC Action/Authority:** EQC action is not anticipated.

**Action MW-10:** ***Evaluate methane emissions from closed landfills and options to reduce such emissions.*** (See page 64 of the greenhouse gas strategy report, Appendix A) This is a Category-II action. Little is known about greenhouse gas emissions from closed landfills, many of which have no gas collection systems. The Governor's Advisory Group recommended that the state evaluate this source of greenhouse gases and conduct a feasibility and cost-benefit study of methods to reduce emissions at closed landfills. Few if any of these closed landfills have closure funds available to spend on methane controls, so implementation of any such controls would require additional funding, with statewide costs potentially in the millions of dollars.

**DEQ's Potential Role:** DEQ would commission and oversee the study of closed landfills and if appropriate, convene an advisory group to recommend next steps. Implementation would require new resources.

**EQC Action/Authority:** EQC action is not anticipated at this time.

**Other Materials and Waste Measures**

The Governor's Advisory Group also recommended two other Category II measures:

- Action MW-5 would legislatively increase the bottle bill redemption value from 5 to 10 cents, expand the bottle bill to cover a wider variety of beverage containers, and allow for other changes to the bottle bill. The bottle bill is administered by the Oregon Liquor Control Commission. DEQ periodically evaluates the effectiveness of the bottle bill through our waste disposal composition and material recovery studies, and a special study is currently underway to better characterize the types and quantities of bottle bill materials that are recycled outside of the redemption system.

- Action MW-7 calls for the Land Conservation and Development Commission to amend land use rules to allow commercial composting on land zoned high value EFU (exclusive farm use). Such a change would allow for greater growth in the composting infrastructure and reduced landfilling of putrescible wastes, resulting in lower methane emissions from landfills and greater carbon storage in agricultural soils treated with finished compost.

## RECOMENDATIONS FOR ALTERNATIVE FUELS

### Oregon Department of Energy

**Action TRANS-3: Promote Biofuel and Production** This is a Category-I (high priority) action. (See page 35 of Appendix A of the greenhouse gas strategy report).

The Oregon Department of Energy (ODOE) will take the lead on implementing recommendations regarding the development of alternative fuels, including ethanol and biodiesel. Alternative fuels such as biodiesel, ethanol, natural gas, electricity and hydrogen are less polluting than conventional gasoline and diversify our transportation fuel supply. ODOE will continue to provide information, technical help, tax credits and low-interest loans to encourage alternative-fuel production and fueling stations in the state.

ODOE intends to assist with the development of local alternative fuel infrastructure by leveraging financing with the Business Energy Tax Credit and Energy Loan Program. ODOE provides technical assistance and consumer education to both fuel distributors and end users. ODOE can assist public fleets with developing fueling infrastructure and procurement of alternative fuel vehicles.

**DEQ's role in implementing the alternative fuels recommendations**: DEQ is not expected to have a significant role in implementing the recommendations on alternative fuels. Possible future involvement by DEQ includes estimating air emissions from the use of new fuels, air quality permitting for alternative fuel manufacturing facilities, and

evaluating the affect of fuels on the implementation of California LEV-II and Pavley emission standards for motor vehicles.

**OTHER RECOMMENDATIONS**

DEQ could also be affected by recommendation BIOSEQUESTRATION-1, calling for the increased use of "Bio-Mass" (wood and plant materials) for electricity generation. This recommendation may help reduce the need for prescribed forestry burning, especially in urban/rural interface areas with easier access to bio-mass fuels and greater options for raw-material transport. The increased use of bio-mass is discussed in the Governor's greenhouse gas reduction strategies, in the sections on Electric Power Generation and Biological Sequestration.

## VII. Next Steps

On December 17, 2004, the Governor's Advisory Group on Global Warming unanimously adopted the Oregon Strategy for Greenhouse Gas Reductions. The recommendations will be presented to the Governor for consideration in early 2005.

The Governor's Advisory Group also recommended the formation of a follow-up advisory group to further develop some of the more complex recommendations. The next advisory group would also be charged with evaluating adaptation strategies for Oregon – how Oregon can better prepare for the consequences of climate change.

If the Governor supports the Advisory Group's recommendations, DEQ will develop more detailed information addressing the timing of implementation, how the recommendations affect agency resources and priorities, stakeholder involvement, and legislative coordination.

## VIII. EQC Involvement

DEQ will periodically brief the EQC on the progress of implementing Oregon's greenhouse gas reduction strategy. DEQ would bring to the EQC any rulemaking actions needed to implement the recommendations adopted by the Governor.

**Attachments**

Attachment A: List of Category-I (high priority) recommended actions
Attachment B: Membership-Governor's Advisory Group on Global Warming,
Attachment C: Draft Oregon Strategy for Greenhouse Gas Reductions (October 13, 2004).

For reference, key sections of the draft greenhouse gas strategy document (Attachment C) include:

Section 2.1: Principles -guiding the greenhouse gas strategy. (page 10)
Section 3.2: Costs and Consequences for Oregon (page 32)
Section 3.3: Mitigation and Adaptation (page 36)
Section 4.0: Recommendations, Goals, Categories, Criteria, and Actions (page 37)
Section 5.0: Conclusion and Next Steps (page 40)
Appendix A: Actions to Reduce Greenhouse Gas Emissions-(detailed description)

Approved:

Section: _____

_____

Division: _____

_____

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# Recommendation Summary
# Actions to Reduce Greenhouse Gases

The summary below lists Category-I (high priority) recommendations contained in the Oregon Strategy for Greenhouse Gas reduction report prepared by the Governor's Advisory Group on Global Warming. Recommended actions in the report are divided into two categories for prioritization: *Category I- Significant Actions for Immediate State Action.* The Advisory Group found that these actions are expected to produce the most significant greenhouse gas savings, are technically feasible today, and cost-effective. *Category II-Other Actions for Immediate State Action.* The Advisory Group found that these actions make sense for Oregon to undertake immediately, but will produce less significant greenhouse gas savings. A full description of Category I and Category-II recommendations can be found in Appendix A of the Oregon Greenhouse Gas Reduction Strategy document.

| **Category –I Recommendations** | Potential DEQ Role |
|---|---|
| **Integrating Actions (See Appendix A, p. 2)** | No significant role (except as noted) |
| **IA-1:** Recommend the Governor adopt near-term, intermediate, and long term greenhouse gas emissions goals for Oregon. | |
| **IA-2**: Urge the Governor to renew the charter of the Advisory Group on Global Warming (or a successor body) to continue the Advisory Group's unfinished agenda. | DEQ will likely be asked to participate in on-going committee work |
| **IA-3:** The Oregon University System should develop strategic and targeted research, development and demonstration (RD&D) programs for greenhouse gas reduction technologies. | Possible collaboration |
| | |
| **Energy Efficiency (See Appendix A, p. 8)** | None Anticipated Lead by ODOE |
| **EE-1**: Meet the Northwest Power and Conservation Council (NWPPC) goal of implementing cost-effective electricity efficiency measures for electric users and equivalent goals for natural gas users. | |
| **EE-1a**: Expand and coordinate electric incentive programs for Investor-Owned Utilities (IOU's). | |
| **EE-1b:** Upgrade building codes on a 3-6 year cycle. | |
| **EE-1c**: Amend building codes to set minimum space and water heating/cooling standards. | |
| **EE-1d**: Adopt state appliance efficiency standards. | |
| **EE-1e**: Advocate with Bonneville Power Administration (BPA) and Oregon COU's to meet NWPPC goal. | |
| **EE-1f**: Support Oregon Public Utility Commission (OPUC) actions to evaluate NW Natural/ETO and ODOE natural gas incentive programs. | |

| **Category –I Recommendations** | Potential DEQ Role |
|---|---|
| **EE-1g**: Advocate with OPUC for AVista and Cascade to meet gas energy savings goals comparable to NW Natural. | |
| **EE-1h**: Advocate for federal equipment and appliance efficiency standards. | |
| **EE-1i**: Strengthen state marketing of energy and incentive programs; initiate Governor's Awards. | |
| | |
| **Electric Generation and Supply (See Appendix A, p. 20)** | None Anticipated Lead by ODOE |
| **GEN-1:** Increase the renewable content of electricity. | |
| **GEN-2:** Develop a greenhouse gas allowance standard for delivered energy. | |
| **GEN-2a:** Develop an Oregon Renewable Portfolio Standard (RPS) or expand public purpose charge as an alternative to GEN-2 above (e.g. have a new renewables goal to meet 25% of 2025 load) | |
| **GEN-3:** Support Oregon PUC's review of rules and tariffs for renewable and combined heat and power (CHP) facilities. | |
| | |
| **Transportation (See Appendix A, p. 28)** | Potentially Significant DEQ role |
| **TRAN-1:** Convene an interim working group to recommend a proposal for the Governor, Environmental Quality Commission, and the Legislature to adopt emission standards for vehicles. | **Potential Lead by DEQ** |
| **TRANS-1a:** Adopt Low Emission Vehicle (LEV-II) Emission Standards for Motor Vehicles | **Potential Lead by DEQ** |
| **TRANS-1b:** Adopt $CO_2$ Tailpipe Emission Standards (per California AB 1493 "Pavley" standards). | **Potential Lead by DEQ** |
| **TRAN-2:** Integrate land use and transportation decisions with GHG consequences. | Consultation |
| **TRAN-3:** Promote biofuel use and production. | Consultation Effort lead by ODOE |
| **Note**: There are two Category-II Transportation recommendations where DEQ has already made substantial progress. These relate to reductions in emissions from heavy-duty diesel vehicles through retrofit technology and the electrification of truck stops. | **Current Lead by DEQ** |
| | |
| **Biological Sequestration (See Appendix A, p. 43)** | No significant role (except as noted) |
| **BIOSEQ-1:** Reduce wildfire risk by creating a market for woody biomass from forests. | DEQ coordination - |

| **Category –I Recommendations** | Potential DEQ Role |
|---|---|
| | linked to Regional Haze program for visibility and smoke management |
| **BIOSEQ-2:** Consider GHG effects in farm and forest land use decisions. | |
| **BIOSEQ-3:** Increase forestation of under-producing lands. | |
| | |
| **Materials Use, Recovery and Waste Disposal (See Appendix A, p. 51)** | |
| **MW-1:** Achieve the waste generation and recycling goals in statute. | **Potential Lead By DEQ** |
| **MW-2:** DEQ should develop guidance to clarify alternative final cover performance at larger landfills: Demonstrate control of gas emissions comparable to geomembrane cover. | **Potential Lead By DEQ** |
| **MW-3**: Provide incentives for larger landfills to collect and burn minimum percentage (65 percent to 80 percent) of methane generated. | **Potential Lead By DEQ** |
| There are other Category-II recommendations affecting Materials Use, Recovery and Waste Disposal. These are described in Appendix A of the governor's GHG strategy. | |
| | |
| **State Government Operations (See Appendix A, p. 65)** | |
| **GOV-1:** State agencies should use their agency Sustainability Plans as the tool for agencies' dynamic involvement in GHG reductions. Operational activities in the areas of electricity, natural gas, transportation, waste and water will be the focus for reduction opportunities. | Consultation |
| **GOV-2:** Through a collaborative effort, the departments of Energy, Environmental Quality and Administrative Services should develop a process to educate agency personnel about opportunities for GHG reductions including how to set goals and calculate GHG reductions. | Consultation |

# MEMBERS OF THE GOVERNOR'S ADVISORY GROUP ON GLOBAL WARMING

**Achterman, Gail L.**
Gail L. Achterman is the Director of the Institute for Natural Resources at Oregon State University. She received her undergraduate degree from Stanford University in economics and then went to the University of Michigan where she received her J.D. in 1974 and an M.S. in natural resource policy and management in 1975. She started her career working for the Department of the Interior in Washington, D.C. before returning to Oregon in 1978 to join a private law firm. Her law practice emphasized natural resource and environmental law. From 1987-1991 she served as Governor Neil Goldschmidt's Assistant for Natural Resources before returning to private practice. She left Stoel Rives LLP in 2000 to become Executive Director of the Deschutes Resources Conservancy in Central Oregon before joining OSU in 2003 as the first full time director of the Institute.

**Allen, Jeff**
Jeff Allen became executive director of the Oregon Environmental Council in October 1996, and OEC's membership, budget, and staff have more than doubled during his tenure. He holds a Master's degree in public policy from the University of California, Berkeley, and graduated Phi Beta Kappa from the University of Michigan. His diverse environmental policy experience includes work for the Union of Concerned Scientists, Clean Water Action, the Center for Clean Air Policy, and the California Senate. Jeff is a manic fisherman who also enjoys backpacking, fishing, and wine. He, his wife Martha and son Sam live in Hood River.

**Berggren, Randy**
Randy L. Berggren has been the General Manager of the Eugene Water & Electric Board since August 30, 1990. He is a professional electrical engineer registered in California. He began his career at EWEB as an Engineering Manager, and was promoted to assistant general manager for planning & development in 1988. Prior to joining EWEB, Jeff held a variety of engineering and administrative positions with the Springfield Utility Board and Southern California Edison Corporation over a 16-year period. He received his bachelor's degree in electronic engineering from the California State Polytechnic University in 1969, and a master's degree in electrical engineering from the University of Southern California in 1971. Randy was a board member for Governor Kitzhaber's Willamette Restoration Initiative and has served as a board member and chairperson on various regional energy associations.

**Blosser, Bill**
Bill Blosser has worked for 35 years in Oregon as a consultant and public official in land use, environmental and sustainability planning. He founded the sustainable development practice within $CH_2MHILL$ and developed sustainability plans for a variety of clients. He served as Governor Kulongoski's sustainability advisor in 2002-2003 and led the

development of the governor's executive order on sustainability and the guidance document for state agencies to implement the order. He currently serves on the Oregon Sustainability Board and the boards of the International Sustainable Development Foundation, the China-US Center for Sustainable Development, and Sustainable Northwest. As a land use and environmental planner, Bill has participated in developing numerous environmental impact studies, municipal water plans, transportation systems plans, and city comprehensive plans. He served for six years as Chair of the Oregon Water Resources Commission and for 9 years as Chair of the Oregon Land Conservation and Development Commission. He served six months as the Interim Director of the Department of Land Conservation and Development.

Bradbury, Bill

Bill Bradbury grew up in Chicago, and moved to Bandon, Oregon in 1971. In Bandon, he owned and operated a small business before beginning his career in government. He served in the Oregon legislature for 14 years, representing Oregon's South Coast, and went on to direct a local non-profit organization. As Secretary of State, Bill Bradbury is our second-highest-ranking constitutional officer. He is the auditor of public accounts, the chief elections officer, and the manager of the state's official legislative and executive records. Along with the Governor and Treasurer, he sits on the State Land Board, and he was appointed by the Governor to chair the Oregon Sustainability Board. He was elected Secretary of State in 2000, and he now lives in Salem with his wife Katy.

Bragdon, Susan

Susan H. Bragdon (B.A. biology, Williams College; M.Sc. Resource Ecology, University of Michigan; J.D. University of Michigan) uses her educational background and experience in science and law to work on critical global issues such as the conservation, use and management of biological diversity; creating compatibility with environment and agriculture; and promoting food security. She was the lawyer for the Secretariat for the Intergovernmental Negotiating Committee for the Convention on Biological Diversity, providing legal advice to the working group handling intellectual property rights, transfer of technology including biotechnology and access to genetic resources. When the treaty was concluded Susan joined the treaty Secretariat as its Legal Advisor. Susan also served as the top Senior Legal Officer for the Basel Convention on the Control of Transboundary Movement of Hazardous Waste before joining International Plant Genetic Resources Institute as a Senior Scientist, Law & Policy in 1997. She now works on legal and policy issues related to plant genetic resources and in particular manages projects on intellectual property rights, biotechnology and biological diversity and on developing decision-making tools for the development of policy and law to manage access to and benefit-sharing from genetic resource. Susan is invited by governments worldwide to provide advice and give lectures on issues of importance related to the conservation of biological diversity and its links to development.

Burkholder, Rex

Rex Burkholder serves as vice-chair of the Joint Policy Advisory Committee on Transportation (JPACT) and as the council liaison to the JPACT Bi-state Transportation Committee and other regional transportation committees. Rex helped found the Bicycle

Transportation Alliance and worked as the policy director for the nonprofit organization, helping to make it one of Oregon's most active grassroots organizations. He also has taught high school science and served as faculty at Portland State University Office of Student Development. As a community activist for the past 20 years, he was a founding trustee of the nationally recognized Coalition for a Livable Future, which unites more than 50 citizen groups on the issue of sustainability. As a parent-volunteer, Rex helped establish the Northeast Community School, an innovative, diverse charter school in Portland. He has been honored as the 1998 Most Effective Citizen Advocate in the metro region by 1000 Friends of Oregon and as a 1999 founder of a New Northwest by Sustainable Northwest. Rex received a bachelor's degree in biology and a teaching certificate from Portland State University. He earned a master's degree in urban and environmental policy from Tufts University in 1989. He is married, has two sons and enjoys playing tenor guitar, spending time with his family and hiking or kayaking around the Northwest.

**Burnett, Michael G.**

Michael Burnett is the Executive Director of the Climate Trust. He is an environmental engineer with twenty-seven years of executive, management, policy, and technical experience in climate change, energy efficiency, and renewable resources, mostly in the Pacific Northwest. As the Trust's initial Executive Director, Mike took the organization through its start up phase, overseeing the development of its accounting system and assisting the Board in developing its policies regarding the selection of offsets. He works with the Board on strategic planning for the Trust, oversees the development of annual work plans and budgets, and manages the staff to meet the work plans. Under his guidance, the Trust has assembled a project carbon offset portfolio totaling $5 million and 2.5 million metric tons of carbon dioxide. Mike led the negotiations on the Trust's first five offset projects and put the stamp of his creativity on the term sheets for the current batch of six projects. He is an active participant in the national and international policy debate regarding GHG mitigation.

Mike was a Vice President for Trexler and Associates, Inc., an international leader in climate change mitigation. There, he prepared corporate climate change strategies, developed a climate change early action crediting proposal for a national sustainable technology industry group, and prepared a feasibility study for a major international carbon offset project. Mike was also the founding CEO for Conservation and Renewable Energy System (CARES), a consortium of public power utilities in Washington State. Mike also has worked in energy conservation, renewable energy, and power planning for two utility trade associations, Bonneville Power Administration, the Western Solar Utilization Network, and the National Park Service. Mike earned an M.S. in Environmental Engineering from the University of Florida while on a National Science Foundation Graduate Fellowship.

**Dodson, Mark S.**

Mark Dodson has served as NW Natural's President and Chief Executive Officer since January of 2003. He joined the company in 1997 as senior vice president and added the general counsel role in 1998. In May of 2001, he was appointed NW Natural's President

& Chief Operating Officer. Before coming to NW Natural, Mr. Dodson practiced law for more than 20 years. In 1979, he worked in the General Counsel's office of the Department of Transportation and then became special counsel to the Federal Aviation Administrator in Washington, D.C. After leaving Washington, D.C., he spent 17 years with the law firm of Ater, Wynne, Hewitt, Dodson, Skerritt in Portland, Oregon. His practice focused on regulated industries, international and national transactions and legislative issues. Over the years, Mr. Dodson has been actively involved in a variety of civic activities. He has been chairman of the Oregon State Board of Higher Education, chair of the Neighborhood Partnership Fund, secretary of the Oregon Health Sciences University Board and co-chair of Governor Kitzhaber's Task Force on Scholarship and Student Aid. He also headed the transition of Oregon Governor Neil Goldschmidt. He is currently the chair-elect of the Portland Business Alliance, chair of the Mayor's Business Roundtable and a member of the executive committee of the Associated Oregon Industries. Mr. Dodson grew up in Beaverton, Oregon, and attended Sunset High School. He graduated from Harvard University in 1967 and from Boalt School of Law, University of California at Berkeley in 1973. He is married to Ruth Ann Dodson, and they have two children: Carrie attends Harvard University; and Kevin is a senior at the University of Oregon.

**Duncan, Angus**

Angus Duncan has served as President and CEO of the Bonneville Environmental Foundation since its formation in 1998. The Foundation generates revenues from regional and national sales of renewable energy and Green Tags. Since 1998, over $1.5 million in Foundation revenues have been dedicated to new renewable energy projects and watershed restoration in the Pacific Northwest. In 1995 Mr. Duncan founded and served as President of The Columbia/Pacific Institute at Portland State University, where he holds an appointment as Adjunct Associate Professor. Mr. Duncan represented three Oregon governors on the Northwest Power Planning Council from 1989 to 1995, including service as Council Chairman (1994-95). Previously he served as Director of Energy Policy, US Department of Transportation. Mr. Duncan has thirty years experience in regional and national energy and environmental affairs, at all levels of government, and in private sector energy development at home and overseas. He speaks and writes frequently on energy and environmental questions, and serves on the Boards of the Oregon Environmental Council and the Northwest Energy Coalition.

**Jubitz, Al**

A native Oregonian, Al graduated from Beaverton High School in 1962, Yale University (BS) in 1966 and the University of Oregon School of Business (MBA) in 1968. Al married Nancy Thompson of Chestnut Hill, MA and together they have three grown daughters and two grandsons. Al recently retired from the family business (Jubitz Corporation) after a career spanning 34 years. He is Past President of and active in the Rotary Club of Portland and currently serves on the Portland Schools Foundation Board. He is Director Emeritus of Morrison Child and Family Services and a Director of Outward Bound West. He also is engaged in the Jubitz Family Foundation and serves as a director of two private companies. His interests are in the areas of peace,

environmental stewardship and early childhood education. He enjoys playing squash and golf.

**Leslie, David A.**

David Leslie has been executive director of Ecumenical Ministries of Oregon (EMO) since 1997. EMO is a statewide association of 17 Christian denominations including Roman Catholic, Orthodox and Protestant and is one of the nation's largest and longest-lasting regional ecumenical associations. Prior to coming to EMO, David served as Executive Director of Interfaith Ministries for Greater Houston, a coalition of more than 300 congregations and regional and national organizations representing Christian, Muslim, Jewish, Buddhist and Hindu communities. He is a founding member and past president of the National Interfaith Community Ministry Network and was the founding Executive Director of the Habitat for Humanity affiliate in Austin, Texas. Leslie's other professional experiences include the Ohio Council of Churches and World Council of Churches.

Community involvement includes service with Network Behavioral Health Housing Board of Directors, Oregon Department of Human Services (ODHS) Reorganization Stakeholders Group, ODHS Faith-based Advisory Group, Oregon Senate Interim Committee on Farmworker Issues, as well as the Salmon and Economic Development Citizens Forum convened by The Oregon Wheat Growers League and Confederated Tribes of the Umatilla Reservation. Born in San Augustine, Texas, David received his Masters of Divinity from Austin Presbyterian Theological Seminary and his Bachelor of Arts in history from The University of Texas at Austin. He is a lay member of the Presbyterian Church (USA). He is married to Leigh Mohney Leslie, and they have three sons Ian, Ryan and Michael.

**Lorenzen, Henry**

Henry Lorenzen is a partner in the Pendleton law firm of Corey, Byler, Rew, Lorenzen & Hojem, L.L.P, which he joined in 1984. He has represented numerous utilities and parties acquiring utility system assets, including: the condemnation action by which the City of Hermiston acquired PacifiCorp's electrical distribution system in Hermiston, Oregon; attorney responsible for acquisition of a $45,000,000 electrical distribution system by a newly formed cooperative, Oregon Trail Electric Consumers Cooperative; and serves as General Counsel for Oregon Trail Electric Consumers Cooperative, Baker City, (1988 - present), Umatilla Electric Cooperative, Hermiston, Oregon, (1984 - present), and Columbia Power Cooperative, Monument, Oregon, (1984 - present). Henry is currently retained by the City of Portland for potential condemnation of assets of Portland General Electric.

Henry served as an Assistant United States Attorney (1977-1983). He is Vice President (1973-1990), and President (1990 - present) of H & C Lorenzen Farm, Inc., which is a 4,000 acre family wheat farming operation located near Pendleton, Oregon. He received Umatilla County Conservation Farmer of the Year Award (1992).

**Lubchenco, Jane**

Dr. Jane Lubchenco is an environmental scientist and marine ecologist who is actively engaged in teaching, research, synthesis and communication of scientific knowledge to interested citizens and policy makers. She received her B.A. from Colorado College, M.S. from the University of Washington and PhD. from Harvard University. She was assistant professor at Harvard University for two years before moving to Oregon State University. She holds two positions at Oregon State University: Wayne and Gladys Valley Professor of Marine Biology and Distinguished Professor of Zoology. Her research interests include biodiversity, climate change, sustainability science and the state of the oceans. She is lead Principal Investigator (of 13 Co-PIs) for a $43 million, 4-university consortium called the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) that is focused on understanding the dynamics of the nearshore portion of the large marine ecosystem along the west coast of the US. She and her husband, marine ecologist Bruce Menge, students and collaborators are also engaged in a comparison of coastal upwelling ecosystems along the coasts of the US West coast, New Zealand, Chile and South Africa.

Jane is the first woman President of the International Council for Science, a Past President of the American Association for the Advancement of Science (AAAS) and of the Ecological Society of America. She serves on the U.S. National Science Board (having been twice nominated by President Clinton and twice confirmed by the US Senate) and she recently completed a term on the Executive committee of the Council of the U.S. National Academy of Sciences. She co-founded and leads the Aldo Leopold Leadership Program and is a Principal of COMPASS, the Communication Partnership for Science and the Sea. Her research contributions in ecology are widely recognized. Eight of her publications have been named Science Citation Classic Papers. She is an elected member of the National Academy of Sciences, the American Academy of Arts and Sciences, the American Philosophical Society and the European Academy of Sciences. She serves on the Pew Oceans Commission, an independent group of American leaders conducting a national dialogue on the policies needed to restore and protect the marine ecosystems in US waters. She is a Director or Trustee of the David and Lucile Packard Foundation, the Monterey Bay Aquarium, SeaWeb, the Royal Swedish Academy of Sciences' Beijer Institute for Ecological Economics and Environmental Defense. She has received numerous awards including a MacArthur Fellowship, a Pew Fellowship, eight honorary degrees (including one from Princeton University), the 2002 Heinz Award in the Environment, the 2003 Nierenberg Prize for Science in the Public Interest and the 2004 Distinguished Scientist Award from the American Institute of Biological Sciences.

**McArthur, Mike W.**

A native Oregonian, Mike McArthur graduated from Lewis and Clark College in 1970 with a BS in Psychology. He played intercollegiate football for fours years and competed on the track team at LC. He then went to Western Oregon to earn a teaching degree and certification with a secondary social science endorsement. Five years of teaching and coaching followed in Portland and the south coast community of Bandon. He married Jeanney, an accomplished multi-media artist, in 1973. In 1977 they left teaching and Bandon to moved to Sherman County, OR to work on a dryland wheat and cattle

operation. Mike was elected to and served on the board of directors of the regional grain cooperative: Mid Columbia Producers for six years. He participated in the National Wheat Industry Leaders of Tomorrow program and was County Wheat League president in 1998. They are still involved in the 115 year old family farming operation although not as actively due to Mike's full time job as County Judge, a position to which he was elected in 1992. The county judge in Sherman County is the chair of the board of commissioners and county administrator as well as juvenile and probate judge. In 1999 McArthur served as the President of the Association of Oregon Counties and currently represents Oregon counties on the board of the National Association of Counties. He has held a number of other positions related to community and economic development and now serves in the position of chair of the Rural Affairs Sub-Committee of the Agricultural Steering Committee for NACo. Also, he currently serves on the Governor's Industrial Lands Task force and is Co-Chair of the State Community Development Forum.

**MacRitchie, Andrew (alternate for Judi Johansen, PacifiCorp)**

Andy MacRitchie became PacifiCorp's executive vice president of Strategy and Major Projects in January 2002. Andy is responsible for strategy, business planning and environmental policy for the U.S. Division of ScottishPower, which includes oversight of the major issues program. He is also a member of the PacifiCorp's Board of Directors. Prior to assuming his current position, Andy formed and served as executive vice president of the Power Delivery business. Here he was responsible for the operational management of PacifiCorp's $4 billion asset base covering electric distribution, transmission and customer service for its 1.5 million customers in Oregon, Utah, Washington, California, Idaho and Wyoming.

Andy moved to the US in December 1998 to lead the ScottishPower merger team through state regulatory commissions' approvals during the company's merger with PacifiCorp. Upon completion of the regulatory process, Andy led the transition planning process, involving a combined PacifiCorp/ScottishPower senior management team in the development of plans to transform PacifiCorp into a top 10 U.S. utility. Andy joined ScottishPower in 1986. Prior to working for ScottishPower, Andy was operations manager at Stagecoach Holdings. He is a member of the Institution of Electrical Engineers (IEE) and is a Chartered Engineer in the U.K. Andy has an honors degree in electronics and electrical engineering as well as an MBA from Strathclyde Graduate Business School in Scotland. He also completed an Executive Development Program at Wharton Business School in the United States.

**Mitchell, Ronald B.**

Dr. Ronald B. Mitchell is an Associate Professor with tenure in the Department of Political Science at the University of Oregon. He earned his PhD in Public Policy at Harvard University in 1992. He was a Visiting Associate Professor at the center for Environmental Science and Policy at Stanford University from June 1999 through December 2001. He has an award-winning book published with MIT Press as well as numerous articles in scholarly journals. His research focuses on the effectiveness of international institutions at influencing the behavior of states and nonstate actors as well as on the influence of environmental science on international policymaking. He teaches

courses on international relations theory, international environmental politics, and international regimes.

**Schell, Steve**

Steven R. Schell is a partner in the Portland Law Firm of Black, Helterline, LLP. He practices environmental, land use and real estate law. He is a native Oregonian, having graduated from Franklin High School in Portland, the University of Oregon with two degrees, in 1961 a BA in Political Science, and in 1968 a J. D in Law. He has a 1965 M.A. from the University of Denver in Economics. He served in the United States Air Force from 1961 to 1965. He served as a member and vice-chairman of Oregon's Land Conservation and Development Commission from 1973 to 1976, on the Oregon Law Commission task force that resulted in the creation of the Land Use Board of Appeals in 1978-1979, on the State's Energy Facility Siting Council from 1990 to 1998. He currently chairs the Oregon non-profit corporation, Energy Trust of Oregon.

**Southworth, Jack**

Jack Southworth and his wife, Teresa own and operate Southworth Bros. Ranch, a cow-calf-yearling ranch located on the south side of the Strawberry Mountains near the small town of Seneca. The ranch was homesteaded by Jack's great-grandfather in 1885 and has been operated by his family ever since. He and Teresa graduated from Oregon State University in 1977, married in 1978 and have been operating the ranch since then. Jack is president of the Grant County Farm Bureau, serves as a director of Blue Mountain Hospital, Oregon Agricultural Education Foundation, the E. R. Jackman Foundation and the Blue Mountain Healthcare Foundation. He is an amateur historian and enjoys collecting photos and stories having to do with the history of southern Grant County. He believes that when ranching is done well, ranchers can produce safe and delicious beef, a healthy ecosystem and do it in a manner that is profitable and enjoyable for the people involved.

**Sten, Erik**

Over the past 7 years, Portland City Commissioner Erik Sten has led the city's efforts to combat climate change in an urban environment. In 1994, the City of Portland was the first city in the United States to adopt a Local Action Plan on Global Warming. Since then over 400 municipal governments world-wide have followed Portland's lead and adopted climate change mitigation plans. In 2001, Portland City Council and the Multnomah County Board of Commissioners adopted a joint Local Action Plan on Global Warming with a goal of reducing carbon dioxide emissions to 10 percent below 1990 levels by 2010. This target is slightly more aggressive than the 1997 Kyoto Protocol, which, though not ratified by the U.S., set a national reduction goal of seven percent below 1990 levels by 2008 to 2012. Commissioner Sten has conveyed Portland's efforts at many national and international gatherings including a presentation at the United Nations Conference of the Parties on Climate Change in Buenos Aires.

**Wilkinson, Jean**

Jean Underhill Wilkinson is a partner in Martin Underhill Farms, a family owned wheat and cattle ranch that has existed since 1878. Prior to joining her family business, Jean

worked as a lobbyist and legal counsel for the Oregon Cattlemen's Association and the Oregon Farm Bureau Federation. Jean is a current member of the Oregon State Bar, and is Chair Elect for the Agriculture Law Section. She is also President of the Wasco County Wheat Growers Association, and a board member for the Multnomah County Farm Bureau.

**Wyatt, Bill**

Bill Wyatt has been Executive Director of the Port of Portland since October of 2001. The Port of Portland, governed by a nine member Commission appointed by the Governor, operates four marine terminals, three general aviation airports and Portland International Airport (PDX). The Port has just over 800 employees and annual revenues of approximately $250 million.

Prior to his appointment as the Port's Executive Director, Wyatt served as Chief of Staff to former Oregon Governor John A. Kitzhaber for seven years, preceded by six years as President of the Oregon Business Council, and five years as Executive Director of the Association for Portland Progress, then, Portland's downtown development association. Wyatt served as a state representative from the Astoria area from 1974 – 1977. He attended public schools in Astoria, and Alexandria, Virginia, and later attended both Willamette University and the University of Oregon, where he was also student body President. Wyatt has been a member of the Board of Directors of Oregon Public Broadcasting, and was Board Chair of the Urban League of Portland. He served as a Director of the Crabbe-Huson mutual funds until their sale to Liberty Mutual in 1998.

**Wyse, Duncan**

Duncan Wyse became the President of the Oregon Business Council in June 1995. The Oregon Business Council is a private non-profit, non-partisan organization consisting of 46 business executives of some of Oregon's largest businesses. OBC's function is to focus the knowledge and resources of its members on key, long-range public policy issues facing Oregon. Prior to this position, Wyse was Executive Director of the Oregon Progress Board, where he developed *Oregon Shines*, Oregon's long-range strategy for economic growth, and *Oregon Benchmarks*, indicators measuring how Oregon is doing as a people, place and economy. Previously, he spent eight years at the California Public Utilities Commission, serving as advisor to the President and Director for Policy and Planning. He was heavily involved in restructuring the telecommunications, electricity and natural gas industries in California. He currently serves on the Oregon Quality Education Commission, the E3: Employers for Education Excellence Board of Directors, the Oregon Mentors Leadership Council, the Multnomah County Leaders Roundtable, Portland-Multnomah Progress Board, the Multnomah County Commission on Children, Families and Community, the Portland Public Schools Foundation, the Willamette Restoration Initiative and the Governor's Global Warming Advisory Group. Wyse holds a Bachelor's degree from Pomona College and a Master's in Business Administration from Stanford University. He grew up in Portland, and is married with three children.

## Ex Officio Member

**Neilson, Ronald P.**
Ronald P. Neilson is a BioClimatologist with the USDA Forest Service, Pacific Northwest Research Station and a Professor (Courtesy) with the Department of Botany and Plant Pathology and the Department of Forest Science at Oregon State University. Dr. Neilson has focused on the theory, mechanisms and simulation of vegetation distribution for nearly three decades. He received the Cooper Award from the Ecological Society of America for his research on oak distribution in the Rocky Mountain region. Dr. Neilson's MAPSS biogeography model and MC1 dynamic general vegetation model have contributed to national and global assessments by the Intergovernmental Panel on Climate Change (IPCC) and the U.S. Global Change Research Program and to *Our Changing Planet*, the formal description of the U.S. Global Change Research Program. Dr. Neilson was the lead author for the Forest sector for the IPCC's special report on *The Regional Impacts of Climate Change* and the convening lead author for an Annex to the Special Report on simulations of global vegetation re-distribution under climate change. His current work extends into Earth System Modeling, Landscape System Modeling and large-scale fire forecasting. Dr. Neilson received the Forest Service Chief's 1999 Honor Award for Superior Science and the USDA Secretary's Honor Award for Superior Service in 2003. He received a BA in 1971 from the University of Oregon, an MS in 1975 from Portland State University, and a Ph.D. in 1981 from the University of Utah.

## State Agency Members

**Grainey, Michael W.**
Michael Grainey is Director of the Oregon Department of Energy in Salem, Oregon. Mike graduated from New York University Law School and received his undergraduate degree from Gonzaga University in Spokane, Washington. He is admitted to practice law in Oregon, Washington and the District of Columbia. His civic activities have included membership on the Board of Directors of the Salem Chamber Orchestra, coaching youth soccer in the Salem Parks and Recreation Program, debate coach for Blanchet High School in Salem and chair of his church's social justice committee.

**Hallock, Stephanie**
Stephanie Hallock was appointed Director by the Oregon Environmental Quality Commission on Nov 6, 2000. Previous to her appointment she was on a special one-year assignment as a water quality policy adviser for Governor John Kitzhaber's Natural Resources Policy Group. Hallock has been with DEQ since August 1988, serving as Administrator of the Hazardous and Solid Waste Division, Acting Administrator of the Water Quality Division, and Administrator of DEQ's Eastern Region ,overseeing agency work in eighteen Oregon counties. She also served at the U.S. Environmental Protection Agency's Region 9 office in San Francisco as chief of the Policy and Grants Branch, and has worked in advertising and public relations at the Hallock/Modey Agency in Portland. Hallock has a master's degree in Public Administration and a Bachelor of Arts degree in English, both from Portland State University.

**Savage, John**

John Savage has been a Public Utility Commissioner since September, 2003. From January 2002 through August, 2003, he directed the Public Utility Commission's 70-person regulatory staff. From December, 1993 to January 2002, he served as director of the Oregon Department of Energy. During that time, the 1997 Legislature passed the carbon dioxide emissions law for new power plants. From January 1987 to December 1993, John headed the Policy and Planning Division of the Oregon Department of Energy. The Division was responsible for producing the state's energy, global warming, and petroleum contingency plans.

**Van't Hof, David**

David Van't Hof is the sustainability and renewable energy policy advisor for Governor Kulongoski. Mr. Van't Hof will be implementing the Governor's Executive Order on sustainability, the Governor's three state climate change initiative, and fostering the development of renewable energy and associated technologies in Oregon. He previously served as Governor Kulongoski's natural resources advisor on water, energy and land use issues. Prior to working for the Governor, Mr. Van't Hof was a private sector attorney who focused on natural resources, land use, and administrative law, with an emphasis on major project permitting and water rights. He advised clients on complex regulatory matters such as environmental and siting issues for projects including natural gas, wind, and hydroelectric facilities. He also assisted a variety of public and private clients with National Environmental Policy Act (NEPA), Endangered Species Act (ESA), water rights, and water quality issues and represented several clients in the Klamath Basin Water Rights Adjudication and in contested cases before the Water Resources Department.

Mr. Van't Hof was a former clerk for then Supreme Court Justice Ted Kulongoski. He graduated *cum laude* from the University of Michigan Law School and was Phi Beta Kappa at Trinity College in Hartford, Connecticut. He attended the Institute for European Studies in Vienna, Austria and was a Peace Corps volunteer in Senegal, West Africa. His past professional activities include: member of the Oregon Water Resources Congress, Rocky Mountain Mineral Law Foundation, Oregon State Bar Environmental and Natural Resources Section, Administrative Law Section, and Indian Law Section, Community Water Supply Task Force, organized by the Oregon Water Resources Commission; board member, African Refugee and Immigrant Network of Oregon; founder and former board member and board president, Hands On Portland; volunteer immigration attorney, Sponsors Organized to Assist Refugees; chair of Large Firm Associates Committee, Campaign for Equal Justice.

# Attachment C

**Governor's Advisory Group**

**On Global Warming**

**State of Oregon**

# *Draft for Public Comment*

# Oregon Strategy for Greenhouse Gas Reductions

**October 13, 2004**

# Table of Contents

C. Inventory of Oregon's Greenhouse Gas Emissions
D. Draft Scientific Consensus Statement on the Likely Impacts of Climate Change on the Pacific Northwest
E. Briefing Paper: Materials and Greenhouse Gases

## i. Executive Summary

This draft Oregon Strategy for Greenhouse Gas Reductions was developed and is offered for public comment by the Governor's Advisory Group on Global Warming. The Advisory Group was appointed by Governor Ted Kulongoski to perform this task early in 2004. This Strategy, if adopted, will complement the agenda of the West Coast Governors' Initiative on Global Warming undertaken by the Governors of California, Oregon and Washington to address greenhouse gas emissions at a state and regional level.

The Advisory Group invites Oregon citizens, businesses and organizations to offer their comments, additions and criticisms of the goals, approaches and actions assembled in this document. These will be taken into account before final recommendations are made to the Governor. The overall Strategy may be summarized as follows:

**Goals:**
Three proposed goals relate to Oregon Benchmark #76, which sets the goal of reducing carbon dioxide ($CO_2$) emission levels at or below 1990 levels by the year 2010. Oregon emissions in 2000 were 18 percent above this benchmark. While other states have proposed meeting a comparable emissions goal by 2010, the Advisory Group recognizes that its draft strategy is not likely to achieve this goal within the time frame. However, measurable progress towards attaining this goal is possible.

The Advisory Group proposes the following goals:

1. By 2010, arrest the growth of Oregon's greenhouse gas emissions (including, but not limited to $CO_2$) and begin to reduce them, making measurable progress towards meeting the existing Benchmark of not exceeding 1990 levels.
2. By 2020, achieve a 10 percent reduction below 1990 greenhouse gas levels.
3. By 2050, achieve a "climate stabilization" emissions level that is less than or equal to 75 percent below 1990 levels.

These goals offer a pathway to climate stabilization that requires vigorous action, but also allows time for necessary individual and business adjustments.

**Strategies:** This draft Oregon Strategy articulates a set of Principles (Section 2.1) and four broad strategies:

1. Invest in Efficiency
2. Replace Greenhouse Gas-Emitting Energy Resources with Cleaner Technologies
3. Increase Biological Sequestration (farm and forest carbon capture and storage )
4. Promote and Support Education, Research and Technology Development

**Recommended Actions:** The draft Strategy proposes actions in seven areas: (1) Integrating Actions; (2) Energy Efficiency; (3) Electric Generation and Supply; (4)

Transportation; (5) Biological Sequestration (carbon capture and storage); (6) Materials Use, Recovery and and Waste Disposal; and (7) Government Operations. Within these areas, the Advisory Group identified two categories of actions[1].

**Category I: Significant Actions for Immediate State Action**. These actions promise significant greenhouse gas savings, are technically feasible today, and are the most cost-effective first actions to be taken.

**Category II: Other Immediate Actions**. These actions make sense for the State to undertake immediately. In most cases the greenhouse gas savings are less significant, but costs are also proportionately lower and many actions are cost-effective now.

The Advisory Group particularly wishes to invite comment on Category I actions. Accomplishing these will usually require the most concerted and disciplined effort on the part of Oregonians; equally, meaningful progress toward the proposed goals will be extremely difficult to achieve without substantially achieving most or all Category I actions. These actions include:

Integrating Actions ((IA-1): Arrest the growth of and begin to reduce Oregon's greenhouse gas emissions by 2010. Meet a goal of 10% below 1990 Oregon emissions levels by 2020, and of 75% below those levels by 2050.

Energy Efficiency (EE-1): Meet Oregon's energy efficiency target set by the Northwest Power Planning Council for the next 20 years, capturing at least 960 average megawatts (aMW) of electricity savings and comparable conservation of natural gas and oil.

Electric Generation and Supply (GEN-I): Develop about 130 average megawatts (aMW) of renewable generation by 2006 and comparable or greater amounts each biennium thereafter.

Electric Generation and Supply (GEN-2): Convene an interim work group to recommend to the 2007 Legislature, a "carbon content" standard for delivered energy (electricity, gas and oil) that will establish a schedule for reducing the greenhouse gas emissions from these sources consistent with the State's overall goals.

Transportation (TRAN-1): Convene an interim work group to recommend a proposal for the Governor, the Environmental Quality Commission and the Legislature to adopt 1) California Low Emissions Vehicle Standards (LEV II); and 2) California Greenhouse Gas Emissions (Pavley) Standards for vehicles.

[1] Note: The Advisory Group considered Category III Actions that, for various reasons including simply manageability of the process, it chose to defer. As these and other possible actions are proposed, they can be developed and considered by a successor to this Advisory Group.

Materials Use, Recovery and Waste Disposal (MW-1): Achieve the waste disposal and recovery goals already adopted by Oregon. (Note: There are three other Category I Actions in the MW section.)

Depending on the schedule of emissions reductions achieved in GEN I and MW I, these five actions alone should result in reversing the continued growth of greenhouse gas emissions generated from Oregon and set us on a path of declining emissions. Costs of these actions also will vary, depending on when actions are undertaken, but the energy efficiency and transportation actions are selected to be cost-effective for Oregonians, independent of their greenhouse gas savings.

## ii. The Governor's Advisory Group on Global Warming

The Advisory Group is made up of citizens and public officials who were asked by Governor Kulongoski to serve for the limited duration necessary to draft a Global Warming Strategy. The Advisory Group will offer their best ideas for public review, and then make their recommendations to the Governor, to state agencies having statutory authority, and to Oregonians generally. The Group's citizen members include businesses that both deliver and use energy, farmers, environmentalists, scientists and others (a list of members is included in Appendix B).

The Group is advisory only, and its recommendations will take effect only if state and local governments, private businesses and other organizations believe they merit adoption. Individual members of the Group may have conflicts of interest with respect to many of the actions under consideration. Such conflicts are inescapable given that the subject matter (energy production and consumption, transportation, waste generation and management, etc.) is integral to the lives and businesses of all Oregonians. Moreover, the Governor wanted citizens who would understand the science and the economic and technical issues involved, and who would be sensitive to the consequences to Oregonians of the actions being considered.

The Advisory Group seeks consensus on the strategies and actions it recommends, but can operate by majority vote if necessary. In developing this draft Strategy for public review, individual members of the Advisory Group are not endorsing specific actions or the package as a whole, but asking for public input prior to final consideration. Some members may have reservations with respect to one or more actions, but have agreed to send them out in order to get the further benefit of public comment. All of us believe that informed public discussion of these issues is no less important than consensus among Advisory Group members.

Where State agencies (such as the Department of Environmental Quality) are directed by independent state commissions (the Environmental Quality Commission), their participation has been ex officio and subject to subsequent commission policy determinations.

Once public comment has been reviewed, the Advisory Group will meet again to decide on final recommendations to the Governor and other appropriate parties. Some recommendations may emerge as state administrative actions, while others will still need legislative approval. Where there are fiscal or workload effects on state agencies, the Governor and agency heads will determine where these recommendations fit into priorities. The Advisory Group expects that more complex actions will require their own task forces to work out details for legislative consideration.

The members of the Advisory Group would like to acknowledge the financial assistance provided by The Energy Foundation of San Francisco. This assistance made it possible for the Group to rely on the services of the National Policy Consensus Center and Oregon Consensus Program at Portland State University for logistical and facilitation support.

# An Oregon Strategy for Greenhouse Gas Reduction

# DRAFT Report to the Governor

## The Governor's Advisory Group on Global Warming

## October 13, 2004

"There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities." (*Intergovernmental Panel on Climate Change [IPCC] 2001 Summary for Policymakers*, p. 5)

"Greenhouse gas forcing in the 21st century could set in motion large scale, high-impact, non-linear, and potentially abrupt changes in physical and biological systems over the coming decades to millennia ...." (*IPCC 2001 Summary for Policymakers*, p. 14)

"Here in Oregon we're putting together a battle plan to reduce greenhouse gases – the primary cause of global warming . . . We are not going to wait for federal leadership. We've got too much to lose if global warming continues unabated. And we've got too much to gain by being a leader in climate solutions."

Governor Ted Kulongoski
May 4, 2004

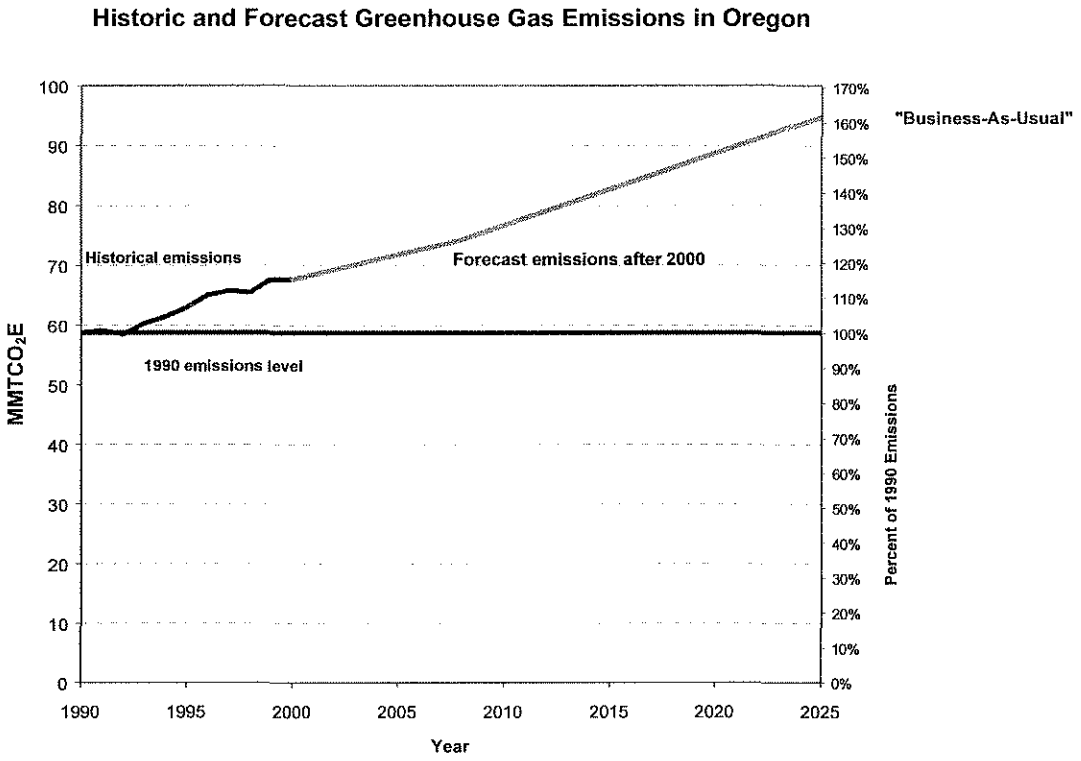
## SECTION I: INTRODUCTION

Global warming is not just another environmental issue.

It's not "just another issue," period.

Absent decisive actions across the globe of the sort proposed in this report, the warming already underway could lead to changes in the earth's physical and biological systems that would be extremely adverse to human beings, their communities, economies and cultures. These are changes that we would have unintentionally brought upon ourselves, but that are also in our power to reverse. Our failure to return atmospheric accumulations of greenhouse gases back to levels that will sustain historic climate patterns may lead to an Earth that is dramatically altered and far less habitable within only a few generations. Figure 1, below, shows historic and projected greenhouse gas emissions for Oregon.

FIGURE 1




***The black line that rises from 1990 to 2000 represents historical greenhouse gas emissions from Oregon. The orange line that rises beyond that represents a forecast of future emissions under a "business as usual" approach, which assumes we continue present activities (including many that now restrain greenhouse gas emissions), but take no additional special actions to reduce these emissions.***

***The vertical axis on the left is in million metric tons of carbon dioxide-equivalent ($MMTCO_2E$). "$CO_2E$" is the equivalent radiative impact of all the greenhouse gases expressed as tons of $CO_2$. It is larger than than of $CO_2$ alone, because it accounts for the radiative effects of other gases. The vertical axis on the right shows differences from 1990 levels, with 1990 representing 100 percent of emissions.***

The impacts on Oregon citizens, businesses and environmental values of such changes are likely to be extensive and destructive. Coastal and river flooding, snowpack declines, lower summer river flows, impacts to farm and forest productivity, energy cost increases, public health effects, and increased pressures on many fish and wildlife species are some of the effects anticipated by scientists at Oregon and Washington universities.

The means to arrest and reverse these effects are at hand, or within technological reach. Many of them carry co-benefits that would justify acting on them without the impetus of global warming: positive economic returns on dollars invested in energy efficiency, energy price stability, healthier air and water. Others will cost us something up front for insurance against the deeply

disruptive and costly effects that we can expect absent any action. The earlier we take many of these actions, the less drastic they will have to be to achieve the same emissions reduction result.

But why is global warming an Oregon concern? We're one medium-sized state among 50 states and a world of nations, all emitting greenhouse gases; what can we do about it anyway? What do we stand to lose if we do nothing? What do we stand to lose – or gain – if we take the issue head-on?

These are the kinds of questions the Governor has asked this Advisory Group on Global Warming to help answer, and this report is our first draft of that answer. It's far from a complete one. The choices we have made over many decades have led to the threat of global warming, and the solutions will take time and deliberate effort. There will be difficult choices along the way and surprising, promising opportunities as well. We will have the company of other knowledgeable and committed partners. And while the challenges are formidable, so are our skills and spirit and resourcefulness.

This report will try to answer the Governor's questions in stages. Section 2 (below) seeks to set out a pragmatic vision for how Oregon can address its global warming responsibilities and, in the process, seek investment and market opportunities for Oregon business, and new jobs for Oregon workers. Section 3 sets out the scientific context for this response, while addressing the general "What is it?" and "What does it mean to me?" kinds of questions. We also review the consequences for Oregon and Oregonians of a global failure to act decisively. Section 4 discusses proposed goals, categories of actions to achieve these, and criteria for selecting actions. Section 5 sums up the Advisory Group's proposition to Oregonians.

Appendix A contains the detailed set of actions on which the Advisory Group asks for public comment.

## SECTION 2: VISION - OREGON ACTS ON GLOBAL WARMING

### 2.1 PRINCIPLES

The Advisory Group began with the following principles to guide our selection of goals and actions to reduce Oregon's greenhouse gas emissions:

A. Oregon's greenhouse gas (GHG) reduction goals and solutions must be meaningful, firmly grounded in science, and lead to effective reductions in Oregon's greenhouse gas emissions, commensurate with our share of the larger global problem.

B. We will begin with the most cost-effective solutions first.

C. To the fullest extent possible, Oregon's actions should be designed to serve both the long-term economic well-being of the state and the goal of climate stabilization.

D. We recognize that there are always tradeoffs between a long-term investment strategy and near-term costs and cash flow. Oregon can and should be a leader - but we can't get so far ahead that Oregon's businesses are not competitive in the short term. We will need some safety valves to relieve short-term competitive pressures if others aren't living up to their responsibilities along with us.

E. We create long-term economic well-being with an "investment strategy" that buys us efficiency savings, new technologies, energy price stability and a competitive edge in marketing – and profiting from – the tools we develop and the lessons we learn.

F. We won't take actions that impair energy reliability.

G. We will look for ways to support innovation, especially if it leads to marketable products and services.

H. We will partner with other states, Canadian provinces, tribal nations and other nations, where doing so will enhance the effectiveness of our actions and their co-benefits for Oregonians.

I. We know that reducing our greenhouse gas emissions won't eliminate the need to adapt to the warming climate that will result from changes already fixed in the atmosphere. We must develop an adaptation strategy next.

J. We are committed to equity in allocating both costs and benefits of this enterprise.

## 2.2 GOALS, STRATEGIES AND IMPLEMENTATION

The package of actions recommended to you by the Advisory Group represents no more than a down payment on the long-term commitment the state – and nation – must make. Many other choices will be required of us, and our successors over the next several decades to arrest and reverse the growth of greenhouse gas emissions that threaten our world.

But isolated action, viewed out of context, will not persuade Oregonians to support the commitments and participate fully in implementing the actions, as they must, if we are to stabilize our climate at historically habitable levels.

The Advisory Group offers its recommendations embedded in a pragmatic vision of goals, ways and means. This vision statement may seem deceptively simple, but the Advisory Group believes it can serve to anchor the full range of our recommendations.

### 2.2.1 Goals

Oregon should adopt greenhouse gas emissions standards, along with other states and local governments. The first measure proposed in this draft Strategy (Measure IM 1) recommends that Oregon do so.
(Note: There is a fuller discussion of Goals in Section 4.1.2 below.)

**Near-term Goal**: The Advisory Group believes the State should first seek to meet its existing Benchmark #76, that $CO_2$ emissions not exceed 1990 levels. We recognize that Oregon is unlikely to meet that benchmark by 2010. In Integrating Action IA-1 (see Appendix A), the Advisory Group recommends, as a near-term goal, that by 2010 Oregon will arrest the growth of and begin to reduce the State's total greenhouse gas emissions, meeting or making measurable progress toward meeting Oregon's current $CO_2$ Benchmark.

Based on current scientific guidance and targets adopted by other states and countries, we consider the following goals to be appropriate for Oregon:

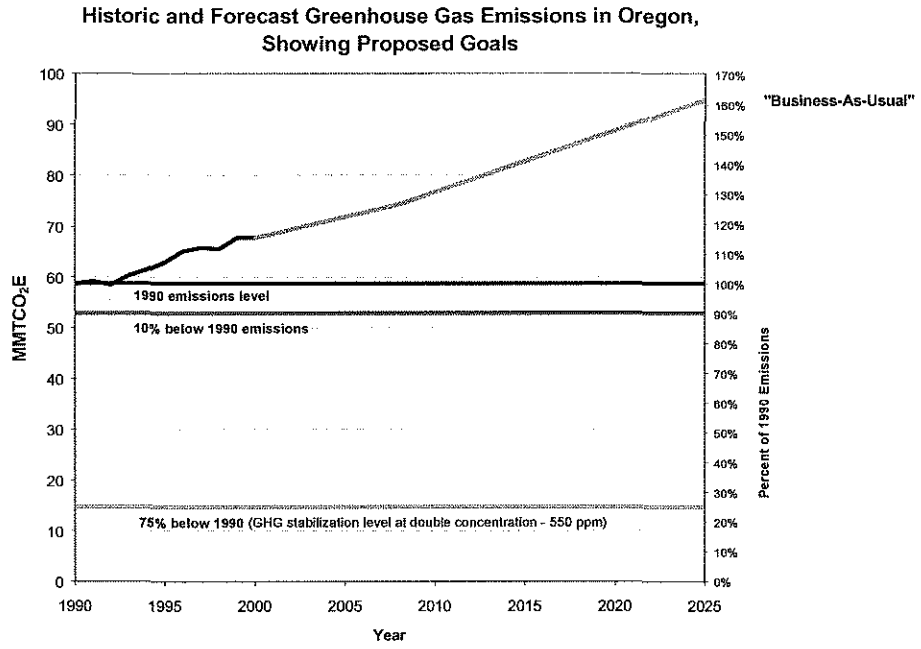
**Intermediate Goal:** By 2020, Oregon's total greenhouse gas emissions will not exceed a level 10 percent below 1990 levels.

**Long-term Goal:** By 2050, Oregon's total greenhouse gas emissions will achieve a "climate stabilization" level at or less than 75 percent of 1990 levels.

The Intermediate and Long-term Goals are predicated on the United States government and the global community achieving comparable goals roughly synchronous with Oregon's efforts. Oregon can exercise leadership in setting goals and acting to attain them, understanding that leaders need followers (or, better yet, partners) to accomplish the global goal.

Having long-term goals will facilitate a long-term Oregon investment strategy to achieve those goals, rather than a series of short-term controls and costs (see Section 2.3, *An "Investment-Based" Solutions Strategy*, below).

**FIGURE 2**




***Along with the historical and forecast emissions shown in Figure 1, the horizontal lines in Figure 2 above show the level of greenhouse gas emissions (a) in 1990, (b) at 10 percent less than 1990 levels, and (c) at 75 percent of 1990 levels. These levels represent proposed goals for the state's strategy and provide a context for the reductions from the proposed actions. The 75 percent reduction of greenhouse gas emissions is what is required globally to stabilize atmospheric concentration of greenhouse gases at 550 parts per million (ppm) of carbon dioxide equivalent, or double the pre-industrial concentration.***

### 2.2.2 Strategies

The Advisory Group's recommended actions will greatly reduced Oregon's GHG gas emissions. Collectively the actions can be summed up in the following four common sense strategies:

**Strategy One: Invest in Energy, Land Use and Materials Efficiency**
This is nothing new for Oregonians, who have often set the pace for the rest of the country in the efficient use of these commodities. Our efficiency investments have almost always generated positive economic returns, together with environmental and quality-of-life dividends. Some payouts are quick (e.g., efficient appliances); others may generate their returns over decades (e.g., "green" buildings and mass transit in urban areas).

Many such investments will also generate business opportunities as described in Section 2.4, below: "*The Economics of Addressing Global Warming: Costs, Investments and Opportunities.*"

Over the next 20 years Oregon must, at a minimum:

- Equal the electric energy conservation savings achieved over the last 20 years, about 1000 average Megawatts (aMW);

- Achieve comparable efficiency savings among natural gas and oil users;

- Offer more convenient and more efficient transit and other alternatives to driving a car, principally in urban areas along the I-5 corridor that have the ability to capture the added efficiency gains of careful land use planning that reduces the number of miles we need to travel and the trips we need to make.

- Insist on products that: 1) use fewer materials and require less energy to produce and transport to market; 2) last longer; and 3) are designed to be recycled more easily and completely using less energy.

**Strategy Two: Replace Greenhouse Gas -Emitting Energy Technologies With Cleaner Technologies**

This means reducing the amount of conventional coal, oil and natural gas we use in our vehicles, homes and businesses unless technological means can be devised to dramatically lower their greenhouse gas emissions.

It requires focusing investment dollars (and government policies) on developing renewable generating technologies that today are not sufficiently advanced to take up the slack.

Higher marketplace costs of conventional, mostly fossil-fueled energy sources are already upon us and are stimulating research and development. But new and more effective government policies – such as greenhouse gas emissions allowances and trading mechanisms – will be needed to meet our proposed goals. No less critical will be government procurement policies that explicitly value low greenhouse gas content, thereby creating a base market for these resources and setting an example.

Using a variety of electric-hybrid and other technologies, we can have new gas and diesel cars and trucks that produce far less $CO_2$ per mile traveled than existing vehicles. Our transportation sector may ultimately rely on electric or hydrogen-powered vehicles, but biofuels are available now and hold considerable near-term promise (not to mention economic opportunity for Oregon's farmers).

The fossil fuel industries are exploring geological greenhouse gas sequestration (capture and storage) that could ultimately prove cost-effective.

**Strategy Three: Biological Sequestration (farm and forest carbon capture and storage)**
Oregon's fields and forests are valued by Oregonians for economic, environmental and recreational reasons, but they can and must perform an additional service. The Advisory Group recommends actions to increase the amount of carbon that can be captured and fixed in new or restored forest and field growth and in the soil beneath. Decades of clearing forests, turning the soil, and building cities and highways where there had been undisturbed ground, have both released large quantities of greenhouse gases and impaired the land's physical ability to take up and sequester excess gases. While we will continue to work the lands that must feed, clothe and shelter us, there are still land management choices that will restore much of this natural sequestration capability. Reforestation and conservation reserves in lands of marginal economic value are familiar tools. These uses must be stepped up dramatically, encouraged and sustained with government policies and public investment dollars.

**Strategy Four: Education, Research and Technology Development**
Reversing the causes of global warming and adapting to its near-term effects will be multi-generational tasks for Oregonians. Success is more likely if succeeding generations of Oregonians are educated about causes and cures and how these will evolve over time. Oregon also will cope better if it enlists the expertise in its colleges and universities to educate citizens and to conduct technological research into remedies that also can produce marketable products and services. Developing electrical and mechanical engineering skills will be essential. Oregon can benefit from taking the early initiative in addressing global warming with such tools. Economic and export opportunities may emerge, particularly in areas such as energy efficiency, small-scale distributed renewables, and biosequestration techniques, where techniques and smaller-scale technologies can have broad application with lower capital requirements.

### 2.2.3 Implementation

The Advisory Group understands that all actions it recommends are provisional, and subject to additional review.

Prior to any final Advisory Group action, we are making our draft recommendations available for public comment this fall. The Advisory Group will then revisit the draft recommendations in light of public comment and modify them where appropriate.

The recommendations will then be forwarded to the Governor and copied to the Sustainability Board, which can then offer its thoughts to the Governor.

Even after the Governor acts to accept, decline or defer our recommendations, the process doesn't end. For many recommended actions, the next step will be an interim task force or work group focusing on a specific measure and including a more targeted group of stakeholders along with state staff.

Finally, many actions will require legislative action. Some of this may come in the 2005 session, but more complex and far-reaching questions may not be ripe for legislative treatment until 2007. This is to ensure that sufficient analytic work has been performed – that we can reasonably gauge costs and benefits, and their distribution. It also will ensure that interested parties will participate as the measure is designed and evaluated.

We appreciate that major actions, with significant and widely distributed consequences, will require deliberation, not a rush to judgment. Given the imperatives of climate change effects, the Advisory Group does not suggest indefinite delay, but strongly favors a deliberate process with access for all affected parties.

## 2.3 AN "INVESTMENT-BASED" SOLUTIONS STRATEGY

Many, perhaps most, of the actions considered by the Advisory Group look and act more like an investment portfolio than like unrecoverable costs. That is, they require that the State and we, as citizens, *invest* financial - and political - capital in energy efficiency and new technologies. The net effect will be both reduced emissions of greenhouse gases such as $CO_2$, and positive long-term financial returns to the State and to us.

To collect these benefits, we will have to be disciplined investors with a long-term investment horizon. Year by year we will have to put state and private business investment dollars into improving the emissions efficiency of our economy. While some of these investments may not pay off for years, or in a few cases, even decades, many will recover their costs and pay dividends within only a year or two. Some may involve actions we would not have taken if we weren't trying to contain the effects of global warming. Short-term needs and satisfactions may have to be deferred. Advisory Group members understand there will be competing demands for these investment dollars and political tradeoffs to be made. Often our political processes yield to near-term consumption over investment, whether expressed in popular government benefit programs or demands for tax cuts. We will have to distinguish and perhaps separate these capital investments from the costs of day-to-day government and business operations.

Two examples from our own Pacific Northwest history, are pertinent to choices facing us today, and illustrate this effect.

> 1) The Columbia River Hydropower System: In the 1930's we began investing in what has become one of the largest hydroelectric power plants in the world, with the energizing of Bonneville and Grand Coulee dams on the Columbia River. The projects were very costly at the time. Concerns were expressed that they would be financial "white elephants" producing far more electricity than the region could absorb or pay for. Roosevelt's New Deal Administration went ahead with them anyway, justifying them on other public policy grounds: they would put people to work during the Depression; they would make the central Washington desert bloom with agricultural products; and they would ease navigation and river commerce inland past the Cascades of the Columbia, the fearful rapids now covered by the waters behind Bonneville Dam.

## Global Warming: Cost and Cost-effectiveness

Most activities we engage in as Oregon citizens and businesses – driving a car, turning on a light, disposing of garbage – result in emissions of greenhouse gases. Any serious proposal to address these emissions affects us all, and we need to understand its costs and benefits.

This is challenging for a set of actions that looks ahead fifty years. Much is unknowable: what fuel prices will do; what statutory constraints may be adopted; and what technology breakthroughs can mitigate costs. Once firm decisions have been made on actions, we can use computer models to predict costs and benefits (with the qualification that uncertainties abound past the next five years).

It also may be useful also for us to think about "cost" in more than one way.

For example, there is the "cost" of an investment we might make, whether in the stock market or in buying a more efficient refrigerator. We pay an upfront "cost" but we recover that cost and begin to earn net "benefits" if it is a good investment. Many of the actions proposed here are efficiency investments that are cost-effective. That is, they will return to consumers a net return independent of their value in reducing greenhouse gas emissions.

Other actions involve developing products and services that can be marketed outside of Oregon as well as applied at home. As greenhouse gases are increasingly regulated by states, the federal government and through international agreements, Oregon can gain an economic advantage by selling mitigation actions we have developed to reduce Oregon's emissions.

We incur a "cost" when we buy health or fire insurance. We don't know if we'll be sick or have our house burn down. But we believe paying these "costs" is justified to mitigate our risk against those outcomes. We still shop for the lowest-cost insurance that will do the job, but we understand it's a good decision even though it may not provide a return under all scenarios. We're advised not to underinsure, so there's enough coverage to rebuild our house or our health.

When we pay for building dams and levees to protect against devastating floods, we're incurring a similar "cost" for a different kind of insurance, one that diverts the potential for catastrophic danger and damage. There's a difference: we speculate that our house *might* burn down, but we know floods *will* occur. We know that occasionally – every fifty to one hundred years – a truly catastrophic flood will occur (for example, in 1996; and 1948; and 1894). We pay an upfront cost, and get our return in the form of less destruction and lower costs to rebuild. We think it is money well spent.

The actions in this package are insurance similar in different respects to both examples. We are insuring against the potentially calamitous consequences of overheating the planet. We can only approximate the specific effects, their geographic distribution and intensities. But we know they are coming, more surely than a hundred-year flood. We can choose to pay an upfront "cost" to mitigate against the worst of these effects, by reducing our use of fossil fuels and the emissions that are released. We want the lowest cost actions in our "policy," certainly. We also want them to add up to an effective response.

The question for Oregonians is, do we think that's money well spent?

In the ensuing seventy years, the long-term financial benefits have paid back the initial investment many times over, as some of the lowest power rates in the nation have

supported the region's economic development. Today about 40 percent of Oregon's electric power comes from this system at low and relatively stable rates that modulate swings in fossil fuel commodity costs. While we are still struggling to reconcile hydroelectricity with sustainable salmon and steelhead populations, the hydroelectric system gets us over forty percent of the way to climate neutrality in our electric power system.[2]

Several of the Advisory Group's key recommendations involve developing a second generation of renewable resources: new wind, solar and biomass plants added to the existing hydroelectric base, meeting our energy supply needs while producing no greenhouse gases[3].

2) Energy Efficiency Investments Under the Northwest Power Act of 1980: The second example is more contemporary. In 1980 the region decided that as new electric generating capacity was needed, we would invest first in energy conservation – in reducing demand for power - if that was less *costly* than building new power plants. We would do so, principally, by investing in more energy-efficient light bulbs and refrigerators, and in set-back thermostats that lowered the heat when you weren't home, then automatically raised it when you returned from work. We invested in more efficient commercial lighting and industrial motors. Overall the utilities in Pacific Northwest invested some $2.4 billion between 1990 and 2002, resulting in savings of some 2600 average megawatts (aMW) annually. That's equivalent to five large coal plants' worth of electricity we have not had to generate, at a fraction of the cost of nuclear generation, gas, coal, or any other source, and at near-zero environmental cost.

That entire $2.4 billion investment pays itself back in electricity bill savings about once every 18 months.[4] The Advisory Group proposes to rely heavily on Oregon's ability to replicate this investment and these returns again in the next 20 years, realizing 960 aMW in Oregon and altogether 3000 aMW region-wide, at comparable investment levels and savings.

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[2] The hydropower system is, however, threatened by global warming which is projected to reduce Cascade Mountain snowpack by 50% or more by 2050 (University of Washington: "Effects of Climate Change on Water Resources in the Pacific Northwest." July 3, 2001). The snowpack serves as an extra "reservoir" for storing water to be used throughout the year. Potential increases in spring runoff would have to be spilled, rather than used to generate power.

[3] Recent studies have evaluated the cost-effectiveness of a "Renewable Portfolio Standard" that would require at least 20% of a utility's supply be from renewable resources. In 2001 the US Energy Information Administration, using generally conservative assumptions – stable fossil fuel costs, higher renewable costs – found virtually no cost difference between the first case (no RPS) and the second (20% RPS). Two other studies, by USDOE's Interlaboratory Working Group and the Union of Concerned Scientists, using cost assumptions closer to market conditions that have prevailed since 2001, both found the 20% RPS case produced lower consumer costs as well as conferring co-benefits such as more jobs and reduced local air pollution. For Oregon, the UCS study projected ±1500 more jobs and $620 mm in consumer cost savings by 2020.

[4] Per personal communication with Tom Eckman, Conservation Program Director, Northwest Power Planning Council, September 16, 2004. Assumes average avoided cost – or value of savings – of 5.5¢.kWh, or $55/MWh. In 2001, when West Coast market prices for electricity spiked to $250/MWh and higher, the savings realized in the Pacific Northwest would have been appreciably greater.

These investments to create lower energy costs to Oregon and Northwest businesses have also created new jobs insulating houses, installing thermostats, and designing and building energy-efficient windows and manufactured housing. Along the way we developed markets in other states for those same windows and manufactured housing units, bringing new dollars and jobs back into Oregon.

Today, if Oregonians had the option of driving more fuel-efficient cars that still met their needs and the option of driving them fewer miles to work or shopping, we'd realize a similar return on investment when gasoline prices rise as they have in 2004[5]. We would be better insulated against the disruptions such price spikes cause in our state's economy, and the dollars we saved could circulate within Oregon, creating more Oregon jobs and goods.

This time the "public purposes" are different from those of other eras: not creating jobs in a Depression or saving energy in an oil embargo, but reducing emissions of $CO_2$, methane and other greenhouse gases. They also include creating energy price stability and building economic opportunity for the next generation of Oregon workers and entrepreneurs.

The tools should look very familiar to us, however. They are tools for investing in energy efficiency – in our homes and businesses, in our means of transportation, and in the way we design land uses and transportation systems for our urban areas. They are also investments in a new generation of renewable energy technologies – not in large hydroelectric dams this time, but in smaller, run-of-the-river projects, in wind turbines, in solar photovoltaic cells, and in crops from Oregon farms that can be converted to biodiesel fuels.

Some energy efficiency investments can be earning positive returns in two years or less. Some renewable energy technologies, such as large wind, are competitive today with fossil fuels, so those early returns will be positive also. Other investments will take longer to turn positive, as the dams did, but they will immediately result in more stable energy costs for Oregonians, again, as the dams did.

In the larger process, we will discover products and services we can market to other areas that were slower in responding to global warming threats (see: 2.4: The Economics of Addressing Global Warming: Costs, Investment and Opportunities).

There will be other, less intuitively obvious, benefits. Lower emissions from power plants and vehicles will mean cleaner air in Medford, Bend, Portland and other communities. Not only will there be more clear days for admiring Mt. McLoughlin, the Sisters and Mt. Hood, but we will have healthier people to enjoy the view and fewer kids handicapped by asthma and other respiratory diseases.

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[5] Even before 2004's price increases at the gas pumps, from 1999 to 2003 Oregon monthly household energy budgets were squeezed by average increased costs of 12% in electricity, 17% in natural gas, and 50% in gasoline (data compiled by The Oregonian from USEIA and other sources; September 11, 2004)

Energy market competition from conservation and renewables can have the effect of lowering demand for fossil fuels, and therefore damping energy prices from those and competing sources[6]. A future energy user who is relying on a mix of conservation, renewables and gas will be contributing to environmental values, *and* saving on energy not used due to efficiency gains, *and* paying a lower rate for each delivered kilowatt hour (or therm of gas).

Where it seems the fairest and most efficient way to accomplish our goals – especially in capturing energy efficiencies in buildings and equipment – we rely on regulatory tools such as building codes. We appreciate that regulation can be politically difficult to propose and sustain. We note, however, that over 40 percent of the 3000 MW the region now is conserving is coming from building codes and appliance efficiency standards, and that these are the *lowest cost savings* being captured day in and day out. Households save money directly on their energy bills and in lower costs for the goods they buy. Oregon businesses save on operating costs and can produce more cost-competitive products and services. Designed properly and applied consistently, regulatory tools can contribute to a competitive "level playing field" among businesses, each making comparable investments to conserve energy, so no one competitor can offer lower costs in the short term by deferring these investments and the benefits they confer on the community as a whole.

## 2.4 THE ECONOMICS OF ADDRESSING GLOBAL WARMING: COSTS, INVESTMENTS AND OPPORTUNITIES

### 2.4.1 Overview

In any discussion of the economics of addressing global warming, it's easy to get trapped in the underbrush of near-term costs and to miss the forest of rational economic calculation of long-term savings. Yes, those near-term costs are going to be higher in some cases, but in many cases they will be matched and more by the returns Oregon families and businesses will see directly. And even more in the shape of the *avoided costs* of adaptation to a warmer, wetter and more uncertain world[7].

Near-term costs are further offset by helping Oregon businesses stay *competitive* in a world moving to carbon limits.

These costs should also be measured against the *economic opportunities* that will open for Oregon businesses that develop goods and services for sale to a world in the market for low-carbon solutions.

### 2.4.2 Avoided Costs

No one likes paying more upfront for an appliance, a car or a house. But as we noted above, we've been doing just that in Oregon and the Pacific Northwest for the last 20 years as we've

[6] See, for example, US Energy Information Administration Study SR/OIAF/2001-03, June 2001

[7] The effects of global warming on Oregonians and the costs we will bear in adapting to climate change are a function, not just of what we do in one state, but the degree to which our leadership and actions are matched by leadership and actions across the country and around the globe.

bought more efficient appliances, cars and houses, or installed insulation and better windows, or introduced more efficient equipment in our stores and factories. They've paid back the extra cost, on average, in about eighteen months from the date of purchase.

Avoided costs from efficiency gains are just the beginning. Slower growth in demand for power and gas means less new transmission infrastructure – poles and pipelines – has to be built, saving more cash. Competition from new efficiency measures and renewable technologies will act to hold down costs from competing fossil fuels.

Efficiency gains are exactly like having a share of your power coming in at a fixed price (renewables also possess this price stability attribute). So households, and especially businesses, avoid the uncertainty for a crucial cost input into their budgets and cost-of-goods. Any energy-dependent company can tell you about the cost of electricity price uncertainty when unprecedented price spikes hit the West Coast as they did in 2001.

Then there are the avoided costs of coping with the physical changes global warming is already bringing: heavier rains, longer dry spells, more extreme storms. We think of those as "future" costs that we can discount (maybe they won't arrive?). But we're already starting to pay them, in the form of higher insurance premiums today as insurers try to anticipate their liabilities for *future* loss claims. Companies that are susceptible to higher costs of doing business in a warmer world are paying higher insurance premiums if they fail to address this business risk. Flood insurance costs are rising in low-lying coastal and other storm-prone areas.

There's one other aspect of avoiding costs that gets too often overlooked. It's the value to Oregon of keeping dollars at home, circulating in our local economy, supporting new businesses (preferably ones that can export products and import more dollars). When we spend our limited capital on imported energy from the Middle East or Venezuela, on coal from Wyoming, on gas from Alberta, and soon from overseas as liquid natural gas (LNG), it's gone. Every dollar exported to buy non-local energy is like a little loss of muscle fiber from our collective economic body. We have to compete in a muscular world economy, and we're a little weaker each time we fill the gas tank.

### 2.4.3 Staying Competitive

Our major trading partners in Europe, Canada and Japan are already investing in new goods and services to deal with global warming. We cannot stay competitive by standing still. If you're a multinational doing business in the European Union or Japan (think Intel, Hewlett-Packard, Boeing, or Nike), you're already working out your carbon reduction and trading strategies. Many smaller Oregon businesses will also need to adjust, or risk their overseas markets going to companies that anticipated the carbon rules taking shape globally. Oregon agricultural products, from wine to wheat to cut flowers, should be thinking how to stay ahead of this wave of change.

### 2.4.4 Exploiting the New Markets

Business Week, in its August 16, 2004 cover story on global warming, argues that "Companies that pioneer low-emissions cars . . . or find cheap ways to slash emissions –will take over from

those who can't move as fast." What are some of those opportunities for Oregon businesses and entrepreneurs?

**(A) Services:**

The Pacific Northwest pioneered energy conservation in the 1970s and '80s. We were lucky; we had the Northwest Power Act of 1980 directing us to buy the cheapest "electricity" first, even (especially) if it came from efficiency savings. In the process we developed expertise that we've marketed elsewhere in the U.S. Portland Energy Conservation, Inc. (PECI) started life as a City of Portland office, spun itself off as a private enterprise, and pioneered commercial building "commissioning" to verify that the new building controls and other efficiency technologies would deliver savings as advertised. It now sells these services nationwide.

Oregon and Washington members of the International Brotherhood of Electrical Workers (IBEW) and National Electrical Contractors of America (NECA) are developing skills in photovoltaic equipment installation, sometimes by providing their services free to install solar panels at schools.

Those big wind energy projects in eastern Oregon are generating power at competitive and stable costs, paying royalties to farming families double-cropping their lands with windmills, and raising rural tax bases. They're also creating marketable skills at engineering firms like CH2MHill and law firms like Stoel, Rives, both of whom now sell their project development services outside Oregon.

Another play for eastern Oregonians is likely to be *biosequestration* services – a fifty dollar word for growing more trees and plants that can retrieve carbon from the atmosphere and hold it for long periods of time. They could also make money from animal manure from which methane can be retrieved and converted to electricity. Other sources include biomass crops, which can be burned for energy with zero net $CO_2$ emissions and changing fertilizing and tilling practices to approaches that reduce emissions or allow soil uptake of carbon. As carbon limits are imposed around the globe on utilities and other companies, agricultural practices that can offset carbon emissions will have growing market value.

Portland has an international reputation in urban design circles for being a city that takes planning and quality of urban life seriously. A co-benefit that is becoming a marketable service is that a city planned for efficiency is a city that can manage its greenhouse gas emissions (Portland has a goal of not exceeding 1990 levels of $CO_2$ emissions, and it's exceeding the goal). Urban design firms like David Evans and Associates can leverage their contributions to Portland into competitive advantages elsewhere. Oregon architecture and engineering firms are learning to design "green" buildings that can earn national certification points and lead to contracts inside Oregon and out.

The Climate Trust, an Oregon-based private non-profit organization, has created a service niche that uses $CO_2$ offset dollars from new power plants and other sources to fund

renewable energy, energy conservation, transportation savings, biosequestration and other projects that reduce greenhouse gas emissions.

As an example of how we can gain even when Detroit is slow to react, Portland stands to benefit as the market for hybrid (gasoline plus electricity) cars grows in the U.S., fueled by new greenhouse gas-reduction regulations being adopted by California (and under consideration in this Strategy for Oregon). The major companies supplying these cars today are Toyota, Honda and Ford. More manufacturers and suppliers are needed. The Port of Portland is the primary West Coast port of entry for Toyota and Honda.

**(B) Goods**

Oregon builders of windows and manufactured housing, to take two examples, were pushed to build their products to the higher efficiency standards set under the NW Power Act of 1980. Both industries found outside markets for those same products as other areas responded to higher energy costs in the 1990s.

Their counterpart today may be Shell Solar in Vancouver, Washington, which manufacturers photovoltaic panels. Soon Shell could be using the silicon-producing capability of firms like Wacker Siltronics in North Portland or other wafer manufacturers from the high-tech community.

As markets generally value "green' products more highly, there can be spinoff benefits for Oregon Country Beef, wild (and sustainably-harvested) salmon, and the emerging Oregon organic natural foods cluster. It's no coincidence that Kettle Chips – with a state tax credit, assistance from Oregon Department of Energy and funding help from the Energy Trust of Oregon, innovative responses -- installed the largest grid-connected solar energy facility in the region on its factory rooftop in Salem this year.

Oregon firms like PPM Energy develop wind farms all over the country. A new product, Green Tags, was pioneered by the Bonneville Environmental Foundation in Portland. BEF sells Green Tags that are wind-based (supplied by PPM, BPA), solar-based (from developer Gerding-Edlen's Brewery Blocks and other solar installations), and even cow-manure-based (from the Port of Tillamook's waste-to-energy project) in 30 states nationwide and up into Canada.

As the market for efficient products and processes heats up, the high-tech and software industries on the West Coast all stand to profit if they anticipate where more precise and responsive instruments and controls will deliver efficient energy results. Opportunities range from home heating systems to interstate high-voltage transmission lines.

**(C) Investment Opportunities**

The Pacific Northwest was once the international leader in renewable energy technology and applications. That was when we were investing in and developing the hydropower capability of the region's rivers and snowpack.

Renewable energy could again be a key economic development "cluster." In addition to devising new efficiencies for the existing hydropower and transmission infrastructure, Oregon has wind, biomass and waste conversion opportunities awaiting smart exploitation.

Oregon isn't positioned to sell anyone gas or coal conversion technology, but we could be leaders and net gainers if we move earlier than the competition to develop the renewable and co-generation technologies and siting services that can then be offered for sale. What's needed? First, a regional market that's big enough and active enough to stimulate entrepreneurial activity and attract investment capital. Oregon by itself probably isn't big enough. But this is no time to be parochial. The states of the Pacific Northwest, plus British Columbia, are a respectable market with a good number of companies already developing products for the renewable energy market. If we want them to stay here, creating jobs and wealth, we have to offer them an accessible West Coast market. We'll have to work California into the strategy as well[8].

Fortunately, our Governor has joined with these neighboring jurisdictions to establish a framework – the West Coast Governors' Global Warming Initiative – with the shared goal of reducing greenhouse gas emissions West Coast-wide. Developing renewable generating technologies and infrastructure, including transmission capacity, is on the common agenda.

Oregon, Washington and California will all need to do their part, starting with public commitments to purchase output, setting expectations for greater utility reliance on renewables to meet load growth and replacement needs, and addressing regional infrastructure needs (e.g., transmission and integration services, expedited siting and permits). The States will need to consider how regulatory and tax codes may be adapted to encourage local industry development.

Oregon's educational system needs to be supported, and in turn needs to provide industry support by building basic and applied skills in energy efficiency and renewable technologies. Our universities already support resource evaluation (Oregon State has wind resource expertise; and the University of Oregon, solar expertise). Technology research, development and demonstration (RD&D) is relatively weaker here. One idea is establishing a regional "incubator" for technologies that are past laboratory work but not yet ready for commercial primetime, something Oregon and Washington could elect to collaborate on.

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[8] California has demonstrated the importance of local market stimulation when it became the world leader in installed windfarm capability in the 1980s. Today it has a 20% Renewable Portfolio Standard (RPS) requirement for its electric utilities, tax credits for citizens and businesses to install their own equipment, and is considering committing an additional $100 mm in state funding to further buy down the costs of solar installations and build solar manufacturing capability in the state.

## 2.5 PARTNERS

So Oregon makes its contributions and investments. What difference can we make? We're not even one of the largest states in this country, and global warming is a global concern. If we make these investments today, what's to keep competitors in other states from tilting the playing field to take short-term advantage of Oregon businesses while they invest for long-term sustainability?

These are all good questions which the Governor must be prepared to answer, and the Advisory Group must offer its help in doing so.

First, we're not alone. The agreement reached among the three Governors of Oregon, Washington and California means the West Coast states will proceed in parallel and sometimes joint efforts. If our three states were a single nation, we'd be the seventh largest emitter of $CO_2$ globally, so we are a player. Our emissions are significant, and our efforts to reduce them can and must be comparably substantial. The actions being proposed in that process, which parallels our own, include joint procurement efforts for hybrid and low-emissions vehicles for state fleets, providing electric hookups at truck stops along the Interstate-5 corridor, and other actions where lower costs and greater benefits can be obtained through three-state coordination.

Second, we have other partners in the six New England states and five eastern Canadian Provinces that form the Conference of New England Governors and Eastern Canadian Premiers, and who have committed to a regional "Climate Change Action Plan." Other states – New York, New Jersey, Delaware, Maryland - are stepping up to their responsibilities. The state-based initiatives have one other important quality: they are bipartisan. Both Republican and Democratic Governors are leading their states into this effort.

Third, our major trading partners in Europe and around the Pacific Rim are Oregon's partners as well. The nations of the European Union have proposed ways that would allow individual U.S. states to participate directly with European countries in greenhouse gas credit trading programs if the states adopt comparable limits on emissions.

In fact, we should be less concerned about acting prematurely, and far more concerned with being into the marketplace too late. Already, other countries have established leads in important commercial areas: Denmark in wind turbines, Japan in solar cells, and Canada in fuel cells. We believe Oregon and the West Coast can compete in greenhouse gas technology markets, but not if we lag behind in our commitments at home (see Section 2.4 above, "*The Economics of Addressing Global Warming: Costs, Investments and Opportunities*").

# SECTION 3: CONTEXT

## 3.1 A PRIMER ON GLOBAL WARMING

The Earth is kept habitable by gases in the atmosphere that capture part of the sun's energy. Those gases are called "greenhouse gases" because of their heat trapping properties. At a relatively stable concentration, these gases are beneficial. However, human activity has resulted in a significant increase in greenhouse gases in the atmosphere since the beginning of the Industrial Revolution in the mid-18$^{th}$ century. At this point, additional greenhouse gases are pollutants that are destabilizing the earth's climate with potentially catastrophic consequences.

### Climate and Weather

We all confuse the two words in everyday speech, usually with no dire effect. But for purposes of dealing with climate change, the distinctions are crucial.

Weather is changeable day by day. Cool, wet Augusts are not unknown; nor are 70 degree days in February. Local, transient phenonoma produce local, transient weather effects. Can the planet truly be warming if we're having a damp and dreary summer?

Yes, because climate is "weather" averaged over time. Climate in the Pacific Northwest is generally cool wet winters that build snowpack in the mountains, showery springs that last through the Rose Festival, and dry, warm to occasionally hot summers that end about mid-October. Eastern Oregon is colder in winter, hotter in summer; while the coast is the reverse, due to climate effects of the ocean and mountains.

There are larger temporal climate effects too. Most of us recognize that an El Nino disturbance will result in drier than normal weather over the year, while a La Nina will be wetter than usual. More expansively, there is a switch (known as the Pacific Decadel Oscillation) that seems to flip over every 20 to 30 years, going from a drier-than-usual climate to a wetter-than usual one.

None of these tells us if it's going to rain this weekend. That's *weather*.

Global warming is a *climate* effect; a rise in <u>*average*</u> temperatures, a background effect with which shorter-term climate effects interact to produce weather. A hot year will tend to be hotter; a cool year, not as cool. A La Nina might produce more intense rain in April, and less moisture in August, than it would have absent the effects of climate change. Global warming will have -- is likely already having – such weather effects. Some of these are predictable: overall warmer weather year round, less snowpack, melting glaciers, more extreme storms and so on. Some are far harder to predict: will it rain more, or less; on the same timetable as now, or will the pattern shift?

We can't use today's weather to judge in what ways climate change is already affecting us. We can look at global average effects and effects observed over the passage of years to see where the disturbing patterns of climate change are coming into focus.

There are growing numbers of dramatic signs that this is occurring. Every writer on the subject has a favored illustration. The snows atop Mount Kilimanjaro that inspired Hemingway's famous story will be gone within fifteen years after enduring for thousands. Robins are seen 250 miles north of the Arctic Circle, where native Inuits have no word in their language for "robin." Alaska permafrost is melting, buckling highways built atop it, while the Iditarod sled race must start two weeks earlier to be certain of snow on the trail to Nome. Glaciers are retreating around the world. The Arctic ice cap is 20 percent smaller than it was 25 years ago, and scientists predict open seas at the North Pole within 50 years.

Closer to home, University of Washington scientists project a 50 percent reduction in Northwest snowpack by the middle of this century. The glaciers in Montana's Glacier National Park are retreating at an accelerated rate, and the forest fire season is arriving earlier and staying longer.

The *Third Assessment Report*, published by the United Nations Intergovernmental Panel on Climate Change (IPCC) in 2001, concluded that human-generated emissions have contributed substantially to the observed global warming over the last 50 years (see Fig. 3 below). Since 1990, the globe has seen the 10 warmest years on record. Since 1980, we've seen 19 of the 20 warmest. The Earth is warming faster than any time in the past 1,000 years.

Global warming, or global climate change, caused by greenhouse gas pollution, is arguably the single most serious threat to human civilization and to even the most robust and insulated ecosystems. Sources of greenhouse gas pollution from human activity have changed the global climate and will continue to change the climate for the foreseeable future. Our challenge is to slow, then reverse these global changes, so their near-term effects can be contained and the longer-term life-threatening impacts do not occur.

The United Nations Framework Convention on Climate Change, ratified by the United States in 1992, set a goal to meet the challenge:

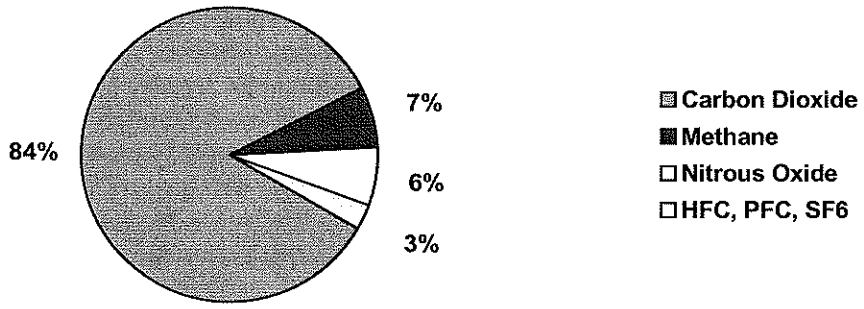
> The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-induced] interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.
> *(from Intergovernmental Panel on Climate Change (IPCC) 2001 Summary for Policymakers*, p. 7

Many IPCC scientists believe that stabilizing the atmospheric concentration of carbon dioxide ($CO_2$) at 500 to 550 parts per million (ppm), which would represent a doubling since 1750, would help avoid the most dangerous changes. However, that is a best estimate and assumes that sudden, unanticipated shifts in climate conditions do not occur. In any case, we are on a track to reach this doubled level of atmospheric $CO_2$ by around 2050, and to continue onward to a

tripling or quadrupling of pre-industrial $CO_2$ concentrations. At these higher levels, we face dangerous, potentially calamitous effects, on our economy and our physical environment.

Methane, nitrous oxide, and halocarbons are significant greenhouse gases, but the pollutant of greatest concern is $CO_2$. The majority of $CO_2$ pollution comes from burning fossil fuels, such as coal, gasoline, diesel, and natural gas. In Oregon, about 84 percent of greenhouse gas pollution comes from $CO_2$ emissions. Emissions from methane, primarily from cattle and landfills, contribute 7 percent of greenhouse gas pollution; nitrous oxide emissions, primarily from agricultural practices, contribute about 6 percent to the State's greenhouse gas pollution. Manufactured halocarbons, which include hydrofluorocarbons, perfluorocarbons, and suflurhexafluoride, account for the remaining 3 percent.

**Figure 3. Oregon Greenhouse Gas Emissions Sources in 2000**




In addition to these greenhouse gases, changing patterns of land use and land cover are altering the atmospheric concentrations, especially from changes to tropical forests. Everywhere, soils, forests, and other vegetation have the potential to remove $CO_2$ from the atmosphere. They also contribute emissions of $CO_2$, methane, and nitrous oxide as forests are cut and as agricultural practices disturb soils and add chemicals.

Emissions of sulfate aerosols, microscopic airborne particles released from burning fossil fuels, introduce a further complexity. These aerosols tend to reflect sunlight before it reaches the Earth and, therefore, have a cooling effect on the atmosphere. On the other hand, carbon black, or soot, is also released from burning fossil fuels; and, it can have a localized warming effect that is only just beginning to be understood.

## Scientific Uncertainty

Critics of efforts to contain global warming often argue that the science is "uncertain." Of course all science is "uncertain" in that it is subject to challenge by new evidence or interpretation. The "scientific method" requires that challenges to an assertion or hypothesis must be based on data and analysis that is peer-reviewed and critically examined by other scholars with expertise in the same field to see if it stands up to scientific scrutiny.

We rely on the "greenhouse effect," a phenomenon not seriously disputed in any academic institutions, to maintain the habitability of the earth. This effect is the result of a layer of gases in the upper atmosphere that surrounds the earth. This necessary layer traps as heat some of the solar energy that enters the atmosphere, maintaining a temperature range within certain optimal limits that sustain life on the planet as we know it. Without this effect, scientists estimate that temperatures would be over 50 degrees cooler, too cold to be habitable. Conversely, too thick a "blanket" of these greenhouse gases can overheat the surface of the earth and affect habitability.

Skeptics of global warming sometimes imply that "uncertainty" is the same as a 50/50 possibility that global warming is either occurring or not. Even if this were true, a 50% chance that the world would see some of the likely impacts scientists are forecasting would merit a determined response. But the inference is both misleading and untrue.

An overwhelming majority of the world's climate scientists are finding a causal link between growing concentrations of $CO_2$ and other greenhouse gases generated from human activity (fossil fuel and other sources) and a warming of the planet - beyond levels known to prevail in pre-industrial times. These scientists serve on the International Panel on Climate Change (IPCC), assembled by the United Nations from leading academic institutions around the globe.

Considerable uncertainty remains over the timing, distribution and potential severity of climate change on storm activity, sea level rise, forest health, water supplies, tropical disease propagation and other terrestrial effects. These effects could as easily be more severe, or occur more rapidly and abruptly, as be less severe and slower to gather. As computer models become more refined, we can expect to understand in greater detail the timing and distribution of effects. What is clear, however, is that the more greenhouse gas concentrations accumulate, the more we will be affected by these changes.

Climate science asks that we apply probabilities to complex, long-term effects and adopt policies in response that must span decades. We must learn to work with such probabilities, acknowledge both the evidence and the remaining uncertainty, and focus on solutions.

When global climate change models incorporate the effects of increased concentrations of greenhouse gas pollution, aerosols, and cyclic changes in the sun's output, the models most closely recreate the past climate history and give us most confidence in future estimates. While all three components play a role in our climate, greenhouse gases are now the major determinant.

**FIGURE 4**

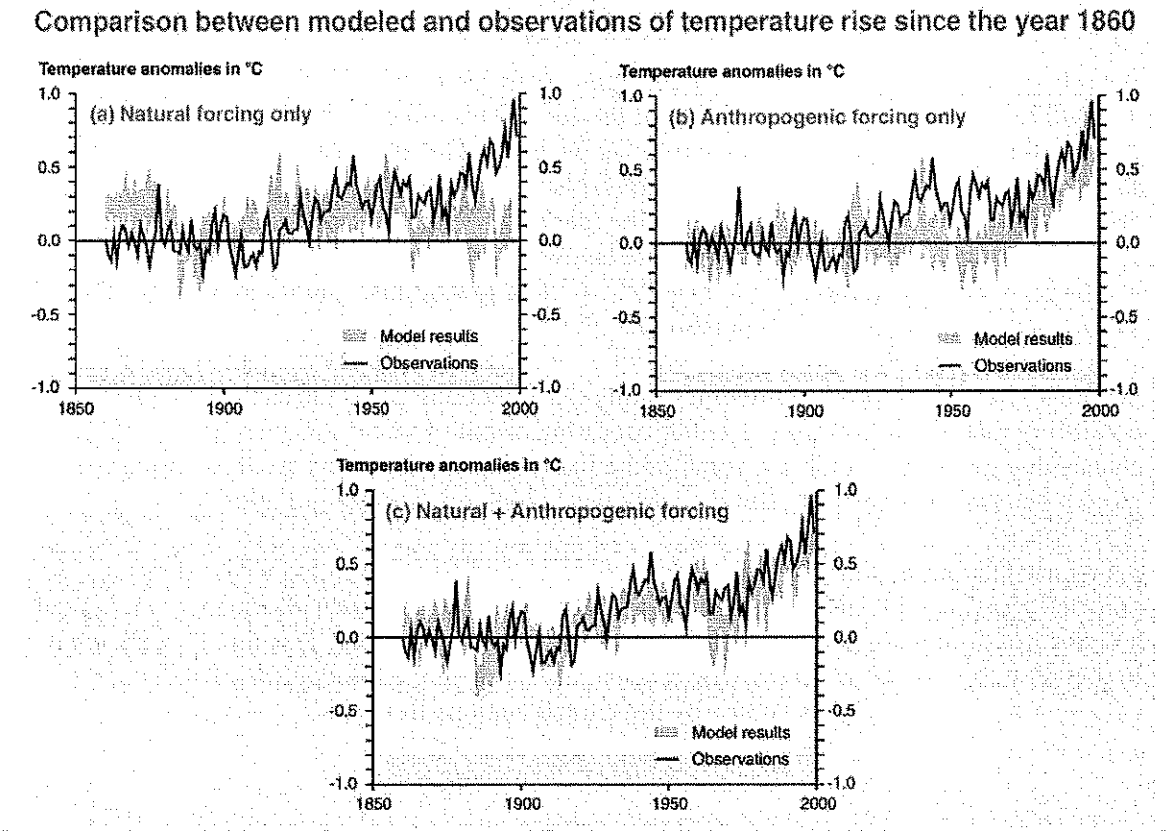



**Figure SPM-2: Simulating the Earth's temperature variations (°C) and comparing the results to the measured changes can provide insight to the underlying causes of the major changes.** A climate model can be used to simulate the temperature changes that occur from both natural and anthropogenic causes. The simulations represented by the band in (a) were done with only natural forcings: solar variation and volcanic activity. Those encompassed by the band in (b) were done with anthropogenic forcings: greenhouse gases and an estimate of sulfate aerosols. And those encompassed by the band in (c) were done with both natural and anthropogenic forcings included. From (b), it can be seen that the inclusion of anthropogenic forcings provides a plausible explanation for a substantial part of the observed temperature changes over the past century, but the best match with observations is obtained in (c) when both natural and anthropogenic factors are included. These results show that the forcings included are sufficient to explain the observed changes, but do not exclude the possibility that other forcings may also have contributed.

Q2 Figure 2-4

*Figure 4 above demonstrates the relationship between natural and anthropogenic (human-generated) sources of climate variation. Credible forecasts require modeling both sources of variation. In the period after 1960 most of the modeled variation is man-made, rather than*

*natural. The combined model (c) using both sources of variation closely tracks observed climate changes.*

**Complexity and Modeling Climate Change**

The physical systems that shape our climate are staggeringly complex. Computer models can begin to simulate this complexity and predict the future, but in broad rather than detailed terms. Current models of climate cause and effect are now delivering useful results at the global level. But more localized effects -- say, storm activity in the Pacific Northwest -- are cautionary, but still imprecise. This is because local climate is affected not just by global shifts in temperature regimes, but by the interactions of those changes with local topography, ocean currents and heat exchanges. Depending on how global heat exchangers (ocean currents and winds) are altered, the Northwest might see more weather systems coming in from the Pacific (therefore wetter weather) or from Alaska and Canada (more storms bringing less moisture).

More dramatic changes in the globe's engines of heat exchange could bring weather patterns that are largely unpredictable locally, except that as more heat is moved about the earth there likely will be more intense storms and other weather events.

Since 1958, an observatory on Mauna Loa, Hawaii, has measured atmospheric $CO_2$ concentrations. Based on data from polar ice cores, the pre-industrial concentration was about 275 parts per million (ppm). In March 2004, the atmospheric concentration reached 380 ppm. Until recently, the annual growth in the $CO_2$ level was less than 2 ppm. For the last two years it has been about 3 ppm. Because the immediate increase in the rate is not understood, it is not possible to know how long concentrations will continue to increase at this higher rate.

About half of human emissions (which include the burning of tropical forests) are absorbed by terrestrial plants and oceans. This absorption is also referred to as a "carbon sink," or biosequestration as mentioned earlier. It includes physical and biological processes in the upper layer of the oceans. It also includes regrowth of trees in the eastern U.S. and Europe, and expanding Siberian forests from changes in precipitation and temperature. It appears, however, that sinks are not taking up $CO_2$ as fast as they were. In any case, uptake is not increasing to compensate for increased emissions. Science is finding the potential for serious adverse consequences to ocean life from $CO_2$-induced changes in water chemistry.

The IPCC projects that $CO_2$ concentrations will rise to between 450 and 550 ppm by 2050 and will continue to increase until the international community agrees to change worldwide emissions. The increase in $CO_2$ emissions since 1750 has not been exceeded during the past 420,000 years and likely not during the past 20 million years.

Greenhouse gases affect global warming on long timescales, both because of their lifetime and the long time it takes the atmosphere to reach equilibrium with the warming effect of the gases. Many greenhouse gases remain in the atmosphere a long time, from many decades to centuries. For example, carbon dioxide may remain in the atmosphere from 5 to 200 years and nitrous

oxide remains for more than 100 years. Achieving a stabilized concentration level requires significantly reducing emissions over a long period. Even on a path to significant reductions, carbon dioxide concentrations and temperature continue to rise for centuries after emissions peak and begin to be reduced. Temperatures will also continue to rise even after the concentration has stabilized at a new level, such as double $CO_2$ at 550 parts per million. So even under the reduction scenarios depicted, we should expect impacts at a scale that will require adaptation as well as mitigation actions.

Given the path we are on, the IPCC projects that global average temperatures will rise from between 1.4°Celsius to 5.8°C (2.5°Fahrenheit to 10.4°F) by 2100. While there is uncertainty about the specific consequences of global warming in the Northwest, scenarios from various global climate change models show the types of changes we could expect to see within the next few decades. The Draft Scientific Consensus Statement states, with intermediate certainty, that the average annual temperature in the region will increase by 2.7°F by 2030 and by 5.4°F by 2050, with consequences outlined below.

## 3.2 THE COSTS AND CONSEQUENCES TO OREGON OF A "BUSINESS AS USUAL" STRATEGY

Dr. Thomas Karl of the National Atmospheric and Oceanic Administration and Dr. Kevin Trenberth of the National Center for Atmospheric Research published a paper in the December 5, 2003 issue of *Science* warning that on our current course, "the likely result is more frequent heat waves, droughts, extreme precipitation events and related impacts [such as] wildfires, heat stress, vegetation changes and sea-level rise." A 2001 report from the National Research Council says greenhouse warming and other human alterations of the climate system may increase the possibility of large, abrupt, and unwelcome regional or global climatic events. Researchers do not know enough about such events to predict them accurately, so surprises are inevitable.

In the Northwest, scientists at Oregon State University (OSU), the University of Washington (UW) and other study centers have already observed measurable warming. The Institute for Natural Resources at OSU hosted an all-day symposium on Impacts of Climate Change in the Pacific Northwest in June 2004, to solicit guidance from the region's own cadre of qualified climate and resource scientists. The objectives included pooling what is now known about state-level and regional effects and identifying critical gaps in our knowledge. The symposium resulted in the Draft Scientific Consensus Statement on the Likely Impacts of Climate Change in the Pacific Northwest.[9]

The Climate Impacts Group of the Joint Institute for the Study of the Atmosphere and Ocean at the University of Washington reports that over the last century the regional average temperature increased by 0.8°C (1.5°F). Precipitation has increased both east and west of the Cascades. East of the Cascades, the increases are dominated by changes from April to July. West of the Cascades, the largest increases are in November, which has overtaken December as the wettest month. While precipitation has increased, there has been a decline in snow water equivalent in

[9] Draft Scientific Consensus Statement from this meeting is attached as Appendix D.

the spring. Likewise, the timing of the peak snowmelt has advanced 10 to 40 days earlier in most of the Western United States over the last 50 years, according to Dr. Edward Miles of the Climate Impacts Group.

**Likely resources and specific impacts are summarized in the next sections.**

3.2.1 Water. Warmer temperatures will lead to less snow pack on the mountains in the winter, which would mean less water available later in the summer. A study by the Climate Impact Group indicates the April 1 snow pack in the Cascades declined about 50 percent from 1950 to 2000. The largest losses are at the lower elevations, consistent with increased warming. Scenarios of future climate change show a further decline by 2090 that could reach 72 percent below the base period of 1960 to 1990. This could reduce summertime stream flows by 20 to 50 percent, according to an article in *Science* (February 20, 2004, p. 1124). Peak flows will occur four to six weeks earlier than present. This will increase the risks of both winter and spring floods and summer droughts. In particular, rainfall-dominated rivers in the low-lying basins west of the Cascades would likely see increased flooding.

Earlier melting will change the timing of water in the rivers, which will affect fish and wildlife and commerce on the river. Earlier melting could also mean a summer drought, especially in Eastern Oregon where irrigation districts rely on melting snow to sustain rivers through the summer and to fill reservoirs.

Warmer water temperatures will harm native species such as salmon and could interfere with the life cycle of all fish, as could a change in the timing of runoff and precipitation going into rivers. For example, the Climate Impacts Group reports that the migrating smolt stage is when salmon are most vulnerable to climate variations. Timing of arrival in the coastal waters plays a big role in their survival, and changes in water flow from climate variability can change that timing. Climate factors also influence the type, distribution and abundance of predators as well as the salmon's food supply in estuaries and the ocean.

Changes in timing and volume of stream flow in the snow-melt dominated rivers could have economic impacts on the hydropower system. If climate change decreases the summer flow at the same time rising temperatures increase demand, both locally and in California, then the price of summer power could rise substantially. On the other hand, the price of winter power could drop as warmer temperatures decrease demand for heating while more precipitation as rain increases the supply of hydropower.

The Climate Impacts Group projects that precipitation will increase above that of the 1990s by about 7 percent by 2050, but it has less confidence in that projection, which is based on the combined results of eight climate change models. There will likely be larger year-to-year variation in precipitation.

On the other hand, some models suggest that as Arctic ice cover diminishes, storms will tend to track further north at key times of the year and the Pacific Northwest could see

reductions of precipitation of up to 40 percent. Some 20 percent of the ice cap over the North Pole has melted since 1979, according to Dr. Kelly Falkner at Oregon State University. If the current rate of loss of the Arctic ice cover continues, the summertime cover could disappear by 2050.

There is little or no room for growth in supply in the regional reservoir storage system. According to Dr. Miles, the regional system was designed on the assumption that about 70 percent of the regional storage would be snow pack. Consequently, we have the ability to store behind dams only about 30 percent of the annual average flow. It would be hard to increase that storage. The level of water scarcity is relatively new. Demands on water systems are growing, but supplies remain essentially fixed. There is less margin of safety available to cope with the unexpected.

3.2.2 **Human Health.** Scientists expect a higher increase in human mortality due to higher temperatures, even though there may be a decrease in cold-related illnesses and mortality. Abnormally high temperatures in Europe claimed about 20,000 lives in August 2003. Another potential threat is from changes in regional diseases when vectors, such as insects that live or thrive in warmer climates, migrate northward.

3.2.3 **Agricultural Production.** Changes in temperature, precipitation, water availability, and soil moisture will affect the distribution and productivity of crops. They will also increase the prevalence of diseases and pests. Although Northwest agriculture will probably be able to adapt to any changes with the first doubling of $CO_2$, adaptation will likely be costly. Dr. Eban Goodstein and Laura Matson of Lewis and Clark College suggest, in an initial estimate, that the lost value of irrigation water could range from $465 million to $2.4 billion. They caution that the estimate should be considered illustrative, not predictive.

3.2.4 **Oceans and Coasts.** The IPCC's most recent mid-range estimate is for an average rise in sea level of 9 to 88 cm (4 inches to 35 inches) by 2100. Recent studies of Greenland glaciers indicate greater instability than previously expected. This indicates that sea level rise may be close to one meter this century, the high end of the IPCC predictions.

This sea level rise could cause severe disruption for ecosystems and people along the coast. Likely effects include increased coastal erosion, both from sea level rise and increased wave height. The Climate Impacts Group notes that the increased frequency of storm surges may be more significant for low-lying areas than sea level rise alone[10]. Likewise, increased storms could lead to saturated ground and more slope failure in coastal bluffs and hills. Impacts would vary along the Oregon coast, because of the variation between rocky shores and sandy beaches and because the southern part of the coast is rising due to geological forces. To the south, that coastal rise is offsetting initial sea level rise. However, relative sea level is rising between Florence and Astoria.

[10] Scientists and engineers in the United Kingdom have estimated that by 2080, "hundred-year" floods could be occurring every *three* years, potentially affecting 3.5 million people in low-lying areas and inflicting costs in the tens of billions of pounds annually. Large numbers of properties would become uninsurable. (David King, Chief of the Office of Science and Technology, United Kingdom, quoted in Science Magazine, January, 2004, p 176).

According to Dr. Roger Samuelson at Oregon State University, global climate change is likely to change the local coastal ocean circulation and ecosystem and regional meteorological conditions. There would be both direct and indirect effects from global warming on regional winds in terms of mean wind direction and hence waves, in addition to warmer temperatures from the enhanced greenhouse effect. Winds, stratification of water levels, and currents are extremely important for coastal habitat.

Concurrently, climate change will produce a different fish community in the ocean waters off the Northwest coast, and this fish community may not support the large salmon populations or other commercial species, according to Dr. Robert Emmet at the National Oceanic and Atmospheric Administration Northwest Fisheries Science Center. Dr. Goodstein and Ms. Matson's estimate economic damage from decline in salmon populations due to global warming will range from $359 million to $7.2 billion by 2050. Given other influences on salmon productivity, the Climate Impacts Group notes that future changes in salmon population and distribution are speculative, although it is clear that a warmer climate and lower summer stream flows can be expected to further adversely affect the stocks.

3.2.5 **Forests**. Forests are expected to experience stress as well. Tree growth is likely to be limited by dryer summers, and, the possible increase in wildfires, pests, and disease are significant threats.

In the near term, increased levels of $CO_2$ may act as a fertilizer. Along with possibly increased precipitation and slightly warmer temperatures, tree growth may increase. However, as forests become denser under favorable initial circumstances, they will demand more water and, therefore, will become even more vulnerable to stresses from increasingly dryer and warmer summers.

The Climate Impacts Group points out that increases in summer temperatures without increases in precipitation would result in greater potential evapo-transpiration and decreased soil moisture. That would result in increased stress and decreased productivity, which would overwhelm any benefit from increased $CO_2$ fertilization of trees.

Warmer temperatures will also favor pests and disease. As the climate continues to change and become more severe, the forests will become even more susceptible to the variable climate. Larger and more intense forest fires are a likely result.

Dr. Ron Neilson, U.S. Department of Agriculture Forest Service, reports that there have been high fluctuations in wet-dry climate cycles for the last 30 years in the Northwest. Climate change may increase the annual and decadal variability of precipitation. He concludes that climate variability, far more than fire suppression, has led to the sudden rise and severity of wildfires in recent years. In fact, climate variability is the primary determinant of fire occurrence, location, and timing. Fuel buildup from previous fire suppression exacerbates fire intensity, but not its occurrence, according to Neilson.

## 3.3 MITIGATION AND ADAPTATION

The Advisory Group distinguishes between "mitigation" of greenhouse gas emissions -- meaning actions that will reduce emissions and their warming effects -- and "adaptation" to global warming -- those actions necessary to cope with the warming effects that are already unavoidable. Nearly all the actions included in this draft Strategy are mitigation actions intended to arrest and reverse the growth of such emissions, eventually reducing them to levels compatible with historically stable global climate patterns. Mitigation is generally afforded highest priority by scientists, given the potentially calamitous consequences to the planet of unrestrained warming.

However, Oregonians and their counterparts in other states and countries will also face adaptation questions, even if the mitigation actions are all adopted and implemented vigorously. This is because the accumulation of $CO_2$ and other greenhouse gases in the atmosphere has grown significantly from levels generally associated with sustainable climate patterns; and, as discussed above, global temperatures are already rising and will continue do so for the next several decades even with deliberate and effective mitigation.

Since it is unrealistic to propose that modern industrial societies will be able or willing to end fossil fuel consumption abruptly and live with the ensuing social and economic disruptions, most scenarios assume continued emissions and accumulation of greenhouse gases well into this century. Under the most optimistic assumptions, accumulations level off at between 450 parts per million (ppm) and 550 ppm by mid-century before effective mitigation – if it is vigorously and effectively pursued -- begins to reduce concentrations. If this is the case, then Oregonians and others will be adapting to the effects of warming for several generations to come.

These effects on Oregonians, discussed elsewhere, may include: more and more intense floods and forest fires; sea level rises that could threaten low-lying coastal communities; vegetation and wildlife changes; more constrained water supplies (and hydroelectricity generation); warmer wetter winters; hotter drier summers; and heightened exposure to diseases now largely confined to the tropics. All these effects and more will require adaptation.

If only Oregon and a few other jurisdictions act to mitigate emissions, the adaptation challenge grows commensurately and, eventually, beyond our capacity to adapt. The Advisory Group's mitigation strategy assumes that Oregon does not act to mitigate alone, but as one of a growing alliance of states and nations rising to this challenge.

The Advisory Group believes the next task, once Oregon has determined its near-term mitigation course, will be to identify adaptation actions, set an adaptation strategy and implement it. This task is beyond the charter of this Group, But final recommendations include encouraging the Governor to assemble a successor group of citizens and government agencies to take on this next great challenge.

# SECTION 4: RECOMMENDATIONS: GOALS, CATEGORIES, CRITERIA AND ACTIONS

## 4.1. GOALS

### 4.1.1 Oregon Benchmark Number 76

Oregon has an existing State Benchmark #76 to hold its $CO_2$ emissions to 1990 levels. In 2000, Oregon was 18 percent above its benchmark.

### 4.1.2 Advisory Group Recommendation on State Goals

The Advisory Group believes that setting goals for the State, expressed together with actions that can plausibly meet those goals over time, gives purpose and structure to the task of reducing our greenhouse gas emissions. The goals proposed here offer a pathway to climate stabilization that requires vigorous action, but also allows time for necessary individual and business adjustments. A fuller discussion of the rationale for setting goals, and for proposing these, can be found in Integrating Action IA-1 in Appendix A.

**Near-term Goal**: The Advisory Group believes the State should strive to achieve its existing Benchmark #76, of $CO_2$ emissions not exceeding 1990 levels, but we recognize that Oregon is unlikely to meet that benchmark by 2010. In Action IA-1 the Group recommends as a near-term goal that Oregon shall have arrested the growth of and begun to reduce the State's total greenhouse gas emissions, meeting or making measurable progress toward meeting Oregon's current $CO_2$ Benchmark.

**Intermediate Goal**: By 2020, Oregon's total greenhouse gas emissions will not exceed a level 10% below 1990 levels.

**Long-term Goal:** By 2050, Oregon's total greenhouse gas emissions will achieve a "climate stabilization" level that is less than or equal to 75 percent of 1990 levels.

## 4.2. RECOMMENDED ACTIONS

This section provides a list of significant actions the Advisory Group recommends in each of seven major areas:

- Integrating Actions (IA)
- Energy Efficiency (EE)
- Electric Generation and Supply (GEN)
- Transportation (TRAN)
- Biological Sequestration (BIOSEQ)
- Materials Use, Recovery and Waste Disposal (M&W)
- Government Operations (GOV)

Note that while the recommended Energy Efficiency actions will require significant effort and investment, the level of effort remains roughly comparable to how Oregon has performed over the last 20 years. In other words, the Strategy assumes the state will continue its current aggressive level of investment and accomplishment in this area.

The categories for action are:

> **Category I: Significant Actions for Immediate State Action.** These are actions that promise significant greenhouse gas savings (usually greater than or equal to 0.25 million tons/year of $CO_2$ or equivalent savings). These levels are technically feasible today and are the most cost-effective first actions to be taken. In some cases, demonstration value substitutes for significant greenhouse gas savings.
>
> **Category II: Other Actions for Immediate State Action.** These are actions that make sense for the State to undertake immediately. In most cases the greenhouse gas savings are less significant, but costs are also proportionately lower and many actions are cost-effective now.

Category I and Government Operations actions are listed below. A full discussion of Category I and II recommended actions under the seven major areas is in Appendix A.

**Integrating Actions (See Appendix A, Page 2)**

| | |
|---|---|
| **IA-1** | **Recommend the Governor adopt near-term, intermediate and long-term greenhouse gas emissions goals for Oregon.** |
| **IA-2** | **Urge the Governor to renew the charter of the Advisory Group on Global Warming (or a successor body) to continue the Advisory Group's unfinished agenda.** |
| **IA-3** | **The Oregon University System should develop strategic and targeted research, development and demonstration (RD&D) programs for greenhouse gas reduction technologies.** |

**Energy Efficiency (See Appendix A, Page 8)**

| | |
|---|---|
| **EE-1** | **Meet the Northwest Power and Conservation Council (NWPCC) goal of implementing cost-effective electricity efficiency measures for electric users and an equivalent goal for natural gas users.** |

**Electric Generation and Supply (See Appendix A, Page 20)**

| | |
|---|---|
| **GEN-1** | **Increase the renewable content of electricity.** |
| **GEN-2** | **Develop a greenhouse gas allowance standard for delivered energy.** |
| **GEN-3** | **Support Oregon PUC's review of rules and tariffs for renewable and combined heat and power (CHP) facilities.** |

**Transportation (See Appendix A, Page 28)**

| | |
|---|---|
| **TRAN-1** | **Convene an interim working group to recommend a proposal for the Governor, Environmental Quality Commission and the Legislature to adopt emission standards for vehicles.** |

| | |
|---|---|
| **TRAN-2** | **Integrate land use and transportation decisions with GHG consequences.** |
| **TRAN-3** | **Promote biofuel use and production.** |

**Biological Sequestration (See Appendix A, Page 43)**

| | |
|---|---|
| **BIOSEQ-1** | **Reduce wildfire risk by creating a market for woody biomass from forests.** |
| **BIOSEQ-2** | **Consider GHG effects in farm and forest land use decisions.** |
| **BIOSEQ-3** | **Increase forestation of underproducing lands.** |

**Materials Use, Recovery and Waste Disposal (See Appendix A, Page 51)**

| | |
|---|---|
| **MW-1** | **Achieve the waste generation and recycling goals in statute.** |
| **MW-2** | **DEQ should develop guidance to clarify alternative final cover performance at larger landfills: Demonstrate control of gas emissions comparable to geomembrane cover.** |
| **MW-3** | **Provide incentives for larger landfills to collect and burn minimum percentage (65 percent to 80 percent) of methane generated.** |

**Government Operations (See Appendix A, Page 65)**

| | |
|---|---|
| **GOV-1** | **State agencies should use their agency Sustainability Plans as the tool for agencies' dynamic involvement in GHG reductions. Operational activities in the areas of electricity, natural gas, transportation, waste and water will be the focus for reduction opportunities.** |
| **GOV-2** | **Through a collaborative effort, the departments of Energy, Environmental Quality and Administrative Services should develop a process to educate agency personnel about opportunities for GHG reductions including how to set goals and calculate GHG reductions.** |

## 4.3 CRITERIA FOR REVIEWING AND ASSIGNING ACTIONS TO CATEGORIES

The Advisory Group is a diverse group of Oregon citizens who bring to their task equally diverse life experiences and perspectives. Applying their perspectives was a valuable first step in evaluating the choices our State faces, but a more systematic evaluation tool also is used The group agreed on the following criteria, although each Group member may weigh and prioritize these independently.

1. Are significant quantities of $CO_2$/ greenhouse gas reduced, avoided or sequestered?

2. Are the reductions captured early, or delayed?

3. Is the measure technically feasible? How do its costs compare to costs of alternative actions (or inaction)?

4. Does the measure require new legislation or regulatory action? By whom? Are there political barriers to be addressed?

5. What collateral benefits or costs may accompany the measure? These might include uneven distribution of impacts, economic development gains, education values, demonstration values, and overlap with the West Coast Governors' Initiative.

## SECTION 5: CONCLUSION AND NEXT STEPS

**Oregon Choices**

As Oregonians and Americans, we clearly have choices about how we will respond to the warming of our planet. We can choose a "business as usual" path of contributing ever increasing greenhouse gas emissions to already high atmospheric concentrations – a path that American and international scientists consider dangerous and alarming. If we choose "business as usual," we leave a legacy for our children and grandchildren of a changing global climate that threatens human habitation and biological ecosystems – with much higher costs to adapt to and remedy these changes than we will face if we act today.

Alternately, we can adopt the goals recommended in this paper and the initial set of actions that will arrest and reverse Oregon's contribution to these atmospheric trends. In doing so, we will set our feet on a path to reduce emissions over time and stabilize the global climate conditions we bequeath to our children. Figure 5 charts our choices and references potential actions to 1990 emission levels and to our proposed intermediate and long-term goals.

Figure 5 below integrates several aspects of historical and forecast emissions of greenhouse gases for Oregon and their relationship to the proposed goals. Emissions are expressed as million metric tons of carbon dioxide-equivalent (MMT $CO_2E$) in the left vertical axis from 1990 through 2025.

1. As in Figure 2, the horizontal lines show the level of greenhouse gas emissions (a) in 1990, (b) at 10 percent less than 1990 levels, and (c) at 75 percent of 1990 levels. These levels represent proposed goals for the state's strategy and provide a context for the reductions from the proposed actions. The 75 percent reduction of greenhouse gas emissions is what is required globally to stabilize atmospheric concentration of greenhouse gases at 550 parts per million of carbon dioxide equivalent, or double the pre-industrial concentration.

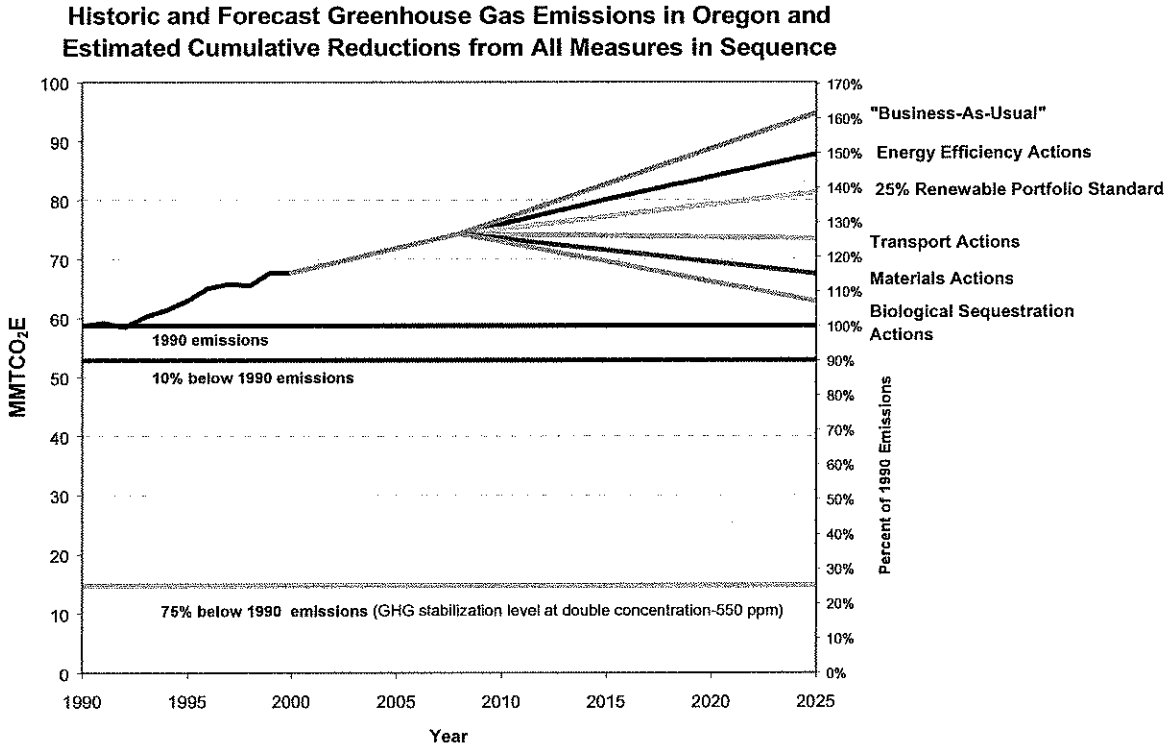
2. As in Figure 1, the black line that rises from 1990 to 2000 represents historical greenhouse gas emissions from Oregon. The orange line that rises beyond that represents a forecast of future emissions under a "business as usual" approach, which assumes we continue present activities (including many that now restrain greenhouse gas emissions), but take no *additional* special actions to reduce these emissions. The vertical axis on the right shows differences from 1990 levels, with 1990 representing 100 percent of emissions.

3. The graph then shows the cumulative, sequential reductions that would result from the proposed actions as subtractions from the "business as usual" approach. The reductions begin in 2008, based on the assumption that it would take that long for most of the new proposals to begin to be effective. The "actions" are the

sum of the emissions reductions from each of the major types of recommendations. Each "action" creates a new, lower forecast of emissions. In effect, all of the reductions from energy efficiency actions are subtracted from business as usual, then all of the reductions from adopting a 25% renewable portfolio standard are subtracted from the level achieved by the energy efficiency actions, and so forth. The reductions also account for the interactive nature of specific actions, as described in the discussion of the actions. Therefore, the total of all actions in an area and between areas is not necessarily the sum of all the specific actions.

Also, the reduction labeled "25% Renewable Portfolio Standard" (RPS) should be seen as a placeholder for the carbon allowance standard proposal. In fact, the state could set a carbon allowance standard at any amount of reduction. If the recommendation for a carbon allowance standard is adopted, it would be up to the task force to recommend a specific level of reduction and the means— possibly including an RPS—to achieve that level.

FIGURE 5




In sum, Figure 5 shows that if we continue business as usual, by 2025 Oregon's greenhouse gas emissions would be 61 percent higher than 1990 levels. On the other hand, if we accomplish reductions from all the actions recommended in the report, our emissions would only be 7

percent higher than they were in 1990, and trending downward, consistent with the Advisory Group's recommended 2010 goal.

**What Scientists Tell Us**

Several thousand of the earth's scientists, working together as the Intergovernmental Panel on Climate Change, agree that global warming caused by greenhouse gas pollution from human activities represents a profoundly serious threat to human civilization and to even the most robust and insulated natural ecosystems. Their comments are echoed in the Draft Scientific Consensus Statement on the Likely Impact of Climate Change on the Pacific Northwest prepared by scientists at Oregon and Washington universities in the fall of 2004.

Emissions of $CO_2$ and other greenhouse gases are materially altering the envelope of greenhouse gases that now keep the earth warm enough to be habitable - it's like adding another blanket, and another, until the cumulative effects exceed the capacity of the earth's systems for absorbing the gases and dissipating the heat.

These same scientists can generally describe the effects on the earth of this gathering threat, from melting glacial formations and rising sea levels to more severe storms, heat waves, more frequent and more intense forest fires, ecosystem disruptions, species extinctions, and mounting costs to cope with these changes in our world.

**Economic Investments and Opportunities**

The economic dimension of dealing with climate change can be stated in this negative way, but it can also be stated in a more promising one. Many actions proposed in this report carry price tags, but they are generally in the nature of investments that can generate net economic returns to us over time. Most are investments we are experienced in making, from improving the efficiency of our homes, farms, factories, appliances and automobiles to developing non-polluting new energy sources such as wind, solar, agricultural biomass and other renewable resources. These should remind us of our half-century long investment in hydroelectricity.

Other costs are similar to buying insurance policies against events that would otherwise cost far more to cope with. Avoiding the potentially destructive storms, floods and forest fires that are projected to accompany global warming would likely be less costly than the repairs we would need to make otherwise.

Moreover, we believe there will be many economic opportunities for companies and communities that rise to the challenge, developing the practices and technology products that our trading partners in other states and countries also will need to cope. We have ample experience in Oregon with this outcome. Many companies here have built prosperous business lines in energy efficiency products and consulting practices, in developing renewable energy technologies and adapting the power system for optimal use. We believe Oregon's entrepreneurs, supported by Oregon's academic and technical capabilities, can prosper by positioning themselves at the leading edge of change.

**Proposed Principles and Actions**

In proposing a set of Principles (Section 2.1) to guide our efforts, we have placed first emphasis on real, measurable and meaningful reductions in our state's greenhouse gas emissions. We have also emphasized the need to focus first on the most cost-effective actions and those that create investment and entrepreneurial opportunities. *We won't take actions that impair reliability in our electrical and other energy supply systems*, and believe that many of our recommendations will actually enhance this quality. We invite public comment, particularly on whether our principles create the right direction and focus for Oregon.

We also have proposed a set of actions – some very specific, others more in the nature of changing course – that collectively will meet our first goal of reversing the upward trend of Oregon's greenhouse gas emissions. The list of actions we choose or must take over the next fifty years are far from complete, since many needed actions and opportunities will only reveal themselves as we proceed. Our purpose is to set a firm foot on the path of emissions reduction, understanding that our successors will have their turn at the wheel as well. We invite public comment on whether we've assembled the right first set of actions to meet our goals and make the most of our opportunities.

**Oregon's Role**

We recognize that Oregon's contribution to both the problem and its solution is a small part of the whole. We can't succeed without complementary activity on the part of states and nations whose emissions dwarf our own. Fortunately many such states and countries are embarking on their responsibilities parallel with Oregon. So we can anticipate partners – beginning with our neighbors in Washington and California who have joined to form the West Coast Governors' Initiative on Global Warming – and competitors as we look for ways to profit from our enterprise. Both should be welcome.

There is a next set of tasks for the next Governor's "advisory group", further development of some of our more complex recommendations. This group must also consider what Oregon must do to adapt to the unavoidable warming conditions from greenhouse gas emissions that have already accumulated over the past 150 years.

But first we must decide, as an Advisory Group, a Governor and a State, whether we are prepared to adopt the goals proposed and the actions required as a down payment on meeting those goals.

Will we do so? Will we deliver on them after we've done the easy part and nodded our heads yes?

There couldn't be more of Oregon's future riding on the answers to these questions.

# APPENDIX A

# Summaries: Actions to Reduce Greenhouse Gases

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This section provides background and discussion on actions recommended by the Governor's Advisory Group on Global Warming. Recommendations fall within seven action areas:

- **Integrating Actions (IA)**
- **Energy Efficiency (EE)**
- **Electric Generation and Supply (GEN)**
- **Transportation (TRAN)**
- **Biological Sequestration (BIOSEQ)**
- **Materials Use, Recycling and Waste Disposal (MW)**
- **Government Operations (GOV)**

Specific actions are identified with an abbreviation denoting the action area and a number for easy reference. Actions are also grouped as Category I or Category II as follows:

> **Category I: Significant Actions for Immediate State Action**. These actions promise significant greenhouse gas savings (usually greater than or equal to 0.25 million tons/year of $CO_2$ or equivalent savings); are technically feasible today; and are the most cost-effective first actions to be taken.
>
> **Category II: Other Immediate Actions**. These actions make sense for the State to undertake immediately. In most cases the greenhouse gas savings are less significant, but costs are also proportionately lower and many actions are cost-effective now.

# INTEGRATING ACTIONS TO REDUCE GREENHOUSE GASES

The three recommended Integrating Actions described in this section are crosscutting and affect the six other action areas. In order to slow and then reverse greenhouse gas (GHG) emissions, it is essential to have a long-term focus.

Action IA-1 recommends goals that provide a long-term context for all other draft actions. The goals extend out 50 years.

IA-2 recommends that the Governor continue the work this group has begun. This includes appointing a successor group that could oversee implementation of global warming actions, develop adaptation actions; and develop additional actions to reduce GHGs.

IA-3 recommends the Oregon University System develop a research strategy for technologies and techniques to reduce GHGs and adapt to climate change. This would allow Oregon to foster new industries and would help Oregon's economy.

| | **Category I – Significant Actions for Immediate State Action** |
|---|---|
| **IA-1** | **Recommend the Governor adopt near-term, intermediate and long-term greenhouse gas emissions goals for Oregon.** |
| **IA-2** | **Urge the Governor to renew the charter of the Advisory Group on Global Warming (or a successor body) to continue the Advisory Group's unfinished agenda.** |
| **IA-3** | **The Oregon University System should develop strategic and targeted research, development and demonstration (RD&D) programs for greenhouse gas reduction technologies.** |

## IA-1: Recommend that the Governor adopt near-term, intermediate and long-term greenhouse gas emissions goals for Oregon.

**Near-term Goal**: The Advisory Group recommends the State meet its existing Benchmark #76, which specifies that carbon dioxide ($CO_2$) emissions should not exceed 1990 levels. We recognize that Oregon is unlikely to meet that benchmark by 2010, but we recommend that we keep it as a benchmark. Therefore, we recommend, as a near-term strategy, that by 2010 Oregon will arrest the growth of and begin to reduce the State's total greenhouse gas emissions, meeting or making measurable progress toward meeting Oregon's current $CO_2$ Benchmark.

Based on current scientific guidance and goals adopted by other states and countries, we consider the following additional goals to be appropriate for Oregon:

**Intermediate Goal**: By 2020, Oregon's total greenhouse gas emissions will not exceed a level 10% below 1990 levels.

**Long-term Goal:** By 2050, Oregon's total greenhouse gas emissions will achieve a "climate stabilization" level at or less than 75% of 1990 levels.

**Background: Setting a Goal**
Setting a goal and adopting actions that constitute a path to meet this goal send an important signal about the seriousness of the state's commitment to reduce greenhouse gas emissions. It encourages the expanded use of renewable energy and increased energy efficiency. It positions Oregon to take significant steps to protect the economic and environmental health of the region.

The appropriate objective of a greenhouse gas (GHG) emissions reduction goal or program is ultimately to prevent dangerous climate change, as stated in the goal of the United Nations Framework Convention on Climate Change. In order to meet such a goal, the first step must be to stabilize emissions and then begin to reduce them.

Most greenhouse gas goals are based on either returning to 1990 emission levels or achieving a reduction in emissions to a level below 1990. Often, there will be an initial goal of reaching 1990 levels, then later achieving the lower emissions target. The Kyoto Protocol to the United Nations Framework Convention on Climate Change, which has not gone into effect and which the Bush Administration has not submitted for ratification to the U.S. Congress, has a binding target for the U.S. of achieving a level 7 percent below 1990, on average, over the period from 2008-2012.

Numerous states and cities have adopted goals, either in plans or legislatively. Some address only $CO_2$; others address all GHGs. Most set 1990 as the base year and then set targets for 2010 and sometimes later for achieving levels below 1990. For example, the City of Portland and Multnomah County have a goal of reducing GHG emissions 10 percent below 1990 levels by 2010. In most cases, the states and cities have developed or are in the process of developing strategies to achieve their goals. Those that set long-term goals often include provisions to revisit the goal on a regular basis and provide for revisions.

Most state goals are expressed in terms of achieving a certain quantity of emissions at a specific year in the future. Current federal policy takes a second approach and sets a target expressed as "*emissions intensity,*" which it measures as the ratio calculated by dividing the greenhouse emissions in a given year by the economic output for that year. A third approach is to set technology-based standards. This approach is tied to specific technologies or sub-sectors, such as Oregon's $CO_2$ standard for new energy facilities.

Setting absolute quantity limits provides simplicity and certainty. One knows in advance how many tons of GHGs will be emitted into the atmosphere if the goal is achieved. More importantly, *absolute* quantities of atmospheric GHG levels are scientifically meaningful, while *relative* amounts (e.g., relative to transient human factors such as economic activity or growth) are not scientifically meaningful if the object is to control and mitigate global warming. Historically, moderate concentrations of such gases are benign, while the higher concentrations that we are generating pose an extremely serious threat to the ability of the planet to sustain human and other life. The physical processes that take place in the earth's atmosphere, and the threat they pose, are facts that must be faced, whether or not they are convenient to one set of economic strategies or another. Most states have used absolute quantities as goals.

Certainly our mitigation strategies must be sensitive to economic effects if we are to choose the most cost-effective and least disruptive mitigation path; but we must not lose sight of the fact that the ultimate objective is a physical one –benign levels of the gases – not a short-term economic one. Thus, fixed physical emissions goals must be set and achieved independent of changes in population or economic activity.

The current U.S. Administration's goal is to reduce carbon intensity by 18 percent between 2000 and 2012. The Government Accounting Office[1] estimates that this target would represent only a 2 percent absolute reduction from the likely GHG emissions that would otherwise accumulate over the period 2002-2012. Under this scenario, GHG levels in 2012 would remain significantly above 1990 levels. IPCC scientists generally agree that a climate stabilization level of emissions would need to be some 75 percent to 85 percent below 1990 emissions levels.

Technology-based targets (e.g., emissions caps for new power plants) can contribute to reducing physical concentrations of GHGs in the atmosphere, but they are likely to be more effective in the context of established goals to which other actions can also contribute. Oregon, Washington, New Hampshire, and Massachusetts have all set technology-based standards for power plants, either new or existing. California is setting technology-based standards for new vehicles. The Northeastern states are considering setting a cap on emissions from power plants.

**Consistency with Goals Established by Other States**

In 2001, the New England Governors and Eastern Canadian Premiers (NEG/ECP) adopted goals to reduce GHG emissions: (a) to 1990 levels by 2010; (b) to 10 percent below 1990 levels by 2020;

[1] United States General Accounting Office, Letter from John B. Stephenson to Senator Ernest F. Hollings and Senator John F. Kerry, regarding "Climate Change Trends in Greenhouse Gas Emissions and Emissions Intensity Factors in the Unites States and Other High-Emitting Nations," October 28, 2003

and (c) to a long-term goal of 75 to 80 percent eventually. These goals are consistent with the objectives of the United Nations Framework Conventions on Climate Change. They are ambitious, but they represent the path the region must be on to begin responding to global warming. The Governors and Premiers acknowledged that the science - and the consequences of a failure to respond -- compel us to set these goals, even if we don't yet have all the tools and technologies we'll need to meet them. Setting expectations is itself a stimulus to developing needed responses.

The Advisory Group is recommending goals generally consistent with those of the NEG/ECP for public review and comment. In addition to the scientific defensibility of setting such goals, Oregon's action will reinforce the emergence of a common, more predictable level of commitment within the state-led action on global warming and climate change.

## IA-2: Urge the Governor to renew the charter of the Advisory Group on Global Warming (or a successor body) to continue the Advisory Group's unfinished agenda.

- **Develop a Global Warming Adaptation Strategy for Oregon**
- **Evaluate and report on implementation progress**
- **Reconsider deferred actions**

**To ensure coordination and systematic progress in implementing this Strategy, the Advisory Group recommends that the Governor ask each state agency with implementing responsibilities to designate lead staff. In addition, the Group asks the Governor to appoint a senior member of his staff to oversee implementation and the ongoing work of a future Advisory Group.**

The Advisory Group recommends that the Governor continue the work the Advisory Group has begun. The State of Oregon has devoted policy and technical attention to global warming issues directly and indirectly, through energy, waste management, transportation and other policies since 1988. Even if Oregon chose not to be proactive on global warming, we would have to respond to the changing climate and the growing attention paid this issue globally, nationally and regionally. However, Oregon can continue to do more than react. It can continue to lead by argument and example. In doing so, Oregon will be able to achieve the GHG reductions ultimately required of it at the lowest possible cost. It can capture the co-benefits that its past commitments to carbon constraints, energy efficiency and renewable technologies have already demonstrated are available. It also can position itself to be a market leader in selling goods and services to its slower-to-respond trading partners.

This Advisory Group has left a very large task – adaptation – barely visible on the state's radar screen. And yet we know that if we could arrest the growth in GHGs tomorrow, we face almost a century of climate change and its oceanic and terrestrial consequences. We need to think through strategies for dealing with lower snowpack and altered regional hydrology; drier forests more susceptible to variable weather, pest infections, stress, and catastrophic fires; and other consequences that are already locked in. The Advisory Group asks that the Governor direct a successor Advisory Group and staff to work with Oregon's academic expertise and with

governments and businesses to develop our adaptation strategy for the next 100 years. By then we hopefully can see a downturn in the atmospheric concentrations of GHGs, the result of beginning today to reduce the emissions that are the subject of this report.

A successor Advisory Group is needed to oversee and report on progress the state and its citizens and businesses have made in implementing the strategy adopted in the current process. Recommending actions is the first and easiest step. Action is more difficult and problematic, the more so in the absence of accountability. The Advisory Group is recommending that it or a successor provide that accountability.

The Advisory Group began by considering a wide range of options. While it dropped some ideas because they will not prove useful, it deferred consideration of many others, because they require additional evaluation and quantification of costs and benefits before they are ripe for recommendation to the Governor and Legislature. A successor Advisory Group can work with state staff and interested parties to develop these ideas, as well as others we expect to be offered as Oregonians increasingly commit to addressing climate change issues.

## IA-3: The Oregon University System should develop strategic and targeted research, development and demonstration (RD&D) programs for greenhouse gas reduction technologies.

Oregon universities have expertise related to mitigation and biological sequestration (carbon capture and storage) of greenhouse gas (GHG) emissions. Enhanced efforts to develop and deploy specific technologies, services or applications can enable Oregon to foster new industries. Possible areas of effort include renewable generation technologies, biofuels production, energy efficiency for electricity, natural gas and oil uses, bio-sequestration, materials disposal, and renewable energy production using landfill gas or agricultural or forestry biomass. Large emission reductions are possible.

Oregon's higher education system is capable of designing and identifying applications for beyond off-the-shelf technologies. It is likely Oregon and other states will need such applications in responses to global warming. Oregon has significant competitive advantages. We have a broad array of educational expertise in energy efficiency research, forestry, and renewable energy. Oregon has been an early adopter of these technologies and services.

State RD&D funds, combined with funds from competitive grants, could enable Oregon's economy to benefit from local deployment. In addition U.S. and worldwide efforts to reduce GHG emissions will create additional demand for these services. Increased state revenues from increased economic activity could more than offset any state expenditures. Local investment and demonstrations can help develop export markets. Collaboration with other West Coast states could better leverage institution strengths and develop complimentary regional capacity

Legislative appropriations are required to conduct an inventory of current programs, capability and interests and to plan future development and support for these programs. Not all technologies for GHG reduction merit funding. The Oregon University System, in coordination with GHG work

groups in Oregon, Washington and California, should develop strategic and targeted RD&D programs for GHG reduction technologies.

# ENERGY EFFICIENCY ACTIONS TO REDUCE GREENHOUSE GASES

**Issue:** For the past twenty years and more, Oregon has had successful energy savings programs for electricity, natural gas and petroleum users. These have included incentive programs and building codes. Even so, significant savings remain to be captured, and new technologies create opportunities for still more savings. Petroleum and natural gas use emits $CO_2$ and other greenhouse gases directly. Almost half of the electricity used in the Oregon is met by coal and gas-fired generation that emit greenhouse gases (GHG).

**Solutions**: To reduce emissions, Oregonians will need to use all energy more efficiently. Oregon's incentive and building code programs need to be reviewed and upgraded, based on concerns over global warming.

***Generation mix affects efficiency saving. In the table below, column three shows estimated $CO_2$ savings in million metric tons (MMT) through 2025. Column four asks if the action is cost-effective(C/E) - yes (Y) or no (N) - to the consumer over the action's lifetime. (This does not include whether it is cost-effective considering the projected effects of global warming.) The following estimates assume displaced generation at a 50-50 mix of gas-fired and coal-fired generation. Refer to the* (draft) Oregon Strategy for Greenhouse Gas Emissions, *Figure 4 in Section 5 for the cumulative impact of actions.***

| | **CATEGORY I: SIGNIFICANT ACTIONS FOR IMMEDIATE STATE ACTION** | *MMT CO2e 2025* | *C/E?* |
|---|---|---|---|
| **EE–1** | **Meet the Northwest Power and Conservation Council (NWPCC) goal of implementing cost-effective electricity efficiency measures for electric users and an equivalent goal for natural gas users.** | | |
| | **EE-1a: Expand and coordinate electric incentive programs for Investor-Owned Utilities (IOUs).** Coordinate Oregon Department of Energy (ODOE), Energy Trust of Oregon (ETO), consumer-owned utility (COU) efficiency programs; 2005 assessment; legislation to amend Residential Energy Tax Credit (RETC). | 3.20 | Y |
| | **EE-1b: Upgrade building codes on a 3-6-year cycle.** (Add building commissioning and increase enforcement funds) | 0.52 | Y |
| | **EE-1c: Amend building codes to set minimum space and water heating/cooling standards.** | 0.09 | Y |
| | **EE-1d: Adopt state appliance efficiency standards.** (requires legislation) | 0.41 | Y |
| | **EE-1e: Advocate with Bonneville Power Administration (BPA) and Oregon COUs to meet NWPCC goal.** | 1.24 | Y |
| | **EE-1f: Support Oregon Public Utility Commission (OPUC) actions to evaluate NW Natural/ETO and ODOE natural gas incentive programs.** (Coordinate programs; conduct an assessment in 2005 to see if it is possible to double the base goal of 4.6 TBtu per year in energy savings) | 0.24-0.48 | Y |
| | **EE-1g: Advocate with OPUC for Avista and Cascade to meet gas energy savings goals comparable to NW Natural** | 0.05 | Y |
| | **EE-1h: Advocate for federal equipment and appliance efficiency** | 0.40 | Y |

| | | | |
|---|---|---|---|
| | **standards.** | | |
| | **EE 1i: Strengthen state marketing of energy efficiency and incentive programs; initiate Governor's Awards** | | Y |
| | **SUB-TOTAL FOR EE-1** | 6.15-6.39 | |
| | **CATEGORY II: OTHER IMMEDIATE ACTIONS** | | |
| **EE-2** | **Support OPUC and COU efforts for modified rate designs** (to reflect daily and seasonal peak demand) | 0.16 | Y |
| **EE-3** | **Support OPUC initiatives for Gas Fuel Switching Programs** (residential electric water heaters and commercial oil boilers) | 0.10 | Y |
| | **TOTAL ALL EE ACTIONS** | 6.41-6.65 | |

## EE-1: Meet the Northwest Power and Conservation Council (NWPCC) goal of implementing cost-effective electricity efficiency measures for electric users and an equivalent goal for natural gas users.

**Achieve Oregon's 960 average Megawatts (aMW) share of the Northwest Power and Conservation Council's regional cost effective energy efficiency (EE) for 2005 to 2025 (18 percent of 2002 sales). Also save 7.5 trillion Btu (TBtu) of Oregon commercial and residential natural gas between 2005 and 2025 (11 percent of 2003 commercial and residential gas sales.)**

In March 2004 the Northwest Power and Conservation Council NWPCC) published its draft conservation resource assessment. The assessment indicates that the NWPCC region (Oregon, Washington, Idaho and the western third of Montana) could reduce electric sales by 2,880 average megawatts (aMW) by 2025 if fully effective conservation programs and regulations were implemented. Oregon's share of this savings is 960 aMW. The Council also notes that about 3,000 aMW were saved in the period 1980 through 2002. While many measures have been installed, technological change has created new opportunities.

Savings of 960 aMW electricity and 7.5 trillion Btus of natural gas are assumed in the energy efficiency case forecast of $CO_2$ emissions. The efforts needed to accomplish this goal are shown in Table EE-1 and EE-2 below. All of these actions are cost-effective and would improve Oregon's economy. With all these measures, Oregon electric loads would grow 1.0 percent per year from 2002 to 2025. If none of this energy efficiency is captured, loads would grow at 1.6 percent per year and $CO_2$ emissions would be 5.6 million metric tons (MMT) higher than assumed. The generation displaced by the energy efficiency is assumed to be a 50-50 mix of gas and coal-fired power plants. Acronyms used in the tables below include IOU (Investor-Owned Utilities), COU (Consumer-Owned Utilities, which include cooperatives and municipal utilities), and PUDs (People's Utility Districts).

**TABLE EE-1**
**Oregon Electric Efficiency Case**
**Energy Savings**

| MMT $CO_2$ | aMW | Measure | |
|---|---|---|---|
| 3.20 | 545 | EE 1a | State and Utility Incentives (IOUs) |
| 1.24 | 212 | EE 1e | State and Utility Incentives (COUs) |
| 0.37 | 63 | EE 1b (electric only) | Improved Building Codes –(building shell) |
| 0.32 | 55 | EE 1h (electric only) | Federal Standards |
| 0.09 | 15 | EE 1c | Calif. Equipment Standards* |
| 0.41 | 69 | EE 1d | Calif. Appliances Standards** |
| 5.63 | 960 | | Total Electricity |

*Oregon can adopt California equipment standards through rule changes. **Adopting appliance standards in Oregon would require legislation.

Base case natural gas utility incentive savings are for Energy Trust of Oregon (ETO) programs for Northwest Natural and savings from state energy efficiency programs. Estimates of savings from incentive programs and improved building codes are from the Oregon Department of Energy (ODOE).

**TABLE EE-2**
**Oregon Natural Gas Efficiency Case Savings**

| MMT $CO_2$ | Trillion Btu | Measure | |
|---|---|---|---|
| **0.29-0.53** | **4.6** | **EE 1f and 1g** | **Utility and State Gas Incentives** |
| **0.15** | **2.9** | **EE 1b (gas only)** | **Improved Building Codes (building shell)** |
| **0.08** | | **EE 1h (gas only)** | **Federal Standards** |
| **TBA** | | | **Calif. Equipment Standards** |
| **TBA** | | | **Calif. Appliances Standards** |
| **0.52-0.71** | **7.5** | | **Total Natural Gas** |

The actions to achieve EE-1a through EE-1i are discussed as individual actions. An overall discussion of the NWPCC goal is immediately below.

**DISCUSSION OF NWPCC GOAL**

The most difficult or controversial element of achieving these $CO_2$ savings is possible legislation to adopt appliance efficiency standards for devices not covered by Oregon building codes (EE-1d). This element is discussed in the draft West Coast Regional Appliance Efficiency Codes and Standards Working Group Paper (WG4 – from three-state West Coast Governors' Global Warming Initiative).

Allowing builders to take an ODOE Residential Energy Tax Credit would require legislation, but may not be controversial (part of EE 1a). The savings are small, but grow as penetrations grow over time. Integrating efficient water-heating equipment at the time of construction is less expensive and requires fewer incentives than adding equipment later.

The remainder of the savings might be accomplished through actions by ODOE, ETO, OPUC and the Building Code Division. These might require budget adjustments for the 2005 session. If a joint OPUC-ODOE assessment indicates the natural gas and electricity efficiency goals cannot be met with existing funding levels, legislation for the electric portion may be needed in the 2007 session because of restrictions enacted in SB 1149 in 1999.

The savings goal is achievable. The NWPCC estimates that almost 3,000 aMW were saved in the region between 1980 and 2002. Of this, roughly 40 percent was saved through codes and standards. This is consistent with experience with Oregon programs where 35 percent of savings were from the energy standards in Oregon's building codes. Figure EE-1 below shows the distribution of $CO_2$ savings from state programs. Savings are annual savings from program activity from 1978 though 2002. Savings from program measures reduce $CO_2$ emission by 3.7 million metric tons per year.

Had these savings not occurred, 2002 emissions from Oregon stationary sources would have been 11 percent higher than they were. This indicates further large $CO_2$ savings from energy efficiency programs are achievable. Historical savings in Figure EE-1 estimates do not include the additional savings from utility energy efficiency programs during the period. Utility programs added substantial saving, especially in the residential sector. In addition to reducing $CO_2$ emissions, these and utility program savings reduced costs to businesses, governments and households compared with purchasing fuel or power and they improved Oregon's economic performance.

## Avoided CO2 emissions in 2002 by program (includes all projects from start of program through 2002)

### Total avoided emissions=3,681,000 metric tonnes CO2

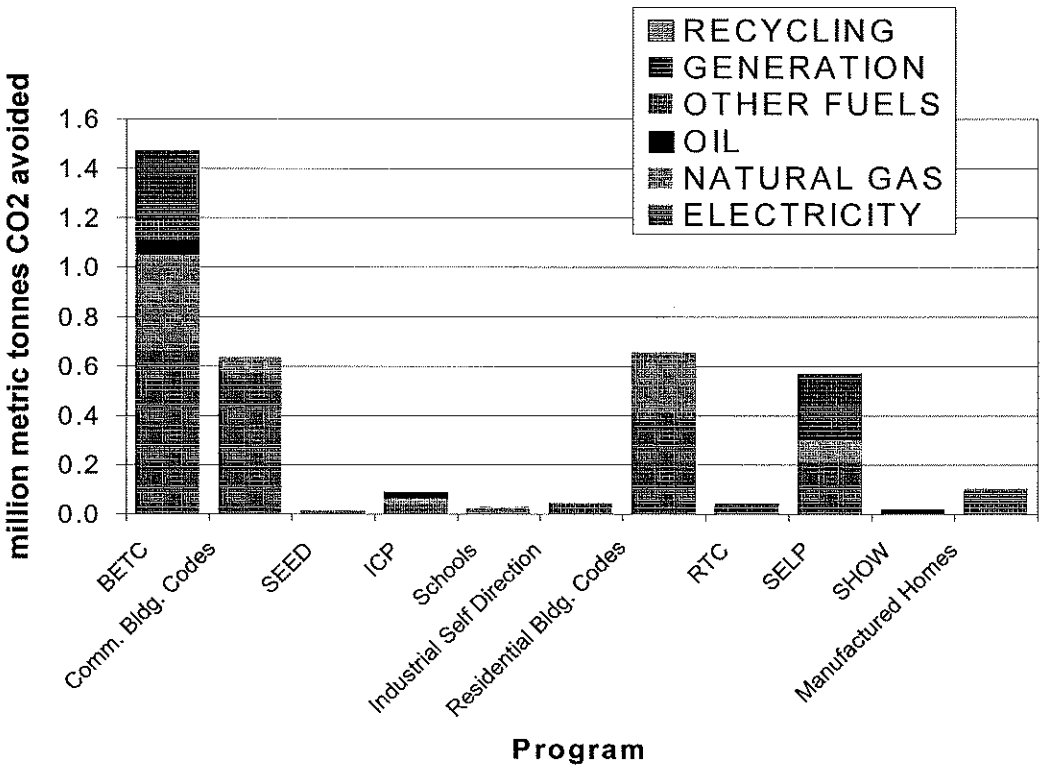



**Figure EE-1**

**Key to Figure EE-1:**
**BETC:** ODOE Business Energy Tax Credit
**SEED:** State Energy Efficient Design requirements for new state government buildings
**ICP:** discontinued federal energy efficiency program for schools and hospitals (Institutional [building] Conservation Program)
**Schools:** current K-12 school programs
**Industrial Self-Direction:** measures paid for by large electric users who self-direct their SB1149 public purpose charges
**RTC:** is the ODOE Residential Energy Tax Credit
**SELP**: ODOE Small-scale Energy Loan Program
**SHOW**: ODOE State Home Oil Weatherization program

## EE-1a: Expand and coordinate incentives for electric Investor-Owned Utilities (IOUs) .

Electricity sales of investor-owned utilities (IOUs) accounted for 72 percent of Oregon sales in 2002. The Energy Trust of Oregon began running the energy efficiency programs of PacifiCorp and Portland General Electric (PGE) in 2002 and of Northwest Natural gas utility in 2003. Idaho Power runs utility incentive programs in the Ontario area. These IOU programs and those of the Oregon Department of Energy and Department of Housing and Community Development might be better coordinated to be more effective with existing funds. Efforts to this effect are underway. The most important need is to track total savings to compare to the global warming goals. If increased coordination is not sufficient to meet the goal, increased funding will be needed. Application of the NWPCC's estimates to Oregon indicates that IOU incentive programs could save 545 aMW by 2025. If instead, this load were met by a 50-50 mix of new gas and coal-fired generation, it would add 3.20 MMT $CO_2$ to Oregon's 2025 emissions. Below are other actions needed to achieve this goal.

**Assess Oregon program performance relative to the NWPCC goal in 2006.** As part of the study due on January 1, 2007 as required under SB 1149 (1999 session), PUC, ODOE and ETO should assess the effectiveness of existing electric programs and regulations in 2005 and 2006 to see if Oregon is capturing its share of the NWPCC goal. These assessments should consider state tax credits; loan financing programs and other state incentives; regulatory tools such as building and equipment codes; technology assessments; utility planning assessments; Oregon Energy Trust programs and other SB 1149 mechanisms. The agencies should conduct a similar program for natural gas programs. If an assessment indicates substantial increases in electric funding and authorities are needed, this would indicate legislation may be needed in the 2007 session.

Similarly the State should review the effectiveness of BPA and COU energy efficiency programs and whether the State's programs are consistent with and supportive of comparable efficiency efforts among non-regulated utilities (see EE 1e below).

**Through legislation, allow homebuilders to take state Residential Energy Tax Credits (RETC) for heat pump water heaters (HPWH), solar photovoltaic (PV) and solar domestic hot water (DHW).** Currently, only the homeowner is allowed to take the credit. With this change either the builder or the homeowner could get the RETC. The NWPCC estimates that the region could acquire 195 aMW of cost-effective savings from HPWH by 2025. Oregon's share of this would be 64 aMW which would reduce annual $CO_2$ emissions in 2025 by 0.35 MMT $CO_2$. This measure will make an important contribution to achieving the NWPCC target for heat-pump and solar water heating.

Solar PV and solar HW savings are not included in the NWPCC plan, as these are not currently cost-effective. Savings or production from solar PV would be in addition to the NWPCC goal. Savings from solar domestic hot water (solar DHW) are included in the 195 aMW of savings, because homes will have either a solar DHW or HPWH system, but not both.

For new homes built on speculation, the builder is the decision-maker on whether to integrate HPWH, solar PV or solar DHW systems. Integration is less expensive than adding these systems later. This would require a statutory change, but it may not be controversial.

## EE-1b: Upgrade Oregon Building Codes on a three- to six-year cycle (building shell measures).

**Amend the energy portions of the residential and commercial building codes on a three- or six-year cycle for shell measures that address exterior structure walls, ceilings and floors.** Because technologies continue to change, Oregon needs additional revisions to its building codes. Significant additional cost-effective savings are possible. As an example, many new or refurbished commercial buildings do not operate properly. Today's building energy systems are complex and should be commissioned (certified) to ensure they perform properly as designed.

The Oregon Department of Energy (ODOE) estimates that structural codes improvement (shell measures) from 2005 through 2025 could save 63 average megawatts (aMW) of electricity for a savings of 0.37 MMT $CO_2$ in 2025 at the assumed displaced generating mix of 50-50 natural gas and coal plants. ODOE also estimates that $CO_2$ savings in natural gas heated homes and commercial buildings could be 0.15 MMT $CO_2$. These savings include building commissioning and increased enforcement measures described below and are included in the energy efficiency forecast. These savings are less certain than the incentive savings in EE-1a above. Residential and commercial building codes should be upgraded every three to six-years to reduce energy use and costs. Otherwise, building users will miss cost saving opportunities from new technologies.

**Require commissioning certification of new buildings and major renovations.** The major barrier to requiring commissioning by code is that code officials don't have the time or expertise to verify that building systems are operating as designed. A viable alternative is a seal of approval from an accredited (certified) commissioning agent. Oregon, Washington, and California should work with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the Building Commissioning Association to develop standards of practice and a certification program, or undertake to develop them regionally, and then require commissioning by code. This would also facilitate re-commissioning of existing commercial buildings. This could be relatively easy, if done cooperatively with California and Washington. This program is likely cost-effective. This would also help achieve cost-effective conservation in new gas and oil-heated commercial buildings.

**Support the infrastructure for enforcement of building energy codes.** The codes only save energy if compliance is met. Among competing priorities, energy efficiency is often overlooked. There should be a renewed effort to provide information and training for code officials, designers, contractors, equipment vendors, and others on energy code requirements and the benefits of energy efficiency. These measures would be cost-effective

## EE-1c: Amend building codes to set minimum space and water heating/cooling standards.

**Amend the residential and commercial building codes to require minimum efficiencies for space heating/cooling and water heating/chilling, based on cost-effectiveness and modeled after California Equipment Standards.**
Oregon, Washington and California have long been leaders in building energy codes. Federal standards preempt state standards for some equipment, but not all. Failure of the federal government to set standards for several types of equipment would allow Oregon, along with other West Coast states, to set equipment standards in codes. To date, Oregon building codes generally have not addressed equipment standards. It would be cost-effective to raise the minimum efficiency of the equipment through changes in the building code. The Building Codes Division has no plans to do this. Also, Oregon currently has no efficiency certification or compliance-monitoring infrastructure for implementing standards, but may be able to adopt California protocols. This is an element of the draft West Coast Regional Codes and Standards Working Group. ODOE estimates this measure will reduce $CO_2$ emissions in 2025 by 0.09 MMT $CO_2$ at the assumed displacement of a 50-50 gas and coal plant mix.

## EE-1d: Adopt state appliance and equipment efficiency standards for Oregon.

**Propose legislation for state appliance efficiency standards (California standards) that cannot be covered under the building code.** Federal appliance efficiency standards could be achieving higher levels of cost-effective conservation. Federal standards preempt state standards for some appliances, but not all. California, Washington and Oregon are jointly exploring efficiency standards for appliances and equipment that cannot be covered by building codes. Appliance standards for products outside the scope of building energy codes would require legislation. This legislation will likely be controversial. The legislation would have to provide a mechanism for product efficiency certification (possibly by relying on California's certification program and database) and for compliance monitoring. These actions would be cost-effective. This is an element of the draft West Coast Regional Codes and Standards Working Group. ODOE estimates this measure will reduce $CO_2$ emissions in 2025 by 0.41 MMT $CO_2$ at the assumed displacement of a 50-50 gas and coal plant mix.

## BASE EE-1e: Advocate with BPA and Oregon Electric Consumer-Owned Utilities (COUs) to meet NWPCC goal.

**Continue Oregon and NWPCC efforts to work with the Bonneville Power Administration (BPA) and Oregon consumer-owned utilities (COUs) to assure programs or incentives for effective energy efficiency programs.** COUs account for 28 percent of the electricity sold in Oregon. Achieving the NWPCC goal in these areas will save 212 aMW and 1.24 MMT $CO_2$ at the assumed mix of new generation. Recent funding levels by BPA and Oregon COUs are comparable to the public purpose charge for PacifiCorp and Portland General Electric. BPA is evaluating its funding levels for 2006-2011.

This will require effective programs for Oregon COUs, either run by BPA or by the utilities themselves. It is recommended that the governor's office follow the regional dialogue on this issue and make recommendations to BPA if necessary. Continued coordination among the existing and new programs of ODOE, ETO, BPA and Oregon COUs is also needed.

## EE-1f: Support OPUC actions to evaluate Northwest Natural energy efficiency programs.

**Support Oregon PUC's reexamination of Northwest Natural's gas utility efficiency programs and ODOE's energy efficiency programs and modify where cost-effective.**
This measure would evaluate the success of ETO's programs for NW Natural and ODOE's gas energy efficiency programs. The ETO has a goal of 1.9 trillion annual Btus (TBtu/year) by 2012. Extrapolated, this would imply savings of 4.6 TBtu per year in 2025 or 0.24 MMT $CO_2$ per year. More cost-effective savings may be possible through higher levels of ratepayer funding of utility marketing and information programs, better coordination with ODOE programs, increasing the level of NW Natural's public purpose charge or by expanding or modifying ODOE programs. The PUC could examine how to improve the marketing of ETO programs to NW Natural's customers. This might involve increasing the overall level of funds for marketing and information or adjusting the balance of funds between the ETO and NW Natural's efforts. Whether these changes are possible or needed would be determined by a joint study of the PUC, ODOE and ETO. As the public purpose funding for NW Natural is not in statute, legislation would not be required to change it.

This evaluation could also involve filling gaps between ETO's gas program for NW Natural and ODOE school gas programs. ODOE's K-12 schools program (under SB 1149) for all fuels does not cover schools in COU territories. ETO programs for NW Natural cover some of these COU areas, but don't have targeted COU schools programs.

Substantial changes in ODOE programs would likely require legislation in 2007. Currently, the PUC has a program that automatically compensates NW Natural for most of the revenue lost due to reduced sales from energy efficiency programs. If not for this program, conservation would reduce NW Natural profits. Before this program, lost revenue had discouraged NW Natural from aggressively pursuing conservation. Continuing this program is likely necessary for conservation to succeed. Doubling the implied ETO goal would reduce NW Natural's 2025 emissions by 0.24 MMT $CO_2$ per year.

## EE-1g: Advocate with OPUC for Avista and Cascade Natural Gas Utilities to meet energy savings goals comparable to NW Natural.

**Recommend the PUC institute programs for Avista and Cascade that resemble those of NW Natural (See EE 1f).** Together these utilities sell 19 percent of the natural gas sold by utilities in Oregon. NW Natural sells the remainder. The PUC and these utilities could adopt a public purpose charge to fund ETO programs and could also remove rate-making disincentives that inhibit pursuit of cost-effective efficiency measures. Extrapolating the savings of NW Natural to these utilities yields a reduction in 2025 emissions of 0.05 MMT $CO_2$ per year.

## EE-1h: Advocate for federal equipment and appliance standards.

**Advocate for federal appliance and equipment standards that fully capture cost-effective energy efficiency.** In recent years the federal government has decided not to apply its standards to several types of equipment and appliances and has not included all cost-effective savings in recent

changes to appliances and equipment it does regulate. For example, U.S. Department of Energy's attempt to weaken federal air conditioner standards in 2001 was overturned by federal courts. States have successfully lobbied for tougher standards in the past. Also, having state standards for non-regulated products has goaded federal action to avoid multiple state standards.

Federal standards and programs have been effective in reducing the economic impacts of electric price spikes and the high cost of imported natural gas and oil, as well as reducing $CO_2$ emissions. Oregon should vigorously support continued improvements in federal appliance and equipment efficiency standards. ODOE estimates full implementation of cost-effective standards for federally covered appliances would save Oregon 55 aMW and 0.32 MMT of $CO_2$ assuming a 50-50 mix of new coal and gas-fired generation. Gas savings are estimated to be 0.08 MMT of $CO_2$.

## EE-1i: Strengthen state marketing and public information of energy efficiency and incentive programs.

**Improve marketing and public information for incentive programs.** In cooperation with state agencies, local governments, utilities and conservation organizations, Oregon could enhance the effectiveness of public information, marketing and branding of energy efficiency efforts. This could involve a Governor's awards program.

## EE-2: Support OPUC and COU efforts for modified electric rate designs.

**Support efforts by the PUC and COUs to re-examine rate design measures that reflect daily and seasonal peak demand and reduce $CO_2$, and implement where cost-effective.** Savings for these potential programs would be in addition to Oregon's share of the NWPCC goal of a 2,880 aMW reduction in electrical sales.

**Electricity – Voluntary Peak Shaving:** Examine voluntary demand-response (peak-shaving) rates and programs for Portland General Electric (PGE) and PacifiCorp in Oregon and implement where cost-effective. These reduce $CO_2$ emissions because the gas-fired power plants that meet peak loads are the least efficient. This could be ranked as easy to accomplish, because the PUC has adopted this goal. This measure might save an annual 0.05 MMT $CO_2$ in 2025.

**Electricity – Residential.** Redesign residential rates to better reflect the higher costs of electricity during peak seasons or times. Revise PGE's residential rate design from flat rates to rates that increase with use (inclining block rates). Revenues from the higher prices for higher use levels would be refunded to ratepayers through a lower price for the initial rate block. This could be ranked as easy. PacifiCorp's Oregon residential rates already have this feature. This measure might save 0.11 MMT $CO_2$ in 2025.

## EE-3: Support OPUC actions for gas and fuel switching.

**Support efforts by the PUC and others to re-examine fuel switching to natural gas to reduce $CO_2$ and implement where cost-effective.**
Savings for the electric water heater program would be in addition to Oregon's share of the NWPCC efficiency goal, roughly estimated as 960 aMW.

**Electric Water Heaters to Gas**: Examine gas utility programs that would convert residential electric water heaters to gas and implement where cost-effective. The PUC approved the concept in October 1991, but the program was not implemented due to concerns that most of the incentives would go to households who would have switched anyway (the so called free-rider effect). A new issue would be the relative cost-effectiveness and $CO_2$ savings of switching existing electric-resistance water heaters to gas water heaters or heat-pump electric water heaters. The PUC has adopted an objective to: "Investigate whether to promote the direct use of natural gas to meet customer needs over its use to generate electricity for that purpose." Savings in 2025 from this program would be 0.09MMT $CO_2$ per year at the assumed mix of new generation of 50-50 coal and gas plants.
**Commercial Oil Boilers to Gas**: Examine gas utility programs to convert existing commercial oil-fired boilers to efficient gas-fired boilers and implement if cost-effective and if the increased gas utility sales revenue would cover program costs. This could be controversial, especially among oil dealers. Savings from this program in 2025 would be 0.01 MMT $CO_2$ per year.

# ELECTRIC GENERATION AND SUPPLY ACTIONS TO REDUCE GREENHOUSE GASES

**Issue**: Oregon electricity supplies, once nearly all renewable (hydro), are now over 40 percent from coal and another 8 percent from natural gas. Both emit $CO_2$ and other greenhouse gases (GHG) in combustion (although gas has lower emissions).

**Solutions**: To reduce greenhouse gas emissions, we must use all energy more efficiently, while meeting new load growth and replacing existing fossil fuel generation with energy efficiency and generation that does not produce greenhouse gases.

***In the table below, column three shows estimated $CO_2$ savings in million metric tons (MMT) through 2025. Column four ask: Is the action cost-effective (C/Y), yes (Y) or no (N), to the consumer over the action's lifetime? (This does not include whether it is cost-effective considering the projected effects of global warming.) A question mark means that estimates of cost-effectiveness are uncertain and more analysis is needed. Because actions interact, $CO_2$ savings cannot be added. Refer to the (draft) Oregon Strategy for Greenhouse Gas Reductions, Figure 4 in Section 5 for the cumulative impact of actions.***

| | CATEGORY I:SIGNIFICANT ACTIONS FOR IMMEDIATE STATE ACTION | *MMT CO2e 2025* | *C/E?* |
|---|---|---|---|
| **GEN-1** | **Increase the renewable content of electricity.** | 0.80 | Y |
| **GEN-2** | **Develop a greenhouse gas allowance standard for delivered energy.** | At least 7.0* | ? |
| | **GEN-2a Develop an Oregon Renewable Portfolio Standard (RPS) or expanded public purpose charge as an alternative to Gen 2 above** (e.g., have new renewable meet 25% of 2025 load). | 7.00 | ? |
| **GEN-3** | **Support Oregon PUC's review of rules and tariffs for renewable and combined heat and power (CHP) facilities.** | 0.54 | Y |
| | **CATEGORY II: OTHER IMMEDIATE ACTIONS** | | |
| **GEN-4** | **Encourage state government to purchase renewables** ("1% for renewables" in new buildings or 20% of energy purchases). | 0.08 | N? |
| **GEN-5** | **Advocate for specific federal policies or legislation** (Re: $CO_2$ legislation and U.S. Dept. of Energy and EPA policies. | varies | varies |
| **GEN-6** | **Advocate with BPA to suppport Oregon's renewables measure** (renewable funding, transmission and integration services, and other policies for renewables). | varies | varies |

* Assumes carbon constraint at least equal to an RPS of 25 percent.

## GEN-1: Increase the renewable content of electricity.

**The forecast mix assumes Oregon will implement the final versions of the Oregon Renewable Energy Action Plan and the West Coast Governor's Global Warming Initiative (WCGGWI) Renewable Resources Working Group Report (Working Group 3), both currently in draft form.** This could have small fiscal impacts. The draft Oregon plan calls for the following new renewable energy projects by the end of 2006:

- 300 megawatts (MW) of wind energy capacity (enough electricity to power a city one and a half times the size of McMinnville)
- 25 MW of biomass-fueled electric capacity (this is primarily focused on woody material from forests, but could include other biomass fuels)
- 1 to 4 MW of environmentally sustainable hydroelectric capacity (primarily irrigation piping channels)
- 5 MW of biogas capacity from waste water treatment, dairies and landfills
- 1 geothermal electric capacity project underway

These projects will produce about 130 average megawatts of electric energy. These measures, other than wind, will likely require additional staffing of about 3 full-time employees (FTE). These staff would primarily draft and oversee federal grants. Initially, this would require general funds, but after successful grant awards, only the grant writing portion would require general funds for about one FTE. The employees could be spread out over several natural resource agencies or a single natural resource agency.

The base case generation mix is based roughly on the Northwest Power and Conservation Council (NWPCC) draft mix that includes reduced load growth from energy efficiency (EE) actions applied in Oregon. The mix also assumes the equivalent of the Oregon Energy Facility Siting Council's (EFSC) $CO_2$ standard being applied gradually throughout the West. The resource additions listed above save 0.80 million metric tons (MMT) of $CO_2$ per year starting in 2006, assuming the displaced mix is half new coal-fired plants and half new natural gas-fired plants. Short term impacts on power plant operations are similar because existing plants with higher fuel costs and $C0_2$ per kWh are displaced first when renewable resources are added.

## GEN-2: Develop a greenhouse gas allowance standard for delivered energy

**Urge the Governor to create a special interim working group to examine the feasibility of, and develop a design for, a load-based allowance standard. This standard would reduce total amounts of $CO_2$ and other greenhouse gas (GHG) emissions due to consumption of electricity, petroleum and natural gas by Oregonians in a deliberate, predictable, effective, equitable and verifiable manner.** The working group should be directed to provide the Governor with its majority recommendation in time for legislative action, if necessary, in the 2007 session.

The working group should include a fair representation of parties with economic and environmental interests at stake, along with appropriate state agency staff and legislators. The long-term (2050) goal should be to reduce GHG emissions from all sources to levels that are consistent with a state goal of climate stabilization emissions levels. A secondary goal should be to capture and reinvest

or equitably distribute economic benefits from energy efficiency, renewables and bio-sequestration strategies. Tools may include: utility and government resource programs (including the Energy Trust and BPA's transmission and integration capabilities); government tax, long-term financing and incentive programs; offsets and trading. Barriers to meeting allowance goals should be identified and addressed, including current state regulatory signals if appropriate.

At a minimum the work group should address the following questions:

1. **Long-Term and Interim Sector Allowances**: What long-term (2050) sector GHG emissions allowances should be set for electricity, gas and oil (consistent with an overall State of Oregon GHG emissions goal if one is adopted)? What *interim* emissions levels should be set (e.g., what are the shape and slope of the compliance curves) that are feasible and allow deliberate but not delayed action? What intervals should be set for interim compliance? Should there be a brief "beta" period at the beginning of enforcement of the cap to test accounting principles and other mechanisms, during which greater compliance flexibility would be permitted?

2. **Different Fuels and Suppliers**: How can equitable standards and/or program options be applied to diverse energy sources (electricity, natural gas, petroleum) and suppliers (including public- and investor-owned utilities, non-utility suppliers and self-generators)? Should compliance curves be identical for all suppliers or different to reflect different supplier circumstances? Should other significant non-energy emitters of GHG's (e.g., industrial emissions) be incorporated into this mechanism, or will they require a different one?

3. **Emissions Credits Trading:** Should – and could – such a system be designed to incorporate features compatible with a regional emissions trading mechanism between Oregon and its West Coast partners (Washington and California) on the premise that the wider the market, the more efficient? Between the West Coast and the Northeast states? Could we design a system that includes and harnesses the initiative of non-utility contributors (e.g., renewable resource developers and others who do not emit GHGs and would not therefore receive an allocation to use or trade)?

4. **Compliance Flexibility**: How can such a system be designed to allow sufficient compliance flexibility -- including trading, acquiring offsets from energy efficiency, renewable energy and/or GHG sequestration, and financial off-ramps -- while still achieving real reductions of greenhouse gas emissions and a transition to a low-carbon energy supply system? Can we quantify these different kinds of contributions in comparable and tradable units? Can we, while avoiding being prescriptive, ensure a diverse portfolio of responses? How can we credit the appropriate utilities and ratepayers for the contributions of non-utility participants such as the Energy Trust?

5. **"Leakage"**: How can such a system be designed to withstand "leakage" or gaming resulting from reallocation of generating resources across state boundaries? In particular, is there a way to account for new and existing resources among the states PacifiCorp serves, so that Oregon emissions reductions do not translate into emission increases elsewhere in the PacifiCorp system[2]?

6. **Economic Development**: How can such a system be designed to capture economic development benefits for Oregon including: developing technologies, products and services for marketing outside the state; and reinvesting energy efficiency savings into new job-creating, and carbon-saving investments?

[2] NOTE 1: Both this leakage issue and PacifiCorp's concerns about inconsistent state-by-state treatment could be addressed in part if Washington and California were to adopt compatible emissions credit trading mechanisms.

Can we devise strategies for reconciling such investment objectives with the goal of keeping compliance costs manageably low?

7. **Protecting Oregon's Competitiveness**: How can a system be designed to capture the economic gains of Oregon's investments in greenhouse gas mitigation, while avoiding loss of competitiveness in energy pricing between Oregon and its neighbor states or other competitors? If there are near-term rate effects — costs or benefits — how can they be allocated in an equitable manner? How can a "safety valve" be designed into the system to create temporary breathing room to respond to critical competitiveness issues, energy market price spikes or other unanticipated and transient pressures?

8. **Federal Preemption**: Could such a mechanism be fitted with an automatic response – that is, an "off-ramp" – in the event of meaningful federal action that could constitute preemption. What should be considered "meaningful" federal action?

**The key issues are:**

- **What kind of entities are subject to the allowance for $CO_2$ or other GHG emissions;**
- **How $CO_2$ or other GHG emissions are calculated if the allowance applies to utilities and other load-serving entities; and**
- **The initial, interim and final levels of allowances**

The discussion below focuses on $CO_2$, the principle GHG emission from fossil fuel and electricity use. To stabilize $CO_2$ concentrations in the atmosphere at roughly double pre-industrial levels, world-wide $CO_2$ emissions will have to be about 25 percent of the 1990 rate by around mid-century. Cumulative $CO_2$ emissions over the 21st century are the key variable. This is the only proposed option, along with efficiency or generation mix options, other than a $CO_2$ tax that could reduce Oregon's electric emissions below the 1990 level. Other energy efficiency and generation actions primarily impact the amount and mix of new generating plants. If adopted, this measure could provide substantial incentives for renewable resource development, which would make Gen 2a (a renewable portfolio standard or RPS) unnecessary (alternately, an RPS could be enacted as one tool to assist the state and energy suppliers in complying with the allowance curve). The measure could also address the risks to Oregon's utilities and ratepayers of likely future carbon regulation affecting new coal plants.

To stabilize climate in this century requires reducing emissions from existing power plants. Some older coal-fired plants will be almost 100 years old in 2050. Without new regulations, these plants might continue to operate past 2050.

Clear long-term guidance on $CO_2$ is needed for utility planning. Utilities are considering retrofits at coal plants to reduce emissions of criteria pollutants (e.g., subject to Clean Air Act constraints) and mercury. If utilities face clear $CO_2$ emission limits in the near future, they can avoid wasting money upgrading the oldest coal-fired power plants and later having to shut them down because of $CO_2$ regulations.

To begin to address the difficult long-term issues, northeastern states are considering a regional cap-and-trade system for electric emissions. Depending on how an Oregon or West-Coast allowance

mechanism is designed, Oregon and other West Coast states might be able to participate and lower our costs to achieve the needed emissions reductions.

Designing allowances on emissions for only those power plants located in Oregon would be inequitable for the state's two largest utilities. Portland General Electric (PGE) has most of its fossil-fueled generation facilities in Oregon while most of PacifiCorp's plants are in other states. Even though the disparities are less severe in the Northeast, this problem is serious enough to consider a different kind of cap.

Another problem with an allowance solely on in-state plants is that it might only encourage new power plants to be built outside of Oregon. If so, this would only harm Oregon's economy with no reduction in $CO_2$ emissions.

Northeast states have looked at a limit on the emissions attributable to the loads of utilities and other load-serving entities. Their approach is referred to as a load-based cap-and-trade system. It would not be inconsistent with Oregon's $CO_2$ accounting system and the Oregon Public Utility Commission's (OPUC) labeling requirements for PacifiCorp and PGE.

Such a limit would be on total CO2 tons of utility emissions as calculated by the pounds per kWh of utility generation sources multiplied by kWh of load. The limits could be designed to provide the appropriate trajectory of utility emissions for the 21st Century. The limits for early years could be near existing emission levels. The limit would be reduced on an established, predictable curve through 2050 to achieve the desired mid-century emissions levels.

An alternative is to set limits only on the emission rates (pounds of $CO_2$ per kWh for each load-serving entity) rather than total $CO_2$ tons emitted. This is referred to as an emissions portfolio standard (EPS). While more comprehensive than a renewable portfolio standard (RPS, see Gen 2a below), an EPS does not ultimately limit emissions and would not incorporate emissions reductions from energy efficiency actions.

Unlike an EPS, an RPS or a ban on new coal plants, an allowance system should allow utilities to minimize the cost of meeting an emissions target. If one utility has lower-cost energy efficiency or generation options, it can reduce its emissions below its allowance and sell allowances to another utility or load-serving entity. This trading could occur between East Coast and West Coast utilities if states adopted a coordinated system. It could also include appropriately designed project offsets. Allowing the use of project offsets can help limit the costs of meeting the limits on $CO_2$ emissions.

There are many details to be worked out. Limits would need to deal with loss of load through changes in utility service territories or customers choosing retail access suppliers. Eastern states are designing a generation-based system. Although cap-and-trade systems have been discussed among West Coast states, there are no active proposals. Each load-serving entity would need an annual allowance for at least the next 50 years. Each utility might have different starting and ending allowances, as current emission levels vary widely. These allowances could be adjusted, but certainty is a major value of this system. Techniques for automatically adjusting allowances based on future conditions would be better than sudden policy changes.

## GEN-2a: Develop an Oregon Renewable Portfolio Standard (RPS) or expanded public purpose charge as an alternative to Gen 2 above.

**Through legislation, substantially expand the amount of new renewable power projects. This could serve as a strategy to implement Gen 2 (above), to be considered by the special interim work group that examines the feasibility of, and develops a design for, a load-based allowance mechanism.** This option could be accomplished with a renewable portfolio standard (RPS) or substantial increases in the public purpose charge (PPC) for renewables.

The fraction of load-growth met by renewable resources could be increased by adopting an RPS for Oregon electric utilities and other retail electric suppliers or by expanding the 0.5 percent renewable portion of the PPC applied to PGE and PacifiCorp retail electric bills from SB1149 (1999 session). In either case, the 0.5 percent renewable public purpose charge should not be repealed entirely, as part of the funds go to renewables, such as solar photovoltaics, that are expensive now, but have good long-term potential.

There are several states with an RPS that could serve as a model. A poorly devised RPS could imply action but be ineffective. Any RPS legislation would have to address several issues. These issues include:

- Resource eligibility (perhaps including separate targets for resources or sub-resource technologies within each category. Inclusion of hydro and definitions of biomass tend to be controversial.
- Vintage (only projects built after a specific year)
- Size of targets (absolute capacity or energy, percent of load or percent of load growth)
- Timing of targets (deferred until a time when loads have grown or fixed targets for specific years)
- Compliance paths (whether to require bundled power purchases or whether to allow renewable energy certificates, a.k.a. "green tags")
- Price or cost caps (absolute or pegged to shifting market values)
- Covered entities (all utilities or investor-owned only, inclusion of retail access suppliers)
- Geographic eligibility (in- and out-of-state plants or in-state only)
- Banking (carryover from over-compliance years to future years and true-up provisions)

This legislation would be highly complex and controversial. It may be perceived as violating the legislative intent of SB1149. If so, this could lead to repeal of the renewable portion of the existing system benefit charges.

Having a 15 percent RPS by 2025 (as percent of 2025 load) would reduce annual carbon dioxide emissions between 3.6 MMT $CO_2$, if it had the effect of banning new coal-fired power plants, and 2.8 MMT $CO_2$ if it did not. A 25 percent RPS would fulfill all new baseload requirements and displace some existing gas- and coal-fired generation under the energy efficiency case forecast of 1 percent annual load growth. Estimated savings are 7.0 MMT $CO_2$ in 2025.

An RPS could be designed with earlier implementation for earlier savings, but an RPS is generally designed to address only new power plants that serve load growth. An RPS that acquires more electricity than is needed for load growth would necessarily back down existing generating plants,

either utility-owned or purchased. However, without further direction, the plants where reductions occur may not be the least-cost source of $CO_2$ reductions. Emissions from existing plants would be better addressed by a load-based cap and trade system.

## GEN-3: Support Oregon PUC's review of rules and tariffs for renewable and combined heat and power (CHP) facilities.

**Support Oregon PUC's review of rules and tariffs to ensure they accurately reflect the costs and benefits to the utility system from combined heat and power (CHP) systems, also called cogeneration, especially within the distribution system. Also, recommend that consumer-owned utilities conduct similar reviews.** This should increase the number of CHP systems, especially efficient gas-fired technologies, which have lower $CO_2$ emissions than stand-alone gas generation and much lower emissions than coal plants. This requires action by an independent board or commission, but could be ranked as easy because the OPUC, which covers 72 percent of Oregon load, has begun this process. The emissions reduction in 2025 could be 0.54 MMT $CO_2$ per year assuming displacement of 200 average megawatts (aMW) of the assumed mix of half coal and half gas-fired power plants.

## GEN-4: Encourage state government to purchase renewables.

**Suggest that the Governor establish a 2005-2007 budget for renewable purchases by state agencies.** This could be through a "one percent for renewables" requirement for new state and university buildings (similar to the "one percent for art" program) or through state purchase of renewable power or renewable energy certificates (green tags) without the power. Spending the funds on visible technologies in new buildings, such as solar photovoltaic (PV), daylighting or ground-source heat systems, might increase public awareness and advance distributed renewable technologies more than purchases of renewable power. A combination of new building measures and purchases is possible. These options would require legislative approval of funding, but might not be controversial, depending on the level of funding.

Buying renewable power, along with renewable energy certificates (green tags), would insulate state energy bills from future fossil fuel cost increases or $CO_2$ regulations. If the state buys only the certificates, it would raise the costs less to state government for the same number of megawatt hours of renewable claims by the state, but would not provide the price stability benefit.

Eugene Water & Electric Board (EWEB) is the only utility or retail electricity service supplier (ESS) that offers a fixed-price renewable product. The City of Portland is exploring this idea with Portland General Electric (PGE), either as a utility product or with PGE helping shape a renewable product from an ESS. If state government pursues this idea, it should be in collaboration with the City of Portland.

This measure refers only to costs of renewable energy in excess of the expected market price of electricity or fuel. Even if renewable resources are more expensive than expected market purchases, they would help insulate future state budgets from electric and natural gas prices spikes. If actual fuel or electricity prices are higher than expected, these actions would reduce the cost of

state operations over the lifetime of the buildings. It is unlikely fuel or electricity prices will be substantially below current levels. The 2000-2001 West Coast energy crisis showed that upside price risk is nearly unbounded.

During the last 15 years, the state spent about a billion dollars on new state buildings. One percent of this would be about $670,000 per year. For comparison, spending this same amount on the above-market cost of electric renewables purchases would make about one-third of the state government's power renewable (assuming renewable power costs $5/MWh more than wholesale market power). This would add 2 to 3 percent to the state's electric bill. This would save 0.08 MMT $CO_2$ per year if the displaced mix of new generation is half coal and half natural gas-powered plants.

## GEN-5: Advocate for specific federal policies or legislation.

**State agencies could advocate for federal policies on energy tax breaks (including the renewable production tax credit); a renewable portfolio standard; $CO_2$ caps (such as the McCain-Lieberman Climate Stewardship Act); $CO_2$ or other energy taxes; budgets for research, development and demonstration; appliance and equipment efficiency standards; biological and non-biological sequestration research and programs; and material use/recycle/disposal research or programs.** For critical legislative issues, the Governor could contact the Oregon Congressional Delegation.

## GEN-6: Advocate with BPA to suppport Oregon's renewables measure.

The Bonneville Power Administration's role in the Northwest since the passage of the NW Power Act of 1980 has been to support development of resources designated by the Act as higher priority (conservation and renewables) through direct acquisition, customer utility programs, products and transmission services. BPA's role is particularly pivotal with COUs, many of whom are small and reliant on the services the larger federal agency can provide. BPA owns and operates the largest part of the Northwest transmission system, manages and dispatches output from the Federal Columbia River Power System. BPA also has the greatest capability to integrate and firm up intermittent generating technologies such as wind. Oregon's renewable generation actions will be more effective if BPA continues to actively provide such support. Oregon should work with BPA in the following areas: a more effective Conservation and Renewable Discount (C&RD), transmission sufficiency, affordable integration services, power rates designs that provide incentives for COUs to develop renewable resources; new non-firm and "near-firm" transmission products; and strategic renewable resources acquisitions. For critical issues, the Governor could support BPA through intervention with the Oregon Congressional Delegation.

# TRANSPORTATION ACTIONS TO REDUCE GREENHOUSE GASES

**Issue:** One-third of Oregon's GHG emissions are from vehicle exhaust. Cost-effective opportunities to reduce these emissions are available, particularly in urban areas.

**Solutions**: Two categorical solutions are: (1) to reduce greenhouse gas emissions from consumption of fossil fuels by displacing conventional combustion engines with hybrid, electric and other technological/fuel options; (2) to guide land use choices, especially in Oregon's urban areas, toward more efficient choices including higher densities, transit options, mixed-use neighborhoods, apartment and common wall dwelling designs.

| Transportation Actions | | Reductions in Greenhouse Gas Emissions in $MMTCO_2E$ | C/E |
|---|---|---|---|
| **CATEGORY I: SIGNIFICANT ACTIONS FOR IMMEDIATE STATE ACTION** | | 2025 | |
| **TRAN-1.** | **Convene an interim working group to recommend a proposal for the Governor, Environmental Quality Commission and the Legislature to adopt emission standards for vehicles.** | | |
| | **TRAN-1a: Adopt Low Emission Vehicle (LEV II) Emission Vehicle Standards.** | 0.24 | Y |
| | **TRAN-1b: Adopt $CO_2$ Tailpipe Emission Standards (per California AB 1493 "Pavley" standards).** | > 6.0 | Y |
| **TRAN-2.** | **Integrate land use and transportation decisions with GHG consequences.** | 0.40 | Y |
| **TRAN-3.** | **Promote biofuel use and production.** | 1.0 | Y |
| **Category II – Other Immediate Actions** | | | |
| **TRAN-4.** | **Review and enhance state tax credits and local incentives for citizens purchasing high efficiency vehicles.** | - | ? |
| **TRAN-5.** | **Incorporate GHG emission impacts into transportation planning decisions.** | - | Y |
| **TRAN-6.** | **Expand "Transportation Choices Programs" and "Travel Smart Pilots."** | - | Y |
| **TRAN-7.** | **Adopt state standards for high efficiency/low rolling resistance tires.** | 0.12 | Y |
| **TRAN-8.** | **Reduce GHG emissions from government fleet purchase and vehicle use.** | - | Y |
| **TRAN-9.** | **State and local governments should switch to "clean diesel" fuel and vehicle purchases, retrofits.** | 0.10 | Y |
| **TRAN-10.** | **Adopt state and local incentives for high efficiency vehicles.** | - | Y |
| **TRAN-11.** | **Set and meet goals for reduced truck idling at truck and safety stops.** | - | ? |
| **TRAN-12.** | **Set up traffic flow engineering "Best Practices."** | 0.08 | |
| **TRAN-13.** | **Set and meet goals for freight (truck/ail) transportation efficiency; achieve this through equipment, coordination, and land use.** | - | ? |
| **TRAN-14.** | **Establish consumer awareness education link to transportation choices.** | - | Y |
| | **TOTAL** | **7.84** | |

(-) Symbol denotes savings of less than .0001, or unable to be estimated.

**BACKGROUND**

The goal of this effort is to reduce greenhouse gas (GHG) emissions from transportation related activities in Oregon. Oregon can achieve this goal by optimizing freight and people movement

through the use of new technologies and diverse modes, land use planning, and using low carbon-content fuel. As a result, Oregonians will live in a healthier environment and show leadership in meeting the challenge of global warming.

Transportation and electricity use are Oregon's two largest contributors to greenhouse gas emissions - more than each of these other direct energy use sectors: industrial, commercial or residential. One-third of Oregon's carbon dioxide ($CO_2$) emissions are from transportation. Modes contributing to these emission levels include cars, light trucks, sport utility vehicles (SUVs), buses, large trucks, airplanes, trains, and marine vessels. In Oregon there are over 3.1 million motor vehicles registered for roadway use. Oregonians spend more than $3 billion for transportation fuels each year.

A balanced approach is needed to improve Oregon's climate, air quality and transportation efficiency objectives. Alternative transportation fuels and better designed vehicles can provide lower emissions and insulation from petroleum price spikes. A reduction in emissions from all transport sectors can result in a more stable climate, cleaner air, and more livable communities.

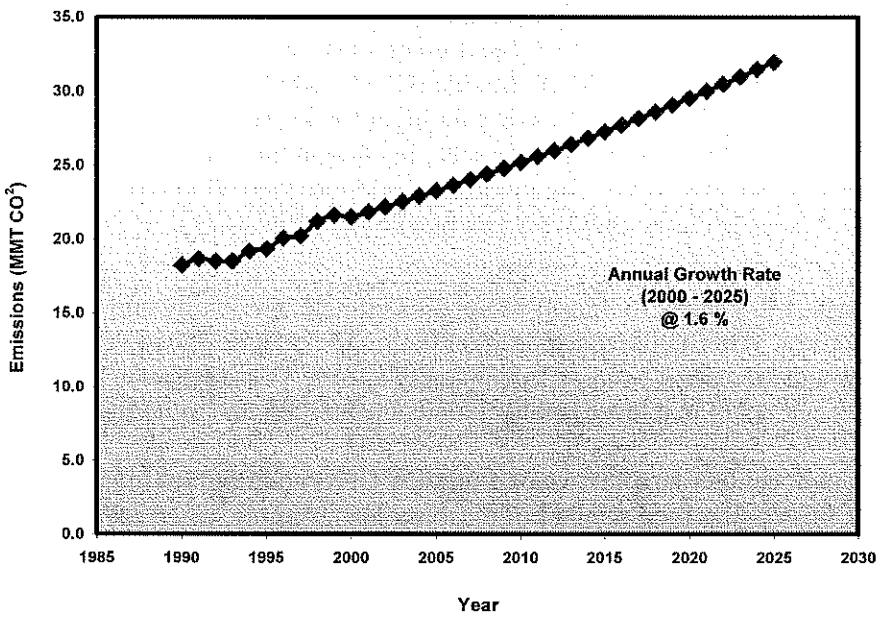
It is difficult to rank actions separately based on their GHG emission savings potential. The rankings can be misleading for a number of reasons. For example, emission standards could be set at various levels, thus affecting the level of GHG savings from actions that reduce vehicle miles traveled. In addition, most of the following actions are listed exclusive of each other. However, it will be a combination of these ideas that will produce the greatest benefit.

Estimates of effectiveness rely upon key economic and behavioral assumptions, which are somewhat uncertain. Strategy effectiveness depends on vehicle emissions and upon the response of travelers to changes in fuel prices (price elasticity), non-monetary travel costs (i.e. time) and land use patterns. Alternative assumptions about economic parameters and determinants of travel demand can also lead to different policy impacts.

## BASE CASE EMISSIONS AND TRENDS IN THE TRANSPORTATION SECTOR

According to the Federal Energy Information Administration (EIA) data, the 1990 Oregon emissions were 18.3 million metric tons (MMT) of $CO_2$. By the year 2000, emissions reached 21.5 MMT $CO_2$, for an annual growth rate of 1.6 percent. Based on the Oregon Department of Transportation's forecast for taxed fuels and U.S. Department of Energy forecasts for jet fuel and freight diesel, the Oregon Department of Energy (ODOE) forecasts an annual growth rate of 1.6 percent, leading to emissions of 32.0 MMT $CO_2$ by the year 2025. The base case transport $CO_2$ emissions grow 33 percent between 2000 and 2025.

**Historic and Projected $CO_2$ Emissions from Transportation Use in Oregon**



## TRAN-1: Convene an interim working group to recommend a proposal for the Governor, Environmental Quality Commission and the Legislature to adopt emission standards for vehicles.

### TRAN-1a: Adopt Low Emission Vehicle (LEV II) Emission Vehicle Standards. TRAN-1b: Adopt $CO_2$ Tailpipe Emission Standards (per California AB 1493 "Pavley" standards).

Currently, Oregon adheres to emission standards (Tier 2 Program) for passenger vehicles set by the federal government. However, under federal law, Oregon is allowed to adopt California's stricter tailpipe standards. This would ensure that auto-makers sell in Oregon only those passenger vehicles that produce less air pollution and fewer global warming gases than the national average. Current California emission standards fall under Low Emission Vehicle II (LEV II) program requirements.

The California Low Emission Vehicle II (LEV II) program establishes emission standards for all new cars sold in California or any state that adopts the program. These standards are designed to address criteria pollutants (non-methane organic gas [NMOG], nitrogen oxides [$NO_x$], and carbon monoxide [CO]). California first adopted its Low Emission Vehicle (LEV) standards in 1990. They were aimed at improving the efficiency of passenger and light duty vehicles. These first LEV standards ran from 1994-2003. LEV II regulations, running from 2004 – 2010, represent continuing progress in emission standards. The LEV II program requires carmakers to meet an overall fleetwide emission standard for criteria pollutants that is 52 percent stronger for passenger cars than standard vehicles and 38 percent stronger for SUVs and pick-ups.

New York, Massachusetts, Connecticut, Vermont and Maine have adopted the California motor vehicle emission control program under section 177 of the Clean Air Act. In addition, the State of Washington is pursuing the adoption of LEV II standards. Vehicles that meet the current LEV II standards result in about a $200 added sticker price compared to federal standards (the added costs should be offset by savings from lower fuel costs).

The LEV II program consists of two components: the low-emission vehicle (LEV) requirement and the advanced technology vehicle program. Under the California standards, 90 percent of a manufacturer's vehicle fleet is required to meet strict baseline emissions standards. Some studies have found that the emission standard for LEV vehicles are higher than the corresponding federal standards and can be achieved through the application of conventional pollution-control technology to the internal combustion engine. The remaining 10 percent of the vehicle fleet must be lower emitting than LEV standards, which qualify for credits under the advanced technology component of the program. The advanced technology components of the LEV II standards are summarized in the following table.

| Advanced Technology Requirements of the LEV II Emission Program, 2005-2008 | | | | |
|---|---|---|---|---|
| **Category** | **Vehicle Type** | **Examples** | **Percent of Total Fleet** | **Percent of Total Alternative Compliance** |
| Gold | Pure - Zero Emission Vehicle (PZEV) | Electric vehicles and fuel cells | 2 | 250 total fuel cell vehicles by 2008 |
| Silver | Advanced technology (AT) ZEVs | High Efficiency Vehicle (HEV), CNG vehicles | 2 | 3 |
| Bronze | SULEVs | Super Ultra Low Emissions Vehicle (SULEV) | 6 | 6 |

In 2002, recognizing that global warming would impose compelling and extraordinary impacts on California, the legislature adopted and the Governor signed AB 1493 (Pavley Bill). That bill directs the California Air Resources Board (CARB) to adopt regulations to achieve the maximum feasible and cost effective reduction of greenhouse gas emissions from motor vehicles. The Pavley standards would take effect for 2009 model year when the LEV II program expires.

***AB 1493 (Pavley) requires that the new regulations be economical to the consumer over the life cycle of the vehicle. Consistent with this direction, the technology packages that provide the basis for the standard result in operating cost savings that exceed the initial capital cost. This results in a net savings to the consumer over the lifecycle of the vehicle.***

On September 24, 2004, the California Air Resources Board (CARB) adopted regulations that achieve "the maximum feasible and cost-effective reduction of GHG emissions" from passenger vehicles and light-duty trucks. The California legislation requiring CARB to develop these GHG regulations explicitly states that CARB cannot impose taxes or restrict speed limits, vehicle size, or other consumer driving choices. It also gives auto-makers flexibility in meeting GHG emissions targets.

The regulations will go into effect in January 2006 and will apply to motor vehicles manufactured in model year 2009 and thereafter. Criteria to be used in determining "maximum feasible and cost-effective" include ability to be accomplished within the time provided, considering environmental, economic, social, and technological factors, and economy to vehicle owners and operators, considering full life-cycle costs of a vehicle. CARB is required to consider the technical feasibility of the regulations and to consider their impact on the State's economy, including jobs, new and existing businesses, competitiveness significantly affected by air contaminants, automobile workers, and related businesses in the state. CARB is also flexible, to the maximum extent feasible, in terms of complying with the regulations. CARB must ensure that any alternative methods for compliance achieve equivalent or greater reduction in GHGs.

Under the new standards (Pavley), the average first cost increase will be about $325 per vehicle in 2012 and about $1,050 per vehicle in 2016. This range results from the phasing in of higher standards starting in year 2009 and continuing through 2016. By 2016, the estimated savings from maximum feasible technology will result in about 30 percent reduction in emissions from passenger cars and light duty trucks. Despite higher initial costs, vehicles that meet these standards are less expensive over the life of the vehicle.

The Oregon Environmental Quality Commission has the authority to adopt emission standards for passenger and light duty vehicles, however legislative support would likely be prudent. Therefore, the Governor might choose to ask the Legislature to adopt the standards, given the significance of the action. By adopting California's vehicle emission standards, Oregon will have in place a progressive standard to curb emissions from vehicles, which will have a significant impact on meeting the Oregon Progress Board Benchmark on climate change.

## TRAN-2: Integrate land use and transportation decisions with GHG consequences.

***Specific Actions:***

- Through local planning and state policy, target infrastructure investments in greenhouse gas efficient locations (locations where people's homes are located near the places they regularly go).
- Foster a Location Efficient Mortgage pilot program, such as Fannie Mae's Smart Commute™ Initiative to encourage homeownership near public transportation.
- Ensure that the Metropolitan Planning Organization's (MPO) regional planning efforts assess and minimize GHG emissions.

The primary purpose of integrating land use and transportation decisions is to reduce the need to travel (or reduce trip length) through providing nearby access to goods and services. The State should consider policies to further limit sprawl and encourage efficient development of residential, commercial, and industrial lands.

This action supports continued integration of land use and transportation planning by incorporating "Smart Growth" principles in decision-making processes, particularly in application of Goal 12 and 13[3] for Transportation and Energy, respectively. Smart growth concepts related to transportation include:

- promoting transit oriented development
- mixed-use development
- minimum street connectivity standards
- minimum densities and/or minimum floor-area-ratios and parking standards (e.g., reducing the minimum number of parking spaces required, employee cash payout programs, and pricing parking)

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[3] Oregon Department of Land Conservation and Development's 19 Statewide Planning Goals and Guidelines

Specific standards for the strategies listed above will vary by community.

The State could accelerate "smart growth" objectives by supporting the on-going implementation of the Transportation Planning Rule (TPR) and Transportation Growth Management (TGM) program that provides funds to local governments to help carry out the planning for the TPR.

Studies of the Vehicle Miles Traded (VMT) impacts of integrated packages of land use and transportation measures have found regional and statewide VMT reductions ranging from 2-10 percent below business-as-usual projections, resulting in roughly equivalent $CO_2$ reductions (1 VMT ~ 1 lb. of $CO_2$). Other studies have found that households located in the most interconnected areas of Seattle generated less than half the VMT of households located in the least connected areas of the region and that findings hold true after controlling for household size, income and vehicle ownership.

## TRAN-3: Promote biofuel use and production.

***Specific Actions:***

- Establish fuel standards that meet engine makers' requirements.
- Require nearly all diesel fuel sold in the state to contain at least 2 percent biodiesel (B-2) by the time Ultra Low Sulfur Diesel (ULSD) fuel is mandated by the federal government (mid 2006). ULSD requires the use of a lubricity additive; biodiesel is a non-toxic lubricity agent.
- All diesel fuel sold in Oregon will contain 5 percent biodiesel (B-5) by 2010, growing to 20 percent (B-20) by 2025. All biodiesel will meet applicable ASTM standards.
- Adopt a statewide ethanol fuel requirement for all gasoline sold in Oregon, such as all standard gasoline sold in Oregon will contain 10 percent ethanol by 2010.
- Mandate a minimum biofuel content for all state-owned fueling stations; for example, 10 percent of the gasoline used by state government vehicles will be E-85 by 2010 and 20 percent of the diesel used by state fleet vehicles will be B-20 by 2010. This percentage will grow to 25 percent by 2025.
- Review the effectiveness of federal and state incentives for producers, blenders or retailers.

Recommended biofuels include biodiesel and ethanol that reduce GHG emissions. Biodiesel can displace conventional diesel with blends ranging from 2 -100 percent. Blends up to 20 percent require no engine modifications. Ethanol can be blended with conventional gasoline up to 10 percent without any engine modifications. Blends using 85 percent ethanol (E-85) require slight engine modifications.

Biodiesel is a clean burning alternative fuel, produced from domestic, renewable resources. It contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. It can be used in compression-ignition (diesel) engines with little or no modifications.

According to a USDOE/USDA life cycle analysis, biodiesel has the highest energy balance of any fuel. For every one unit of fossil fuel it takes to produce biodiesel, 3.2 units of energy are gained (using renewable fuel crops). That same study concluded that biodiesel also results in a 78 percent lifecycle reduction in carbon dioxide.

Ethanol alcohol fuel is usually mixed with gasoline at 85 percent ethanol and 15 percent unleaded gasoline to form what is called E-85. Currently, gasoline in Oregon has zero to 10 percent ethanol, with an overall average of 2 to 3 percent. Typically derived from distilling corn, ethanol is also a byproduct of starch manufacturing. Ethanol made from cellulose (e.g., woody crops, wood waste, switchgrass, agricultural residues, municipal solid wastes) generates substantially fewer GHGs than fossil fuels or ethanol made from corn, but the technology to produce cellulosic ethanol is not developed. Currently, no E-85 fuel is commercially available in Oregon.

## TRAN-4: Review and enhance state tax credits and local incentives for citizens purchasing high efficiency vehicles.

This action reviews and considers modifying the Business Energy Tax Credit and the Residential Energy Tax Credit programs to ensure that they are effectively promoting the purchase of more fuel-efficient vehicles. An incentive could be based on the fuel efficiency (miles per gallon) of the vehicle rather than a specific technology.

The Oregon Department of Energy (ODOE) offers tax credits to assist the added costs of alternative fuel vehicles. These vehicles include those powered by ethanol, methanol, electricity, compressed natural gas, liquefied natural gas, liquefied petroleum gas, bio-diesel, hydrogen, and hybrid vehicles.

Purchasing more efficient lower-emission gasoline-powered vehicles provides benefits similar to alternative fuels, most often at a lower first cost. The tax credit program could be reviewed to include fuel-efficiency and polluting qualities of the vehicle, rather than the vehicle technology. The tax credit available to private citizens, now at $1500 per vehicle, could be raised to parity with the credit available to businesses under the Business Energy Tax Credit (BETC) program at about $2000 per vehicle.

## TRAN-5: Incorporate GHG emission impacts into transportation planning decisions.

***Specific Actions:***

- Develop method to account for GHG emissions and use as a ranking criterion in transportation planning decisions.
- Communicate to the Oregon Road User Fee Task Force the need to keep incentives in place for the purchase of fuel-efficient vehicles.
- Through transportation system plans (TSPs), identify and fund strategic transportation investments that reduce GHG emissions, such as pedestrian improvements in high-use corridors where transit providers are looking to implement frequent service lines.

Incorporate climate change as a key criterion in Oregon Department of Transportation (ODOT) funding decisions, giving priority to those service improvements and expansions that offer the greatest GHG reductions. ODOE could work with ODOT to develop a methodology for analyzing

GHG as part of the Oregon Transportation Plan – using 'System Element' as a criterion in analyzing transportation investment priorities on a statewide basis.

The Oregon Road User Fee Task Force is charged with developing a road user fee that will eventually replace the gas tax. While a Vehicle Miles Traveled fee might make sense from a road-user equity perspective, a switch to such a fee might influence consumers to purchase less fuel-efficient vehicles, as the cost impact of different fuel efficiencies (miles per gallon) will be less.

## TRAN-6: Expand "Transportation Choices Programs" and "Travel Smart Pilots."

***Specific Actions:***

- Expand City of Portland TravelSmart programs. City of Portland programs include environmental and air quality, education, and transportation options.
- Expand CarpoolMatchNW.org statewide and enhance marketing. Encourage the use of ODOT's TripCheck program.
- Provide incentives for investment in station car services (car-sharing link to mass transit). Station service cars would allow access to 'car-share' vehicles at transit stations.
- Using existing transit and social service programs, promote the state's use of additional flexible federal funds to support the efforts of transit providers to coordinate elderly and disabled transportation options.

The Department of Environmental Quality (DEQ) manages the Employee Commute Options program and ODOE provides tax credits and technical assistance to businesses that encourage alternatives to driving alone, such as telecommuting. Transportation Management Associations (TMAs) work with major employers to reduce single occupancy vehicle commuting. TMAs assist in coordinating vanpools, carpooling, formation of transit pass programs, and offer information about transportation demand management options.

TravelSmart is a social marketing program that identifies individuals who *want* to change the way they travel, motivates them to think about their travel options and provides them with information about how to use transit, bike, walk or carpool for some of their trips.

## TRAN-7: Adopt state standards for high efficiency/low rolling resistance tires.

Fuel efficiency is directly related to rolling resistance (RR). The greater the RR, the more fuel is burned. The average RR of replacement tires is about 20 percent higher than that of tires that automakers put on new cars. Ecos Consulting estimates the fuel efficiency savings of using "low rolling resistance" (LRR) tires at 3 percent annually and that a typical driver would save $87 to $260 on fuel at an incremental cost of $9 to $22 for two sets of LRR tires.

The California Legislature passed legislation in 2003 requiring the state to implement by 2008 a replacement tire efficiency program that is designed to ensure that replacement tires sold in the state are at least as energy efficient, on average, as the original equipment.

Reduce GHG emissions from government fleet purchase and vehicle use.

*Specific Actions:*

- Use the states' combined purchasing power to reduce petroleum dependence by obtaining low-rolling resistance tires for motor pool fleets.
- Ensure state procurement by requiring state fleets to purchase LRR tires; encourage local governments to act consistently with and support state procurement on their behalf.
- Develop a marketing program with tire dealers and consumers to encourage the purchase of LRR tires. This effort might include a voluntary labeling program for tire fuel efficiency.
- Alternate 1: Establish West Coast mandatory labeling requirement by 2010.
- Alternate 2: Establish legislation to set LRR standards for tires. By 2010.

## TRAN-8: Reduce GHG emissions from government fleet purchase and vehicle use.

*Specific Actions:*

- Use the states' combined purchasing power to obtain fuel-efficient vehicles for motor pool fleets; encourage local governments to act consistently with and support state procurement on their behalf.
- Seek a change in the implementation of the federal Energy Policy Act of 1992, which currently excludes hybrid vehicles as an allowable mechanism for compliance with the alternative fuels in state fleets requirement.
- As the fleet turns over, require all state vehicles to be low-GHG and the most efficient in their class.
- Coordinate emission standards for fleet vehicle specifications.
- Develop a model "Green Fleet" Policy Statement that describes policies and/or standards that consider best practices for fleets in a comprehensive way.
- Provide training for fleet managers on how to educate employees about fuel-efficient driving techniques, optimize vehicle operation and maintenance, and reduce the need to travel.

Public fleets can lead by example in implementing effective purchasing policies and best maintenance practices. The following actions are intended not only to improve pricing and other factors for the states' purchases, but also to have a positive impact on the market for efficient vehicles and replacement parts.

## TRAN-9: State and local governments should switch to "clean diesel" fuel, vehicle purchases and retrofits.

*Specific Actions:*

- Support DEQ's efforts to create a buying club for ultra low sulfur diesel fuel, as well as its work to promote diesel engine retrofits to reduce carbon black emissions.
- Establish a state contract requirement for low-emission fleets and construction equipment.
- Clean up Oregon's school bus fleet by providing funding for replacement of older school buses, retrofit of newer school buses, and purchase of biodiesel fuel. This would have immediate positive impacts on children's health and safety and would result in $CO_2$ reductions, as well as black carbon (soot) emissions. The Environmental Protection Agency (EPA) has allocated funds

to retrofit school bus fleets under the Clean School Bus USA demonstration program (www.epa.gov/otaq/schoolbus/funding.htm).

The Department of Environmental Quality (DEQ) is working to promote voluntary retrofit of diesel engines in both on- and off-highway situations. Users of heavy-duty diesel engines, who retrofit with emission controls, can qualify for a credit against Oregon income taxes of up to 35 percent of the retrofit costs. Retrofits would reduce emissions of black carbon (soot), which contribute to the greenhouse effect.

## TRAN-10: Adopt state and local incentives for high efficiency vehicles.

***Specific Actions:***

- Pursue legislative approval of a climate-friendly vehicle registration fee (2007).
- Encourage local governments to devise incentive and recognition programs for hybrid owners.

The state could shift the amount drivers pay to title and register their cars in a revenue neutral manner, raising the $55 title transfer fee and $27 per year registration fee for cars with below average MPG (EPA miles per gallon rating) and lowering the fees for more efficient vehicles. This would have mostly a symbolic effect as the increased cost would be about the cost of a fill-up. Raising the fee for less efficient vehicles, but maintaining the fee for more efficient vehicles could have more impact. In the latter scenario, the additional funds could be used to fix Oregon's bridges and roads.

Local governments could offer incentives such as preferred or free meter parking, recognition decals and other incentives.

## TRAN-11: Set and meet goals for reduced truck idling at truck and safety stops.

***Specific Actions:***

- Establish a core network of facilities along the West Coast Interstate 5 (I-5) corridor that will enable truck drivers to rest or "overnight" in their sleeper cabs without idling their truck engines.
- Support the Oregon Solution's Team on truck idle reduction.
- Support the West Coast Diesel Emissions Reduction Collaborative.
- Institute similar and compatible programs to encourage truck operators to use these facilities as they are established.
- DEQ and ODOE secure federal funding and carbon offset funding for alternatives to engine idling.
- Market existing incentives to support deployment of this technology.
- Increase the number of trucks participating in Oregon's "Green Light" program. Green Light allows trucks to pass over weigh-in-motion scales and under transponder readers to pre-clear the weigh station, thus cutting down on idling.
- Review transponder and WIM requirements of Washington and California. Implement consistent equipment requirements along the West Coast.

Support the development of infrastructure to reduce diesel truck idling at truck stops and safety stops. Currently, technology exists to outfit truck stops with a custom heating, ventilation and air conditioning (HVAC) system that can be ducted directly to the truck, eliminating the need for idle power.

Truck drivers idle their engines during their rest periods to provide heat or air conditioning for the sleeper compartment, keep the engine warm during cold weather, and provide electrical power for their appliances. About 500,000 trucks travel 500 or more miles as their primary range of operation. Based on this travel distance, truck drivers will likely require an extended rest period and may idle their engines during this time. Some studies indicate that the typical duration rest period lasts from six to eight hours per day, over 300 days per year.

The West Coast Governor's Global Warming Initiative sets a goal of having the West Coast Interstate 5 (I-5 corridor) outfitted with electrified truck stops to reduce truck idling. The governors of Oregon, Washington and California have made this a priority goal for each of their administrations. The goal of this project is to establish a network of truck stop operators and truck fleet managers willing to develop the necessary infrastructure to reduce truck idling in Oregon along the I-5 corridor. This project will lay the groundwork for a core network of facilities along the I-5 corridor to enable truck drivers to use their sleeper cabs and auxiliary appliances without idling their truck engines.

An Oregon Solutions Team has been convened to investigate idle reduction options for Oregon. The goal of the Oregon Solutions Team is to equip 600 parking spaces at truck stops along I-5 in Oregon with idle reduction technology. There are 1,977 commercial truck parking spaces on the Oregon segment of I-5 alone and about 5,000 commercial spaces across the entire state. As the advantages of idle reduction technologies become better known and tested, and as demand grows, the broader goal of the Collaborative is to install this technology in the majority of truck stops in the state as well as throughout the West Coast. The Team partners include the Oregon DEQ, the Oregon Department of Energy, truck stop owners, the Oregon Trucking Association, PacifiCorp, Oregon State University, the Oregon Environmental Council and The Climate Trust.

The funding for this project is coming from several key partners: The Environmental Protection Agency is contributing $200,000; The Climate Trust will purchased $CO_2$ offsets for more than $2 million; the Oregon Business Energy Tax Credit Program, administered through the Oregon Department of Energy, would provide $2.3 million in credits; and the State Low Interest Energy Loan Program, also administered by the Oregon Department of Energy would provide loans for $1.4 Million. Technology providers, IdleAire and Shurepower, have agreed to contribute to a portion of the overall project costs as a matching contribution, valued at $1.6 million.

## TRAN-12: Set up traffic flow engineering "Best Practices."

***Specific Actions:***

- Improve signal timing (Leverage Climate Trust, Federal Highway Administration, City of Portland initiatives).

- Enforce speed limits.
- Apply Intelligent Transportation System solutions.
- Identify, prioritize and reduce recurring traffic congestion and optimize highway speeds to the preferred range.
- Analyze potential projects using value pricing (i.e., congestion pricing).

Truck and auto travel is most energy efficient when the vehicles travel in the 40 to 50 mph range, without frequent stops and starts. Traffic flow can be optimized through targeted infrastructure investments, traffic signal re-timing, value pricing, and investments in alternatives to the automobile. Projects that improve traffic flow through road widening or traffic management strategies will reduce fuel use in the short-term if vehicles operate at more efficient speeds with less braking and accelerating. However, increasing or improving road capacity may attract more drivers, thereby increasing VMT and eroding GHG benefits.

## TRAN-13: Set and meet goals for freight (truck/rail) transportation efficiency; achieve this through equipment, coordination, and land use.

***Specific Actions:***

- Site industrial land/facilities along key freight corridors. Encourage warehouse and distribution center development in existing urban areas.
- Work with ports statewide to adopt "green port" goals, e.g., promoting a rail/truck/barge mode split that reduces port-related VMT and promotes mass transit use by port employees.
- Enable Hillsboro airport to accommodate larger aircraft to allow for greater access to PDX airport. Moving freight via air would reduce overall emissions and congestion as compared to truck movement.

Make strategic investments in multi-modal freight transportation options (e.g., rail, shipping, waterways, and any of these in combination with road transport). Use Intelligent Transportation Systems (ITS) to maximize freight efficiency. Freight railroads move a significant percent of the nation's freight and connect businesses with each other across the country.

## TRAN-14: Establish consumer awareness education link to transportation choices.

***Specific Actions:***

- Use and make available public awareness materials from USEPA/USDOT's *It All Adds Up to Cleaner Air* program through state and local governments, transportation providers and air quality agencies.
- Participate in the development of the second generation of *It All Adds Up to Cleaner Air* materials.
- Develop an educational campaign to promote fuel-efficient driving behavior and best practices auto maintenance to be used as part of driver education classes in public schools, Department of Motor Vehicles programs,and Vehicle Inspection Program outreach.

- Offer drivers an opportunity to donate to the Climate Trust to offset their $CO_2$ emissions.
  Require that car registration materials (or car titling materials) include an educational brochure about fuel-efficient driving.
- Work with car dealers to promote the sale of GHG-efficient vehicles.
- Team up with gas stations to develop an anti-idling campaign, e.g., "Turn your key and be idle free."
- Team up with the automotive service industry to offer "green" auto maintenance options to drivers either in conjunction with maintenance work or oil changes.

Develop an education program to raise public awareness about the connection between global warming and driving. Focus on the benefits of low–GHG vehicles and available incentives for their purchase, as well as ways to boost fuel efficiency through driving techniques and vehicle maintenance.

# BIOLOGICAL SEQUESTRATION MEASURES TO MITIGATE GREENHOUSE GASES

**Issue:** Carbon dioxide is sequestered (captured and stored) in trees, soils and other biomass. Human activities can release this carbon or increase sequestration.

**Solution:** To increase sequestration or reduce emissions for forest and other lands Oregonians need to maintain and increase good land use practices.

***Because actions interact, $CO_2$ savings cannot be added. Refer to the (draft) Oregon Global Warming Strategy, Figure 4 in Section 5 for the cumulative impact of actions.***

| | **Category I – Significant Actions for Immediate State Action** | *MMT CO2e 2025* | *C/E?** |
|---|---|---|---|
| **BIOSEQ- 1** | **Reduce wildfire risk by creating a market for woody biomass from forests.** | 3.2 | Y |
| **BIOSEQ-2** | **Consider GHG effects in farm and forest land use decisions.** | 0.6 | Y |
| **BIOSEQ-3** | **Increase forestation of underproducing lands.** | 0.5 | Y? |
| | **Category II: Other Immediate Actions** | | |
| **BIOSEQ-4** | **Expand the application of water-erosion reducing practices for cereal production.** | 0.2 | Y? |
| **BIOSEQ-5** | **Leverage the Conservation Reserve Program (CRP) to expand reserved acreage.** | 0.2 | N? |
| **BIOSEQ-6** | **Establish a municipal street tree restoration program.** | less than 0.1 | N |

**** Cost-effective to consumer over measure lifetime? (This does not include whether it is cost-effective considering the projected effects of global warming)***

**BIOMASS – SUPPRESSION OF WILDFIRES**

**Background:** All plants use energy from the sun's light to make their own food in a process called photosynthesis. During photosynthesis, carbon dioxide ($CO_2$) absorbed through leaves is broken down by the sun's energy and combined with hydrogen from water to make sugars that plants live on. This process releases oxygen into the air. The carbon in the sugars is stored as biomass in the plant's leaves, branches, trunk, and roots. Plants break down the sugars into energy. This process, called respiration, releases $CO_2$ back into the air. Plants use much more $CO_2$ in making their food and storing it as biomass than they release during respiration. The remainder of the carbon is stored in their tissues

Carbon sequestration performed by plant and soil systems is called biological (or terrestrial) sequestration. Plants and soils fix the $CO_2$ and store the carbon in living and dead plant tissues and as organic material. Stored carbon can return to the atmosphere as $CO_2$ when plant biomass or soil organic carbon is oxidized or decomposes through processes such as burning or turning the soil over. When trees are harvested and manufactured into wood products, some carbon remains stored in lumber and other wood products until the wood is discarded and disposed. If it is burned, the stored carbon is released back as $CO_2$. Wood discarded into landfills continues to store carbon, but may contribute to other greenhouse gases from landfills such as methane.

Much work remains to reduce the risk of high carbon release during catastrophic wildfires. Expanding the amount of forest area that is treated and restored to healthier forest conditions will reduce the risk of extreme fires. It could also provide economic benefits by utilizing hazardous wildfire material as biomass fuel through viable markets for chips and small diameter trees.

In addition, current treatments do not take advantage of small woody biomass that can be used for fuel in energy production, thus displacing fossil fuel $CO_2$ emissions. The $CO_2$ savings from increased renewable biomass projects are counted in the GEN-1 action in the Electric Generation and Supply section.

## BIOSEQ-1: Reduce wildfire risk by creating a market for woody biomass from forests.

Dense growth has limited the size and resiliency of trees in some forested areas of the state. In the Blue Mountains of eastern Oregon, for example, the health of large areas of forestland has deteriorated.

The condition of the forest in these overgrown areas is not natural. It is largely the result of fire suppression and past logging practices combined with vegetative expansion due to climate change. Thinning removes dead, suppressed and other competing trees. It improves the health of the remaining trees and changes the behavior of fires. Rather than stand-replacing crown fires that kill larger trees, fires would tend to be less intense, confined to the ground and would remove under-story brush and small trees.

Carefully planned forest thinning activities can preserve wildlife habitat and minimize soil erosion. With less competition for nutrients and water, the remaining trees can grow and increase the amount of carbon stored in standing trees.

However, without a market for forest fuels and small diameter timber, biomass forest thinning is limited by federal and state funds. The alternative of also removing larger, healthy and more valuable trees could offset the cost of the thinning, but would not sequester $CO_2$. There are not enough funds to thin most of the overgrown areas. Development of an economic biomass generation technology could increase the number of acres treated.

An additional 100 MW of woody biomass plants would result in the thinning of 2.4 million acres over 30 years. The average annual sequestration from reduced crown fires and improved forest health would be 3.2 MMT of $CO_2$. This $CO_2$ reduction is in addition to, and does not include displacing fossil fuels with biomass fuels. The GHG benefit of displaced fossil fuels is included in GEN-1. Additional benefits from this action include rural economic development (1,600 to 2,000 direct jobs), reduced costs of fighting wildfires and avoided smoke pollution.

Viable markets for forest biomass could cover the cost of removing woody biomass from unhealthy forests. The key is to locate smaller biomass plants near forests to reduce hauling costs and to reduce harvest pressure on local forests. Otherwise, the cost of trucking the fuel would outweigh the value of the power generated. Also, diesel trucks emit $CO_2$, reducing the net reduction of $CO_2$ from sequestration.

Viable markets will require new smaller generation technologies (2 to 5 MW) and increased state or federal incentives for constructing these small facilities. There are technical and institutional issues with getting power onto the grid from these smaller sized plants. However, smaller plants could improve reliability of the power grid in rural areas.

Most importantly, electric generation using biomass from thinning overstocked stands is now eligible for the federal production tax credit. This tax credit was reserved for wind and closed-loop, energy-dedicated, plantation biomass projects.

Several possible incentives could supplement the federal production tax credit. Biomass generation is eligible for state energy tax incentives and loans. The Public Utility Commission's Portfolio Advisory Committee could promote environmentally sound woody biomass projects in its mix of green-tag sales to PacifiCorp and Portland General Electric. In addition, the Energy Trust of Oregon might be able to accelerate efforts to use public purpose charge funds for small (under 5 MW) woody biomass projects.

**LAND USE**

**Background:** Since 1973, Oregon has maintained a statewide program for land-use planning (Oregon Revised Statutes (ORS) 197.010 – ORS 197.245). The foundation of the program is a set of 19 statewide planning goals (Oregon Administrative Rules (OAR) Chapter 660, Division 015 – Statewide Planning Goals and Guidelines, Oregon Department of Land Conservation and Development; http://www.lcd.state.or.us/goalhtml/goals.html). Goals 4 and 5, respectively, address maintaining and conserving the forest and agricultural land base. Oregon's statewide goals are achieved through local comprehensive planning for city and county governments. This has led to a system for state-approved local comprehensive plans that cover the entire state.

**Trend (western Oregon):** During the period 1974 to present, urban growth boundary and land use zoning in local comprehensive plans have prevented the loss of 1.2 million acres of forest and agricultural land to low density residential or high density urban development (Figure Bio 1)

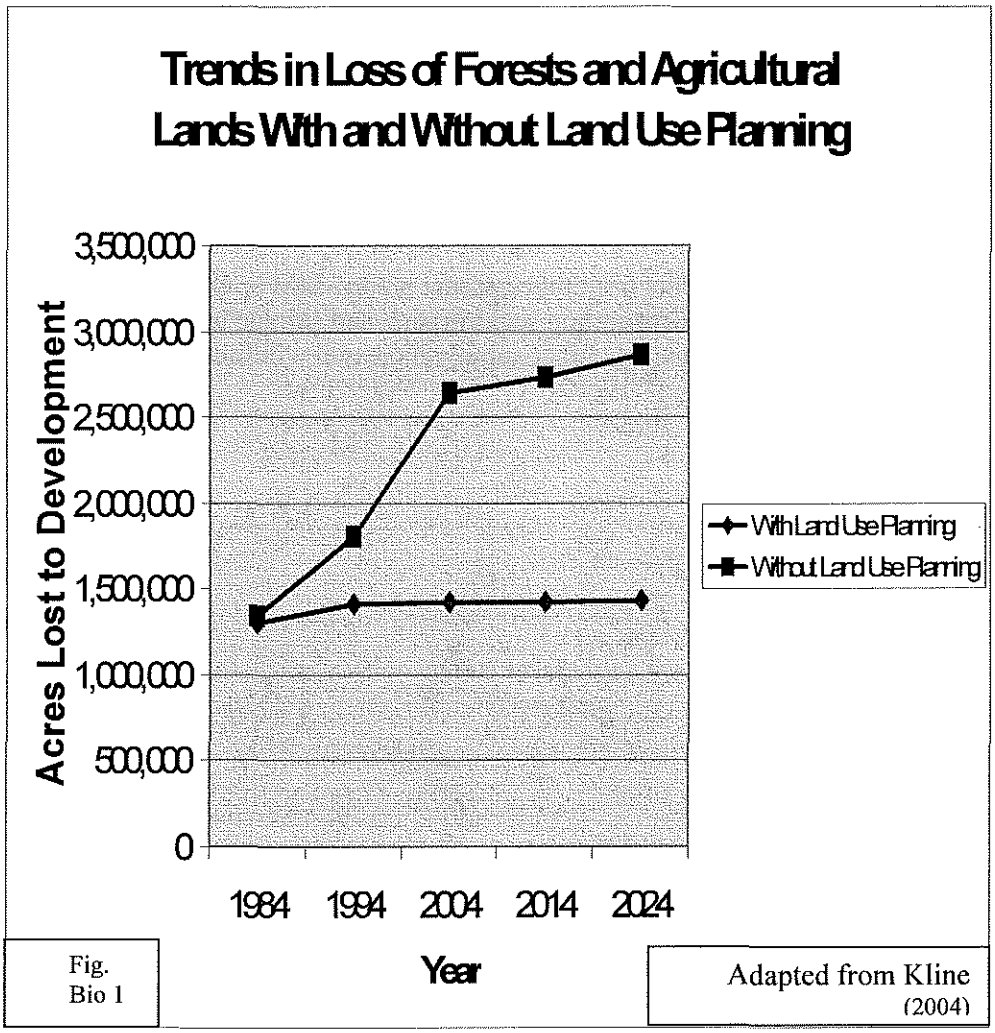



Fig. Bio 1

Adapted from Kline (2004)

Projections through 2024 indicate that local comprehensive plans, if maintained consistent with current statewide planning goals and guidelines, will prevent additional forest and agricultural land

conversions to development, though at a slower rate (Figure Bio 1). Using average carbon stocks of 35 metric tons/acre for forest and agricultural lands and 4.2 metric tons/acre for low-density residential and developed lands (adapted from Delaney 2004), Oregon's land use planning program has prevented 51 $MMTCO_2$ emissions over the 1974-2004 time period, or 1.7 $MMTCO_2$ per year.

## BIOSEQ-2: Consider GHG effects in farm and forest land use decisions.

The recommendation is to maintain Oregon's statewide program for land-use planning (ORS 197.010 – ORS 197.245; (OAR) Chapter 660, Division 015).
Carbon dioxide emission reduction benefits from this measure are about 0.6 $MMTCO_2$ per year from avoided emissions by maintaining the forest and agricultural land base.

## BIOSEQ-3: Increase forestation of underproducing lands.

Convert marginal agriculture, pasture and unproductive brush lands (capable of growing forests) back into healthy, productive forests (both riparian and upland). Develop market mechanisms and accompanying carbon accounting mechanisms for the transfer of $CO_2$ emission offsets from non-federal forest landowners to emitting entities. Continue use of existing state and federal programs (e.g., Oregon's Reforestation of Underproducing Lands 50 percent Tax Credit and Conservation Reserve Enhancement Program) as a means to provide landowners technical and financial assistance. Increase the current rate of accomplishment by 40 percent.

Carbon dioxide emission reduction benefits from this measure are 0.5 $MMTCO_2$ per year from delayed (beginning in year 2030) permanent carbon sequestration and storage in healthy, productive forests. Additional benefits include expanded timber supply, increased wildlife habitat, improved fish habitat and water quality.

## AGRICULTURE AND RANGE

**Background:** A large proportion of stored carbon in agricultural and rangeland systems is found in the upper soil profile. Factors affecting the amount of stored carbon include the amount of $CO_2$ sequestered by the agricultural crops or range grasses, the amount of biological oxidation of soil organic carbon to $CO_2$, and the physical loss of soil through erosion. Agricultural and range management practices can affect all three factors. The combined effects can result in a net sink (more $CO_2$ is sequestered and stored than carbon lost), a net source (more carbon is lost as $CO_2$ than is stored) or break-even (neither source or sink).

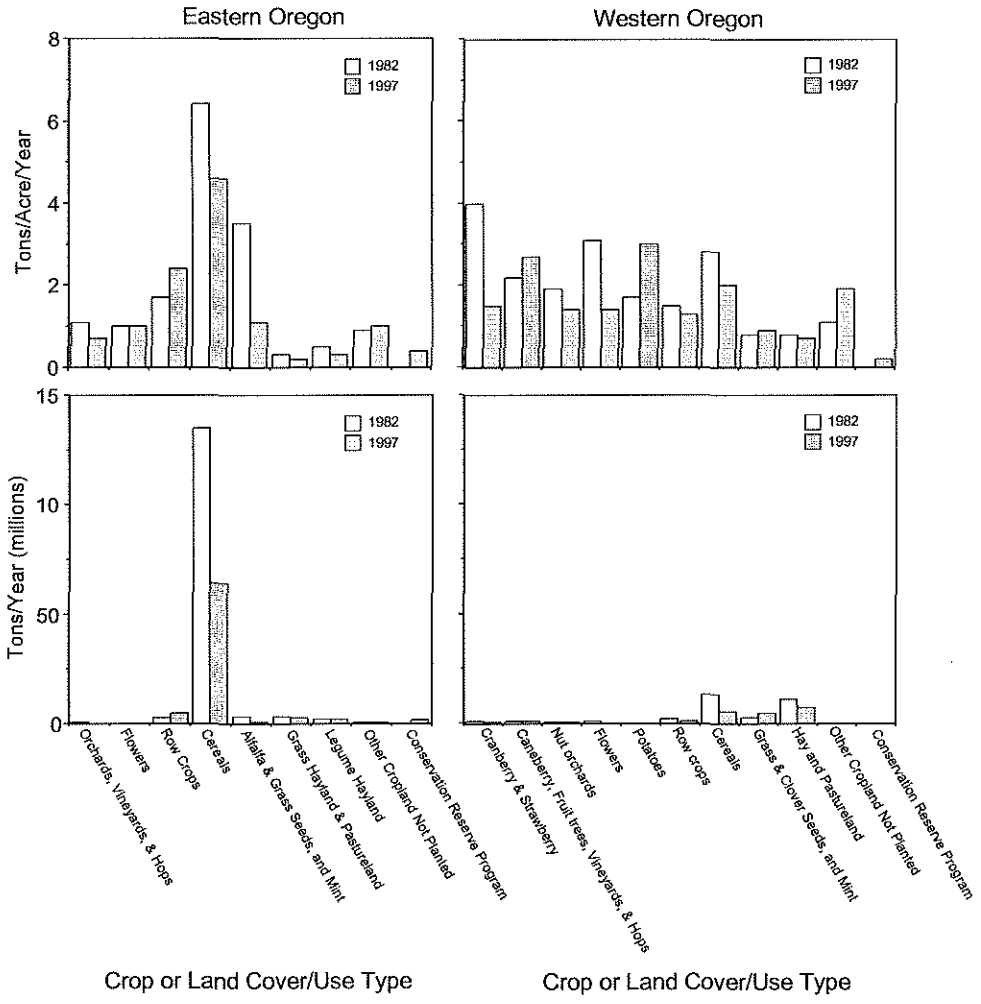



Figure Bio 2: Trends in water-erosion soil losses between 1982 and 1987 by crop or land use cover (data from U.S. Department of Agriculture, Natural Resource Conservation Service, National Resources Inventory).

Water-erosion soil loss is used as a surrogate indicator for trends in stored carbon in agricultural systems. Based on site specific capability, agricultural practices such as no tillage, reduced tillage, chemical fallow, and conservation retirement are likely to increase carbon storage over time. These practices reduce erosion and return enough carbon in organic matter to offset the carbon lost to soil oxidation. The amount of precipitation and soil water holding capacity influence the carbon storage ability of rangeland systems. Areas of deep soils and good water holding capacity have more carbon storage potential.

**Trend** –Between 1982 and 1997, changes in agricultural management practices have generally lead to a reduction in water-erosion soil losses for most crop types found in Oregon agriculture (Figure Bio 2). Most notably, water-erosion soil losses from cereal production systems – by far the single largest source of water-erosion soil loss - have been cut by over 50 percent. Opportunities for enhancing this trend through an expanded application of water-erosion reducing practices are greatest for cereal production systems of the Columbia Plateau. In general, rangeland systems act as carbon storage sinks for most of the year. Through 1997, 486,600 acres of environmentally sensitive cropland have been enrolled in the Conservation Reserve Enhancement program.

## BIOSEQ-4: Expand the application of water erosion-reducing practices for cereal production.

Develop new, and expand use of existing, incentives for shifting from traditional winter wheat-summer fallow production systems to continuous winter wheat systems for lands capable of this type of system. Where appropriate, incorporate other practices such as reduced tilling. Concentrate efforts in the Columbia-Plateau Major Land Resource Area in northeast Oregon.

$CO_2$ emission reduction benefits about 0.2 MMT per year through avoided emissions and increased sequestration over an 80-year period. Additional benefits are reduced soil erosion and improved water quality.

## BIOSEQ-5: Leverage the Conservation Reserve Program (CRP) to expand reserved acreage.

Continue to encourage landowners to convert environmentally sensitive cropland to permanent vegetative cover through the U.S. Department of Agriculture's (USDA) Conservation Reserve Program as administered by the Farm Service Agency. USDA Natural Resource Conservation Service provides technical land eligibility determinations, Environmental Benefit Index Scoring, and conservation planning. Participating farmers receive an annual rental payment over a multi-year contract period. Financing for Conservation Reserve Program should occur through the federal Commodity Credit Corporation. Developing incentives to maintain existing Conservation Reserve Program acres after existing contracts expire would extend GHG-reducing benefits.

$CO_2$ emission reduction benefits would be about 0.2 MMT per year through avoided emissions and increased sequestration over a 45-year period. Landowners would be compensated for opportunity costs through annual rental payments. Additional benefits would include reduced soil erosion, improved water quality, improved air quality, and increased wildlife habitat. There is potential to put emphasis on restoration of native bunchgrass-sage habitats.

## URBAN BIOMASS SEQUESTRATION

**Background:** Urban trees are relatively expensive, but have the side benefits of shading buildings, which reduces the energy needed to air-condition the buildings. They also provide aesthetic benefits and carbon sequestration.

## BIOSEQ-6: Establish a Municipal Street Tree Restoration program.

**Establish a Municipal Street Tree Restoration Program in the Oregon Department of Forestry and administer the program in cooperation with the Oregon Department of Transportation.**

Funding for the municipal street tree restoration account would come by transferring 25 cents from vehicle registration fees collected under ORS 803.420. Funds from the Municipal Street Tree Restoration Account would provide grants to local governments for the purpose of planting street trees within treeless sites along urban street rights-of-ways.

Carbon dioxide emission reduction benefits from this measure are less than 0.1 $MMTCO_2$ per year from delayed (beginning in year 2020) permanent carbon sequestration and storage through increased tree biomass along urban street public rights-of-ways. All registered vehicles in Oregon would pay a fixed share of the cost ($0.25 per registration). This measure has high public education and awareness value due to the explicit connection and direct action on climate change. Additional benefits include reduced storm water runoff, improved neighborhood livability, and increased urban forest canopy for wildlife.

# MATERIALS USE, RECOVERY AND WASTE DISPOSAL ACTIONS FOR REDUCING GREENHOUSE GASES

This discussion evaluates actions relative to a common baseline and independent of other measures. Table MW-1 lists the measures that are recommended by the Advisory Group. A few of the measures in Figure 3 have been restated by the Governor's Advisory Group. Measures in Table MW-1 are described in greater detail in the remainder of this report. Measures are grouped in Table MW-1 according to their place on the state's "solid waste management hierarchy" (ORS 459.015), which ranks the preferred order of waste management options in order as follows:

1. Prevention/reuse
2. Recycling
3. Composting
4. Energy recovery
5. Landfilling

Information sources used to evaluate specific measures include waste composition studies, existing policy documents and feasibility studies, reports from evaluation of existing programs in Oregon and elsewhere, and in some cases, estimates informed by professional judgment.

**Table MW-1.**

**Because measures interact, $CO_2$ savings cannot be added. Refer to the *(draft) Oregon Strategy for Greenhouse Gas Reductions*, Figure 4 in Section 5 for the cumulative impact of measures.**

| | | Reductions in GHG Emissions in $MMTCO_2E$ | C/E?* |
|---|---|---|---|
| | | 2025 | |
| **Category I – Significant Actions for Immediate State Action** | | | |
| MW-1 | Achieve the waste generation and recycling goals in statute. | 5.2 | Y |
| MW-2 | DEQ should develop guidance to clarify alternative final cover performance at larger landfills: Demonstrate control of gas emissions comparable to geomembrane cover. | 0.53 | N |
| MW-3 | Provide incentives for larger landfills to collect and burn minimum percentage (65 percent to 80 percent) of methane generated. | @65 percent: 0.47<br>@80 percent: 0.88 | N |
| **Category II – Other Immediate Actions** | | | |
| MW-4 | Provide incentives to increase salvage of reusable building materials. | 0.02 | Y |
| MW-5 | Increase the "Bottle Bill" redemption value from 5-cents to 10-cents and expand the "Bottle Bill" to all beverages except milk, including juice, water, liquor, wine, tea and sports drinks; and consider alternative redemption methods. | 0.05 | ? |
| MW-6 | Develop statewide recovery infrastructure for consumer electronics waste, with shared responsibility among producers, retailers, NGOs, and government. | 0.03 | ? |
| MW-7 | Change land use rules to allow commercial composting on land zoned High Value EFU (exclusive farm use). | less than 0.01† | Y |
| MW-8 | Increase public awareness to discourage on-site burning of garbage, especially fossil-carbon materials. | 0.02 | Y |
| MW-9 | Continue landfill regulation with additional reporting and analysis. | Unknown | Y |
| MW-10 | Evaluate methane emissions from closed landfills and options to reduce such emissions. | Unknown | ? |

* Cost-effective to consumer over measure lifetime? (This does not include whether it is cost-effective considering the projected effects of global warming). **Measures with savings 0.25 MMT CO2e or more in 2025 are Priority I Measures.**

†Actual reductions over time could be several times higher than shown, depending on the measure and the details of implementation. Most of the greenhouse gas benefit of these measures is associated with reducing methane generation at landfills; for the dry landfill that accepts most of the Metro area's waste, methane generation occurs up to 150+ years following disposal, so the majority of emissions offsets occur after the 2015 and 2025 time horizons of this project.

**Background**

The goal of this chapter is to identify and evaluate options that could reduce greenhouse gas (GHG) emissions associated with the use and discard of materials by households and businesses in Oregon. Oregon can achieve these GHG reductions by controlling methane emissions from solid waste landfills, reducing the burning of certain wastes, increasing recycling and composting, and using materials more efficiently.

The manner in which materials are used and discarded in Oregon, which contributes to greenhouse gases, is multi-faceted and complex. Some GHG emissions occur inside Oregon, while others occur in other states or even other nations. Some options that reduce emissions lead to an immediate reduction in emissions, while other options may reduce emissions by smaller amounts each year for many years into the future. For a more thorough explanation of the materials life cycle, its greenhouse gas emissions, background on waste recovery and disposal in Oregon, and the accounting framework, refer to the document, "Briefing Paper: Materials and Greenhouse Gases," provided as Appendix E.

**Projection of GHG Emissions**

Waste generation is the sum of recovery plus disposal. According to the Oregon Department of Environmental Quality (DEQ), per-capita waste generation in Oregon rose from 5.9 pounds per person per day in 1993 to 7.5 pounds per person per day in 2002. Of this, recovery (recycling, composting and certain types of waste combustion) grew from 1.8 to 3.2 pounds per person per day, while landfilling (disposal) held fairly constant throughout 1993–2002 ranging from 4.1 to 4.5 pounds per person per day.

This historic trend is used as the starting point for projecting future growth in waste generation. To project future per-capita waste generation, we first divided the waste stream into 33 different material categories listed in Appendix E Using DEQ and EPA data, estimates were made of the rate of change in per-capita waste generation during the period 1993 to 2002 for these 33 different categories. These are adjusted to account for changes in reporting and assumptions regarding shifts of waste into the waste system (such as shifting waste from open burning, which isn't counted, to recycling, which is). The accuracy of these estimates is better for some material categories than others. The rates of adjusted growth in per-capita waste generation (by material) were then related to the rate of growth in inflation-adjusted Oregon personal income during the same period, 1993 – 2002.

The Advisory Group projects that per-capita waste generation, aggregated across all 33 material categories, will grow to 10.1 pounds per person per day in 2025 under the baseline, or a "business as usual" scenario. This assumes relationships between personal income and materials use/waste hold constant. It is based on projections of inflation-adjusted personal income from the Oregon Department of Administrative Services. Coupled with projected population increases, total in-state waste generation (all discards, including recycling and composting) is projected to grow from 5.1 million tons in 2003 to 8.4 million tons in 2025.

Emissions factors over the entire materials life cycle (materials production, transportation, and end-of-life management) are applied to these projections of in-state waste generation. Oregon also

imports significant quantities of municipal solid waste (garbage) from other states. Waste imports are modeled, growing at a rate of about 4.6 percent per year, from about 1.5 million tons projected in 2003 to 4.0 million tons in 2025. Only emissions associated with the disposal portion of the life cycle are counted for these imported wastes.

For the sake of projections, it is further assumed that 1) per-ton emissions factors for material production, transportation and end-of-life management of each material type (glass, corrugated paper, grass clippings, etc.) remain constant between 2003 and 2025; 2) open burning of wastes continues to fall; and 3) the disposition of all remaining wastes (between recycling, composting, energy recovery, and different landfills) remains fairly constant. Under these assumptions, greenhouse gas emissions are projected to rise from 7.0 million metric tons of $CO_2$ equivalent ($MMTCO_2E$) in 2003 to 13.6 $MMTCO_2E$ in 2025. This represents almost a doubling of emissions between 2003 and 2025, or an average annual growth rate of about 3.1 percent under the business as usual scenario.

**Relative Importance of Different Life Cycle Stages**

The different life cycle stages (production, recycling, landfilling, etc.) contribute different amounts to the estimate of total net emissions. The relative importance of different life cycle stages varies widely across different types of materials. For example, most of the greenhouse gas emissions associated with steel result from energy used during manufacturing, while most of the greenhouse gas emissions associated with yard debris occur during landfilling. For the mix of materials and waste as a whole, emissions associated with resource extraction and product manufacturing are, on average, significantly higher than any other category of emissions. Put differently, the majority of emissions occur "upstream" of the user (Oregon household or business). "Downstream" emissions associated with management of discards tend to be smaller, on average, than upstream emissions.

Table MW-2 shows the contribution of different life cycle stages to the projected net emissions of 8.9 $MMTCO_2E$ in 2015 associated with the materials life cycle for materials used and discarded in Oregon. These are not included in the Oregon greenhouse gas inventory.

**Table MW-2**
**Oregon Materials Life Cycle, 2015**
**(Baseline Scenario)**

| **Waste generation** | | $MMTCO_2E$ |
|---|---|---|
| | "Upstream" activities of resource extraction, product manufacturing, and transportation | 10.92 |
| **Recycling** | | |
| | Material production and transportation | -1.01 |
| | Indirect carbon storage in forests | -2.13 |
| **Composting** | | |
| | Production and transportation | 0.02 |
| | Carbon storage in soils treated with compost | -0.10 |
| **Combustion** | | |
| | Open burning* | 0.06 |
| | Mass incineration of garbage (Marion, Coos Counties) | 0.10 |

| | | |
|---|---|---|
| | Emissions from combustion of other wastes for energy | 0.22 |
| | Energy recovery offset | -0.58 |
| **Landfilling**** | | |
| | Pre-2003 waste | 1.30 |
| | Waste 2003-2015 | 0.04 |
| **Total** | | **8.94** |

Negative numbers represent offsets. Positive numbers represent net emissions.

* Agricultural and forestry open burning not included

** For pre-2003 waste, only methane emissions and energy recovery offsets are included. For waste disposed of in 2003 and subsequent years, the number shown includes methane emissions, energy recovery offsets, transportation/equipment emissions in 2015, and the sizeable carbon storage offsets for materials disposed of in landfills.

**Regulatory Versus Non-Regulatory Approaches**

Several of the measures listed below are characterized as ***new*** regulatory requirements of waste generators (businesses, households), local governments, and/or landfill operators. All of the regulatory measures have costs associated with them. However, for some measures, the associated reduction in greenhouse gas emissions could be achieved through financial incentives in lieu of regulation. For example, while the state could require all large landfills to capture 65 percent of methane by 2010 through a statutory requirement, the state (or another party) could also provide financial incentives that, by fully or partially offsetting these costs, would achieve the same goal. In some cases, financial incentives (such as grants or tax credits) might be a better option than regulation, especially where the costs and benefits are not well established.

**Uncertainty in Evaluating Measures**

For the most part, the Advisory Group has relied on U.S. EPA emissions factors for the many different types of materials/wastes (steel, aluminum, corrugated, newsprint, etc.) and their different management options (recycling, landfilling, etc.). Some estimates of GHG emissions and savings potential have significant uncertainty and should be considered in that context. Tools, data, and accounting standards for evaluating greenhouse gas impacts of the materials life cycle are still relatively new, and substantial research is needed to improve their accuracy.

Several measures vary in their degree of stringency. For example, requirements that landfills collect 50 percent of generated methane will have a different effect on emissions than a requirement that landfills collect 80 percent of generated methane, and will have correspondingly different economic repercussions. Some measures are evaluated at varying levels of intensity or implementation, while others are evaluated at only one level.

The effectiveness of measures also varies over time. For example, the placement of a ton of waste in a solid waste landfill is expected to generate a certain quantity of methane over the period of its decomposition. However, decomposition in "wet" landfills (such as those in Western Oregon) occurs much faster than decomposition in "dry" landfills (including the Columbia Ridge landfill in Arlington, the largest in the state and the repository for most of the Portland area's garbage). Thus, diverting putrescible wastes from landfills in any single year will lead to reductions in actual methane emissions over a period of several decades (in Western Oregon) or even several centuries (in Eastern Oregon). An important corollary to this fact is that programs that divert certain

carbonaceous wastes from landfills, even if only for one year, will result in reductions in methane emissions spread over many subsequent years. Therefore, for some measures, the estimates of greenhouse gas reductions in the years 2015 and 2025 significantly understate the full quantity of emissions reductions associated with the measure.

The difference between wet and dry landfills also means that waste-related greenhouse gas emissions and reduction potentials – both in terms of absolute amounts and timing – vary in different areas of the state.

Projections of methane emissions from solid waste landfills also are uncertain and somewhat controversial because of limited data. A variety of computer models are used to project methane emissions, but the models suffer from some uncertainty and results are dependent on the quality of data inputs and assumptions. Measuring actual methane emissions from landfills is quite difficult.

The greenhouse gas reduction impacts of individual measures are also influenced by whether or not additional measures are implemented. Estimates of reductions are not additive when multiple measures are implemented simultaneously. For example, the greenhouse gas benefit of food waste composting is a function of many variables, including the presence or absence of gas collection and energy recovery at landfills, the timing of any changes in gas collection, and whether the food is being diverted from a wet or a dry landfill. Therefore, enhancing methane collection at landfills will reduce the greenhouse gas benefit of diverting highly putrescible wastes, such as food, away from those landfills and towards composting sites. Conversely, achieving the state's waste generation and recovery goals will result in lower emissions from landfills over time, thus decreasing the benefit of enhanced energy recovery systems at those landfills. The cumulative net greenhouse gas reduction in 2025 of all of the measures recommended by the Advisory Group for implementation is about 6.0 $MMTCO_2E$.

Finally, it is important to note that all emissions reported below are *net* emissions. In the accounting approach used by the U.S. EPA and the Advisory Group, certain types of activities contribute to offsets which are counted as negative emissions. Using landfills again as an example, there are four categories of emissions, two of which are offsets (negative emissions):

- $CO_2$ emissions from equipment used to operate the landfill (positive number)
- methane emissions from the landfill (positive number)
- an offset for landfills that recover energy from landfill gas, which decreases the need to burn fossil fuels elsewhere (negative number)
- an offset for that portion of biogenic carbon that is not expected to decompose in a landfill (negative number). (An example of this would be that portion of dimensional lumber that does not decompose. The U.S. EPA has defined a carbon sequestration offset for "carbon storage in landfills.")

Because of this storage offset, a landfill with a moderately effective gas collection system might appear to have zero or even negative *net emissions*. However, ongoing emissions of heat-trapping methane continue and could be further reduced through enhanced gas collection systems.

## MW-1: Achieve the waste generation and recycling goals in statute.

ORS 459.015 establishes the following solid waste generation and solid waste recovery goals for Oregon:

*Generation:*

- By 2005 and in all subsequent years, no increase in per-capita waste generation.
- By 2009 and in all subsequent years, no increase in total waste generation.

*Recovery:*

- 45 percent recovery rate in 2005
- 50 percent recovery rate in 2009

These two parallel sets of goals address waste generation (total discards, a rough proxy for material use) and the recovery rate (the fraction of discards diverted from disposal to recycling, composting, and certain energy recovery activities).

The waste generation goals were added to statute by the 2001 Legislature. DEQ and several local governments have a number of pilot projects in various stages of implementation and evaluation. DEQ is scheduled to develop a waste generation plan during the current biennium. Lacking details on how these goals would be achieved, it is not realistic to evaluate the cost, feasibility, etc. of this measure. Therefore, this measure is evaluated for its greenhouse gas reduction potential only, assuming that reductions in waste generation occur across all material types.

Because of significant emissions in manufacturing stages of the life cycle, some materials, such as aluminum, carpet, and electronics, have relatively high per-ton reductions in greenhouse gas emissions associated with waste prevention and reuse. Other materials have relatively low per-ton emissions reductions, but are present in such large quantity that significant emissions reductions can still be realized through waste prevention.

Similarly, the greenhouse gas benefit of material recovery varies widely across material types (mixed waste paper, film plastics, tires, etc.) and management methods (recycling, composting, combustion with energy recovery). For example, recycling a ton of aluminum reduces net emissions more than recycling a ton of office paper, but there is more office paper disposed of in Oregon than aluminum cans. And while many recovery activities decrease net emissions, a few (such as energy recovery from tires and motor oil) actually *increase* net emissions.

Accomplishing the waste generation goals is projected to result in much greater reductions in greenhouse gas emissions (5.0 $MMTCO_2E$) in 2025 than accomplishment of the recovery goals (0.25 $MMTCO_2E$). In part, this is because of how the goals are defined and the fact that Oregon is already very close to achieving the recovery goals, while achieving the generation goals would involve a larger quantity of materials. However, because the two goals are interactive, the combined reduction would be 5.19 $MMTCO_2E$.

In 2002, the state's recovery rate was 46.6 percent. The 2003 recovery rate, which DEQ is currently calculating, may be lower due to reduced demand for waste urban wood as fuel in industrial boilers. Achieving the recovery goals may require several new initiatives, examples of which are described as subsequent measures below. Therefore, like the waste generation goal, this measure is evaluated for its greenhouse gas reduction potential only.

The state of Oregon and all wastesheds in Oregon ("wastesheds" include Metro, all other counties, and one city) have waste recovery goals for 2005 and 2009. Because the waste recovery rates are calculated on a tonnage basis, strategies to achieve the goals have often involved targeting materials that are heavy and/or are disposed of in significant quantities. Some recovery proposals have emphasized the idea of "keeping material out of landfills" without consideration of broader environmental impacts. Improved analysis and evaluation tools, education of private industry and government staff, and even directives from the Governor's office and/or Legislature to include environmental considerations other than recovery rates (such as greenhouse gases) in program planning would likely lead to improvements in the environmental benefit of waste recovery programs as a whole.

It is not known at this time if the waste generation or recovery goals can be achieved without additional regulation and costs, but at a minimum the Advisory Group recommends that both sets of goals be achieved to the extent that they can be accomplished cost-effectively. Achievement of the recovery goals is highly dependent on strong market demand for recyclables, compostables and energy recovery. Some waste prevention and recovery activities will reduce costs to Oregon households and businesses. Waste prevention may create business opportunities for producers of some materials and services while reducing opportunities for others. Recovery also provides economic development opportunities. There are significant other environmental benefits and potential education and demonstration values associated with achieving these goals as well.

The state should create incentives that will contribute to achievement of the waste generation and recovery goals in a cost-effective manner. "Cost effectiveness" should recognize all costs, including externalities, and quantify them where possible. Achieving the waste generation and recovery goals can reduce greenhouse gas emissions and other environmental problems. Incentives should reflect (and monetize, if possible) the environmental and social benefits of achieving the waste generation, recovery, and GHG reduction goals.

## MW-2: DEQ should develop guidance to clarify alternative final cover performance at larger landfills: Demonstrate control of gas emissions comparable to geomembrane cover.

Municipal solid waste (MSW) landfills in wet climates are normally closed, using a cover system that includes an impermeable geomembrane barrier layer to reduce infiltration of precipitation into the landfill. Because methane cannot easily pass through such a cover, geomembrane barriers have the added advantage of improving the effectiveness of methane collection systems. EPA and state rules allow DEQ's Director to approve "alternative final cover" designs (such as thick layers of soil) as long as these covers are, at a minimum, comparable to the standard design (geomembrane) at reducing infiltration and controlling erosion. As a practical matter, alternative final covers are only feasible in dry areas east of the Cascades.

Under this measure, DEQ would revise its guidance for landfills that are subject to Title V air quality permits so that alternative final covers at such landfills would also need to reduce greenhouse gas emissions comparable to a conventional (geomembrane) cover. Such a guidance change would currently effect only four landfills in Eastern Oregon. No new legislation would be required. The Department believes comparable control of gas emissions could likely be achieved

by incorporating a gas venting layer and/or compost layer into the alternative cover design, resulting in an estimated reduction of greenhouse gas emissions of 0.53 $MMTCO_2E$ in 2025. Greenhouse gas reduction benefits would be sustained for decades; much of the methane generation in eastside landfills occurs after individual cells are closed. This would increase landfill costs by about $14 million between 2010 and 2025.

Assuming that the costs are passed back to landfill customers through rates, this would increase garbage costs for users of these four landfills. Users of other large landfills would not see any new rate impacts as their landfills are already using or planning to use the more protective geomembrane covers.

### MW-3: Provide incentives for larger landfills to collect and burn minimum percentage (65 percent to 80 percent) of methane generated..

Under this measure, existing funding incentives would be leveraged, and additional funding would be provided if necessary, to encourage larger landfills to increase methane collection or other methane controls.

For the purpose of this analysis, we have modeled this measure at two different levels: 65 percent and 80 percent by the year 2010, applied to the eight landfills expected to be open in 2010 that are or are eventually expected to be subject to existing EPA New Source Performance Standards (NSPS) for landfill gas. Of these, six are privately owned, while the other two are owned by Lane and Deschutes Counties. Three of the eight landfills are already at or above 80 percent gas collection rates; two more are estimated at being between 65 percent and 80 percent; two are in the 20 percent to 40 percent range; and the last has minimal gas collection.

Setting a 65 percent collection goal would reduce emissions in 2025 by an estimated 0.47 $MMTCO_2E$, while an 80 percent goal would reduce 2025 emissions by 0.88 $MMTCO_2E$. Achieving the 65 percent goal at all eight landfills would cost about $3.4 million, while achieving the more ambitious 80 percent goal would cost about $4.9 million. It is unclear if existing incentives are sufficient to lead to these levels of additional greenhouse gas reductions; additional incentives may likely be required. Of course, landfills that have already invested in advanced landfill gas collection systems, either because of regulation or on a voluntary basis (to capture energy), would not have as much opportunity to take advantage of this incentive; the incentive is targeted more at landfills that have below-average gas collection systems.

Some landfills with gas collection simply flare the methane, while others have installed energy recovery systems to use the methane to generate heat or electricity. The state Business Energy Tax Credit (BETC) is already available to help incent landfill gas energy recovery systems, including collection systems above and beyond those required for compliance with environmental regulations. (Current environmental regulations require landfill gas collection and combustion, but do not address energy recovery. BETC cannot be used if gas is merely collected and flared, the current practice at some landfills.)

Because of the potent greenhouse gas impact of methane, which is 23 times as powerful as $CO_2$, most of the greenhouse gas benefit of this measure is associated with gas collection and combustion

(converting the methane to carbon dioxide), regardless of whether or not energy recovery is included. This alternative would supplement BETC with additional incentives in order to increase gas collection at those landfills with below-average gas capture rates.

Alternatively, the Legislature could establish mandatory methane collection goals for these landfills or direct the DEQ to establish such goals through rule. In this case, compliance would be paid for by the users of the landfills with below-average gas capture rates. Gas collection rates are defined as gas collection divided by gas generation. One significant challenge is that while gas collection is easily measured, gas generation is not. Normally landfill engineers rely on computer modeling to estimate gas generation. Landfills required to increase their gas collection rate would have the opportunity to demonstrate an alternative gas generation estimate in order to achieve partial or full compliance with the goals.

## MW-4: Provide incentives to increase salvage of reusable building materials.

Salvage of reusable building materials, sometimes called "deconstruction" is growing in popularity in Oregon. Some buildings slated for demolition contain valuable furnishings and fixtures, high-value wood flooring, molding and structural lumber, and other materials that can be reused, such as doors and sinks. A growing number of not-for-profit organizations are trying to capture reusable building materials and resell them for reuse.

In this measure, the state would provide incentives, such as grants, to help establish an infrastructure of reusable building materials sites. Presumably, the incentives would primarily support capital and other start-up expenses, as revenue from the re-sale of materials should be sufficient to pay for ongoing operational costs. In addition to environmental and resource benefits, building material salvage provides more affordable materials to middle- and lower-income households. Material salvage programs can also provide living-wage jobs.

At a cost of about $2.3 million between 2010 and 2025, greenhouse gas reductions in 2025 are estimated at 0.016 $MMTCO_2E$.

## MW-5: Increase the "Bottle Bill" redemption value from 5-cents to 10-cents and expand the "Bottle Bill" to all beverages except milk, including juice, water, liquor, wine, tea and sports drinks; consider alternative redemption methods.

The deposit and redemption value for beverage containers covered under Oregon's "bottle bill" was established at 5 cents in 1970. Adjusted for inflation, it is worth about 1.6 cents in today's dollars. In recent years, the percentage of containers returned for deposit under the bottle bill has fallen. Further, many of the beverage containers currently in use are not covered by the bottle bill because they were not commercially available (or were uncommon) when the bottle bill was established in 1970.

This measure would make at least two changes to the bottle bill. First, it would change the deposit/redemption value of the bottle bill from 5 cents to 10 cents. Second, it would expand the bottle bill to cover a wider variety of beverage containers. As a result, the recycling of these

containers would increase. Most of the associated reductions in greenhouse gas emissions result from energy savings when post-consumer aluminum, glass and plastic displace the production of virgin resources.

There are other changes to the structure of the bottle bill that might also be proposed, although these have more impact on distribution of costs and responsibilities, and political feasibility, and less impact on environmental results. These other issues include:

- allowing redemption to occur at locations other than grocery stores, and exempting grocery stores from providing redemption if nearby alternatives are available;
- the formation of an industry-operated container stewardship organization to oversee and operate the redemption system;
- the disbursement of unredeemed deposits (escheats), which are currently maintained by the distributors; and
- the addition of a processing fee to compensate redemption centers for their costs in handling bottle bill materials.

Bottle bill expansion would require statutory change and would face varying levels of political opposition, depending on the nature of the proposed re-design. Higher handling costs associated with processing the additional materials are projected to be roughly $3.5 million annually. Greenhouse gas reductions in 2025 are estimated to be 0.050 $MMTCO_2E$.

## MW-6: Develop statewide recovery infrastructure for consumer electronics waste, with shared responsibility among producers, retailers, NGOs, and government (reuse and recycling)

Electronic waste ("e-waste"), such as computers, monitors, and televisions, is a rapidly growing waste stream in Oregon and the U.S. Options for end-of-life management of e-waste include disposal, stockpiling, recycling, and reuse. For personal computers (PCs), both reuse and recycling reduce greenhouse gas emissions. Because of the large amounts of energy used to manufacture a PC (particularly fabrication of silicon wafers), reuse has much greater greenhouse gas benefits than recycling, as long as the reuse displaces or delays the production of a new computer.

Oregon has been a participant in the National Electronics Product Stewardship Initiative (NEPSI), a three-year effort to negotiate a national end-of-life management program for e-waste, where responsibility for managing e-waste is shared between manufacturers, retailers, governments, consumers, and nongovernmental organizations (NGOs) and businesses. Although agreement has been reached on many aspects of a national system, manufacturers have yet to agree on an upfront financing approach for the system. Currently electronics manufacturers are holding meetings to develop a recommendation to bring back to the full NEPSI group for consideration. Resolution of this issue is expected by the end of 2004. The next step would then be to finalize the NEPSI agreement and move forward with federal legislation.

In Oregon, the 2003 Legislature passed Senate Bill 867, establishing a statewide Task Force comprised of industry, governments, and nongovernmental organizations, to look at issues related to end-of-life management of e-waste in Oregon. The effort is intended to build upon the concept

of product stewardship and the national NEPSI discussions, look at what currently exists, and determine what measures would be needed to establish a sound reuse and recovery system for Oregon. The Task Force is directed to complete their effort by December 2004. The information gathered by this Task Force should inform any future legislation or efforts in Oregon to manage e-waste at end-of-life.

In addition to the legislation passed in Oregon in 2003, the states of California and Maine have passed landmark legislation in the past year. The California legislation, which will be implemented by November 2004, addresses only cathode ray tubes (CRTs) and plasma screens as hazardous waste. It establishes an advance recovery fee on the sale of these devices in order to fund a government-managed recycling program for this specific waste stream. The Maine legislation, passed in the spring of 2004, is a producer responsibility approach requiring manufacturers to be responsible for paying for and providing the transportation and processing of discarded computers, CRTs, television, and other computer peripherals through internalization of costs. Government is responsible for setting up the collection infrastructure. Washington also passed a "study bill" similar to Oregon's in the spring of 2004.

The design and funding of a statewide program in Oregon for reusing and recycling e-waste is a complicated issue that is currently being addressed by the SB 867 Task Force. For the sake of the Governor's Advisory Group on Global Warming's recommendations, this report assumes a system of shared responsibility, where manufacturers help to pay for and/or operate the infrastructure for reuse and recycling of e-waste, without defining the details of how such a program would operate. Regardless, increasing the recycling and reuse of e-waste would reduce net greenhouse gas emissions, with a "middle of the road" estimate of 0.034 $MMTCO_2E$ in 2025. Other benefits include reducing disposal of toxins, increased computer ownership opportunities for lower-income households (via reuse), and potential economic development opportunities.

It is assumed that such a system would require new legislation, and that this would require the cooperation of industry, nonprofits and the public sector. Costs of the program depend on its design and scope; at a minimum, collection infrastructure requires financing.

## MW-7: Change land use rules to allow commercial composting on land zoned High Value EFU (exclusive farm use).

Composting of food wastes can significantly reduce net greenhouse gas emissions, both by reducing methane emissions from landfills and by sequestering carbon in agricultural soils treated with finished compost. However, food waste composting operations, even when operated at high standards, can create odor problems. Because of this, commercial food waste composters are not ideally suited for land zoned as industrial and, as a practical matter, cannot locate near residential or commercial lands without major capital investments (such as mechanical aeration systems with biofilters or totally enclosed composting operations).

Commercial composting that is not in conjunction with farm use is not allowed on lands zoned for high value exclusive farm use (EFU). According to compost industry experts, this makes it very difficult to site a commercial composting operation in most areas of the Willamette Valley, which are zoned high value EFU.

The goal of this measure is to allow for the establishment of composting capacity that is relatively close to waste generators (cities) and is protective of the environment while being affordable. Amending Oregon Administrative Rules (OAR) 660-033-0120 to allow commercial composting as a conditional use on lands zoned High Value EFU would likely allow for the establishment of a few commercial composting operations in the Willamette Valley. Because of high disposal fees for garbage in Marion County and the Metro area, a nearby commercial composter could likely set tip fees high enough to be profitable, yet low enough that larger waste generators could realize financial savings from separating their food wastes from their garbage. In addition to these financial savings to Oregon businesses, expanding food waste composting provides economic development opportunities, greenhouse gas benefits, and other environmental benefits. The greenhouse gas benefits are relatively small in earlier years, but continue for decades due to reduced methane generation at landfills associated with the avoided long-term decomposition of food wastes.

## MW-8: Increase public awareness to discourage on-site burning of garbage, especially fossil-carbon materials.

Burning of garbage in burn barrels, burn piles, and fireplaces is a source of greenhouse gases and a wide variety of air toxics. It also can create fire risks. Greenhouse gases of concern are carbon dioxide from the combustion of fossil-derived materials (plastics, synthetic fabrics, tires, rubber) and nitrous oxide from combustion of paper and wood.

Outdoor burning of plastics, rubber and tires is already illegal in Oregon. Additional restrictions on open burning at both the state (DEQ/EQC) and local (city, fire district) level further limit the outdoor burning of other wastes in some areas. Still, in some areas of the state, significant quantities of wastes are burned.

The state could work with local governments, including fire districts, to further discourage on-site burning of garbage. (The baseline scenario assumes that existing restrictions and enforcement programs remain in place.) This could include education of households and businesses and the development of model ordinance language to make it easier for local governments to adopt burning restrictions.

This measure is easily to implement, except for the additional funding required for coordination and promotion/education, and any local enforcement activities. Reducing burning of wastes has significant public health benefits, above and beyond reductions in greenhouse gases. Greenhouse gas savings are difficult to project due to insufficient data on the quantity and composition of wastes burned, but are estimated to be around 0.02 $MMTCO_2E$ in 2025.

## MW-9: Continue landfill regulation with additional reporting and analysis.

***Specific Actions:***

- Continue to implement Title V regulations for control of methane emissions at landfills and installation of wells in active areas where waste has accumulated for five or more years.

- Require annual reporting of methane generation, collection and collection effectiveness (much of this reporting is already occurring).
- Encourage landfill owners/operators to collect actual data on gas generation.
- Evaluate the accuracy of measurement efforts.

DEQ will continue to require the installation of methane controls at landfills to meet federal and state regulations. Under this measure, DEQ would require additional reporting of estimates of methane generation, collection, and collection system effectiveness at larger landfills.

Collection system effectiveness is defined as gas collection divided by gas generation. One challenge is that while gas collection is easily measured, gas generation is not. Normally landfill engineers rely on computer modeling to estimate gas generation. Under this alternative, DEQ would support landfill operators interested in conducting actual measurements and enhanced modeling of generation.

Ongoing administration of current environmental laws, and compliance with those laws, is assumed as part of the baseline forecast. This measure would result in additional reductions in gas emissions if landfill owners chose to improve further upon gas collection systems in order to maintain competitiveness in a marketplace where potential customers (particularly local governments) might include greenhouse gas considerations in their procurement of disposal services.

## MW-10: Evaluate methane emissions from closed landfills and options to reduce such emissions.

Oregon is home to many smaller landfills that are now closed and have no or very limited engineered methane controls. The quantity of methane emitted from these landfills is unknown, but is estimated (in 2003) to be about half as much as the emissions from the larger open landfills. Emissions from these closed landfills are (on the whole) assumed to be falling, while emissions from larger open landfills continue to climb as waste disposal continues to increase.

Under this measure, the state would evaluate methane emissions from closed landfills and conduct a feasibility and cost-benefit study of methods to reduce emissions, at a cost of about $50,000 to $100,000. Few if any of these closed landfills have closure funds available to spend on methane controls, so implementation of any such controls would require additional funding, with statewide costs potentially in the millions of dollars, depending on the number of landfills involved and the scope of methane control measures recommended.

# GOVERNMENT OPERATIONS ACTIONS TO REDUCE GREENHOUSE GASES

| | |
|---|---|
| **GOV-1** | **State agencies should use their agency Sustainability Plans as the tool for agencies' dynamic involvement in GHG reductions. Operational activities in the areas of electricity, natural gas, transportation, waste and water will be the focus for reduction opportunities.** |
| **GOV-2** | **Through a collaborative effort, the departments of Energy, Environmental Quality and Administrative Services should develop a process to educate agency personnel about opportunities for GHG reductions including how to set goals and calculate GHG reductions.** |

In support of the Advisory Group, state agencies evaluated how they can promote policies and programs that will move Oregon toward greenhouse gas reductions. They conducted their review in context of Governor Kulongoski's Executive Order EO 03-03, which he issued in June 2003 and which is also the basis for the Advisory Group's report on reducing greenhouse gases.

The Executive Order and subsequent guidance outlined expectations for 20 state agencies to develop plans that would incorporate sustainability into their management practices. The Governor called for specific actions each agency could take and provided standards and guidelines. Throughout the document, activities were cited as areas of focus for the agencies. These included use of renewable energy, improved water efficiency, expanded materials reduction and recycling, new fleet management opportunities, and alternative fuels use.

While the link to climate change advantages was not a focus of the first Sustainability Plans, the plans typically include GHG reduction activities. Therefore, the Sustainability Plans set in motion a mechanism for moving agencies toward GHG reductions in a united front. All State agencies will be expected to meet GHG reductions proportional to the goals stated in "Recommendation IA-1."

## GOV-1: State agencies should use their agency Sustainability Plans as the tool for agencies' dynamic involvement in GHG reductions. Operational activities in the areas of electricity, natural gas, transportation, waste and water will be the focus for reduction opportunities.

Staff reviewed the agency Sustainability Plans and calculated GHG reductions that agencies might achieve through implementation of the plans. Unfortunately, most of the agency Sustainability Plans did not have activities for which GHG reduction calculations could be made with certainty.

The Sustainability Plan review showed that agencies were knowledgeable about how to move toward sustainability. What was missed in the first round, for purposes of the climate change work, is the link between those selected sustainability activities and GHG reductions and an understanding of the metrics used to calculate those reductions.

The Sustainability Plans are an effective mechanism to move forward the goals of GHG reductions. Table GOV-1 shows a summary of those activities where GHG reduction could be calculated. The table does not represent all agencies or all proposed action items. Please refer to www.sustainableoregon.net for a complete list of Sustainability Plans.

**Table GOV-1: Selected GHG Reduction Actions from Agency Sustainability Plans**

| Agency | Activity | GHG reductions ( metric tons) |
|---|---|---|
| Energy | Truck stop electrification (with DEQ) | 24,000 |
| | High performance school plan | 2880 |
| | Train resource conservation managers at state agencies | 4 |
| | Technical assistance to agencies | 216 |
| | State Energy Efficient Design Program (new state buildings) | 997 |
| Housing and Community Service | Energy efficiency and weatherization | 4600 |
| Corrections | Solar hot water at Pendleton | 1.3 |
| | Geothermal closed loop water system in Lakeview | 2800 |
| | Burner controllers on boilers/tuning at various facilities | 278 |
| Consumer and Business Services | Extend life of personal computers | 170 |
| Administrative Services | Reduce non-renewable energy use by 10 percent below 2000 levels | 1500 |
| **TOTAL** | | **37,446** |

*Note: This table identifies specific actions that state agencies will take as described in their Sustainability Plans and approved by the Sustainability Board. Not all agencies are listed here and these are not the only activities agencies will take. These are the only actions in the plans where GHG savings could be quantified and forecasted for the purposes of this report.*

**GOV-2: Through a collaborative effort, the departments of Energy, Environmental Quality and Administrative Services should develop a process to educate agency personnel about opportunities for GHG reductions including how to set goals and calculate GHG reductions.**

As noted, while Sustainability Plans can lead to greenhouse gas reductions, many current plans do not address that directly. By providing each agency a simple and uniform record-keeping program for greenhouse gas emissions, the agencies will be able to identify and pursue opportunities to reduce emissions.

## APPENDIX B

## MEMBERS OF THE GOVERNOR'S ADVISORY GROUP ON GLOBAL WARMING

**Achterman, Gail L.**
Gail L. Achterman is the Director of the Institute for Natural Resources at Oregon State University. She received her undergraduate degree from Stanford University in economics and then went to the University of Michigan where she received her J.D. in 1974 and an M.S. in natural resource policy and management in 1975. She started her career working for the Department of the Interior in Washington, D.C. before returning to Oregon in 1978 to join a private law firm. Her law practice emphasized natural resource and environmental law. From 1987-1991 she served as Governor Neil Goldschmidt's Assistant for Natural Resources before returning to private practice. She left Stoel Rives LLP in 2000 to become Executive Director of the Deschutes Resources Conservancy in Central Oregon before joining OSU in 2003 as the first full time director of the Institute.

**Allen, Jeff**
Jeff Allen became executive director of the Oregon Environmental Council in October 1996, and OEC's membership, budget, and staff have more than doubled during his tenure. He holds a Master's degree in public policy from the University of California, Berkeley, and graduated Phi Beta Kappa from the University of Michigan. His diverse environmental policy experience includes work for the Union of Concerned Scientists, Clean Water Action, the Center for Clean Air Policy, and the California Senate. Jeff is a manic fisherman who also enjoys backpacking, fishing, and wine. He, his wife Martha and son Sam live in Hood River.

**Berggren, Randy**
Randy L. Berggren has been the General Manager of the Eugene Water & Electric Board since August 30, 1990. He is a professional electrical engineer registered in California. He began his career at EWEB as an Engineering Manager, and was promoted to assistant general manager for planning & development in 1988. Prior to joining EWEB, Jeff held a variety of engineering and administrative positions with the Springfield Utility Board and Southern California Edison Corporation over a 16-year period. He received his bachelor's degree in electronic engineering from the California State Polytechnic University in 1969, and a master's degree in electrical engineering from the University of Southern California in 1971. Randy was a board member for Governor Kitzhaber's Willamette Restoration Initiative and has served as a board member and chairperson on various regional energy associations.

**Blosser, Bill**
Bill Blosser has worked for 35 years in Oregon as a consultant and public official in land use, environmental and sustainability planning. He founded the sustainable development practice within $CH_2MHILL$ and developed sustainability plans for a variety of clients. He served as Governor Kulongoski's sustainability advisor in 2002-2003 and led the

development of the governor's executive order on sustainability and the guidance document for state agencies to implement the order. He currently serves on the Oregon Sustainability Board and the boards of the International Sustainable Development Foundation, the China-US Center for Sustainable Development, and Sustainable Northwest. As a land use and environmental planner, Bill has participated in developing numerous environmental impact studies, municipal water plans, transportation systems plans, and city comprehensive plans. He served for six years as Chair of the Oregon Water Resources Commission and for 9 years as Chair of the Oregon Land Conservation and Development Commission. He served six months as the Interim Director of the Department of Land Conservation and Development.

**Bradbury, Bill**

Bill Bradbury grew up in Chicago, and moved to Bandon, Oregon in 1971. In Bandon, he owned and operated a small business before beginning his career in government. He served in the Oregon legislature for 14 years, representing Oregon's South Coast, and went on to direct a local non-profit organization. As Secretary of State, Bill Bradbury is our second-highest-ranking constitutional officer. He is the auditor of public accounts, the chief elections officer, and the manager of the state's official legislative and executive records. Along with the Governor and Treasurer, he sits on the State Land Board, and he was appointed by the Governor to chair the Oregon Sustainability Board. He was elected Secretary of State in 2000, and he now lives in Salem with his wife Katy.

**Bragdon, Susan**

Susan H. Bragdon (B.A. biology, Williams College; M.Sc. Resource Ecology, University of Michigan; J.D. University of Michigan) uses her educational background and experience in science and law to work on critical global issues such as the conservation, use and management of biological diversity; creating compatibility with environment and agriculture; and promoting food security. She was the lawyer for the Secretariat for the Intergovernmental Negotiating Committee for the Convention on Biological Diversity, providing legal advice to the working group handling intellectual property rights, transfer of technology including biotechnology and access to genetic resources. When the treaty was concluded Susan joined the treaty Secretariat as its Legal Advisor. Susan also served as the top Senior Legal Officer for the Basel Convention on the Control of Transboundary Movement of Hazardous Waste before joining International Plant Genetic Resources Institute as a Senior Scientist, Law & Policy in 1997. She now works on legal and policy issues related to plant genetic resources and in particular manages projects on intellectual property rights, biotechnology and biological diversity and on developing decision-making tools for the development of policy and law to manage access to and benefit-sharing from genetic resource. Susan is invited by governments worldwide to provide advice and give lectures on issues of importance related to the conservation of biological diversity and its links to development.

**Burkholder, Rex**

Rex Burkholder serves as vice-chair of the Joint Policy Advisory Committee on Transportation (JPACT) and as the council liaison to the JPACT Bi-state Transportation Committee and other regional transportation committees. Rex helped found the Bicycle

Transportation Alliance and worked as the policy director for the nonprofit organization, helping to make it one of Oregon's most active grassroots organizations. He also has taught high school science and served as faculty at Portland State University Office of Student Development. As a community activist for the past 20 years, he was a founding trustee of the nationally recognized Coalition for a Livable Future, which unites more than 50 citizen groups on the issue of sustainability. As a parent-volunteer, Rex helped establish the Northeast Community School, an innovative, diverse charter school in Portland. He has been honored as the 1998 Most Effective Citizen Advocate in the metro region by 1000 Friends of Oregon and as a 1999 founder of a New Northwest by Sustainable Northwest. Rex received a bachelor's degree in biology and a teaching certificate from Portland State University. He earned a master's degree in urban and environmental policy from Tufts University in 1989. He is married, has two sons and enjoys playing tenor guitar, spending time with his family and hiking or kayaking around the Northwest.

**Burnett, Michael G.**

Michael Burnett is the Executive Director of the Climate Trust. He is an environmental engineer with twenty-seven years of executive, management, policy, and technical experience in climate change, energy efficiency, and renewable resources, mostly in the Pacific Northwest. As the Trust's initial Executive Director, Mike took the organization through its start up phase, overseeing the development of its accounting system and assisting the Board in developing its policies regarding the selection of offsets. He works with the Board on strategic planning for the Trust, oversees the development of annual work plans and budgets, and manages the staff to meet the work plans. Under his guidance, the Trust has assembled a project carbon offset portfolio totaling $5 million and 2.5 million metric tons of carbon dioxide. Mike led the negotiations on the Trust's first five offset projects and put the stamp of his creativity on the term sheets for the current batch of six projects. He is an active participant in the national and international policy debate regarding GHG mitigation.

Mike was a Vice President for Trexler and Associates, Inc., an international leader in climate change mitigation. There, he prepared corporate climate change strategies, developed a climate change early action crediting proposal for a national sustainable technology industry group, and prepared a feasibility study for a major international carbon offset project. Mike was also the founding CEO for Conservation and Renewable Energy System (CARES), a consortium of public power utilities in Washington State. Mike also has worked in energy conservation, renewable energy, and power planning for two utility trade associations, Bonneville Power Administration, the Western Solar Utilization Network, and the National Park Service. Mike earned an M.S. in Environmental Engineering from the University of Florida while on a National Science Foundation Graduate Fellowship.

**Dodson, Mark S.**

Mark Dodson has served as NW Natural's President and Chief Executive Officer since January of 2003. He joined the company in 1997 as senior vice president and added the general counsel role in 1998. In May of 2001, he was appointed NW Natural's President

& Chief Operating Officer. Before coming to NW Natural, Mr. Dodson practiced law for more than 20 years. In 1979, he worked in the General Counsel's office of the Department of Transportation and then became special counsel to the Federal Aviation Administrator in Washington, D.C. After leaving Washington, D.C., he spent 17 years with the law firm of Ater, Wynne, Hewitt, Dodson, Skerritt in Portland, Oregon. His practice focused on regulated industries, international and national transactions and legislative issues. Over the years, Mr. Dodson has been actively involved in a variety of civic activities. He has been chairman of the Oregon State Board of Higher Education, chair of the Neighborhood Partnership Fund, secretary of the Oregon Health Sciences University Board and co-chair of Governor Kitzhaber's Task Force on Scholarship and Student Aid. He also headed the transition of Oregon Governor Neil Goldschmidt. He is currently the chair-elect of the Portland Business Alliance, chair of the Mayor's Business Roundtable and a member of the executive committee of the Associated Oregon Industries. Mr. Dodson grew up in Beaverton, Oregon, and attended Sunset High School. He graduated from Harvard University in 1967 and from Boalt School of Law, University of California at Berkeley in 1973. He is married to Ruth Ann Dodson, and they have two children: Carrie attends Harvard University; and Kevin is a senior at the University of Oregon.

**Duncan, Angus**

Angus Duncan has served as President and CEO of the Bonneville Environmental Foundation since its formation in 1998. The Foundation generates revenues from regional and national sales of renewable energy and Green Tags. Since 1998, over $1.5 million in Foundation revenues have been dedicated to new renewable energy projects and watershed restoration in the Pacific Northwest. In 1995 Mr. Duncan founded and served as President of The Columbia/Pacific Institute at Portland State University, where he holds an appointment as Adjunct Associate Professor. Mr. Duncan represented three Oregon governors on the Northwest Power Planning Council from 1989 to 1995, including service as Council Chairman (1994-95). Previously he served as Director of Energy Policy, US Department of Transportation. Mr. Duncan has thirty years experience in regional and national energy and environmental affairs, at all levels of government, and in private sector energy development at home and overseas. He speaks and writes frequently on energy and environmental questions, and serves on the Boards of the Oregon Environmental Council and the Northwest Energy Coalition.

**Jubitz, Al**

A native Oregonian, Al graduated from Beaverton High School in 1962, Yale University (BS) in 1966 and the University of Oregon School of Business (MBA) in 1968. Al married Nancy Thompson of Chestnut Hill, MA and together they have three grown daughters and two grandsons. Al recently retired from the family business (Jubitz Corporation) after a career spanning 34 years. He is Past President of and active in the Rotary Club of Portland and currently serves on the Portland Schools Foundation Board. He is Director Emeritus of Morrison Child and Family Services and a Director of Outward Bound West. He also is engaged in the Jubitz Family Foundation and serves as a director of two private companies. His interests are in the areas of peace,

environmental stewardship and early childhood education. He enjoys playing squash and golf.

**Leslie, David A.**
David Leslie has been executive director of Ecumenical Ministries of Oregon (EMO) since 1997. EMO is a statewide association of 17 Christian denominations including Roman Catholic, Orthodox and Protestant and is one of the nation's largest and longest-lasting regional ecumenical associations. Prior to coming to EMO, David served as Executive Director of Interfaith Ministries for Greater Houston, a coalition of more than 300 congregations and regional and national organizations representing Christian, Muslim, Jewish, Buddhist and Hindu communities. He is a founding member and past president of the National Interfaith Community Ministry Network and was the founding Executive Director of the Habitat for Humanity affiliate in Austin, Texas. Leslie's other professional experiences include the Ohio Council of Churches and World Council of Churches.

Community involvement includes service with Network Behavioral Health Housing Board of Directors, Oregon Department of Human Services (ODHS) Reorganization Stakeholders Group, ODHS Faith-based Advisory Group, Oregon Senate Interim Committee on Farmworker Issues, as well as the Salmon and Economic Development Citizens Forum convened by The Oregon Wheat Growers League and Confederated Tribes of the Umatilla Reservation. Born in San Augustine, Texas, David received his Masters of Divinity from Austin Presbyterian Theological Seminary and his Bachelor of Arts in history from The University of Texas at Austin. He is a lay member of the Presbyterian Church (USA). He is married to Leigh Mohney Leslie, and they have three sons Ian, Ryan and Michael.

**Lorenzen, Henry**
Henry Lorenzen is a partner in the Pendleton law firm of Corey, Byler, Rew, Lorenzen & Hojem, L.L.P, which he joined in 1984. He has represented numerous utilities and parties acquiring utility system assets, including: the condemnation action by which the City of Hermiston acquired PacifiCorp's electrical distribution system in Hermiston, Oregon; attorney responsible for acquisition of a $45,000,000 electrical distribution system by a newly formed cooperative, Oregon Trail Electric Consumers Cooperative; and serves as General Counsel for Oregon Trail Electric Consumers Cooperative, Baker City, (1988 - present), Umatilla Electric Cooperative, Hermiston, Oregon, (1984 - present), and Columbia Power Cooperative, Monument, Oregon, (1984 - present). Henry is currently retained by the City of Portland for potential condemnation of assets of Portland General Electric.

Henry served as an Assistant United States Attorney (1977-1983). He is Vice President (1973-1990), and President (1990 - present) of H & C Lorenzen Farm, Inc., which is a 4,000 acre family wheat farming operation located near Pendleton, Oregon. He received Umatilla County Conservation Farmer of the Year Award (1992).

**Lubchenco, Jane**

Dr. Jane Lubchenco is an environmental scientist and marine ecologist who is actively engaged in teaching, research, synthesis and communication of scientific knowledge to interested citizens and policy makers. She received her B.A. from Colorado College, M.S. from the University of Washington and PhD. from Harvard University. She was assistant professor at Harvard University for two years before moving to Oregon State University. She holds two positions at Oregon State University: Wayne and Gladys Valley Professor of Marine Biology and Distinguished Professor of Zoology. Her research interests include biodiversity, climate change, sustainability science and the state of the oceans. She is lead Principal Investigator (of 13 Co-PIs) for a $43 million, 4-university consortium called the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) that is focused on understanding the dynamics of the nearshore portion of the large marine ecosystem along the west coast of the US. She and her husband, marine ecologist Bruce Menge, students and collaborators are also engaged in a comparison of coastal upwelling ecosystems along the coasts of the US West coast, New Zealand, Chile and South Africa.

Jane is the first woman President of the International Council for Science, a Past President of the American Association for the Advancement of Science (AAAS) and of the Ecological Society of America. She serves on the U.S. National Science Board (having been twice nominated by President Clinton and twice confirmed by the US Senate) and she recently completed a term on the Executive committee of the Council of the U.S. National Academy of Sciences. She co-founded and leads the Aldo Leopold Leadership Program and is a Principal of COMPASS, the Communication Partnership for Science and the Sea. Her research contributions in ecology are widely recognized. Eight of her publications have been named Science Citation Classic Papers. She is an elected member of the National Academy of Sciences, the American Academy of Arts and Sciences, the American Philosophical Society and the European Academy of Sciences. She serves on the Pew Oceans Commission, an independent group of American leaders conducting a national dialogue on the policies needed to restore and protect the marine ecosystems in US waters. She is a Director or Trustee of the David and Lucile Packard Foundation, the Monterey Bay Aquarium, SeaWeb, the Royal Swedish Academy of Sciences' Beijer Institute for Ecological Economics and Environmental Defense. She has received numerous awards including a MacArthur Fellowship, a Pew Fellowship, eight honorary degrees (including one from Princeton University), the 2002 Heinz Award in the Environment, the 2003 Nierenberg Prize for Science in the Public Interest and the 2004 Distinguished Scientist Award from the American Institute of Biological Sciences.

**McArthur, Mike W.**

A native Oregonian, Mike McArthur graduated from Lewis and Clark College in 1970 with a BS in Psychology. He played intercollegiate football for fours years and competed on the track team at LC. He then went to Western Oregon to earn a teaching degree and certification with a secondary social science endorsement. Five years of teaching and coaching followed in Portland and the south coast community of Bandon. He married Jeanney, an accomplished multi-media artist, in 1973. In 1977 they left teaching and Bandon to moved to Sherman County, OR to work on a dryland wheat and cattle

operation. Mike was elected to and served on the board of directors of the regional grain cooperative: Mid Columbia Producers for six years. He participated in the National Wheat Industry Leaders of Tomorrow program and was County Wheat League president in 1998. They are still involved in the 115 year old family farming operation although not as actively due to Mike's full time job as County Judge, a position to which he was elected in 1992. The county judge in Sherman County is the chair of the board of commissioners and county administrator as well as juvenile and probate judge. In 1999 McArthur served as the President of the Association of Oregon Counties and currently represents Oregon counties on the board of the National Association of Counties. He has held a number of other positions related to community and economic development and now serves in the position of chair of the Rural Affairs Sub-Committee of the Agricultural Steering Committee for NACo. Also, he currently serves on the Governor's Industrial Lands Task force and is Co-Chair of the State Community Development Forum.

**MacRitchie, Andrew (alternate for Judi Johansen, PacifiCorp)**

Andy MacRitchie became PacifiCorp's executive vice president of Strategy and Major Projects in January 2002. Andy is responsible for strategy, business planning and environmental policy for the U.S. Division of ScottishPower, which includes oversight of the major issues program. He is also a member of the PacifiCorp's Board of Directors. Prior to assuming his current position, Andy formed and served as executive vice president of the Power Delivery business. Here he was responsible for the operational management of PacifiCorp's $4 billion asset base covering electric distribution, transmission and customer service for its 1.5 million customers in Oregon, Utah, Washington, California, Idaho and Wyoming.

Andy moved to the US in December 1998 to lead the ScottishPower merger team through state regulatory commissions' approvals during the company's merger with PacifiCorp. Upon completion of the regulatory process, Andy led the transition planning process, involving a combined PacifiCorp/ScottishPower senior management team in the development of plans to transform PacifiCorp into a top 10 U.S. utility. Andy joined ScottishPower in 1986. Prior to working for ScottishPower, Andy was operations manager at Stagecoach Holdings. He is a member of the Institution of Electrical Engineers (IEE) and is a Chartered Engineer in the U.K. Andy has an honors degree in electronics and electrical engineering as well as an MBA from Strathclyde Graduate Business School in Scotland. He also completed an Executive Development Program at Wharton Business School in the United States.

**Mitchell, Ronald B.**

Dr. Ronald B. Mitchell is an Associate Professor with tenure in the Department of Political Science at the University of Oregon. He earned his PhD in Public Policy at Harvard University in 1992. He was a Visiting Associate Professor at the center for Environmental Science and Policy at Stanford University from June 1999 through December 2001. He has an award-winning book published with MIT Press as well as numerous articles in scholarly journals. His research focuses on the effectiveness of international institutions at influencing the behavior of states and nonstate actors as well as on the influence of environmental science on international policymaking. He teaches

courses on international relations theory, international environmental politics, and international regimes.

**Schell, Steve**
Steven R. Schell is a partner in the Portland Law Firm of Black, Helterline, LLP. He practices environmental, land use and real estate law. He is a native Oregonian, having graduated from Franklin High School in Portland, the University of Oregon with two degrees, in 1961 a BA in Political Science, and in 1968 a J. D in Law. He has a 1965 M.A. from the University of Denver in Economics. He served in the United States Air Force from 1961 to 1965. He served as a member and vice-chairman of Oregon's Land Conservation and Development Commission from 1973 to 1976, on the Oregon Law Commission task force that resulted in the creation of the Land Use Board of Appeals in 1978-1979, on the State's Energy Facility Siting Council from 1990 to 1998. He currently chairs the Oregon non-profit corporation, Energy Trust of Oregon.

**Southworth, Jack**
Jack Southworth and his wife, Teresa own and operate Southworth Bros. Ranch, a cow-calf-yearling ranch located on the south side of the Strawberry Mountains near the small town of Seneca. The ranch was homesteaded by Jack's great-grandfather in 1885 and has been operated by his family ever since. He and Teresa graduated from Oregon State University in 1977, married in 1978 and have been operating the ranch since then. Jack is president of the Grant County Farm Bureau, serves as a director of Blue Mountain Hospital, Oregon Agricultural Education Foundation, the E. R. Jackman Foundation and the Blue Mountain Healthcare Foundation. He is an amateur historian and enjoys collecting photos and stories having to do with the history of southern Grant County. He believes that when ranching is done well, ranchers can produce safe and delicious beef, a healthy ecosystem and do it in a manner that is profitable and enjoyable for the people involved.

**Sten, Erik**
Over the past 7 years, Portland City Commissioner Erik Sten has led the city's efforts to combat climate change in an urban environment. In 1994, the City of Portland was the first city in the United States to adopt a Local Action Plan on Global Warming. Since then over 400 municipal governments world-wide have followed Portland's lead and adopted climate change mitigation plans. In 2001, Portland City Council and the Multnomah County Board of Commissioners adopted a joint Local Action Plan on Global Warming with a goal of reducing carbon dioxide emissions to 10 percent below 1990 levels by 2010. This target is slightly more aggressive than the 1997 Kyoto Protocol, which, though not ratified by the U.S., set a national reduction goal of seven percent below 1990 levels by 2008 to 2012. Commissioner Sten has conveyed Portland's efforts at many national and international gatherings including a presentation at the United Nations Conference of the Parties on Climate Change in Buenos Aires.

**Wilkinson, Jean**
Jean Underhill Wilkinson is a partner in Martin Underhill Farms, a family owned wheat and cattle ranch that has existed since 1878. Prior to joining her family business, Jean

worked as a lobbyist and legal counsel for the Oregon Cattlemen's Association and the Oregon Farm Bureau Federation. Jean is a current member of the Oregon State Bar, and is Chair Elect for the Agriculture Law Section. She is also President of the Wasco County Wheat Growers Association, and a board member for the Multnomah County Farm Bureau.

**Wyatt, Bill**

Bill Wyatt has been Executive Director of the Port of Portland since October of 2001. The Port of Portland, governed by a nine member Commission appointed by the Governor, operates four marine terminals, three general aviation airports and Portland International Airport (PDX). The Port has just over 800 employees and annual revenues of approximately $250 million.

Prior to his appointment as the Port's Executive Director, Wyatt served as Chief of Staff to former Oregon Governor John A. Kitzhaber for seven years, preceded by six years as President of the Oregon Business Council, and five years as Executive Director of the Association for Portland Progress, then, Portland's downtown development association. Wyatt served as a state representative from the Astoria area from 1974 – 1977. He attended public schools in Astoria, and Alexandria, Virginia, and later attended both Willamette University and the University of Oregon, where he was also student body President. Wyatt has been a member of the Board of Directors of Oregon Public Broadcasting, and was Board Chair of the Urban League of Portland. He served as a Director of the Crabbe-Huson mutual funds until their sale to Liberty Mutual in 1998.

**Wyse, Duncan**

Duncan Wyse became the President of the Oregon Business Council in June 1995. The Oregon Business Council is a private non-profit, non-partisan organization consisting of 46 business executives of some of Oregon's largest businesses. OBC's function is to focus the knowledge and resources of its members on key, long-range public policy issues facing Oregon. Prior to this position, Wyse was Executive Director of the Oregon Progress Board, where he developed *Oregon Shines*, Oregon's long-range strategy for economic growth, and *Oregon Benchmarks*, indicators measuring how Oregon is doing as a people, place and economy. Previously, he spent eight years at the California Public Utilities Commission, serving as advisor to the President and Director for Policy and Planning. He was heavily involved in restructuring the telecommunications, electricity and natural gas industries in California. He currently serves on the Oregon Quality Education Commission, the E3: Employers for Education Excellence Board of Directors, the Oregon Mentors Leadership Council, the Multnomah County Leaders Roundtable, Portland-Multnomah Progress Board, the Multnomah County Commission on Children, Families and Community, the Portland Public Schools Foundation, the Willamette Restoration Initiative and the Governor's Global Warming Advisory Group. Wyse holds a Bachelor's degree from Pomona College and a Master's in Business Administration from Stanford University. He grew up in Portland, and is married with three children.

## Ex Officio Member

**Neilson, Ronald P.**
Ronald P. Neilson is a BioClimatologist with the USDA Forest Service, Pacific Northwest Research Station and a Professor (Courtesy) with the Department of Botany and Plant Pathology and the Department of Forest Science at Oregon State University. Dr. Neilson has focused on the theory, mechanisms and simulation of vegetation distribution for nearly three decades. He received the Cooper Award from the Ecological Society of America for his research on oak distribution in the Rocky Mountain region. Dr. Neilson's MAPSS biogeography model and MC1 dynamic general vegetation model have contributed to national and global assessments by the Intergovernmental Panel on Climate Change (IPCC) and the U.S. Global Change Research Program and to *Our Changing Planet*, the formal description of the U.S. Global Change Research Program. Dr. Neilson was the lead author for the Forest sector for the IPCC's special report on *The Regional Impacts of Climate Change* and the convening lead author for an Annex to the Special Report on simulations of global vegetation re-distribution under climate change. His current work extends into Earth System Modeling, Landscape System Modeling and large-scale fire forecasting. Dr. Neilson received the Forest Service Chief's 1999 Honor Award for Superior Science and the USDA Secretary's Honor Award for Superior Service in 2003. He received a BA in 1971 from the University of Oregon, an MS in 1975 from Portland State University, and a Ph.D. in 1981 from the University of Utah.

## State Agency Members

**Grainey, Michael W.**
Michael Grainey is Director of the Oregon Department of Energy in Salem, Oregon. Mike graduated from New York University Law School and received his undergraduate degree from Gonzaga University in Spokane, Washington. He is admitted to practice law in Oregon, Washington and the District of Columbia. His civic activities have included membership on the Board of Directors of the Salem Chamber Orchestra, coaching youth soccer in the Salem Parks and Recreation Program, debate coach for Blanchet High School in Salem and chair of his church's social justice committee.

**Hallock, Stephanie**
Stephanie Hallock was appointed Director by the Oregon Environmental Quality Commission on Nov 6, 2000. Previous to her appointment she was on a special one-year assignment as a water quality policy adviser for Governor John Kitzhaber's Natural Resources Policy Group. Hallock has been with DEQ since August 1988, serving as Administrator of the Hazardous and Solid Waste Division, Acting Administrator of the Water Quality Division, and Administrator of DEQ's Eastern Region ,overseeing agency work in eighteen Oregon counties. She also served at the U.S. Environmental Protection Agency's Region 9 office in San Francisco as chief of the Policy and Grants Branch, and has worked in advertising and public relations at the Hallock/Modey Agency in Portland. Hallock has a master's degree in Public Administration and a Bachelor of Arts degree in English, both from Portland State University.

**Savage, John**
John Savage has been a Public Utility Commissioner since September, 2003. From January 2002 through August, 2003, he directed the Public Utility Commission's 70-person regulatory staff. From December, 1993 to January 2002, he served as director of the Oregon Department of Energy. During that time, the 1997 Legislature passed the carbon dioxide emissions law for new power plants. From January 1987 to December 1993, John headed the Policy and Planning Division of the Oregon Department of Energy. The Division was responsible for producing the state's energy, global warming, and petroleum contingency plans.

**Van't Hof, David**
David Van't Hof is the sustainability and renewable energy policy advisor for Governor Kulongoski. Mr. Van't Hof will be implementing the Governor's Executive Order on sustainability, the Governor's three state climate change initiative, and fostering the development of renewable energy and associated technologies in Oregon. He previously served as Governor Kulongoski's natural resources advisor on water, energy and land use issues. Prior to working for the Governor, Mr. Van't Hof was a private sector attorney who focused on natural resources, land use, and administrative law, with an emphasis on major project permitting and water rights. He advised clients on complex regulatory matters such as environmental and siting issues for projects including natural gas, wind, and hydroelectric facilities. He also assisted a variety of public and private clients with National Environmental Policy Act (NEPA), Endangered Species Act (ESA), water rights, and water quality issues and represented several clients in the Klamath Basin Water Rights Adjudication and in contested cases before the Water Resources Department.

Mr. Van't Hof was a former clerk for then Supreme Court Justice Ted Kulongoski. He graduated *cum laude* from the University of Michigan Law School and was Phi Beta Kappa at Trinity College in Hartford, Connecticut. He attended the Institute for European Studies in Vienna, Austria and was a Peace Corps volunteer in Senegal, West Africa. His past professional activities include: member of the Oregon Water Resources Congress, Rocky Mountain Mineral Law Foundation, Oregon State Bar Environmental and Natural Resources Section, Administrative Law Section, and Indian Law Section, Community Water Supply Task Force, organized by the Oregon Water Resources Commission; board member, African Refugee and Immigrant Network of Oregon; founder and former board member and board president, Hands On Portland; volunteer immigration attorney, Sponsors Organized to Assist Refugees; chair of Large Firm Associates Committee, Campaign for Equal Justice.

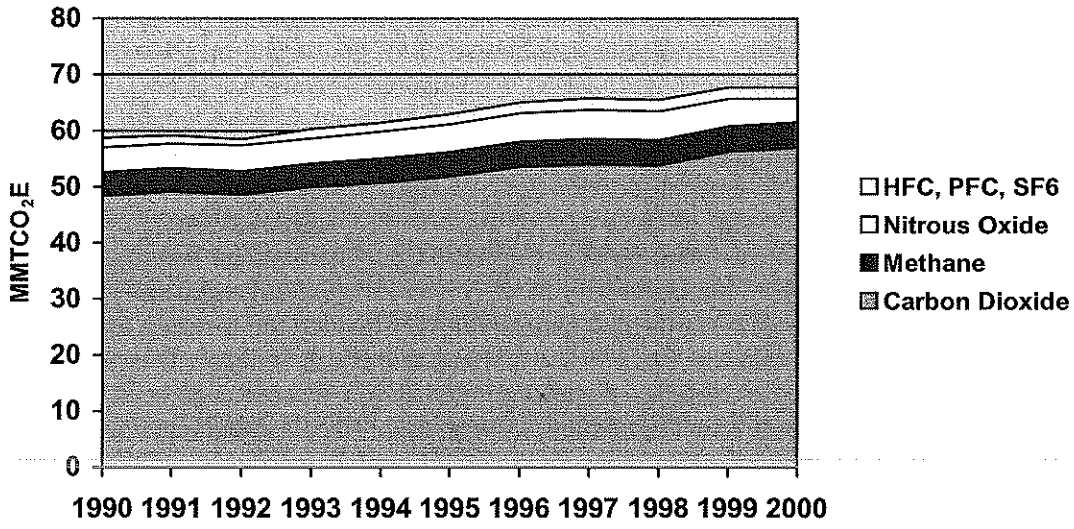
## APPENDIX C

## INVENTORY AND FORECAST OF OREGON'S GREENHOUSE GAS EMISSIONS

In 2000, Oregon's greenhouse gas (GHG) emissions were 67.7 million metric tons of carbon dioxide equivalent[1] ($MMTCO_2E$).[2] That was about one percent of US GHG emissions, which exceeded 7 billion metric tons $CO_2E$.

By 2000, there was an 15 percent increase over Oregon's 1990 GHG emissions of 58.7 $MMTCO_2E$. According to its worst case forecast, the Department of Energy estimates that GHG emissions from Oregon will be 61 percent higher by 2025. Figure 1 shows change in emissions between 1990 and 2000. Table 2 shows historical emissions and Table 3 shows the forecast emissions.

### Figure 1. Oregon Greenhouse Gas Emissions




[1] "Carbon dioxide equivalent ($CO_2E$)" refers to a comparison of the radiative force of different greenhouse gases related to $CO_2$, based on their global warming potential. It is a way to compare all greenhouse gases on a uniform scale of how much $CO_2$ would be needed to have the same warming potential as other gases over the same time scale. Following US Environmental Protection Agency (EPA) and international reporting protocols per the *Second Assessment Report*, methane is 21 times more powerful than $CO_2$ over 100 years and nitrous oxide is 310 times more powerful for example.

[2] The Department used the US Environmental Protection Agency State Toll for Estimating Greenhouse Gas Emissions to prepare its inventory except for variations in accounting for $CO_2$ emissions from electricity use, methane emissions from landfills, and a few minor sources. Exceptions are explained in the discussion of gases. EPA's *Emissions Inventory Improvement Program Volume VII: Estimating Greenhouse Gas Emissions* serves as a guide.

Of the GHG emissions from Oregon in 2000, 84 percent came from $CO_2$. The primary source of $CO_2$ pollution came from burning fossil fuels, such as coal at power plants serving the state, gasoline, diesel, and natural gas. There were also emissions from industrial processes, such as manufacture of cement and from combustion of fossil-fuel derived products in burning municipal and industrial wastes.

The inventory includes a reduction in emissions from storage of carbon from yard trimmings, wood products, and other miscellaneous products in landfills. The inventory does not include other land use and forest-management related sources and sinks, such as forest sequestration, because data were not available. They are being collected as part of another study, the West Coast Carbon Sequestration Partnership. Because that effort was already underway when the Advisory Group on Global Warming began, the Department did not attempt to duplicate its efforts.

Table 1 provides a summary of the major sources of greenhouse gas emissions. The individual sources are described in later sections.

**Table 1. Oregon Greenhouse Gas Emissions, $MMTCO_2E$**

| | 1990 | 1995 | 2000 |
|---|---|---|---|
| **Gross $_{CO2}$** | 49.2 | 52.6 | 57.9 |
| **Net $_{CO2}$** | **48.4** | **51.9** | **57.0** |
| $CO_2$ from Fossil Fuel Combustion | 48.5 | 51.9 | 57.0 |
| Industrial Processes | 0.3 | 0.3 | 0.6 |
| Waste | 0.3 | 0.4 | 0.3 |
| Landfill Carbon Storage | (0.8) | (0.8) | (0.8) |
| **Methane** | **4.2** | **4.4** | **4.5** |
| Stationary Combustion | 0.1 | 0.1 | 0.1 |
| Mobile Combustion | 0.1 | 0.1 | 0.1 |
| Natural Gas and Oil Systems | 0.6 | 0.6 | 0.6 |
| Enteric Fermentation | 2.0 | 2.2 | 2.2 |
| Manure Management | 0.3 | 0.3 | 0.3 |
| Waste | 1.0 | 0.9 | 1.1 |
| Wastewater | 0.2 | 0.2 | 0.2 |
| **Nitrous Oxide** | **4.4** | **4.9** | **4.2** |
| Stationary Combustion | 0.1 | 0.1 | 0.1 |
| Mobile Combustion | 0.6 | 0.8 | 0.8 |
| Manure Management | 0.1 | 0.1 | 0.1 |
| Agricultural Soil Management | 3.4 | 3.8 | 3.1 |
| Waste | 0.0 | 0.0 | 0.0 |
| Wastewater | 0.1 | 0.1 | 0.1 |
| **HFC, PFC, and $SF_6$** | **1.7** | **1.8** | **2.0** |
| Hydrofluorocarbons | 0.0 | 0.3 | 0.7 |
| Perfluorocarbons | 1.1 | 1.1 | 0.9 |
| Sulfur Hexafluoride | 0.5 | 0.5 | 0.3 |
| **Gross Emissions** | 59.5 | 63.8 | 68.6 |
| **Landfill Carbon Storage** | (0.8) | (0.8) | (0.8) |
| **Net Emissions (Sources and Storage)** | **58.7** | **63.0** | **67.7** |

In 2000, emissions from methane ($CH_4$), primarily from cattle and landfills, contributed 7 percent of greenhouse gas pollution. Nitrous oxide ($N_2O$) emissions, primarily from agricultural practices, contributed about 6 percent to greenhouse gas pollution. Manufactured halocarbons, which include hydrofluorocarbons (HFC), perfluorocarbons (PFC), and suflur-hexafluoride ($SF_6$), accounted for the remaining 3 percent.

## Carbon Dioxide Emissions

Fossil fuel combustion is the primary source of $CO_2$ emissions. Table 2 shows the breakdown of $CO_2$ emissions from fossil fuel combustion for the majors sectors: electricity generation, transportation, industrial, residential, and commercial.

**Table 2. $CO_2$ Emissions by Sector from Fossil Fuel Combustion, $MMTCO_2$**

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Electricity generation | 20.7 | 21.0 | 20.6 | 21.4 | 21.6 | 22.0 | 22.7 | 22.9 | 21.7 | 22.9 | 24.2 |
| Transportation | 18.2 | 18.7 | 18.5 | 18.5 | 19.2 | 19.4 | 20.1 | 20.2 | 21.2 | 21.6 | 21.5 |
| Industrial | 5.6 | 5.6 | 6.2 | 6.3 | 6.3 | 6.9 | 6.7 | 6.9 | 6.6 | 7.4 | 6.8 |
| Residential | 2.1 | 2.2 | 1.8 | 2.2 | 2.1 | 2.1 | 2.3 | 2.3 | 2.4 | 2.6 | 2.6 |
| Commercial | 1.9 | 1.8 | 1.6 | 1.7 | 1.6 | 1.6 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 |
| **TOTAL** | **48.5** | **49.3** | **48.8** | **50.1** | **50.8** | **51.9** | **53.6** | **54.1** | **53.8** | **56.3** | **57.0** |

Oregon has a Benchmark to hold its $CO_2$ emissions at 1990 levels. However, between 1990 and 2000 total net $CO_2$ emissions grew almost 18 percent.

**Electricity Generation.** Electricity was the major source of $CO_2$ from fossil fuels in 2000, representing 42 percent of those emissions. Emissions from electricity grew 17 percent from 1990 to 2000, but its relative contribution stayed the same.

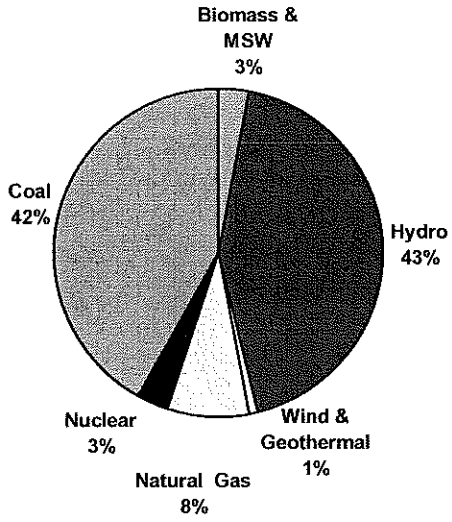
The Department calculates emissions from electricity generation based on the carbon content of the regional mix of electricity for the 11 contiguous western states. The Department took the average carbon content from 1990 through 2000 and applied that to electricity loads. While some states inventory only emissions from generating facilities within the state, the Department believes a regional carbon mix better reflects the carbon mix associated with the delivery of electricity to Oregon's consumers.

The regional approach better reflects carbon emissions for the following reasons: 1) The regional grid provides electricity to the state. 2) Taking credit for the hydropower generated for the Bonneville Power Administration from dams on the Columbia River, as it is allocated to Oregon in national inventories, does not reflect the way that electricity is distributed in the region. 3) Oregon's second-largest investor-owned utility, PacifiCorp, has most of its generation out of state, and most of that is coal-fired.

Although the comprehensive emissions inventory stops at 2000, the Department does have data from 2002 that reflect the carbon content of the electricity serving the state. This is based on data specific to Oregon utilities, rather than the more general regional average. However, it does not differ significantly from the regional number. Figure 2 shows the sources of electricity that supplied the state in 2002.

The mix of sources shows hydropower, which has no direct emissions, at 43 percent and coal at 42 percent. At 8 percent, natural gas-fired plants were the third largest source of electricity supply. Non-fossil fuel sources also included biomass and municipal solid wastes, shown as one category, and nuclear, which each supplied about 3 percent. Wind and geothermal together supplied only 1 percent.

**Figure 2. Electricity Generation Mix Supplying Oregon 2002**




**Transportation.** Gasoline and diesel fuel use in transportation[3] were the second largest sources of emissions from fossil fuels at 38 percent in 2000. Emissions from transportation grew 18 percent from 1990 to 2000, but the relative contribution has not changed.

**Direct Natural Gas and Distillate Use.** $CO_2$ emissions from the industrial and residential sector from direct natural gas and distillate fuel combustion grew by 22 and 23 percent, respectively, from 1990 to 2000. Other sources were asphalt and petroleum coke in the industrial sector and liquefied petroleum gas in the residential sector. Emissions from the commercial sector were flat.

## Methane

Methane emissions contributed about 4.5 $MMTCO_2E$ in 2000. That represented about 7 percent of Oregon's 2000 greenhouse gas inventory. The distribution of methane emissions for 2000 is shown in figure 3.

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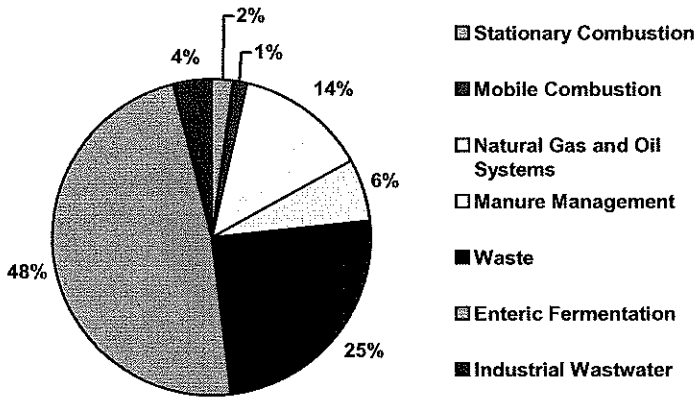
[3] Residual fuels use by vessels is not included because international ships are the primary purchasers. They purchase fuel at any port, based on price. Therefore combustion of the fuel is not directly related to economic activity within Oregon.

More than half of methane emissions came from agricultural practices. Enteric fermentation, or burps from cattle and other domesticated animals, contributed 48 percent. The methane is generated in the rumen, or first stomach, of cattle and other ruminants. Another 6 percent came from manure management, both from that managed in lagoons on farms or that simply deposited on the ground.

The second largest source of methane was from waste in municipal and industrial landfills at 26 percent[4] Another 4 percent came from wastewater from pulp and paper production, fruit and vegetable processing, and red meat and poultry processing.

**Figure 3. Methane Emissions in Oregon**




Other sources include leaks from natural gas and oil systems (calculated from miles of pipeline and number of services), emissions from vehicles, and emissions from combustion of natural gas, distillate, residual fuel, and wood in homes and businesses.

## Nitrous Oxide

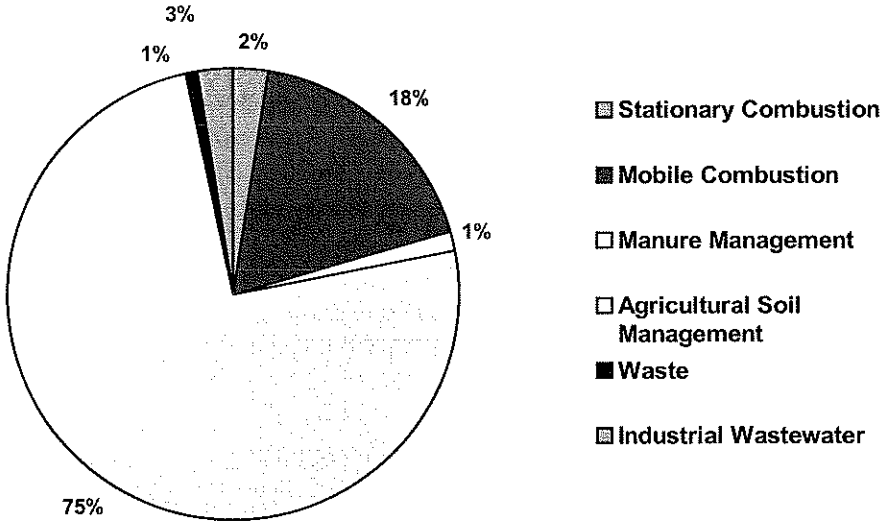
Nitrous oxide ($N_2O$) emissions contributed about 4.2 $MMTCO_2E$ in 2000. That represented about 6 percent of Oregon's 2000 GHG emissions. The distribution of $N_2O$ emissions for 2000 is shown in figure 4.

The primary source of $N_2O$ emissions is from agricultural soil management through numerous pathways. $N_2O$ is emitted from agricultural soils due to synthetic and organic fertilizer use, application of animal wastes through daily spread activities, application of managed animal wastes, crop residues remaining on agricultural fields, biological nitrogen fixation by certain crops, cultivation of highly organic soils, and land application of sewage sludge. $N_2O$ also is emitted from soils from direct deposit of animal wastes in pastures, ranges and paddocks. There are also indirect emissions from fertilizers and

[4] This represents an estimate of methane actually released to the atmosphere. The amount of methane produced in landfills is significantly higher, but some is converted to $CO_2$ as it passes through surface soils and some Oregon landfills also capture and flare methane. Since the $CO_2$ released from landfills is not fossil-based, it is not calculated separately. It is assumed to be recycling through the biosphere.

from leaching and runoff. In addition to agricultural soils management, $N_2O$ is directly emitted from the manure decomposition process.

**Figure 4. Nitrous Oxide Emissions 2000**




Small amounts of $N_2O$ are emitted from internal combustion engines and during the catalytic after-treatment of exhaust gases, but these processes are not well understood. In any case, those emissions stayed relatively flat over the period 1990-2000.

## Perfluorocarbons (PFCs)

Aluminum production was the major source of PFCs between 1990 to 1996. The emissions occur during the reduction of alumina in the primary smelting process. (As of 2001, aluminum is no longer produced from alumina in Oregon, and recycling aluminum does not produce PFC emissions.)

Beginning in 1997, emissions from PFCs for plasma etching and chemical deposition processes in the semiconductor industry exceeded aluminum production, and by 2000 represented about 70 percent of PFC emissions. However, total emissions of PFCs dropped from 1.2 $MMTCO_2E$ in 1990 to 0.9 $MMTCO_2E$ in 2000. Overall, PFC emissions were about 1 percent of the state's GHG emissions in 2000.

## Hydrofluorcarbons (HFCs)

HFCs are most commonly used as a replacement for CFC in cooling and refrigeration systems. (CFC was formerly the most common refrigerant. However, CFC destroys the stratospheric ozone layer. Its production is banned by international treaty.) Use and discharge of HFC is controlled as a refrigerant, but not for other uses.

HFCs are used for foam blowing, fire extinguisher applications, aerosols, sterilization, and as solvents. HFCs are also used in plasma etching and chemical deposition processes

in the semiconductor industry. While HFCs do not damage the ozone layer, they are powerful greenhouse gases. HFC emissions rose from nearly zero in 1990 to about 0.7 $MMTCO_2E$ in 2000, when they accounted for about 1 percent of Oregon's GHG emissions.

## Sulfur Hexafluoride (SF6)

$SF_6$ is one of the most powerful greenhouse gases. It is 23,900 times more powerful than $CO_2$. The largest use of $SF_6$ is as an electrical insulator in transmission and distribution equipment. $SF_6$ is also used for plasma etching and chemical vapor deposition processes in the semiconductor industry. There was some $SF_6$ emitted from aluminum production as well.

$SF_6$ emissions dropped from 0.5 $MMTCO_2E$ in 1990 to 0.3 $MMTCO_2E$ in 2000, primarily because of declines in emissions from the electricity sector due to better control practices. $SF_6$ was about 0.5 percent of total GHG emissions in 2000.

## Forecasts

The Department forecasts that Oregon's greenhouse gas emissions will grow by 36 $MMTCO_2E$, or 61 percent, in the worst case estimate from 1990 to 2025. That rate assumes no change from current practices. In reality, it will probably grow less. Table 3 shows the forecast by sources of gases. The following discussion highlights major elements of the forecast.

**Electricity and Natural Gas.** For $CO_2$ emissions from electricity and natural gas, the Department used a growth rate of 1.6 percent, which is a composite of Northwest Power and Conservation Council forecasts and forecasts in the integrated resource plans of Portland General Electric, PacifiCorp, and Northwest Natural.

**Transportation.** For transportation, the 1990 Oregon emissions were 18.3 $MMTCO_2$, according to the Federal Energy Information Administration (EIA) data. By the year 2000, emissions reached 21.5 MMT $CO_2$, for an annual growth rate of 1.6 percent. Based on the Oregon Department of Transportation's forecast for taxed fuels and U.S. Department of Energy forecasts for jet fuel and freight diesel, the Oregon Department of Energy forecast an annual growth rate of 1.6 percent, leading to emissions of 32.0 MMT $CO_2$ by the year 2025. The base case transport $CO_2$ emissions grow 33 percent between 2000 and 2025.

**Methane**. The forecast for methane emissions from landfills is described in the introduction to the section on materials use in the main report. In summary, the historic trend is used as the starting point for projecting future growth in waste generation. Using Department of Environmental Quality and US EPA data, estimates were made of the rate of change in per-capita waste generation during the period 1993 to 2002 for 30 different categories of wastes. The rates of adjusted growth in per-capita waste generation (by material) were then related to the rate of growth in inflation-adjusted Oregon personal income during the same period.

**TABLE 3. Historical and Forecast Oregon Greenhouse Gas Emissions**

| | 1990 | 1995 | 2000 | 2015 | 2025 |
|---|---|---|---|---|---|
| **Gross $CO_2$** | 49.2 | 52.6 | 57.9 | 67.1 | 73.3 |
| **Net $CO_2$** | **48.4** | **51.9** | **57.0** | **66.1** | **72.1** |
| $CO_2$ from Fossil Fuel Combustion | 48.5 | 51.9 | 57.0 | 65.9 | 71.8 |
| Industrial Processes | 0.3 | 0.3 | 0.6 | 0.9 | 1.1 |
| Waste | 0.3 | 0.4 | 0.3 | 0.3 | 0.4 |
| Landfill Carbon Storage | (0.8) | (0.8) | (0.8) | (1.0) | (1.2) |
| **Methane** | **4.2** | **4.4** | **4.5** | **5.9** | **6.5** |
| Stationary Combustion | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |
| Mobile Combustion | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |
| Natural Gas and Oil Systems | 0.6 | 0.6 | 0.6 | 0.7 | 0.8 |
| Enteric Fermentation | 2.0 | 2.2 | 2.2 | 2.6 | 2.9 |
| Manure Management | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Waste | 1.0 | 0.9 | 1.1 | 1.9 | 2.3 |
| Wastewater | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| **Nitrous Oxide** | **4.4** | **4.9** | **4.2** | **5.5** | **6.0** |
| Stationary Combustion | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |
| Mobile Combustion | 0.6 | 0.8 | 0.8 | 1.0 | 1.1 |
| Manure Management | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 |
| Agricultural Soil Management | 3.4 | 3.8 | 3.1 | 4.3 | 4.7 |
| Waste | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Wastewater | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| **HFC, PFC, and $SF_6$** | **1.7** | **1.8** | **2.0** | **2.5** | **3.3** |
| Hydrofluorocarbons | 0.0 | 0.3 | 0.7 | 1.9 | 2.6 |
| Perfluorocarbons | 1.1 | 1.1 | 0.9 | 0.5 | 0.5 |
| Sulfur Hexafluoride | 0.5 | 0.5 | 0.3 | 0.2 | 0.1 |
| **Gross Emissions** | 59.5 | 63.8 | 68.6 | 81.1 | 89.1 |
| **Landfill Carbon Storage** | (0.8) | (0.8) | (0.8) | (1.0) | (1.2) |
| **Net Emissions (Sources and Storage)** | **58.7** | **63.0** | **67.7** | **80.1** | **87.8** |

The estimate is that per-capita waste generation, aggregated across all 30 material categories, will grow to 10.1 pounds per person per day in 2025 under the "business as usual" scenario. This assumes that relationships between personal income and materials use/waste hold constant and is based on projections of inflation-adjusted personal income from the Oregon Department of Administrative Services. Coupled with projected population increases, total in-state waste generation (all discards, including recycling and composting) is projected to grow from 5.1 million tons in 2003 to 8.4 million tons in 2025. The recovery rate (recycling and composting) of these rates, currently at about 46 percent, is assumed to hold constant, so not all discards end up in landfills.[5]

[5] The non-landfill benefits of recycling, composting, and waste prevention, such as reduced fossil fuel use and increased carbon storage in forests and landfills, were included in estimates of the greenhouse gas benefits of specific measures. However, the state inventory does not account for non-landfill offsets, such as savings in industrial processes from using recycled feed-stocks, in part because many of the benefits involve emission reductions outside of Oregon.

Oregon also imports significant quantities of municipal solid waste (garbage) from other states. Waste imports are modeled, growing at a rate of about 4.6 percent per year, from about 1.5 million tons projected in 2003 to 4.0 million tons in 2025. Only emissions associated with the disposal portion of the life cycle are counted for these imported wastes.

**Other GHG.** Most other projection sources are forecast based on linear regressions or exponential regressions of historical data. The Department did not have source-specific forecasts for the many minor contributors. Because most major semiconductor manufacturers have programs to reduce HFC, PFC, and $SF_6$, we forecast that those emissions from that sector will return to 1995 levels in the future. The 1995 level is therefore the value in the 2015 and 2025 forecast for that sector.

APPENDIX D

# Scientific Consensus Statement on the Likely Impacts of Climate Change on the Pacific Northwest

## Executive Summary

The signatories of this statement seek to describe the state of scientific knowledge regarding likely impacts of climate change to the Pacific Northwest region. The intent is to assist Governor Kulongoski's Advisory Group on Global Warming in its task of developing a greenhouse gas emission reduction strategy for Oregon. The signatories agree that climate change is underway and that it is having global effects as well as impacts in the Pacific Northwest region. Climate-related changes to date, likely future changes, key questions to answer and research priorities are listed below.

**Regional Climate Change Impacts in Recent Decades.**

**Temperature.** Scientists are very certain that the Pacific Northwest is warming, and that since 1975 the warming is probably best explained by human-caused changes in greenhouse gases.

**Precipitation.** Since the beginning of the 20th century, annual precipitation has increased on average by 10% in the Pacific Northwest, with increases in the range of 30–40% in some areas of eastern Washington and northern Idaho.

**Sea Level.** Land on the central and northern Oregon coast (from Florence to Astoria) is being submerged by rising sea level at an average rate of 0.06 – 0.08 inches (1.5–2 mm) annually, as inferred from data for the period 1930–1995.

**Snowpack.** Between 1950 and 2000, snowpack across the Pacific Northwest declined. In the Cascades of Oregon and Washington, the cumulative downward trend in April 1 snow-water equivalent from hydrologic simulations is approximately 35% for the period 1950–2003. About half of these changes are due to temperature increases, and half to declines in precipitation. Timing of the peak snowpack has moved earlier in the year, increasing March streamflows and reducing June streamflows. Snowpack at low-to-mid elevations is the most sensitive to warming temperatures.

**Regional Climate Change Projections over the Next 10-50 Years.**

**Temperature.** Scientists have intermediate certainty that average temperatures in the Pacific Northwest will continue to increase in response to global climate change. Assessments suggest that the average warming will be in the range of 0.9–4.7° F for the 2020s and 2.7–5.8° F for the 2040s. These projected increases are highly likely to result in a higher elevation treeline, longer growing seasons, longer fire seasons, earlier animal and plant breeding, longer and more intense allergy season and changes in vegetation zones.

**Precipitation.** Precipitation changes are very uncertain. The challenge will be to resolve scientific uncertainties about the interactions among atmosphere, land and ocean before significant climate change impacts occur. Oregon is expected to remain a wintertime-dominant precipitation regime (i.e., most precipitation will continue to occur in the winter). In addition, most precipitation will continue to occur in the mountains. In many river basins (especially those characterized a mix of winter precipitation and those dominated by snowmelt), winter

streamflow will increase, summer streamflow will decease, and peak flows will occur earlier in the year. Impacts to water resources may include decreased summer water availability, decreased low flows in late summer, increased flood risks in winter, reduced summer hydropower capacity, higher water temperatures, and increased pollutant concentrations in late summer.

**Sea Level.** Sea level is very certain to continue to rise although the impact will vary depending upon how fast the land is rising. In addition to increases in sea level, maximum wave heights will likely also increase, resulting in increasing erosion in coastal areas.
**Snowpack.** Spring snowpack will continue to decline in many areas, resulting in further losses of natural water storage in the mountains. Mid-elevation areas will, in general, experience impacts sooner than high-elevation areas.
**Marine Ecosystems.** It is very certain that ocean circulation will continue to change in response to ocean-atmospheric processes. These changes suggest a likely increase in the magnitude and duration of upwelling, which will affect marine ecosystems. It is uncertain whether these changes will lead to increased ocean primary production or will have adverse impacts such as more frequent occurrences of the low-oxygen ("dead zone") events seen in 2002 and 2004.
**Terrestrial Ecosystems.** The impact of changes in temperature and precipitation on terrestrial ecosystems is poorly known. Due to current biomass densities, the anticipated drier summers will likely increase drought stress and vulnerability of forests to insects, disease and fire.

**Important Questions that could be Answered by Research.**
What will be the trend and pattern of precipitation in the region?
What will be the patterns of coastal ocean winds?
What are the dynamics of large, decadal-scale patterns of ocean/atmosphere interactions?
Do thresholds exist for abrupt climate change and system shifts?
How will these patterns affect ecosystem patterns and resilience?
How will changes impact human health?
How will changes affect regional economic and social conditions?

**Research Priorities**
1. Improved and sustained observation of critical processes that can resolve interannual/decadal-scale variability.
2. Focused process experiments and studies of critical processes, such as impacts of increased $CO_2$ on forest dynamics.
3. Improved numerical and statistical models focused on coupled atmosphere/ocean/land processes that include ecological as well as geophysical dynamics.
4. Modeling and analysis of the effects of economics and management policies interannual/decadal-scale processes in the region.

APPENDIX D

**Scientific Consensus Statement on the Likely Impacts of Climate Change on the Pacific Northwest**

## History and Objective

This Consensus Statement was drafted by a subcommittee of participants in the scientific meeting "Impacts of Climate Change on the Pacific Northwest" convened at OSU on June 15, 2004. The statement has been reviewed and signed by XX meeting participants. The objective of the statement is to assist Governor Kulongoski's Advisory Group on Global Warming (GAGGW) by describing the state of scientific knowledge and uncertainty regarding climate change impacts in the Pacific Northwest. The GAGGW is charged with recommending strategies for reduction of greenhouse gas emission for the State of Oregon. For more information about the consensus process and participants, see Appendix A.

## Global Effects of Climate Change

The signatories of this consensus statement agree with the scientific findings about climate change as reported in the Third Assessment Report of Working Group I of the Intergovernmental Panel on Climate Change (IPCC), published in 2001. The IPCC finds that

- over the last century, the global average surface temperature increased about 1° F, and
- sea level rose between 4 and 8 inches.

The IPCC predicts that if current trends continue, by 2100

- the global average temperature will increase 2.5–10.4° F and
- sea level will rise 4–35".

The IPCC report concludes that

> "There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities."

An overview of these and other findings from the IPCC Third Assessment Report is attached in Appendix B.

## Regional Impacts of Climate Change

Climate change is also affecting important parameters and processes on a regional scale. This Consensus Statement addresses the following key questions related to the impacts of climate change on the Pacific Northwest:

- What are the areas of consensus on the impacts of climate change on the Pacific Northwest based on scientific findings and observed changes?
- What are the projections for impacts of climate change on the Pacific Northwest over the next 10–50 years?
- What are the areas of uncertainty affecting our ability to understand and predict likely climate change?
- What are the most important questions to be answered in the next 5–10 years?
- What are the priorities for future research?

**What are the areas of consensus on the impacts of climate change on the Pacific Northwest, based on scientific findings and observed changes?**

Some major parameters and processes in the Pacific Northwest affected by climate change are described below. Areas of consensus on these topics, based on scientific findings and observed changes, were gathered and synthesized from a variety of sources, including the U.S. Global Change Research Program Report (USGCRP 2001), papers in peer-reviewed scientific publications, and scientific presentations and breakout group summaries from the June 2004 Impacts of Climate Change in the Pacific Northwest meeting at OSU.

***Temperature***

Scientists are very certain that the Pacific Northwest is warming. The USGCRP Report indicates that the annual average temperature has increased 1–3° F (0.6–1.7° C) over most of the region in the last century. Temperature change during this time is characterized by a steep rise from 1900 to 1940, a decline from 1940 to 1975, and a rise thereafter. Model simulations suggest that the earlier warming was largely due to natural causes, whereas the most recent warming is probably best explained by human-caused changes in greenhouse gases (Water Resources Breakout Group 2004). Since 1920, nearly every temperature monitoring station in the Pacific Northwest—both urban and rural—shows a warming trend (Mote 2003).

***Precipitation***

While there is little evidence of a consistent global warming signal for precipitation in the West since 1915, precipitation has increased modestly from 1916 to 1997 (Water Resources Breakout Group 2004). Since the beginning of the 20$^{th}$ century, the USGCRP Report indicates that annual precipitation has increased across the region by 10% on average, and the level of increase has reached 30–40% in some areas of eastern Washington and Northern Idaho.

***Sea Level***

During the period 1930–1995, land on the southern Oregon coast between Florence and Coos Bay has generally risen faster than worldwide changes in sea level by about 1 mm per year (Abbott 2004). However, the same data, which are based on geodetic leveling and tide-gauge records, indicate that land on the central and northern coast of Oregon (from Florence to Astoria) is being submerged by rising sea level at a rate of 1.5–2 mm per year.

***Snowpack***

From 1950 to 2000, warming temperatures across the West have diminished snowpacks. During this period, most monitoring stations in the Pacific Northwest show a decline in April 1 snowpack (or "snow water equivalent") (Miles 2004). In the Cascades, the cumulative downward trend in snow water equivalent is approximately 35%. Model simulations for the period 1950–2003 show that roughly half the reductions in the Cascades are due to warming trends, and half are due to downward trends in precipitation. Trends for the period 1916–1995 show smaller trends due to warming (a 20% decrease in 82 years) and little effect from precipitation (Water Resources Breakout Group 2004).

Simulations of snow-water equivalent from 1916–1997 show that the timing of peak snow accumulation and 90% snowmelt have both moved toward earlier calendar dates across the West (Water Resources Breakout Group 2004; Miles 2004). In sensitive areas like the Cascade, for

example, the date of peak snowpack has shifted by as much as 40 days earlier in the year. These simulations are supported by studies of observed snowpack, along with observations of stream flow from 1950–2003 which show systematic reductions in April 1 snowpack and June flow, and increases in March flow, over much of the West (Water Resources Breakout Group 2004; Stewart et al. in review).

Snowpack at low-to-mid elevations is the most sensitive to warming temperatures. Watersheds in the Cascades have shown significant losses of summer water availability due to warming over the last 55 years. The fraction of annual streamflow from May to September in the Cedar River watershed, for example, has declined by 30% in 55 years (Miles 2004). These observed changes in streamflow are not explained by trends in precipitation.

***Climate Variability at the Scale of Years to Decades***

The USGCRP Report indicates that the climate of the Pacific Northwest shows significant recurrent patterns of year-to-year variability. For the 20$^{th}$ century as a whole, wintertime temperature and precipitation are uncorrelated in the Pacific Northwest, but summertime temperature tended to vary in opposition with summertime precipitation (the tendency was for either warm-and-dry or cool-and-wet summers). Scientists conclude with high certainty that variations in Pacific Northwest climate do, however, show clear correlations with the large-scale El Nino-Southern Oscillation (ENSO) at year-to-year time scales, and the Pacific Decadal Oscillation (PDO) at decadal-to-interdecadal time scales (Abbott 2004). Warm phases of both ENSO and PDO are associated with warm and dry winters in the Pacific Northwest, while cool phases of both ENSO and PDO are associated with cool and wet winters in the Pacific Northwest. The combination of temperature and precipitation changes during ENSO and PDO extremes yields amplified changes in regional hydrology, wherein warm-and-dry winters yield significant springtime snow pack reductions, low summertime stream flows, less abundant salmon, and an increased frequency of large forest fires. Conversely, a deep springtime snow pack, abundant summertime stream flow, abundant salmon runs, and a lower than average frequency of large forest fires typically follow cool-and-wet winters in the Pacific Northwest.

**What are the projections for climate change and its impacts in the Pacific Northwest over the next 10-50 years?**

***Temperature***

There is intermediate certainty that average temperatures in the Pacific Northwest will continue to increase in response to global climate change. The slope of the trend over the last 20 years should continue in the next few decades. The USGCRP Pacific Northwest assessment predicts that, relative to the 1990s, there will be average warming over the region in the range of 0.9–4.7° F (0.5–2.6° C) for the 2020s and 2.7–5.8° F (1.5–3.2° C) for the 2040s. This change translates into a future rate of warming of 0.18–0.9° F 0.1–0.5 °C) increase per decade. However, the rate of increase may be even higher in the eastern portion of the region. The exact magnitude and rate of increase are difficult to predict, particularly beyond 50 years.

These projected temperature increases are highly likely to result in:

- An increase in elevation of the upper tree line,
- Longer growing seasons,
- Increased length of fire season,
- Earlier breeding by animals and plants,
- Longer and more intense allergy season, and
- Possible changes in vegetation zones.

Other changes, such as prevalence of insect infestations and expansion of woody vegetation, are less certain (Terrestrial Ecosystems Breakout Group 2004), in part because they are affected by additional factors such as precipitation and land use.

***Precipitation***

Changes in precipitation regimes are generally acknowledged to be very uncertain in comparison with the temperature changes described above. Existing models are unable to make consistent projections of precipitation on regional scales. Recent IPCC global climate model scenarios have suggested the likelihood of modest increases in winter precipitation and decreases in summer precipitation for the Pacific Northwest. These effects are broadly consistent with the expected consequences of an intensified hydrologic cycle at the global level.

Some current research, however, suggests that these scenarios could be wrong for the Pacific Northwest because other factors may influence the outcome. For example, systematic changes in global sea surface temperature patterns, or in other fundamental drivers of global atmospheric circulation, could create systematic changes in storm-track behavior (Water Resources Breakout Group 2004). Based on this hypothesis, the Pacific Northwest could conceivably become drier, despite an intensification of the hydrologic cycle on a global level. These alternate hypotheses underscore the current uncertainty even about the direction of trends (i.e., increasing or decreasing) in precipitation. Better understanding of the interactions among atmosphere, land, and ocean are critical to predicting changes to and patterns of precipitation. The challenge will be to resolve these scientific uncertainties before significant climate change impacts occur.

Regarding specific projections, Oregon now experiences most of its precipitation during winter, with the greatest precipitation occurring in the mountains. The expectation is that this pattern will continue, and that the greatest precipitation (in the form of snow) will remain at high elevations. Changes in cool-season (i.e., October–March) climate are, therefore, likely to have the greatest effect on river flow and water resources.

Due to relatively little precipitation in summer and an earlier summer streamflow recession associated with earlier snowmelt, intensified impacts on water resources likely will include:

- Increased summer water demand (because of population growth) coupled with decreased water availability due to warmer temperatures, systematic reductions in summer streamflow, and limited reservoir storage.

- Changed ability to mitigate flood damage (which could result from increased unpredictability associated with extreme weather events and streamflow forecasting) that may warrant reconsideration of current management schemes for storage reservoirs and flood protection to account for this altered flow regime.

- Increased winter flows (if precipitation remains the same or increases in winter) that enhancement hydropower production in winter months and reductions in summer streamflow that diminish hydropower production in summer months may challenge the current approach to hydropower production in the Columbia River (Water Resources Breakout Group 2004).

- Decreased summer water availability and late-summer flows that may further decrease the overall ability water of water regulators and users to meet instream flow targets using storage reservoirs, and intensify the conflict between winter hydropower production and summer water supply.

- Exacerbated water-quality issues, including increased water temperatures in lakes and rivers, increased salinity and pollutant concentration (because water withdrawals decrease water quantity and concentrate pollutants in remaining water), lower dissolved oxygen content with increasing temperature, increases in certain pathogens that thrive at higher temperatures, and changes in the ecosystem and food web—all of which would stress fish including salmon.

***Sea Level***

Sea level is very certain to continue to rise. The impacts of sea-level rise, however, will vary because of differences in tectonic processes throughout the Pacific Northwest. In some areas where tectonic processes exceed sea-level rise, land will rise faster than increased sea level. Where tectonic processes do not exceed sea-level rise, the region's shoreline will move landward. Maximum wave heights also will likely increase. This increase in wave height, in association with sea-level rise, has the potential to increase erosion in coastal areas.

***Snowpack***

It is highly certain that the April 1 snowpack will continue to decline in response to increasing global greenhouse-gas emissions. This decline in snowpack will correspond with an earlier peak runoff of snowmelt, and increased streamflows earlier in the year (see above).

Other effects of warmer temperatures on snowmelt hydrology have been well understood for decades, and the effects of global warming on Pacific Northwest rivers has been quantified in a number of published studies. In basins with significant snow accumulation in winter, warmer temperatures systematically reduce peak snow accumulation, producing more runoff in winter, earlier peak flows in spring, and reduced water availability in summer. Snowpack at high elevations is generally less sensitive to temperature changes and more sensitive to precipitation changes. Thus, at high elevations, snowpack could increase if winter precipitation increases over time. However, even if there is an increase in snowfall at high elevations, the area covered by high elevations is small relative to the area of an entire river basin and consequently the total

snow pack in a river basin typically declines if temperatures rise (even if precipitation increases by a modest amount).

***Marine Ecosystems***
It is very certain that ocean circulation will continue to change in response to ocean-atmospheric processes occurring at the scale of years to decades (see discussion of ENSO and PDO above). These changes in ocean circulation include the response to the intensity and character of upwelling winds, as well as changes in freshwater input (Water Resources Breakout Group 2004). While the patterns of these variations and their impacts on marine ecosystems (e.g., persistent changes in ecosystem structure, directional changes in productivity, etc.) are unknown, paleological records and quantified physical dynamics help to shed light on potential projections. Paleo-records suggest that over long time scales (i.e., hundreds to thousands of years), warm regimes have been associated with strong upwelling. It also is known that a warmer continent results in stronger equator-ward winds that fuel upwelling. In combination, these two trends suggest a likely increase in the magnitude and duration of upwelling along the Pacific Northwest coast (Water Resources Breakout Group 2004).

Increased upwelling may increase nutrient supply to the upper layers of the nearshore ocean, and this in turn may increase primary production. The emergence of a mass of hypoxic (low oxygen) water (a so-called "dead zone") appearing off the central coast of Oregon in 2002 and 2004 may signal an unanticipated consequence of climate change mediated through changes in ocean circulation, such as upwelling.

Projections about climate change in the region also indicate the potential for:
- Influx of seawater into estuaries and lower reaches of rivers due to sea-level rise,
- An earlier influx of freshwater into estuarine and coastal areas,
- Greater seasonal variation, and
- Increased stress on estuarine and nearshore species that are physiologically adapted to particular patterns in physical characteristics of their habitats (e.g., salinity).

***Terrestrial Ecosystems***
Changes in temperature and precipitation patterns are likely, but the manner in which these changes will affect the terrestrial ecosystems of the Pacific Northwest is poorly known. Likely impacts include shifts in species composition and timing of the growing season, but the details are unpredictable. For example, temperature changes and loss of snowpack are expected to affect forests, particularly those in southwest, central, and eastern Oregon that rely on snowpack for water. Given current biomass densities, the anticipated drier summers will increase drought stress and vulnerability of forests to insects and diseases, and may ultimately lead to widespread fires that may systematically alter the hydrologic response in river basins over time.

**What are the greatest areas of uncertainty affecting our ability to understand and predict likely climate change in the Pacific Northwest?**
Shifts in regional-scale climate forcing, such as precipitation and winds, are the fundamental processes that affect ecosystems. We have little certainty in the projections about these key processes for the Pacific Northwest, and their effects on outcomes such as extreme events (e.g., flooding and large fires). The next level of uncertainty is the response of marine and terrestrial

ecosystems to changes in the patterns of variability as well as long-term trends. Lastly, shifts in management practices, urban development, and other human activities will be convolved with changes in the natural environment and will impact ecosystems.

**What are the most important questions to be answered in the next 5-10 years?**

- What will be the trend and pattern of precipitation in the Pacific Northwest?
- What will be the patterns of coastal ocean winds and associated upwelling events?
- What are the dynamics of large, decadal-scale patterns of ocean/atmosphere interactions?
- Do thresholds exist for abrupt climate change and system shifts?
- How will the aforementioned patterns affect ecosystem patterns and resilience (including the maintenance of processes and patterns in the face of variability)?

**What are the priorities for future research?**

The priorities should be based on answering the four questions listed above. To accomplish this, we need to invest in four areas of research.

1. Improved and sustained observations of critical processes that can resolve interannual/decadal-scale variability. These observing systems should be focused on both physical and biological variables, and should be of sufficient quality to resolve local, small-scale processes relative to climate signals.
2. Focused process experiments and studies of critical processes, such as the impacts of increased $CO_2$ on forest dynamics and the impact of changes in the upwelling regime on coastal marine ecosystems and fisheries.
3. Improved numerical and statistical models focused on coupled atmosphere/ocean/land processes that include ecological as well as geophysical dynamics. Particular emphasis should be on developing regional-scale projections. Close interaction between modeling and analysis and the observing programs should be ensured.
4. Modeling and analysis of the effects of economic and management policies interannual/decadal-scale processes in the Pacific Northwest. This could include forest management, land use changes, fishery management, coastal zone management and water policy.

## Appendix A – Consensus Process and Participants

On June 15, 2004, a symposium entitled "Impacts of Climate Change on the Pacific Northwest" was held to provide invited Oregon and Washington-based scientists an opportunity to: 1) share knowledge concerning the present status of global climate change research and regional greenhouse gas emission reduction strategies, 2) share findings on scenarios for climate change and possible impacts in the Pacific Northwest, and 3) identify areas of consensus and uncertainty. Sixty-five people attended the meeting. Participants were primarily scientists working in a variety of fields related to climate change in the Pacific Northwest, such as oceanography, forest ecology, forest economics, agriculture and resource economics, hydrology, paleoclimatology, marine ecology, fisheries biology, estuarine ecology, population biology, geography, ornithology, climatology, and meteorology. Attendees also included a diversity of observers, such as members of the Advisory Group and agency staff providing technical support to the Advisory Group, media, and other individuals working on issues related to climate change policy.

Pre-meeting questionnaires were distributed to participants. Four experts presented overview of scientific understanding in key areas. Responses to the pre-meeting questionnaires, the slideshow presentations, extended abstracts of the presentations, and summaries of four breakout group sessions (terrestrial ecosystems, marine ecosystems, water resources, and the Pacific Northwest as a system) are available as part of the meeting proceedings online at http://inr.oregonstate.edu/policy/climate-change.html.

This Consensus Statement, drafted by a subcommittee of participants and circulated to other participants for review and sign-on, is also part of the proceedings. The statement is signed by xx Ph.D.-level scientists with expertise on the impacts of climate change. Names of the signatories appear below.

(List of signatories to be added.)

APPENDIX D

APPENDIX D

## Appendix B – Overview of Findings from the Third Assessment Report of the Intergovernmental Panel on Climate Change

(Excerpted from *Climate Change 2001: Synthesis Report – Summary for Policymakers, an Assessment of the Intergovernmental Panel on Climate Change.* This summary, approved in detail at IPCC Plenary XVIII (Wembley, United Kingdom, 24-29 September 2001), represents the formally agreed statement of the IPCC concerning key findings and uncertainties contained in the Working Group contributions to the Third Assessment Report.)

**Table SPM-1** 20th century changes in the Earth's atmosphere, climate, and biophysical system.[a]

| *Indicator* | *Observed Changes* |
|---|---|
| *Concentration indicators* | |
| Atmospheric concentration of $CO_2$ | 280 ppm for the period 1000–1750 to 368 ppm in year 2000 (31±4% increase). |
| Terrestrial biospheric $CO_2$ exchange | Cumulative source of about 30 Gt C between the years 1800 and 2000; but during the 1990s, a net sink of about 14±7 Gt C. |
| Atmospheric concentration of $CH_4$ | 700 ppb for the period 1000–1750 to 1,750 ppb in year 2000 (151±25% increase). |
| Atmospheric concentration of $N_2O$ | 270 ppb for the period 1000–1750 to 316 ppb in year 2000 (17±5% increase). |
| Tropospheric concentration of $O_3$ | Increased by 35±15% from the years 1750 to 2000, varies with region. |
| Stratospheric concentration of $O_3$ | Decreased over the years 1970 to 2000, varies with altitude and latitude. |
| Atmospheric concentrations of HFCs, PFCs, and $SF_6$ | Increased globally over the last 50 years. |
| *Weather indicators* | |
| Global mean surface temperature | Increased by 0.6±0.2°C over the 20th century; land areas warmed more than the oceans (*very likely*). |
| Northern Hemisphere surface temperature | Increase over the 20th century greater than during any other century in the last 1,000 years; 1990s warmest decade of the millennium (*likely*). |
| Diurnal surface temperature range | Decreased over the years 1950 to 2000 over land: nighttime minimum temperatures increased at twice the rate of daytime maximum temperatures (*likely*). |
| Hot days / heat index | Increased (*likely*). |
| Cold / frost days | Decreased for nearly all land areas during the 20th century (*very likely*). |
| Continental precipitation | Increased by 5–10% over the 20th century in the Northern Hemisphere (*very likely*), although decreased in some regions (e.g., north and west Africa and parts of the Mediterranean). |
| Heavy precipitation events | Increased at mid- and high northern latitudes (*likely*). |
| Frequency and severity of drought | Increased summer drying and associated incidence of drought in a few areas (*likely*). In some regions, such as parts of Asia and Africa, the frequency and intensity of droughts have been observed to increase in recent decades. |

**Box SPM-1** Confidence and likelihood statements.

Where appropriate, the authors of the Third Assessment Report assigned confidence levels that represent their collective judgment in the validity of a conclusion based on observational evidence, modeling results, and theory that they have examined. The following words have been used throughout the text of the Synthesis Report to the TAR relating to WGI findings: *virtually certain* (greater than 99% chance that a result is true); *very likely* (90–99% chance); *likely* (66–90% chance); *medium likelihood* (33–66% chance); *unlikely* (10–33% chance); *very unlikely* (1–10% chance); and *exceptionally unlikely* (less than 1% chance). An explicit uncertainty range (±) is a *likely* range. Estimates of confidence relating to WGII findings are: *very high* (95% or greater), *high* (67–95%), *medium* (33–67%), *low* (5–33%), and *very low* (5% or less). No confidence levels were assigned in WGIII.

| Table SPM-1 | 20th century changes in the Earth's atmosphere, climate, and biophysical system.* |
|---|---|
| ***Indicator*** | ***Observed Changes*** |
| *Biological and physical indicators* | |
| Global mean sea level | Increased at an average annual rate of 1 to 2 mm during the 20th century. |
| Duration of ice cover of rivers and lakes | Decreased by about 2 weeks over the 20th century in mid- and high latitudes of the Northern Hemisphere (*very likely*). |
| Arctic sea-ice extent and thickness | Thinned by 40% in recent decades in late summer to early autumn (*likely*) and decreased in extent by 10–15% since the 1950s in spring and summer. |
| Non-polar glaciers | Widespread retreat during the 20th century. |
| Snow cover | Decreased in area by 10% since global observations became available from satellites in the 1960s (*very likely*). |
| Permafrost | Thawed, warmed, and degraded in parts of the polar, sub-polar, and mountainous regions. |
| El Niño events | Became more frequent, persistent, and intense during the last 20 to 30 years compared to the previous 100 years. |
| Growing season | Lengthened by about 1 to 4 days per decade during the last 40 years in the Northern Hemisphere, especially at higher latitudes. |
| Plant and animal ranges | Shifted poleward and up in elevation for plants, insects, birds, and fish. |
| Breeding, flowering, and migration | Earlier plant flowering, earlier bird arrival, earlier dates of breeding season, and earlier emergence of insects in the Northern Hemisphere. |
| Coral reef bleaching | Increased frequency, especially during El Niño events. |
| *Economic indicators* | |
| Weather-related economic losses | Global inflation-adjusted losses rose an order of magnitude over the last 40 years (see Q2 Figure 2-7). Part of the observed upward trend is linked to socio-economic factors and part is linked to climatic factors. |

* This table provides examples of key observed changes and is not an exhaustive list. It includes both changes attributable to anthropogenic climate change and those that may be caused by natural variations or anthropogenic climate change. Confidence levels are reported where they are explicitly assessed by the relevant Working Group. An identical table in the Synthesis Report contains cross-references to the WGI and WGII reports.

**Appendix C – References**

Abbott, M. 2004. Impacts of Climate Change on the Coastal Ocean. Presentation at the June 14, 2004 Impacts of Climate Change on the Pacific Northwest Meeting, Oregon State University, Corvallis, Oregon. Available at http://inr.oregonstate.edu/policy/climate_abbott_files/frame.htm.

Fazio, J. et al. *In review.* Potential Impacts of Climate Change in the Pacific Northwest. Draft assessment report to the Northwest Power and Conservation Council, Portland, Oregon.

Intergovernmental Panel on Climate Change, Working Group I. 2001. Climate Change 2001: Synthesis Report – Summary for Policymakers, an Assessment of the Intergovernmental Panel on Climate Change. Third Assessment Report. World Meteorological Organization, Geneva, Switzerland. 34 pp.

Marine Ecosystems Breakout Group. 2004. Summary of breakout group discussion at the June 14, 2004 Impacts of Climate Change on the Pacific Northwest Meeting, Oregon State University, Corvallis, Oregon. Available at http://inr.oregonstate.edu/policy/climate_marine_breakout_presentation_files/frame.htm.

Miles, E. 2004. Climate Change Impacts in the Pacific Northwest. Presentation at the June 14, 2004 Impacts of Climate Change on the Pacific Northwest Meeting, Oregon State University, Corvallis, Oregon. Available at http://inr.oregonstate.edu/policy/climate_miles_files/frame.htm.

Mote, P. W. 2003. Trends in temperature and precipitation in the Pacific Northwest during the twentieth century. *Northwest Science* 77(4): 271-282.

Stewart, I. T. et al. *In review.* Changes toward earlier streamflow timing across western North America. Journal of Climate.

Terrestrial Ecosystems Breakout Group. 2004. Summary of breakout group discussion at the June 14, 2004 Impacts of Climate Change on the Pacific Northwest Meeting, Oregon State University, Corvallis, Oregon. Available at http://inr.oregonstate.edu/policy/climate_breakout_terrestrial.pdf.

U.S. Global Change Research Program, National Assessment Synthesis Team. 2001. Potential Consequences of Climate Change Variability and Change for the Pacific Northwest. Chapter 9 in Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change. Cambridge University Press, Cambridge, United Kingdom. 612 pp.

Water Resources Breakout Group. 2004. Summary of breakout group discussion at the June 14, 2004 Impacts of Climate Change on the Pacific Northwest Meeting, Oregon State University, Corvallis, Oregon. Available at http://inr.oregonstate.edu/policy/climate_breakout_water.pdf.

# Briefing Paper
# Materials and Greenhouse Gases

## Prepared for the Governor's Advisory Group on Global Warming

**By David Allaway, Oregon Department of Environmental Quality (DEQ)**

## April 27, 2004

This paper provides background information for members of the Governor's Advisory Group on Global Warming. Topics covered include:

- An overview of materials and waste in Oregon, including key definitions.
- An introduction to materials-related greenhouse gas sources and sinks.
- The rationale for developing a supplemental accounting of materials-related greenhouse gases.
- An overview of this supplemental accounting.
- An introduction to the basic methods of reducing materials-related greenhouse gas emissions, including waste reduction, energy recovery, and landfill controls.

The work of the Technical Subcommittee on Materials Use, Recovery and Disposal will be presented to the Advisory Group in two parts.

1. At the Advisory Group's May 12 meeting, the topics listed above will be summarized and time will be available for discussion.
2. Results of the supplemental materials accounting and the evaluation of specific materials-related measures (program and policy options) will be summarized at the Advisory Group's June 13 meeting for discussion at that time. Written materials will be forwarded in advance of that meeting.

### Scope and Background: Materials and Waste in Oregon

The scope of the Technical Subcommittee on Materials Use, Recovery, and Disposal includes emissions and offsets associated with the production, use, recycling, composting, incineration, and landfilling of materials. The focus is on materials *used by and discarded by* Oregonians, as opposed to all materials *made in* Oregon. These include the many different types of materials that Oregon households and businesses discard for recycling, composting, or garbage collection.

The following types of materials are not addressed in this evaluation:

- Materials exported for *use out of state*. The in-state emissions associated with production and transportation of these materials are addressed by the energy and transportation subcommittees.
- Materials used in Oregon that are disposed of in wastewater systems, such as food and tissues. Some impacts from related wastewater processes (such as methane and nitrous oxide emissions from wastewater treatment plants) are addressed by the Technical Subcommittee on Other Greenhouse Gases.
- Materials managed as hazardous wastes and industrial and agricultural process wastes, such as slash from timber operations and crushed rock from mining, and materials exempted from the statutory definition of "counting" solid wastes, such as junked cars.

Once a material is no longer wanted by an Oregon household or business, it becomes a "waste". Roughly 35 percent of wastes discarded in Oregon in 2002 were either recycled or composted. The remaining wastes were either incinerated or sent to solid waste landfills. Most garbage in Oregon is landfilled, and Oregon is also one of the West's largest importers of garbage. In 2002, Oregon landfilled approximately

2.6 million tons of municipal solid waste from inside Oregon and another 1.4 million tons from other states, primarily Washington.

Some wastes, such as tires, dimensional lumber and used motor oil, are kept separated from mixed wastes and are burned as fuels by industry. In addition, Oregon has two mixed waste incinerators. Marion County's incinerator recovers energy while Coos County's does not. Approximately 12 percent of wastes discarded in Oregon in 2002 were burned for energy.

In addition to these known quantities of waste, which DEQ counts annually, an unknown quantity of waste is burned on-site or dumped in backyards or public lands.

A few notes regarding terminology: **Disposal** includes both disposal of waste at landfills and most disposal at garbage incinerators. **Waste recovery** includes recycling and composting, and in certain cases, thermal recovery of energy from waste. **Waste generation** is defined as the sum of disposal and recovery. It is largely synonymous with what households and businesses discard. **Waste prevention** means making less waste in the first place, such as more efficient use of materials. Waste prevention and **reuse** differ from recycling. In reuse, materials are used again in their original form, without the repulping, melting, grinding, or other mechanical or chemical reformulation associated with recycling. Finally, the term **waste reduction** incorporates all activities that reduce disposal, including waste prevention, reuse, recycling, and composting.

Per-capita waste generation (discards), as counted by DEQ, has risen more than 30 percent between 1992 and 2002. DEQ is currently evaluating this trend in an attempt to determine its causes. Some of the increase is explained by better reporting. Shifts in waste from on-site management such as backyard burning (which isn't counted in generation) to the system of recycling, composting and disposal (which are counted) also explain some of the rise in per-capita generation. Increases not attributed to better reporting and waste shifting are most likely attributable to increasing use, recovery, and disposal of resources.

Oregon statute includes a **waste management hierarchy**, which states that the preferred order for managing wastes are prevention, followed by reuse, followed by recycling, then composting, then energy recovery, and finally landfilling as the least preferred option. Also contained in law are **waste generation goals** and **waste recovery goals**, as follows:

- In 2005 and subsequent years, no increase in per-capita waste generation.
- In 2005, a waste recovery goal of 45 percent.
- In 2009 and subsequent years, no increase in total waste generation.
- In 2009, a waste recovery goal of 50 percent.

The state's waste recovery rate includes recycling and composting, as well as some energy recovery, and some adjustments for reuse and home composting. In 2002, the state's recovery rate was 46.6 percent. DEQ is concerned that the rate for 2003, which is currently being calculated, will fall as energy recovery from wood waste declined due to poor market conditions.

**Materials-Related Greenhouse Gas Sources and Sinks**

Greenhouse gas emissions and reductions associated with the production, recovery and disposal of materials and wastes are numerous and complex. In the United States, the U.S. Environmental Protection Agency's (EPA's) Office of Solid Waste and Emergency Response (OSWER) has funded and published some of the most comprehensive and definitive research on these topics.

The categories of emissions (sources) and offsets (reductions and sinks) recognized by OSWER include the following:

1. **Fossil fuel-derived energy in manufacturing** and natural resource extraction. This includes direct combustion of fossil fuels (for example, natural-gas fired boilers at paper mills) and the use of fossil fuels to generate electricity used by industry.
2. **Non-energy emissions from industrial processes**, such as carbon dioxide ($CO_2$) emissions from converting limestone to lime (used in the production of steel and aluminum) and methane emissions from natural gas processing associated with the manufacture of plastic products.
3. **Transportation-related emissions** including transporting raw materials to industry, manufactured products to customers, and discards to recovery and waste disposal facilities.
4. **Carbon storage in wood products and indirect carbon storage in forests** (related to changes in demand for timber as a result of recycling and reducing use of paper and wood). Increasing use of wood products increases the amount of carbon stored in products, while decreasing demand for timber is projected to indirectly increase carbon storage in forests.
5. **Carbon storage in agricultural soils** amended with composted wood, yard debris, and/or food waste. Soils that have been depleted of carbon have the potential to store carbon if treated with finished compost. ($CO_2$ from the decomposition or combustion of plant-based wastes is typically considered part of the natural carbon cycle and is not counted in most greenhouse gas inventories.)
6. **Methane emissions from landfills**. In the oxygen-poor landfill environment, a portion of carbon in waste is converted to methane. Many large landfills capture a portion of this methane and convert the carbon back to $CO_2$ through combustion.
7. **Carbon storage in landfills**. Slow-to-degrade materials, such as wood, may increase carbon sequestration if disposed of in landfills, thus offsetting methane emissions.
8. **Emissions from incineration of wastes**. These include nitrous oxide as well as $CO_2$ from the combustion of fossil carbon-derived materials such as tires, plastics, and synthetic textiles.
9. **Offsets from reductions in fossil fuel use resulting from energy recovery** of incinerated wastes or methane collected at landfills. Incinerators that recover energy from waste, and landfills that recovery energy from methane, offset the combustion of other fossil fuels elsewhere.

For any given material, several of these types of emissions and reductions or sinks may be relevant. For example, when comparing the recycling vs. disposal of paper, relevant categories of emissions include industrial energy for production of virgin and post-consumer paper, transportation, carbon storage in forests, methane emissions from landfills, carbon storage in landfills, and fossil fuel offsets from landfill gas energy recovery.

The relative importance of each of these types of emissions also varies widely between materials. For example, grass clippings, when landfilled, can produce significant quantities of methane, a potent greenhouse gas. In contrast, plastics and glass are relatively inert in landfills and generate little or no methane. For glass and plastic, their greenhouse gas profiles are dominated by manufacturing and transportation. Lawn prunings, on the other hand, are not manufactured and thus have no manufacturing-related greenhouse gas impacts.

One further complication is that some emission and reduction effects occur immediately, while others are delayed and extended over multiple years. For example, when material is disposed in a dry landfill, it may slowly generate methane for 100 – 150 years, or more. Depending on the accounting system used, landfill-related benefits of waste reduction may be assigned either to the year in which the waste reduction occurs, or in small increments in each of the years in which resulting methane emissions are reduced. The latter approach is used in this project. Landfill emissions in the year 2015, for example, are modeled as actual emissions *in that year* from waste disposed of in all previous years. Emission

reductions associated with carbon storage benefits at landfills, compost-amended soils, and forests (indirect) are also treated as occurring over multiple years. Advisory Group members should be aware that for some program and policy measures, actual emission reductions, over time, will be greater than what is estimated for the years 2015 and 2025.

**Limitations of EPA's State Inventory Tool and Oregon's Inventory – The Need for a Supplemental Accounting of Materials-Related Greenhouse Gases**

The EPA's State Inventory Tool provides a framework for inventorying a state's greenhouse gases. Oregon has chosen to use the State Inventory Tool (SIT) in support of the Advisory Group's work, with one major modification. Whereas the SIT assigns emissions from combustion of fossil fuels for electricity generation to the state where the electricity is generated, Oregon is choosing to assign these emissions to the state where the electricity is used. Thus, Oregon is assigned the emissions associated with the electricity we *use*, as opposed to the emissions from the electricity we *produce*. In other words, greenhouse gases associated with electricity generation are assigned to the state that is home to the *user* of the electricity, regardless of whether the electricity is generated in or out of state.

In contrast, state greenhouse gases associated with materials production are assigned not to the *user* of the material but rather the *producer*.

A consequence of this approach is that energy conservation and materials conservation are treated inconsistently. If Oregon is successful at reducing electricity use or shifting electricity purchases to non-fossil sources, Oregon will be assigned 100 percent of the reduction in emissions under the state's inventory. But if Oregon is successful at reducing waste, then reductions in upstream (manufacturing) emissions, which are often significant, will be assigned to the state where the material is produced (or where recycled wastes displace virgin feedstocks). Since many materials used in Oregon are not manufactured here, only a fraction of the benefit of waste reduction would be assigned to Oregon.

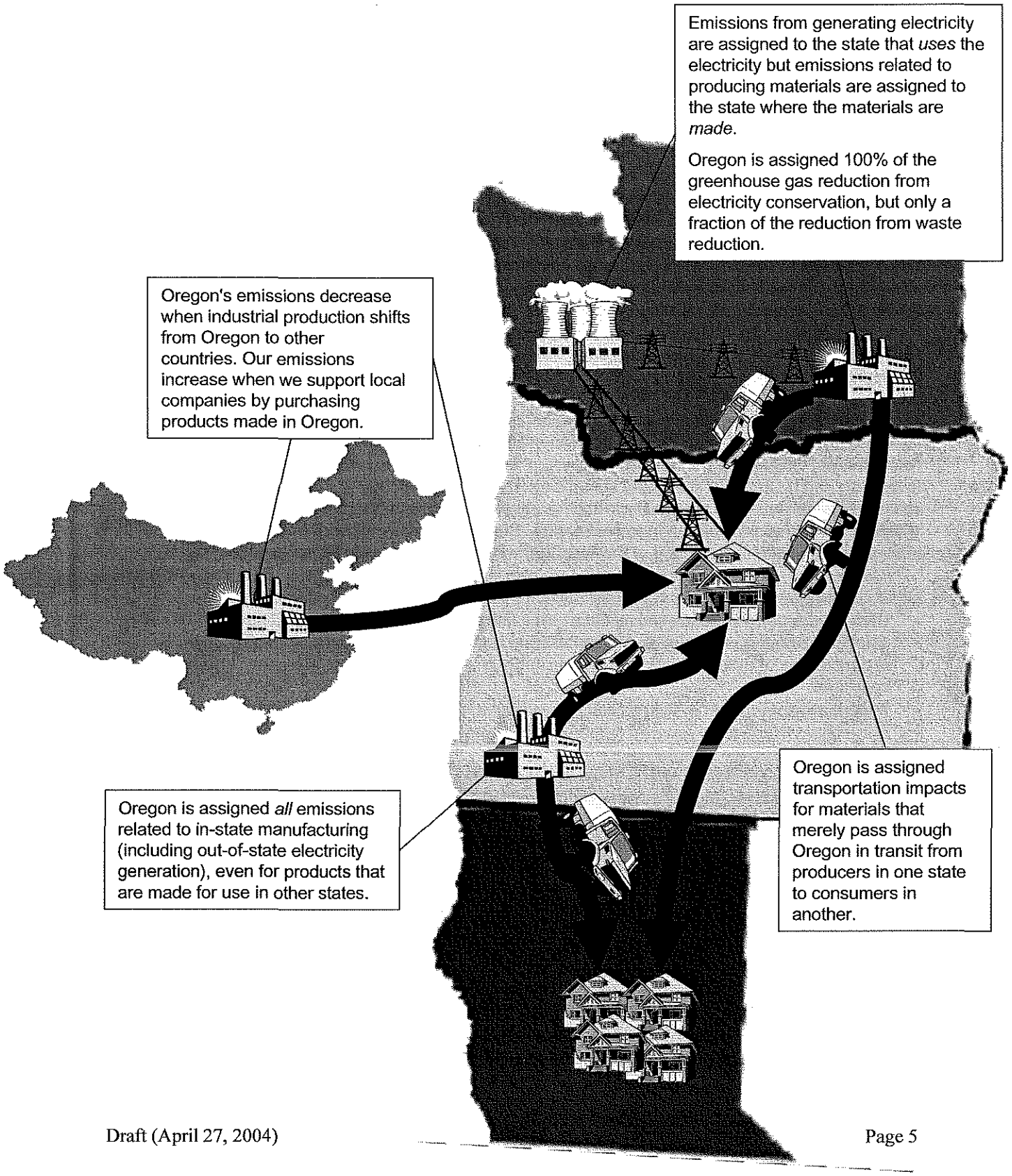
Other challenges with the SIT and Oregon's inventory framework include the following:

- Because resource extraction and manufacturing impacts are assigned entirely to the state (or nation) where the resource extraction and manufacturing occurs, out-of-state (or nation) consumers are assigned none of these impacts. All responsibility is assigned to the producer; none is shared with the consumer.
- Materials manufactured in state X, and shipped (by truck) through Oregon on their way to state Y for sale, cause Oregon to be assigned a portion of transportation impacts, even though Oregon neither produces nor uses the materials.
- Under both the SIT and Oregon's inventory, the shifting of production from Oregon to another state or country would be counted as an emissions reduction, even if global consumption and associated $CO_2$ emissions were unchanged. Conversely, if Oregon households and businesses shift consumption to locally-produced materials, a likely outcome of Oregon's inventory is that Oregon's greenhouse gas profile would appear to rise, even as global emissions probably fall (all other things being equal).

These issues are illustrated graphically in Figure 1.

## Figure 1.

## Oregon's Greenhouse Gas Inventory - How it Accounts for Material Production and Consumption



**Our Solution: A Supplemental Accounting**

The Technical Committee has decided not to make direct adjustments to the EPA's State Inventory Tool as part of this evaluation effort, other than for electricity. Instead, the Materials Subcommittee is developing a supplemental accounting of materials-related emissions. This supplemental accounting is being performed as a series of side calculations to the inventory. Results of the supplemental accounting will not be added to the Oregon inventory in order to avoid double-counting. However, this supplemental accounting will establish a framework whereby Oregon will be able to account for greenhouse gas reductions resulting from waste reduction initiatives in Oregon, even if they lead to changes in production and transportation outside of the state. Results of the supplemental accounting will be presented at the June 13 meeting of the Governor's Advisory Group and will also be shared with the EPA and the States of Washington and California in support of the activities of Working Group #5 (protocols).

In its simplest form, the supplemental accounting uses DEQ and EPA data on the composition of materials disposed and recovered in Oregon, as well as national sales, production, import, and export data to develop a model of materials use and discards in Oregon. For each type of material, EPA Office of Solid Waste and Emergency Response (OSWER) emissions factors for production, recycling, composting, landfilling, etc. are then applied. Adjustments are being made to some of these emissions factors to reflect Oregon-specific conditions, and to account for manufacturer-to-consumer transportation emissions, which were not included in OSWER's report.

Figure 2 illustrates the materials-related differences in what is included and excluded by the Oregon inventory and the Oregon supplemental accounting.

**Strategies for Reducing Materials-Related Greenhouse Gases**

Given the types of emissions noted above, three basic strategies for reducing greenhouse gases are:

1. Reduce fossil fuel use by waste prevention (more efficient use of products and packaging, reuse, using less), recycling of certain materials, and energy recovery from wastes and methane.
2. Increase carbon storage. Carbon storage can be increased in wood products, in soils (by composting and applying that compost to carbon-depleted soils), and in landfills (by landfilling certain carbonaceous materials). Indirect carbon storage can be increased in forests by recycling paper and preventing waste.
3. Reduce methane from landfills by reducing the landfilling of materials with large methane generating potential, controlling landfill conditions, and capturing methane emissions.

The Materials Subcommittee is currently evaluating a wide variety of materials- and waste-related measures. These will be presented to the Governor's Advisory Group at its June 13 meeting. The types of measures under study include both programmatic and policy changes. Examples include:

- Provide financial incentives or require enhanced methane collection at landfills (and energy recovery from that methane).
- Decrease the on-site burning of wastes, particularly fossil-carbon derived materials (plastics, tires, etc.) through education and/or increased regulation or enforcement.
- Provide additional funding to support the establishment and/or maintenance of enhanced waste reduction programs, such as food waste composting.
- Ban disposal in landfills of materials such as yard debris and recyclable paper, where the recovery infrastructure is well established.

(continues, next page)

**Figure 2.**
**Comparison of Oregon's Inventory and Materials-Related Supplemental Accounting**

| Type of Emissions | Oregon Inventory (SIT with adjustment for electricity generation) | Oregon Supplemental Accounting (materials-related) |
|---|---|---|
| **Raw Materials Extraction, Product Manufacturing, and Transport of Products to Consumer** | | |
| Products made in Oregon | | |
| and used/discarded in Oregon | Included[a] | Included |
| and used/discarded elsewhere | Included[a] | Excluded |
| Products made outside Oregon | | |
| and used/discarded in Oregon | Excluded | Included |
| and used/discarded elsewhere | Excluded | Excluded |
| **Municipal Solid Waste Disposal in Oregon (methane emissions)** | | |
| Waste generated in Oregon | Included | Included |
| Waste generated elsewhere and imported to Oregon | Included[b] | Included[b] |
| **Waste Combustion in Oregon** | Included | Included |
| **Carbon Sequestration** | | |
| In landfills: yard debris | Included | Included |
| In landfills: other wastes | Excluded | Included |
| In compost | Excluded | Included |
| In wood products (in use) | Excluded | Included |
| In forests (indirect, resulting from waste reduction) | Excluded | Included |

[a]Accounted for in non-waste modules (electricity use, industrial energy use, transportation fuel use).
[b]Only landfill-related methane emissions are counted for imported waste.

- Require loads of mixed waste to be sorted prior to disposal in high-population counties.
- Expand the bottle bill to cover more materials and/or increase the deposit value to reverse the decline in redemption rates.
- Encourage the more efficient use of materials (waste prevention) through education and incentives.

Advisory Group members with questions regarding the work of the Technical Subcommittee on Materials Use, Recovery and Disposal are welcome to contact the Subcommittee Chair directly at the following:

David Allaway, Oregon DEQ
Allaway.david@deq.state.or.us
(503) 229-5479

December 29, 2004

# Guest Viewpoint: Kulongoski right to address global warming

**By Ronald B. Mitchell and Randy Berggren**

Gov. Ted Kulongoski's Advisory Group on Global Warming has proposed important, effective and realistic steps that Oregon should take to reduce our contributions to global warming and climate change.

Many of these steps will be cost-effective in the short term. Others involve investments designed to reduce future impacts from climate change or to make Oregon more competitive in a world in which most of the world's governments, industries and consumers will demand climate-sensitive products and policies.

California, Washington, the New England states and more than 140 American cities are already taking action to help avert climate change. All of the European Union countries, Japan, Russia and more than 100 other countries have signed the Kyoto Protocol, the major international approach to reducing global greenhouse gas emissions that will become international law early next year.

Oregon can afford to take these steps. Indeed, we cannot afford not to.

Scientists are in all but unanimous agreement that humans are causing significant changes to the Earth's climate. In the next several decades, Oregonians can expect to see higher average temperatures, significantly lower annual snowpack, decreased water availability in summer, higher sea levels, more harmful and frequent floods and coastal erosion, and many difficult-to-predict changes to land and ocean ecosystems. Many of these impacts, though hard to observe in our daily lives, have already become evident through careful scientific measurement.

These dramatic changes are largely due to the carbon dioxide released as we use fossil fuels to build, heat and light our homes and offices, to drive our cars, and to create the products we buy.

The Governor's Advisory Group has recommended ways both the public and private sector can address this global problem. These efforts involve improving energy efficiency, shifting to sources of energy for electricity and transportation that do not emit greenhouse gases, using farms and forests to capture and store carbon dioxide already emitted into the atmosphere, and promoting education, research and technology development.

All Oregonians should support the governor's efforts to take on the problem of global warming.

First, rather than being costly, early efforts by companies such as Dupont, British Petroleum, Hewlett-Packard, IBM and Intel have shown that reducing greenhouse gas emissions often lowers production costs, creates new business opportunities and leads to improved marketing.

Second, these strategies will help Oregon companies remain globally competitive. As the effects of climate change become more evident, consumers are likely to demand climate-sensitive products.

Third, if we fail to work with others around the globe to reduce our emissions today, we will be forced to increase taxes in years to come to pay for larger dams to hold water no longer stored as snowpack, to rebuild houses and factories damaged by flooding and coastal erosion, and to help farmers maintain a strong food supply in the face of increasing threats from higher temperatures and agricultural pests. Our best strategy for avoiding these costs involves reducing our emissions of carbon dioxide and other greenhouse gases.

Fourth, actions by Oregon, when combined with the efforts of other states and countries, constitute an important contribution to solving this problem while also encouraging other states and countries that have not yet taken action to do so.

In short, the strategies proposed by the Governor's Advisory Group represent crucial ways Oregonians can help. Kulongoski deserves our support in his efforts to steer Oregon to a leadership position on this

important global issue.

*Ronald B. Mitchell is an associate professor of political science at the University of Oregon. Randy Berggren is general manager of the Eugene Water & Electric Board. The Draft Oregon Strategy for Greenhouse Gas Reductions is available at www.energy.state.or.us/climate/Warming/Draft_Intro.htm. A report titled ``Scientific Consensus Statement on the Likely Impacts of Climate Change on the Pacific Northwest'' is available at: inr.oregonstate.edu/policyclimate_impacts_consensus_statement.pdf.*

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# Panel calls for stricter emissions standards

## A recommendation for Oregon to follow California's lead on reducing greenhouse gases draws quick criticism from automakers

Saturday, December 18, 2004

**RICHARD L. HILL**

A proposal to adopt California's stricter auto-emissions standards in Oregon has generated early opposition as the governor's advisory group on global warming made final changes to a plan that would slash greenhouse-gas emissions.

The 27-member committee unanimously approved its report Friday, which urges steps to return emissions of heat-trapping greenhouse gases to 1990 levels. It will go to Gov. Ted Kulongoski next month for review.

Although the report includes dozens of proposals, a recommendation to adopt California's tougher tailpipe-emission standards already has drawn fire from automakers.

The Alliance of Automobile Manufacturers, which represents General Motors, Ford, Toyota and other carmakers, is suing California, arguing the state can't regulate fuel use in cars under federal law. The group opposes Oregon adopting the California standards.

"If California does not have authority to do what it did, neither does Oregon," said Paul Cosgrove, an Oregon lobbyist for the automakers.

Member Angus Duncan said the advisory group -- made up of business executives, environmental leaders, government officials and scientists -- wants the governor and the Legislature to consider California's rules.

California's regulations require cars and trucks to reduce carbon dioxide emissions beginning with 2009 models. Gov. Gary Locke of Washington last week urged his state to adopt the same standards, which he said could cut emissions in cars and light trucks by 25 percent and in larger trucks and SUVs by 18 percent.

Cosgrove said that stricter emission standards would have a direct impact on Oregon. "We are the West Coast's biggest importer of cars, including, ironically, hybrids of Honda and Toyota, as well as many other cars that would be impossible or difficult to sell here. Those two companies specifically and dramatically oppose these California standards."

David Van'thof, an environmental adviser to Kulongoski, said the governor will not make any decisions about the recommendations until he studies the report.

The panel is headed by Mark Dodson, chief executive officer of Northwest Natural Gas,

and Jane Lubchenco, a marine ecologist at Oregon State University. More than 150 people worked on the report, and three public hearings were held after a draft was released in October.

Members want Oregon to curb the growth of greenhouse gas emissions by 2010 and reduce them 10 percent below 1990 greenhouse gas levels by 2020.

Besides calling for reductions in tailpipe emissions, the panel urges the use of biofuels, including ethanol; cleaner technologies in generating energy; upgraded building codes to increase energy efficiency; state tax credits for home builders who use solar power and heat-pump water heaters; and promoting the sale of vehicles that don't emit as much greenhouse gases.

Kulongoski created the panel after forming the West Coast Governors Global Warming Initiative last year with the governors of California and Washington.

Last month, the three governors approved 36 recommendations to combat global warming -- from collaborating on buying hybrid cars to emphasizing energy efficiency in building codes -- and directed their staffs to work on strategies to cut emissions.

Researchers project that the Northwest could see higher temperatures, declining snowpacks and a rise in sea level as the climate continues to warm as it has in the past few decades.

Lubchenco said more research is needed about the impact of climate change on Oregon and the economic effects of many of the panel's recommendations.

"Our proposals aren't pie-in-the-sky goals," Lubchenco said. "They are very concrete and doable."

The report is available online at www.energy.state.or.us/climate/Warming/Draft_Intro.htm.

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# Panel suggests ways to cut emissions

BETH CASPER
Statesman Journal

*December 18, 2004*

Oregon is a small state, but its contribution to the world's global-warming gases is surprisingly high, according to the governor's global-warming advisory group.

The group unanimously approved a report Friday that recommends ways for Oregon to reduce carbon dioxide and other greenhouse gases. Based on population, Oregon produces six times its share of carbon dioxide.

By the end of January, Gov. Ted Kulongoski is expected to review the plan and decide whether to approve it.

"The government is about short term, and politicians are about short term," Kulongoski said. "One of the difficulties is for us to sit down and look at issues and realize these are long-term issues and you have to take some risk to reach long-term solutions."

Kulongoski said that the advisory group succeeded by recognizing the serious problem at hand.

The report recommends reducing greenhouse-gas emissions by adopting California's emission standards for vehicles, increasing the state's use of renewable energy resources and meeting a goal of reducing greenhouse-gas emissions to 10 percent below 1990 levels by 2020.

Some of the more specific recommendations included installing

## Information

After a year of meetings, the governor's advisory group on global warming unanimously approved a report Friday to reduce Oregon's greenhouse-gas emissions. Greenhouse gases contribute to global warming.

The governor is expected to decide in January whether to approve the plan.

Some of the recommendations include:

Adopting California's emission standards for vehicles

Increasing the state's use of renewable energy resources

Installing electric outlets for trucks to prevent idling

Purchasing more hybrid vehicles for the state government fleet

Adopting efficiency standards for some appliances not regulated by the federal government

Find the report at:
www.energy.state.or.us/climate/Warming/Global.htm

electric outlets for trucks to prevent idling, purchasing more hybrid vehicles for the state government fleet and adopting efficiency standards for some appliances not regulated by the federal government.

Group members were enthusiastic about the report.

Jean Wilkinson, an advisory member who represented the Oregon Farm Bureau, said farmers are eager to see how they can play a part in reducing greenhouse gases. She said that incentives for growing crops for biodiesel or to keep carbon out of the atmosphere are important to farmers.

Other programs -- which might increase costs of electricity -- might negatively impact farmers, she said.

But the group's members agreed that everyone will have to do their part to solve the problem.

"We can do (what's in the report) in ways that will also strengthen the economy, improve public health and create energy-price stability," said Angus Duncan, president of the Bonneville Environmental Foundation and member of the advisory group. "We are doing this because it is clear beyond a reasonable doubt that global warming is occurring. We've already seen evidence of it in Oregon."

Duncan noted that half of the region's snowpack disappeared between 1950 and 2000, and experts expect half of the remaining snowpack to disappear in the next 50 years.

"This is a problem of our making and that we have the means to fix," he said.

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# Enviros back state move to curb greenhouse gases

Prev | Next

*From Bend.com news sources*
Posted: Thursday, December 16, 2004 9:48 AM
Reference Code: PR-20018

**December 16** - The Oregon Environmental Council applauds Governor Kulongoski for convening the Governor's Advisory Group on Global Warming.

The Advisory Group and technical subcommittees have outlined a number of sensible actions Oregon can take to reduce greenhouse gas emissions.

Recommended actions cover energy efficiency, transportation, renewable energy, recycling and other areas. The proposed state strategy will set Oregon on the path to deep reductions in global warming pollution while rewarding us with all the health, economic and ecosystem benefits that come with climate protection. The Advisory Group will finalize its recommendations on Friday, Dec. 17.

"This effort puts Oregon in the category of climate leaders," said OEC executive director Jeff Allen, a member of the Advisory Group. "The rest of the world's advanced economies and a growing number of states and cities are moving forward – we can't wait for federal action."

The Advisory Group received comments from more than 250 citizens, businesses, elected officials, not-for-profits and others, the vast majority in favor of the draft plan.

As the problem of global warming looms ever larger, a number of like-minded citizens are banding together around Oregon to insist that state and local leaders take action. Two examples of note include the Engineers for Global Responsibility and the Douglas County Global Warming Coalition.

Engineers for Global Responsibility was launched by a Portland engineer who is adding to the fold engineers of many different types who are advocating in support of federal and state action to combat global warming.

"As engineers, we are acutely aware of our responsibility to protect public safety by basing our designs and plans on the best scientific and economic information possible," said Mike Unger, founder of Engineers for Global Responsibility. "We expect our leaders to do the same regarding climate change. The actions proposed by the advisory group are a responsible first step for the State of Oregon."

The Douglas County Global Warming Coalition, based in Roseburg, serves as a local catalyst for promoting a healthy climate in their community by identifying and sharing solutions.

"We believe Oregon's leadership role will be beneficial to the state as other regions of the country will ultimately rely on our accumulated experience and expertise," said Stuart Liebowitz, coordinator of the Douglas County Global Warming Coalition.

Founded in 1968, The Oregon Environmental Council (OEC) is a nonprofit, nonpartisan organization with more than 2,000 members throughout the state. We bring Oregonians together for a healthy environment. Via programs such as the Bottle Bill, curbside recycling and the creation of local watershed councils, OEC has played a leadership role in helping Oregonians be part of the solution to environmental problems. Our current programs focus on protecting kids' health from toxic pollution, cleaning up Oregon's rivers, and protecting our climate by curbing vehicle pollution. For more information about OEC, visit our website at www.orcouncil.org.

2/4/05 EQC Meeting, Item E Handout



# Oregon Renewable Energy Action Plan (Second Draft)

**If you have *questions*, please call Carel DeWinkel, Oregon Department of Energy, in Oregon 800-221-8035 or 503-378-6099, or send an email to carel.dewinkel@state.or.us**

"We can make Oregon the national leader in renewable energy and renewable product manufacturing. .... Development of renewable energy will lessen our reliance on fossil fuels, protect Oregon's clean air and create jobs."
Governor Kulongoski, 2003

## 1 Introduction

Promoting a diversity of renewable generating resources is good energy policy for an electricity system that is heavily dependent on hydropower and increasingly dependent on fossil fuels. And because some renewable energy fuels are free, and others aren't subject to the price swings in fossil fuels, they help stabilize electric rates. It thereby contributes to a healthy electricity infrastructure. Similarly, developing a biofuels industry in Oregon will help reduce our dependency on petroleum for transportation. As importantly, developing the state's renewable energy resources and related manufacturing and research and development presents a huge economic opportunity, particularly in rural parts of the state where economic development can be most challenging. Investments stay in Oregon, creating jobs and growing a "second crop" for farmers and ranchers. Finally, renewable energy is an investment in the environment by displacing the use of fossil fuel generation and avoiding numerous pollutants and global warming gases.

*"It is a fairly rare initiative that is good policy, good economic development, and good for the environment, but renewable energy development is that rare gem."*[1]

Oregon has long been one of the nation's leaders in encouraging renewable energy resources. For example, the state provides tax credits and low-interest loans for all types of renewable resource projects through the Oregon Department of Energy. The Energy Trust of Oregon uses public purpose charge funds from Portland General Electric (PGE) and Pacific Power customers toward achieving a goal of renewable sources supplying 10 percent of the state's electric power by 2012. Many utilities in the state offer consumers "green power" options to support development of renewable resources. PGE ranks second in the country in sales for green power options; PacifiCorp ranks fourth. More than a million Oregon households and businesses receive information regularly on the power sources, environmental impacts and costs of generation from renewable energy sources versus fossil fuels. The Bonneville Power

[1] Quote from comment letter

Administration (BPA) and the publicly owned utilities offer renewable incentives through the Conservation and Renewable Discount program.

Among the benefits of renewable energy for the state:

- A $100 million investment in renewable energy resources creates some 1,250 new jobs.
- Using forest residues to produce energy can reduce wildfire risk and costs.
- Clean transportation fuels can come from Oregon farm and forest products, instead of out-of-state sources.
- Generating energy from waste gas at dairies, landfills and sewage treatment plants can reduce environmental liabilities and provide another revenue source for businesses and communities.
- Renewable resources help insulate Oregonians from volatile fossil-fuel prices.
- Using renewable energy resources reduces air pollution, thereby reducing health care costs and limiting the impact of likely stricter federal emission standards in the future.
- A clean environment helps attract and retain businesses and is also very important to the tourist industry.

Oregon is proud of its outstanding past achievements. But it can and must do better. By building on these achievements with the actions as outlined in this Renewable Energy Action Plan (the Plan), Oregon will continue to be a leader on renewable energy policy and will meet a large fraction of its energy needs with new renewables by the year 2025. The Plan also will play a central role in furthering the Governor's initiatives on sustainability and global warming. And the Plan complements the state's energy efficiency programs.

## 2 Driving forces behind the Renewable Energy Action Plan

Oregon's policy supporting this Action Plan is described in Oregon Revised Statute 469.010, adopted three decades ago:

> 1) Continued growth in demand for nonrenewable energy forms poses a serious and immediate, as well as future, problem. It is essential that future generations not be left a legacy of vanished or depleted resources, resulting in massive environmental, social and financial impact.
>
> 2) It is the goal of Oregon to promote the efficient use of energy resources and to develop permanently sustainable energy resources. The need exists for comprehensive state leadership in energy production, distribution and utilization. It is, therefore, the policy of Oregon:
>
> > (a) That development and use of a diverse array of permanently sustainable energy resources be encouraged utilizing to the highest degree possible the private sector of our free enterprise system.
> >
> > (b) That through state government example and other effective communications, energy conservation and elimination of wasteful and

uneconomical uses of energy and materials be promoted. This conservation must include, but not be limited to, resource recovery and materials recycling.
(c) That the basic human needs of every citizen, present and future, shall be given priority in the allocation of energy resources, commensurate with perpetuation of a free and productive economy with special attention to the preservation and enhancement of environmental quality.
(d) That state government assist every citizen and industry in adjusting to a diminished availability of energy.
(e) That energy-efficient modes of transportation for people and goods shall be encouraged, while energy-inefficient modes of transportation shall be discouraged.
(f) That cost-effectiveness be considered in state agency decision-making relating to energy sources, facilities or conservation, and that cost-effectiveness be considered in all agency decision-making relating to energy facilities.
(g) That state government shall provide a source of impartial and objective information in order that this energy policy may be enhanced. [1975 c.606 §1; 1979 c.723 §1]

**Risk Mitigation**

There are significant risks in both the availability and prices of fossil fuels. Oregon is vulnerable to oil price spikes and shortages. Oregonians spent $4.1 billion on oil products in 2000. The vast majority of this money left the state. If oil prices doubled it would have a severe impact on the state.

Oregonians spent $1.1 billion on natural gas in 2000, not including gas used in power plants. As with oil, the vast majority of this money leaves the state. Oregonians spent 50 percent more per British thermal unit (Btu) to heat their homes in 2002 than they did in 1998. New supplies are proving to cost as much or more than current supplies.

In 2002, Oregonians spent $2.9 billion on electricity. Oregon's economy is still recovering from the wholesale electric price spike of 2000-2001. As loads grow, there will be continued pressure on rates because new resources are more expensive than existing ones. Natural gas provides 15 percent of Oregon's power, but this percentage is growing.

Readily available energy at an affordable price is essential for the manufacturing, agricultural, transportation, retail, and indeed all sectors of Oregon's economy. It is prudent that we diversify our investments and allocate a greater portion to renewable resources. By focusing our efforts on renewable energy markets, Oregon will better protect itself from the volatility of the wholesale electric and natural gas markets. It is essential that we act now to lay the foundation for accelerated renewable energy development that will sustain Oregon's progress.

**Economic Development and Job Creation**

Investments in renewable energy result in a *net* increase in jobs. For every $100 million in investments in renewable energy, about 1,250 full time equivalent jobs are created.[2] Furthermore, the *net* increase in economic output (the value of the production by the industries involved), wages, business and other income total almost $200 million. In addition, the increase in state and local taxes is about $1 million.

Initiatives as outlined in this document could lead to an investment of $300 million or more by the end of 2006, which would result in about a 3,700 net job increase. This is a significant number of new family-wage jobs in the state's agricultural and forestry segments of our economy, as well as other businesses all over the state.

Recent studies indicate that by making investments in public/private renewable energy partnerships and providing incentives for the renewable energy sector, the *net bill* to American consumers may be *lowered* because an increased use of renewable energy will stem the rise of natural gas prices.

**Environmental Benefits**

Renewable energy systems have far less impact on the environment than those systems that rely on fossil fuels and nuclear power. Reducing the environmental impact of energy use helps preserve Oregon's natural resources and enhance Oregonians' quality of life.

In addition to the obvious environmental benefits, such as cleaner air and water, we can reduce the health risks associated with pollution, minimize the impact of future federal mandates on air and water quality standards, bolster tourism and recreation, and grow Oregon's economy.

Oregon's renewable energy policy allows no backsliding on important siting standards. All new large-scale energy facilities in Oregon, including those using renewable resources, must meet siting standards that protect the public health and safety, and the environmental protection policies of the state.

## 3 Goals, Initiatives and Budget Impacts

The Plan's goal is to encourage and accelerate the production of energy from renewable sources, stimulate economic development, particularly in rural parts of the state, and improve the environmental future of the state. The Plan intends to demonstrate a variety of

[2] Based on Economic Impact Analysis of Energy Trust of Oregon Program Activities, Final Report, by ECONorthwest, Portland, April 2003. It is important to emphasize that these are *net* benefits because they were calculated relative to the case where ratepayers, following their normal spending patterns, spent an equivalent amount of money. If a comparison were made between investing in renewable energy projects within Oregon versus with making the same investment outside the state, then the benefits from the investments would be much greater. Accordingly, they are conservative estimates.

technologies for tapping renewable resources, and removing barriers to renewable resource development.

This section presents long term and short-term goals, followed by potential legislative initiatives, coordination initiatives by the Governor's Office and an estimate of the fiscal impact for the next biennium. Section 4 lists the actions that will benefit renewable energy development across sectors, and section 5 lists sector-specific action items.

## Long Term Goals: 2007 - 2025

### *Electricity Generation*

1. Forty percent of electric generation capacity that will be built between now and the year 2025 to serve the electricity needs in the state, will be from new renewable generating resources.
2. Twenty five percent of state government's total electricity needs will be met by new renewable energy sources by 2010 and 100 percent by 2025.[3]

### *Transportation Fuels*

1. All petroleum diesel sold in Oregon will contain 5 percent biodiesel (B-5) by 2010, growing to 20 percent (B-20) by 2025.
2. All standard gasoline sold in Oregon will contain 10 percent ethanol in 2010.
3. Five percent of all gasoline sold in Oregon will be an E-85 blend of ethanol and gasoline (85 percent ethanol, 15 percent gasoline) by the year 2015, growing to 15 percent in 2025.
4. Ten percent of state government's transportation fleet fuel needs will be met by biofuels by 2010.[4] This percentage will grow to 25 percent by 2025.

## Short Term Goals, to be achieved by the end of 2006

### *Electricity Generation*

1. Three hundred megawatts of new wind energy resources will be developed, of which 10 percent will be from *community or locally owned* wind energy projects.
2. Find a solution to the transmission capacity bottleneck(s) between eastern and western Oregon to provide access from renewable resources in eastern Oregon to load centers.
3. Two and a half megawatts of new solar electric systems will be installed.
4. Five megawatts of new biogas generation facilities will be obtained from wastewater treatment, dairies and landfills.
5. Twenty-five megawatts of new biomass-fueled electric generation will be built.
6. Fifty megawatts of new combined heat and power generation systems will be built.
7. Two hundred 5-kilowatt fuel cells will be installed.[5]

[3] This goal is dependent on funding. See discussion under Budget Impacts below.
[4] Assumes 20 percent biodiesel blend for all diesel and 2 percent ethanol blend for all gasoline.

8. Thirty megawatts or more geothermal electric generation in the process of being developed.
9. One to four megawatts of new environmentally sustainable hydroelectric generation on line or in the process of being developed (primarily irrigation piping channels).
10. Completion of a feasibility assessment of a renewable portfolio standard (RPS) for the state.

***Transportation Fuels***

1. Diesel sold in Oregon will contain 2 percent biodiesel (on average).
2. Gasoline sold in Oregon will contain 2 percent ethanol (on average).
3. One hundred million gallons of ethanol will be produced annually.
4. Fifteen million gallons of biodiesel will be produced annually from Oregon crops or products.

***State Government***

1. Ten percent of state government's total electricity needs will be met by renewable energy sources (through green tag purchases and/or direct development of renewable energy by state government).[6]
2. Five percent of state government's transportation fleet fuel needs will be met by renewable biofuels.
3. Creation of a streamlined process for leasing state land to develop renewable energy resources.

***Demonstration Projects***

To highlight the benefits of renewable electricity generation and fuels, the following projects will be completed:

1. Five public or private energy-efficient buildings that make use of passive solar design features.
2. One biodiesel plant using mustard, other agricultural products or "waste" products.
3. One ethanol plant.
4. Projects that generate electricity either singularly or through any combination of the sun, wind, geothermal sources, irrigation district micro-hydro, biomass burning, on-farm dairy waste digesters, waste heat recovery systems and renewably-fueled fuel cells.
5. Five sites that directly use geothermal energy.
6. One industrial park that integrates renewable energy and sustainability related products or services.

[5] Some, but not all, of the fuel cells will use renewable fuels.
[6] See discussion under Budget Impacts below

**Legislative Initiatives in 2005**

1. Make changes in the Small Energy Loan Program to allow renewable energy projects to be more easily financed.[7]
2. Repeal the provision in state law that creates a conflict for renewable energy projects between the state Business Energy Tax Credit (BETC) and the federal production tax credit.
3. Increase eligible project cost for renewable energy projects for the Business Energy Tax Credit (BETC) from $10 million to $20 million.
4. Revise the Residential Energy Tax Credits (RETC) for large solar electric systems to be applied over several years (up to $1,500 per year for up to three years).[8]
5. Allow builders who are building speculation homes to claim Residential Energy Tax Credits (RETC) on the installation of renewable resource features.
6. Extend the 50 percent property tax exemption for ethanol production facilities until the close of the 2016 fiscal year and expand this exemption to biodiesel facilities.
7. Introduce a production-based tax credit for biofuels: 5 cents per gallon of biodiesel produced from Oregon grown crops or grease and 4 cents per gallon of ethanol produced in Oregon.
8. Introduce a ban on MTBE[9] in the state.
9. Establish a government approved *voluntary* labeling program for identifying "lower carbon dioxide" fuels at the pump.
10. Allow biomass facilities to qualify for net metering and allow the Oregon Public Utility Commission to adopt rules to increase the 25-kilowatt limit on a net metering facility for customers of Portland General Electric and Pacific Power.
11. Authorize state agencies to develop renewable energy projects on state property where renewable energy resources, such as remote wind sites or geothermal, may not otherwise be developed by private organizations.
12. Establish a fund to collect wind characteristics data at ten sites throughout the state, *and make those data publicly available,* to help community and locally-owned wind farm developments as well as large scale wind farm development and wind energy integration with the grid.
13. Establish a fund to collect information on the geochemistry of wells and springs, *and make those data publicly available,* to assist the geothermal industry, state and federal agencies and research institutions in geothermal resource target evaluation in Oregon.[10]

[7] For example, the Oregon Department of Energy proposes to remove the five-megawatt limit on loans for projects that increase the output of a hydroelectric project and to make projects that *enable* the use of renewable energy eligible for loans as well.

[8] This initiative will not increase the total amount of tax credits. Currently, a small system is installed the first year and then expanded over the next few years, claiming a tax credit with each expansion.

[9] MTBE - methyl tertiary-butyl ether. It is one of a group of chemicals commonly known as "oxygenates" because they raise the oxygen content of gasoline. Oxygen helps gasoline burn more completely, reducing harmful tailpipe emissions from motor vehicles. The US Environmental Protection Agency's Office of Water has concluded that available data are not adequate to estimate potential health risks of MTBE at low exposure levels in drinking water but that the data support the conclusion that MTBE is a potential human carcinogen at high doses. Eleven states including California and Washington have banned its use as a fuel additive.

14. Establish a revolving fund *for units of local governments only* [11] to finance feasibility studies of renewable projects to be owned by those units of local governments.

**Key Coordination Initiatives to be taken by the Governor's Office**

1. Appoint a Renewable Energy Working Group to be coordinated through the Governor's Office to guide the implementation of this Plan.[12]
2. Appoint a blue-ribbon Transmission Expansion Working Group to make recommendations to the Governor on how to solve the regional transmission issues.
3. Coordinate this Plan with Western Governors' global warming and renewable energy efforts.
4. Play an active role in recognition of programs, projects or policies that help promote this Plan's objectives.

**Budget impacts**

***Revenue impact estimates***

*The following lists only the estimated reductions in tax revenues and funds needed for the action items as outlined in this document. The increase in revenue as a result of the additional investments and jobs associated with the renewable resource projects, which would not have taken place without these incentives, is not included here.*

The proposed Business Energy Tax Credit (BETC) increase in the maximum project cost from $10 to $20 million would have an estimated $750,000 impact for the 2005-2007 biennium. The actions to promote the use of forest-based biomass would have an estimated impact of $300,000 for 2005-2007 (use of BETC for gathering and hauling biomass from the forests to the generating facilities).[13] The BETC for one new ethanol plant and two new biodiesel plants during the 2005-2007 biennium would be $680,000.

The changes in the Residential Energy Tax Credit (RETC) for solar electric systems, fuel cells, and speculation homes would have an estimated impact of about $170,000 for 2005-2007.

Production based tax credits for biofuels would likely have a minor impact for the 2005-2007 biennium. However, assuming that the production level at the end of 2006 reaches full output of 100 million gallons of ethanol per year with a 4 cents/gallon tax credit, ethanol tax credits

[10] Funding support will be sought from a number of sources, including US DOE grants

[11] Such as counties, municipalities, and special districts.

[12] This working group could delegate many of the action items to several smaller resource specific working groups like the Wind Working Group, but other implementation actions and policy considerations will require this higher level integrated approach.

[13] Equipment for gathering and transporting the biomass from the forest to the energy facility is already eligible for the BETC.

would total $4 million per year. As for biodiesel, 15 million gallon/year with a 5 cents/gallon payment would total $750,000 per year.

A fund for gathering wind characteristics data at ten sites would have an estimated cost of $200,000 for 2005-2007. A fund to collect information on the geochemistry of wells and springs would have an estimated cost of $150,000 for 2005-2007.

A revolving fund *for units of local governments only* [14] to finance feasibility studies of renewable projects to be owned by those units of local governments could initially be set at $200,000.[15]

Amendments to existing incentives that are under consideration would likely have a relatively small impact on state or local revenues next biennium, such as extending the 5-year 50 percent property tax exemption for ethanol production facilities to 2016 and expanding this exemption to biodiesel facilities.

***State agencies' budgets***
The extra activities outlined in this Plan by individual agencies and the coordination of work between agencies and stakeholders would require an estimated 3 FTE spread out over several agencies.

***Purchases of renewable energy resources by state government***
The amount of renewable energy resources that state government purchases will depend on the funding level, source and which of the following three mechanisms the state uses to achieve these goals: green tags, bundled stable- price power purchases and/or investments in renewable resource projects at state facilities.

It would cost about $200,000 per year to buy green tags for 10 percent of state government's electricity needs as proposed for the 2005-2007 biennium.[16] Payments would go toward renewable resource projects in Oregon. A "stable- price" renewable resource product is an alternative that has the added benefit of fixing power costs over several years. However, only one Oregon utility offers such an option today. The state may not want to enter a contract with an alternative electricity supplier for a term sufficient to acquire such a product, if available. Estimates of the costs of this option are not available at this time. Investments in renewable resources at state facilities could include solar electric systems on government buildings and wind turbines at government sites with favorable wind resources. The projects could meet load at the site, displacing the need for purchased power, or be sized to sell excess power to a utility or third party.

[14] Such as counties, municipalities, and special districts.
[15] This would be sufficient for four to five studies in the first year. Assuming that three out of four studies would result in a successful project and return the funds once financing of the project has been obtained, such fund would be sufficient for five years or so, after which this has to be reviewed.
[16] Assuming a cost of 0.5¢/kWh for green tags.

The added costs of these investments could come from the state general fund. The Energy Trust could contribute toward these investments to the extent they benefit the PGE and Pacific Power customers (including state agencies) that provide the Trust's renewable resource funds. Investments would be tied to increasing generating capacity from renewable resources in the state and demonstrating on-site generation.

## 4 General Renewable Resource Actions

The following actions will be taken to enhance and expand support for development of *all* renewable resources in Oregon. Actions supporting expansion of specific renewable resources follow in section 5.

*Actions:*

1. The Governor's Office will:
    - Coordinate the legislative initiatives as outlined in section 3 of this Plan.
    - Appoint a **Renewable Energy Working Group** to assist in reaching long and short term goals. It will coordinate the implementation of the action items outlined in this Plan and prepare regular progress reports to the Governor's Office and stakeholders. This group will consist of private sector citizens, renewable industry representatives, agricultural representatives, a governor's office representative, key state agencies, private and consumer-owned utilities, and others. The Oregon Department of Energy (ODOE) will provide staff support for this working group.
    - Appoint a blue-ribbon **Transmission Expansion Working Group** to make recommendations to the Governor on how to solve the regional transmission issues. This will particularly benefit the further development of wind energy, but also future geothermal power development. Members of this working group will include executives of Portland General Electric (PGE), PacifiCorp, Public Power and the Bonneville Power Administration (BPA), as well as representatives of the ODOE, Oregon Public Utility Commission (OPUC), and independent power industry. ODOE will provide staff support for this working group. **Target date to complete this task is July 1, 2005.**

2. The Renewable Energy Working Group's tasks include, but are not limited to:
    - Assist in reaching the long and short term goals of this Plan; coordinate the implementation of the action items outlined in this Plan; prepare regular progress reports to the Governor's Office and stakeholders.
    - Work with the Oregon's congressional delegation to support a national renewable portfolio standard.

- Work with the Oregon's congressional delegation to continue and expand the federal Production Tax Credit and the Renewable Energy Production Incentive to include all renewable energy resources.[17]
- Assess as the feasibility and effectiveness of production-based incentives for electricity generated by small to medium scale renewable resource facilities.[18]
- Assess the feasibility of a state Renewable Portfolio Standard, and compare it with production-based incentives as to its effectiveness to encourage renewable energy.
- Work with the state's publicly and privately owned utilities, the Northwest Power and Conservation Council and BPA to develop a process and protocols for expediting interconnection requests and developing more distributed generation.
- Work with Oregon's congressional delegation, BPA and publicly owned utilities to expand BPA's Conservation and Renewables Discount Program.
- Work with BPA and publicly owned utilities to promote PURPA's[19] Qualifying Facilities using renewable resources, while avoiding negative financial harm to the utilities.
- Explore whether some transmission constraints for community owned renewable energy projects can be overcome if a portion of new or upgraded transmission capacity were reserved for such community owned projects in exchange for a reduction in property taxes.
- Identify growing Oregon renewable energy businesses and assist them with expansion planning and workforce development. Identify how that growth can be replicated through export service.
- Help improve coordination and provide tools to attract new renewable energy businesses to build facilities in Oregon.
- Focus efforts to solidify the strength of a Brand Oregon renewable energy market for our technology services and commodities.

3. The Oregon Department of Energy will:
   - Assist the Governor's Office with the coordination of the legislative initiatives for the 2005 session, as listed in section 3.
   - Include in its Biennial Energy Plan a section that tracks the progress towards this Plan's goals.
   - Provide staff support for the Renewable Energy Working Group and the Transmission Expansion Working Group.

[17] In case the current efforts in Washington, DC don't succeed.

[18] Production based incentives have been very successful in the Midwest and Europe. For examples of community wind projects in the Midwest, see http://www.windustry.com/community/default.htm#Projects.
For discussion of the European incentives "called feed laws", see
http://www.energy.state.or.us/renew/Wind/WindPubs/feed_laws_Hvelplund.pdf.

[19] PURPA: Public Utilities Regulatory Policies Act of 1978. Before PURPA, only utilities could own and operate electric generating plants. PURPA required utilities to buy power from independent companies that could produce power for less than what it would have cost for the utility to generate the power, called the "avoided cost".

- Continue to assist households, businesses, units of local government and others to invest in renewable energy resources through the state's energy tax credit and energy loan programs, in coordination with incentives offered by the Energy Trust and BPA.
- Manage the revolving fund *for units of local governments only* to finance feasibility studies of renewable projects to be owned by those units of local governments, if such a fund is established.
- Provide information on model siting standards and technical assistance to local governments to help them plan for siting renewable resource facilities.

4. The Oregon Economic and Community Development Department will:
   - Help develop a viable renewable energy industry "cluster" by working with key stakeholders in government, business, non-governmental organizations, higher education, and local communities.
   - Create financial incentives, support regulatory streamlining, provide technical assistance, and publicly recognize businesses and communities that implement energy conservation programs, purchase renewable energy, and adopt best practices.
   - Support research and education to further development of new technologies that leverage renewable energy sources.
   - Grow Oregon's economy by obtaining funds for the development of and facilitating the transfer of new technologies from Oregon's university system and Research and Development centers to private enterprise.
   - Encourage and support infrastructure projects that incorporate eco-friendly design and innovative technologies that use renewable energy resources and enhance livability.

5. The Department of Administrative Services will:
   - Report on the state's purchases of renewable energy resources on an annual basis.

6. The Oregon Public Utility Commission has investigations underway or may examine for the *regulated* utilities the following:
   - How to assess the benefits of renewable resources in avoiding fuel price volatility and emissions costs.
   - Standards to streamline the interconnection of small generators.[20]
   - Increasing the size of qualifying facilities eligible for standard purchase rates, a standard power purchase agreement with an extended contract length, and a standard method for determining avoided costs.
   - How distributed renewable and combined heat and power resources can help meet energy, capacity, distribution and transmission system needs at the lowest cost.

[20] Generally less than 20 MW.

- Backup service for renewable resources and other distributed generators to ensure that costs and benefits are properly reflected in rates and terms.
- Ways to remove utilities' disincentives for accommodating independently owned renewable resources and combined heat and power resources.
- Standard rates and terms for retail customers to use the distribution system to sell power to other customers and marketers.

In addition, the Oregon Public Utility Commission will continue to work with its Portfolio Advisory Committee, the utilities and third-party providers to improve green power options for Oregonians and increase participation.

7. The Oregon Department of Agriculture will:
   - Assist, jointly with ODOE, in planning and conducting workshops and other educational activities to inform agricultural producers about renewable energy information, technologies, resources, and programs.
   - Assist, jointly with ODOE, agricultural producers in evaluating project feasibility and eligibility for federal energy grants, ODOE tax credits, and other resources for renewable energy projects. Assist growers in applying for these resources as appropriate to the project.

8. The Oregon Department of State Lands will:
   - Review its administrative rules guiding the leasing of state-owned lands managed by the agency to determine what more can be done to further streamline the process for leasing state lands for the siting of renewable energy projects while meeting its Trust obligations. The Department will also consider the importance of renewable energy resources when revising its Asset Management Plan.

9. The Department of Forestry will:
   - Assess, in cooperation with other agencies including the Oregon Departments of Energy and Fish and Wildlife, the feasibility of a streamlined process for leasing state lands for purposes of renewable energy development.

10. The Oregon Department of Consumer and Business Services' Building Codes Division will:
    - Provide education and training materials to local governments regarding renewable energy installations.
    - Update its code and standards to reflect the new technologies and developments in renewable energy installations.

11. The Oregon University System and Community Colleges will:
    - Inventory all of the renewable resource and energy efficiency research, development and curricula.

- Further develop higher education renewable resource research and development capabilities to help Oregon businesses gain a national and international leadership role in this market.
- Establish and/or maintain educational standards that will produce future leaders in renewable resource systems integration and resource technologies.

## 5 Resource Specific Actions

Each resource segment, listed in alphabetical order below, briefly identifies the resource and technologies currently being used and lists the main perceived barriers. Actions are listed next, with the highest priority given to those that address the main barriers.

**Biofuels – Biodiesel and Biolubricants**

Canola, rape seed, mustard, possibly soy and other crops, along with waste grease from the food service or processing industry, can be refined into an oil suitable to fuel diesel engine vehicles and to be used as lubricants. Many of these feedstocks can be grown in Oregon. Biodiesel can be blended in various ways, but generally comes in B-20 (20 percent biodiesel, 80 percent petroleum diesel) or B-100 (100 percent biodiesel) forms.

Currently, suppliers are rapidly developing an Oregon customer base of public and commercial fleets. The Oregon Department of Administrative Services began buying B-20 exclusively, which amounts to about 200,000 gallons per year. The total amount of B-20 used in 2003 in Oregon was about 700,000 gallons.

A crushing plant is needed in Oregon to separate oils from crop feedstock. There is no market-pull mechanism in place with mandated goals to increase the use of biodiesel. Consumer awareness is low for both biodiesel and biolubricants. Better incentives are needed to facilitate market penetration.

*Actions:*

1. The Renewable Energy Working Group will:
   - Help form partnerships with growers, state agencies and interested investors for building a crushing plant to separate oils from crop feedstock.
   - Support a production-based incentive of 5 cents/gallon for biodiesel with ceilings per production facility, per year and total number of years.
   - Support extending the 50 percent property tax exemption for ethanol production facilities through the end of the 2016 fiscal year *and expand the exemption to biodiesel facilities.*
   - Assist in the completion of a demonstration project where oil seed crops are grown as a healthy rotational crop, are crushed and refined on-site, and produce all of the farm's fuel.

- Develop public support for a new law that provides for a government approved *voluntary* labeling program to identify "lower carbon dioxide" fuels at the pump.

2. The Oregon Department Agriculture will:
   - Work with Oregon State University to evaluate and disseminate information on production of bio-fuel crops for conversion to biodiesel and biolubricants.
   - Assist growers assess the feasibility of grower-owned processing facilities, and work with parties interested in biodiesel production on business plan evaluation, plant development and siting, and identifying potential funding sources (in coordination with the Oregon Economic and Community Development Department (OECDD), ODOE, and local communities).
   - Work with OECDD, ODOE and other appropriate entities to identify methods of branding and pump labeling for Oregon produced biodiesel to encourage consumer consumption of locally produced product.

3. The Oregon Department of Energy will:
   - Work with the BPA to evaluate the potential of using biodiesel in electric generators for rural/remote areas where transmission is a problem during peak hours.

**Biofuels - Ethanol**

Ethanol is a renewable fuel currently distilled primarily from corn. In the future, ethanol will be produced from lignocellulosic feedstocks such as wood waste and agricultural residue, which are abundant in Oregon. Throughout North America, ethanol is used as a gasoline additive for a wide variety of purposes, including the reduction of exhaust pollutants that become precursors to ground level ozone. The ethanol content in gasoline can be as high as 15 percent without to need to modify standard engines. Slight modifications to a vehicle's fuel system have to be made to run on E-85 (85 percent ethanol). In Oregon, ethanol is the predominant oxygenate in the gasoline supply. In 2002, up to 60 million gallons of ethanol were used to oxygenate the 1.6 billion gallons of gasoline used by Oregonians. That ethanol, which accounts for up to 4 percent of Oregon's gasoline supply, was produced in the Midwest.

The summer nighttime temperatures in Oregon are not ideal for growing the high sugar corn or hard red wheat preferred by ethanol distillers. There are currently no distillers or refiners located in Oregon. Other Oregon biomass feedstocks such as barley or cellulosic wastes (grass straw or wheat stubble) can be used to make ethanol, but at higher cost.

There is no market-pull mechanism in place with mandated goals to increase the use of ethanol. Consumer awareness is low. Better incentives are needed to make ethanol plants using Oregon grown crops economically viable.

*Actions:*

1. The Renewable Energy Working Group will:

- Support a production-based incentive of 4 cents/gallon of ethanol with ceilings per production facility, per year and total number of years.
- Develop public support for extending the 50 percent property tax exemption for ethanol production facilities through the end of the 2016 fiscal year.
- Support Oregon university system's research on alcohol fuels produced from cellulosic materials.
- Support a ban on MTBE.
- Continue and enhance efforts to work with the national Governor's Ethanol Coalition.
- Develop public support for a new law that provides for a government approved *voluntary* labeling program to identify "lower carbon dioxide" fuels at the pump.
- Support policies and actions to promote government and private purchases of hybrid vehicles fueled with E-85.

2. The Department of Agriculture will:
   - Assist growers and cooperatives, in coordination with Oregon State University research and extension programs and agricultural organizations, in the development of bio-fuel crops for ethanol production, including varietal development, growing and harvesting practices, development of business plans, facilities for processing, siting, market development and promotion.

3. The Department of Forestry will:
   - Assist, jointly with ODOE, the forest products industry to get federal funds for biomass-to-ethanol development through demonstration of cellulose to glucose conversion.

4. The Department of Administrative Services will:
   - Make sure that its fleet fuel use will meet the short and long-term goals for the use of ethanol.

**Biogas**

Biogas facilities produce electricity and heat or steam from waste gas (methane) from landfills, sewage treatment plants and manure. Digesters can also produce syn-fuels (equivalent to LNG). Currently, three landfills tap waste methane gas to generate four megawatts of electricity and provide industrial fuel. In addition, 29 wastewater treatment plants use methane to generate three megawatts of electricity and provide heat for sewage treatment. Electricity is beginning to be generated using manure from dairy cows. For farmers, biogas is mostly a byproduct and other benefits are often the main reason for these projects. With syn-fuels, the value of the fuel is significantly more at current market prices than the value of potential electricity generation, but other byproduct revenue is still needed.

Only the largest cities can afford landfill and waste treatment facility biogas projects. Lack of funding for feasibility studies and lack of fact sheets for best design practices for methane recovery systems have been identified as barriers.

*Actions:*

1. The Oregon Department of Energy will:
    - Identify the major remaining landfill and waste treatment facility sources of biogas and provide up-to-date "best practices" information to the owners of promising sites.[21]
    - Support efforts to reach the short-term goal of 5 MW of new biogas-fueled electricity production demonstration projects.

2. The Oregon Department of Agriculture will:
    - Assist livestock operations in assessing best design practices for methane recovery and related technologies.
    - Promote the development of methane production digesters - as economically feasible for producers - through industry association events, OSU Agricultural Extension Service and local economic development and Oregon Department of Environmental Quality field staff.
    - Support efforts to reach the short-term goal of 5 MW of biogas-fueled electricity production demonstration projects.

**Biomass**

Currently, there are biomass combustion boilers at more than fifty industrial sites in Oregon. These boilers supply heat and energy for industrial processes. The power generated at these facilities was about 108 megawatts in 2001.

New biomass energy markets may provide a way of disposing of otherwise problematic forest biomass residues from timber harvests, stand improvement activities, fuels treatments, and thinning in a least-cost, if not profitable, manner. Agricultural and urban biomass wastes can also provide fuel for energy facilities.

The high cost of gathering and transporting forest biomass to an energy conversion facility continues to be a barrier to economic biomass energy development. However, investments in forest biomass conversion to energy will lead to multiple environmental, economic, and social benefits. These include:

- reduced wildfire risks to communities and wildfire suppression costs to taxpayers
- increased timber supplies
- improved forest health, water quality, wildlife habitat, and recreation areas

[21] In cooperation with the U.S. EPA's Landfill Methane Outreach Program (LMOP). This is a voluntary assistance and partnership program that promotes the use of landfill gas as a renewable, green energy source.

- reduced air pollution from wildfire and prescribed forest burning smoke
- reduced and avoided carbon dioxide emissions, and
- maintenance of family-wage jobs and a forest industry infrastructure in rural Oregon.

These benefits are not properly accounted for in the energy market place.

Although electric power is the most widely used end product from biomass, integrated bio-refineries offer another opportunity. These refineries can produce liquid fuels, high-value chemicals and materials, and electric power within the same facility. With proper encouragement, integrated facilities could gasify rather than combust their feedstocks and use the synthetic gas to offset the use of natural gas for power production, while also converting that same synthetic gas to liquid fuels and/or chemicals.

Biomass facilities may need a production-based tax credit in addition to the fuel cost reduction to be economically viable.

*Actions:*

1. The Renewable Energy Working Group will:
   - Help determine whether financial support (such as a per ton transportation incentive) for forest treatment projects is needed to move biomass feedstock from the forest to renewable energy plant sites. Particular attention should be paid to 1) existing facilities for which utility contracts expire, and 2) how the cost of such projects can be spread out over a larger geographic area than the local utility's service territory.
   - Help the formation of partnerships between private companies and consumer owned utilities to develop energy systems for local communities.
   - Support efforts to develop integrated bio-refineries that produce liquid fuels, high-value chemicals and materials, and electric power within the same facility.
   - Support the legislative initiative to allow biomass facilities to qualify for net metering and allow the Oregon Public Utility Commission to adopt rules to increase the 25-kilowatt limit on a net metering facility for customers of Portland General Electric and Pacific Power.

2. The Oregon Department of Energy (ODOE) will:
   - Reach out, jointly with the Oregon Department of Forestry (ODF), to local governments and biomass energy developers and assist them in locating potential facility site locations.

3. The Oregon Department of Forestry will:
   - Expand its ongoing, statewide Forest Assessment Project to include a comprehensive assessment of forest biomass supply and demand relationships.

- Identify federal, state, and private forestlands where proximity and non-timber biomass production potential provide long-term opportunities for biomass recovery for energy generation.
- Cooperate with biomass energy developers in locating potential facility site locations on Board of Forestry forestlands and, consistent with other management plans for these lands, work to develop expedited leasing processes for such sites.
- Assist in the development of long-term forest health restoration contracting mechanisms with the USDA Forest Service and USDI Bureau of Land Management to assure affordable and predictable access to forest biomass on federal forestlands in regions surrounding biomass generation sites.
- Promote congressionally approved experiments in Oregon where local communities with mature, successful histories of collaboration are empowered to demonstrate their stewardship of federal forestlands.
- Promote active fuels and vegetation management, along with aggressive fire suppression on public and private forestlands, as key tools to produce biomass for energy generation and to manage forest health.
- Promote alternatives to prescribed burning through the administration of the Department of Forestry Smoke Management Plan.
- Monitor, jointly with ODOE, available federal funds for biomass projects and provide this information to stakeholders. Where needed, they will provide assistance with the application process for federal funds.
- Work with federal agencies to promote forest biomass energy opportunities through administration of the National Fire Plan and the Healthy Forests Restoration Act.
- Facilitate the use of the federal Environmental Quality Incentive Program to provide matching funds for forest fuel reduction projects that will provide feedstock for biomass energy plants.
- Investigate the benefits of reduced and avoided carbon dioxide emissions from forest fuel reduction projects in conjunction with biomass energy generation.

4. The Oregon Economic and Community Development Department will:
   - Develop, jointly with the ODF, a comprehensive forest sector economic development strategy for Oregon that will encourage continued investment in forestlands by public and private landowners and that promotes biomass energy production along with timber and non-timber forest products.

5. The Department of State Lands will:
   - Cooperate with biomass energy developers in locating potential facility site locations on state lands where it can be accommodating taking into account the Department's Trust obligations and current lease commitments.

6. The Oregon University System and Community Colleges will:

- Research and identify Oregon's potential for biorefinery industry. Identify opportunities where bio-refineries can produce liquid fuels, high-value chemicals and materials, and electric power within the same facility.

**Combined Heat and Power Systems**

The combined heat and power (CHP or cogeneration) form of distributed generation is about twice as energy-efficient, and therefore produces fewer pollutants, than producing heat and power separately.[22] These systems capture the waste heat produced during generation for industrial processes or for heating and cooling. Although CHP systems typically use fossil fuels, they can also use renewable energy resources. Due to these benefits, three states[23] have legally recognized waste heat recovery, regardless of primary fuel source, as a renewable resource eligible to satisfy renewable portfolio standards.

Recovering waste heat does not require any burning of additional fuels. Some of the benefits of this technology are:

- Minimal environmental impact, as they are located on existing industrial sites.
- Low operating and maintenance requirements.
- Base load generation.

The current CHP resource in Oregon consists of 41 projects in Oregon with 818 megawatts of electric generation capacity.[24] Natural gas turbines comprise 15 of these CHP projects for 540 megawatts of capacity. The other 26 projects account for 278 megawatts and use renewable resource fuels such as wood residue (hogged fuel), black liquor[25] and wastewater gas. It is estimated that there is very cost-effective potential for upwards of 1,000 megawatts of new CHP resource in Oregon.

*Actions:*

1. The Renewable Energy Working Group will:
   - Work with state agencies and others to give waste heat the same status as renewable energy in state legislation, rules and miscellaneous programs or projects that benefit renewable energy resources.
   - Assist the Building Codes Division and the Oregon Public Utility Commission to identify and adopt uniform technical standards, procedures and agreements for

[22] Traditional power plants waste up to two-thirds of the fuel's energy value before it reaches customers, most of it waste heat.

[23] Nevada, North Dakota and South Dakota.

[24] Those systems range in size from 30 kilowatts at a commercial office to over 100 megawatts at a pulp and paper plant. In almost every case, the systems operate to generate electricity and thermal energy primarily for onsite use. Only a few of the largest facilities sell electricity on the market. Not all of them operate at all times.

[25] In chemical pulping the lignin in the wood is dissolved in a digester where the wood chips are cooked. The fibres are separated from the spent pulping liquor (so-called black liquor). The black liquor is first concentrated, and subsequently incinerated in so-called recovery boilers,

interconnecting generators, where the Federal Energy Regulatory Commission does not have jurisdiction.

**Fuel Cells**

Fuel cell technology can play an important role in Oregon's renewable energy future. Fuel cell fuel reformers are able to combine water with renewable fuels including bio-methanol, biodiesel, biogas and ethanol to produce hydrogen. The renewable hydrogen can then be used in a fuel cell stack where it is converted to electricity, or the hydrogen can be used directly in commercial or industrial applications.

Oregon commercial and industrial sectors use approximately 30 million cubic feet of hydrogen per year. All hydrogen is imported since there are no commercial hydrogen generation plants in Oregon. If hydrogen used in Oregon were generated in Oregon using renewable resources, new jobs could be created.

In the short run, most fuel cells are expected to use non-renewable fuels. However, a goal of this Plan is to foster increasing use of renewable fuels as technologies become feasible.

*Actions*

1. The Renewable Energy Working Group will:
    - Support Oregon companies in attracting funding from regionally targeted federal fuel cell and hydrogen generation programs including regional US Department of Energy and US Environmental Protection Agency (EPA) programs.
    - Support a bill to expand the Residential Energy Tax Credit for fuel cells to provide up to $1,500 in tax credits for three years.
    - Encourage the University System to explore fuel cell technology and to establish a fuel cell technology center.
    - Support a revision of the federal tax credit language for renewable fuels to include off-road and stationary uses instead of exclusively supporting transportation applications.
    - Support and highlight one or more demonstration projects that generate electricity using Oregon-made fuels with energy technologies engineered and manufactured in Oregon.

2. The Oregon Department of Energy will:
    - Modify its web site and publications to identify more clearly how a fuel cell owner can apply for tax credits and to describe how the owner is using those tax credits.

**Geothermal**

Most areas of high heat flow are in the Cascades, central Oregon, southeast Oregon and parts of northeast Oregon. These are the locations where geothermal resources are most likely to be found. Geothermal resources include high-temperature for electricity generation, intermediate

temperature for industrial, agricultural and municipal applications and low-temperature heat pump applications. The Oregon Department of Geology and Mineral Industries (DOGAMI) has available to the public geothermal resource maps of Oregon showing both regional and site-specific information.

Currently, about 1,800 ground-source heat pumps provide space and water heating for Oregon homes. The City of Klamath Falls uses geothermal energy for a district heating system, which represents only a small portion of the direct geothermal use in the area. Geothermal sources elsewhere in Oregon supply heat for buildings, swimming pools, resorts and industrial uses. All of these applications fall into the "direct use" category.

Geothermal electric generation could provide important renewable *baseload* generation. Furthermore, geothermal electricity production on federal lands requires that a resource production royalty be paid to the federal government. In Oregon, half of the royalty payment would be paid to the state, and the state is obligated to pass at least 50 percent onto the county where the electricity was produced.

Since 1975, geothermal exploration and development in Oregon has been facilitated by a successful collaboration between state and federal agencies (DOGAMI, Bureau of Land Management and the US Forest Service). Memoranda of Understanding have been useful tools and these agencies anticipate continuing this association in the future. Numerous projects - heat flow and exploratory drill holes throughout the state and the Newberry Project - have obtained useful results.

Geothermal experts at the state and federal level and in private industry continue to consider the area on the flanks of Newberry Volcano, outside the Newberry National Volcanic Monument, to be one of the best prospects for high-temperature geothermal electricity production in the Pacific Northwest. To date, limited exploration drilling has measured temperatures up to 600 degrees F.

The main barrier for development of geothermal electricity generation in Oregon is its above-market cost. Financial incentives similar to those for wind (about 1.5 to 2 cents per kWh) are needed in the near future.[26] When power sales contracts are anticipated or awarded, the geothermal industry will likely respond with building a 20 MW or larger demonstration plant. Furthermore, an important round of exploration and assessment in Oregon will likely be undertaken.

*Actions to promote direct use:*

1. The Oregon Department of Energy will:

[26] As of July 2004, the Senate passed an extension of the federal Production Tax Credits which includes geothermal. The House version does not include geothermal.

- Work with the GeoHeat Center and others to help establish training for heating, ventilation and air-conditioning (HVAC) contractors on the benefits of earth-coupled heat pumps and help develop a statewide promotion strategy.
- Work with the GeoHeat Center and others to highlight demonstrations of homes, businesses and public buildings such as schools and correctional facilities using direct geothermal energy in the community.

2. The Oregon Department of Geology and Mineral Industries, in cooperation with the Departments of Energy, Forestry, and State Lands, will:
   - Work with the GeoHeat Center and others to provide copies of existing maps detailing the geothermal resource potential of Oregon and incorporate additional information into the data base as new information becomes available.
   - Periodically publish updated geothermal resource maps of Oregon as additional data availability and demand require.

3. The Oregon Department of Agriculture will:
   - Collaborate with ODOE and agricultural producers in identifying new and expanded uses for geothermal application in agricultural operations, and expand implementation through education, pilot projects, and existing incentive programs.

*Actions to promote generation of electricity:*

1. The Renewable Energy Working Group will:
   - Work with the state's congressional delegation to support a federal production tax credit for geothermal electricity generation.[27]
   - Work with the federal government and others to provide a forgivable loan or grant program for drilling exploratory holes.
   - Work with the Energy Trust, the utilities, BPA and others to expedite a Power Purchase Agreement with added incentives based on above-market costs for a 20 MW or larger demonstration project.
   - Review the royalty and tax implications of geothermal production facilities and explore funding means to help promote geothermal development.[28]
   - Help develop a partnership plan between state and federal agencies for further development of projects on federal land or involving federal leases.

2. The Oregon Department of Geology and Mineral Industries will:
   - Sample and analyze waters from wells and springs throughout the state to develop a statewide data base useful to the geothermal industry, to state and federal agencies

[27] In case the current efforts in Washington DC don't succeed.

[28] Geothermal electricity production on federal land requires that a royalty be paid. In Oregon, half of the royalty payment would be paid to the state, and the state is obligated to pass at least 50% onto the county where the electricity was produced.

and research institutions as a valuable component in geothermal resource target evaluation in Oregon, provided funding can be obtained.[29]

3. The Oregon Department of Energy will:
   - Continue the collaboration with the Pacific Northwest Section of the Geothermal Resources Council regarding geothermal resources within Oregon.
   - Coordinate the Oregon Geothermal Working Group, which is part of USDOE's "Geo-Powering the West" program.

4. The Oregon Department of State Lands will:
   - Review and, if necessary, revise its administrative rules governing the exploration for and leasing of geothermal resources to ensure that they are easily understood and usable by persons wanting to conduct these activities on lands administered by the agency.

**Hydroelectric Generation**

Currently, hydropower meets more than half of Oregon's electricity demands. In comparison, "new" hydro would be a small player in any likely renewable-generation growth scenario. It focuses primarily on the potential to develop micro-hydro (or "seasonal" hydro) in association with numerous irrigation piping canals. Run-of-the-river technology could also make a contribution throughout many areas of rural Oregon. Oregon has significant experience designing, financing, installing and operating these optimized water use systems.

*Actions:*

1. The Renewable Energy Working Group will:
   - Work with state agencies and interested stakeholders to explore the feasibility of multi-purpose upstream small storage facilities for use in micro-hydro projects in the context of ORS 536.238's "environmentally and financially feasible storage."
   - Seek funding to defray costs of water rights permitting for micro-hydro projects.
   - Identify and support generation efficiency improvements as hydro facilities come up for Federal Energy Regulatory Commission re-licensing and State of Oregon reauthorization. Support maximum generation efficiency for new projects in Oregon, while safeguarding the environment.
   - Continue to support the state's policy of reauthorizing hydroelectric projects that are found to be in the public interest if they balance the region's generation needs with the enhancement or maintenance of the natural resources of the state.
   - Assist irrigation and water service districts as they identify sites in Oregon where untapped micro-hydro could be developed using irrigation piping channels.

[29] This has been done in Nevada with positive results. Funding support will be sought from a number of sources, including the state and US DOE grants

- Help develop irrigation canal systems that use pipes to reduce evaporation and percolation losses, concentrate water pressure which reduces irrigation pumping energy use, and provides sites for hydroelectric generation.
- Help complete an environmentally enhancing hydroelectric demonstration project case study that involves multi-agency analysis and collaboration.

2. The Oregon Water Resources Department (OWRD) will:
   - Work with state agencies and interested stakeholders to develop recommendations to streamline rules and application procedures for micro-hydro projects.
   - Continue to develop and enhance the coordination of micro-hydro projects consistent with state policies.
   - Identify micro-hydro resources and make them available to the public on OWRD's web site.
   - Prepare and disseminate a "Guide to Micro-Hydro Permitting in Oregon."

3. The Oregon Department of Energy will:
   - Seek changes in its state Energy Loan Program to make it easier to finance small hydro projects.[30]

4. The Oregon Department of State Lands will:
   - Revise its administrative rules governing the authorization of hydroelectric projects on state-owned waterways. The goals of this review will be to develop administrative rules that are easily understood and usable by persons who currently have, or want to place such facilities on state-owned waterways. At the same time, ensure that the Common School Fund receives an appropriate amount of revenue from the use of these lands in this manner.

**Solar**

Solar energy can provide space heating, hot water and electricity (primarily with photovoltaic cells). Designing buildings to make the most of sunlight for lighting also can reduce energy needs. South-facing windows with overhangs to prevent overheating in summer and heat storage materials add little to the cost of a new building. Solar water heating can supply about half of the hot water for a typical Oregon home. Currently, residents have installed more than 17,000 solar water heating systems in the last 20 years. There are more than 250 solar electric systems in the state.

*Actions*

1. The Oregon Economic and Community Development Department, with assistance from ODOE, will:
   - Stimulate the development of an Oregon inverter-manufacturing sector.

[30] For example, ODOE proposes to remove the five-megawatt limit on loans for projects that increase the output of a hydroelectric project.

- Work to attract a photovoltaic manufacturer with existing financing and tax incentives.

2. The Oregon Department of Energy will:
   - Seek a legislative change for large solar electric systems so that the tax credit can be applied over several years (up to $1,500 per year for up to three years).[31]
   - Seek a legislative change to allow builders of speculation homes to claim residential tax incentives on the installation of renewable features in their homes.
   - Demonstrate high performance energy homes that use advanced design to reduce energy demand, passive solar for space heating, active solar water heating and photovoltaic systems to produce as much or more electric energy than the home uses on an annual basis.

3. The Oregon Department of Agriculture will:
   - Collaborate with ODOE and agricultural producers in identifying new and expanded uses for solar application in agricultural operations, and expand implementation through education, pilot projects, and existing incentive programs.

**Wave Energy**

Generation of electricity through conversion of ocean current, swell, wave action, tidal, or thermal gradients is being successfully demonstrated. Most promising applications are offshore use of the consistent rise and fall of swells along deep-water shorelines where there is significant year-round wave action. Wave power densities in Oregon are estimated to be capable of producing between five and 15 megawatts per mile of coastline.

The technology is available now to construct a sizeable wave farm. Economics are likely to be in the $3,000/kW range for smaller than 10 MW offshore systems, falling to around $1,000/kW for a 200 MW system. Power price is in the range of 10 cents/kWh for small systems, falling to a projected 3-5 cents /kWh for the larger systems. This lower number would be competitive with current baseload generation.

Currently the United Kingdom has a vibrant program of wave, ocean, and marine/tidal technologies being supported through government support. The Electric Power Research Institute (EPRI) recently began studies to build six demonstration projects in six states, including Oregon and Washington. EPRI wants to build a 500 kW demonstration project off the Oregon coast within a 2-4 year time horizon.[32]

*Actions:*

[31] The current tax credit strategy which encourages small systems to be installed and then expanded each year. The total tax credits will not increase.

[32] At the end of 4 years, the pilot project will have generated enough data to begin determining commercial feasibility.

1. The Renewable Energy Working Group will
   - Encourage the ongoing ocean energy research at OSU to include technology cost reduction, improvement in efficiency and reliability, identification of sites, interconnection with the utility grid, and study of the impacts of the technology on marine life and the shoreline.
   - Coordinate efforts to attract one of EPRI's 500 kW demonstration projects to the Oregon coast by 2006.

**Wind**

Large wind farms are currently operating in Oregon with a total capacity of 259 MW, the largest of which is Stateline with 120 MW. Several of these existing wind farms are planning expansions and new plants are in the planning phase as well. Utilities have incorporated wind energy in their resource plans. The feasibility of smaller wind farms (of up to about 10 MW) owned by local communities and landowners is being investigated at several locations. Net metering is available for systems of 25 kW and smaller.

Transmission capacity between eastern and western Oregon is the main barrier for further large-scale development of wind. Currently, all wind farms need a production based tax credit (or similar financial incentive), but this may not be needed in the future given the price trend of natural gas and the efficiency of larger turbines. Smaller project economics are more challenging due to the higher cost of installing small numbers of utility-scale wind turbines. Transmission issues are often barriers for this kind of developments as well. The lack of long-term wind speed data from different parts of the region (other than the eastern Columbia River area) impairs the marketability and development of wind.[33]

*Actions:*

1. The Renewable Energy Working Group will:
   - Work with the BPA to use the federal hydropower system and BPA's new wind integration services to reduce the cost of energy to customers.
   - Help develop a project to collect wind characteristics data at ten sites throughout the state, and make them publicly available, to help community and locally owned wind farm developments as well as large scale wind farm development and wind energy integration with the grid, if funds become available. Oregon State University would manage such a program.
   - Work with BPA and others to expand the anemometer loan program that is currently offered by the Energy Trust.

2. The Oregon Department of Energy will:

[33] Data are needed by utilities to lower their risk, by network operators to solve their integration problems, and by developers who will go where the good long term data sites are and who need long term data for financing. Regional energy costs can be lowered by the availability of an extensive database.

- Continue to coordinate technical and financial assistance for community and farmer-owned wind farm demonstration projects.
- Continue to coordinate the Oregon Wind Working Group, as part of the US Department of Energy's Wind Powering America Program with the primary focus to promote small-sized wind farms to agricultural communities.

3. The Oregon Department of Forestry will:
   - Cooperate with wind energy developers and community leaders in locating potential facility site locations on Board of Forestry forestlands and state lands.
   - Work to develop expedited leasing processes for such sites, consistent with other management plans for these lands.

4. The Oregon Department of State Lands will:
   - Continue to look for opportunities on state lands administered by the agency for the placement of wind farms. Additionally, the agency will cooperate with wind energy developers and community leaders in locating facility sites while meeting its Trust and current lease obligations.

5. The Oregon Military Department will:
   - Perform a feasibility study of installing wind turbines on or near its military properties throughout the state.

2/4/05 CAC Meeting, Item E Handout

# Roadmap for Climate Protection: Reducing Greenhouse Gas Emissions in Puget Sound

## The Puget Sound Clean Air Agency Climate Protection Advisory Committee

Prepared with the Assistance of: Ross & Associates Environmental Consulting, Tellus Institute, The Center for Clean Air Policy, and Thomas D. Peterson

12/29/04

# 6. TRANSPORTATION SECTOR

## PRIORITY RECOMMENDATIONS

**Reduce the greenhouse gas emissions of new vehicles sold.**

**Reduce motor vehicle miles traveled.**

## BACKGROUND

The transportation sector represents approximately 50% of the Puget Sound region's GHG emissions.[58] Emissions from transportation sources are projected to grow 24% by 2020 if no action is taken. Although this sector contributes the highest amounts of GHG emissions in the region, the strategies provide significant reductions and could help relieve other regional problems such as congestion, air pollution, and urban sprawl.

The greatest source of emissions from the transportation sector is on-road motor vehicles, representing approximately 74% of the overall transportation sector emissions in 2020. The vast majority of sector emissions are from light-duty vehicles (i.e., passenger cars and trucks), which account for just under 60% of transportation GHG emissions, with heavy-duty vehicles (i.e., diesel trucks) making up the remainder of on-road sources.

## REDUCE THE GHG EMISSIONS OF NEW VEHICLES SOLD

**Key Action Items:**

1. Actively engage in efforts to urge the federal government to achieve improvements in fuel economy.
2. Adopt the California Motor Vehicle standards state-wide.[59]

[58] Transportation sector sources include cars, trucks, buses, aircraft, construction equipment, recreational vehicles, boats and ferries.

[59] Adopting California Motor Vehicle Standards is not a consensus recommendation. The Association of International Automobile Manufacturers did not support adopting these standards.

Two distinct key actions are targeted to reduce GHG emissions from the transportation sector: advocate as a region for the Federal government to adopt improved fuel efficiency standards and support actions by the State of Washington to adopt California's motor vehicle emission standards. These two actions are presented below.

## 1. Federal Fuel Efficiency Standards

**The CPAC supports immediate federal action to achieve improvements in fuel economy and recommends that the Clean Air Agency actively work with the state and others to urge the federal government to adopt improved standards.**

CPAC members agree that strengthening the federal standards on average fuel economy offers the most promising approach for achieving GHG emission reductions from automobiles and light duty trucks, such as Sport Utility Vehicles (SUVs). Because motor vehicles are such a significant contributor to GHG emissions nationwide, the United States as a whole needs to begin to take action immediately to reduce their emissions.

## 2. Adopt California Motor Vehicle Standards

**All of the CPAC members, except for the Association of International Auto Manufacturers, recommend that the State of Washington adopt California Motor Vehicle standards.**

The federal government is generally responsible for establishing national emission standards for new motor vehicles.[60] However, in some instances, California's Motor Vehicle Program is allowed to set motor vehicle requirements that may be stricter than the federal standards. As an alternative to federal vehicle emission standards, Section 177 of the Clean Air Act permits other states to adopt California's vehicle standards if they exceeded federal air quality standards in 1990.[61]

All of the CPAC members, except for the Association of International Auto Manufacturers, recommend that Washington State opt into the California vehicle program, which consists largely of two key components:

a. California's Low Emission Vehicle (LEV II) Standards.
b. Pavley Motor Vehicle standards.

[60] In 2004, Federal Tier 2 emission standards went into effect. These Tier 2 standards require stricter tailpipe and evaporative emissions controls in new passenger cars and light duty trucks than the previous federal standards.

[61] The Puget Sound Clean Air Agency legal staff believe that Washington State meets this requirement and hence is eligible to adopt the California program. Specifically, Washington has two non-attainment areas, Yakima and Spokane, and two large regions, Seattle and Vancouver that are now Maintenance Plan areas.

Each component is briefly described below.

### *LEV II*

California LEV II Standards consist of two parts – a low emission vehicle (LEV) component, which requires 90% of new cars and light duty trucks to meet stringent emission limits and a zero emission vehicle (ZEV) component which requires 10% of new vehicles to meet even stricter pollution limits, including zero evaporation limits.[62] The ZEV requirement may be met with partial ZEVs (or PZEVs), such as hybrid electric vehicles and other advanced technology vehicles. The LEV II program reduces nitrogen oxides, hydrocarbons, and carbon monoxide. It is not specifically designed to reduce GHG emissions; however, there is a small GHG reduction because of the 10% ZEV requirement. The technical analyses supporting the CPAC process indicated that implementation of LEV II standards would reduce transportation GHG emissions by less than 1% or 0.14 $MMTCO_2e$ in 2020. This number assumes that the Puget Sound region will meet the ZEV requirement through a combination of hybrid-electric and other ZEV-certified vehicles.

### *Pavley Motor Vehicle Standards*

California is developing regulations to reduce GHG emissions from motor vehicles. By January 1, 2005, the California Air Resources Board (CARB) is required to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles and light-duty trucks.[63] CARB has analyzed technology packages that address the GHGs from motor vehicles, including both tailpipe emissions and refrigerant emissions. The regulations are to go into effect in January 2006 and will apply to motor vehicles manufactured in model year 2009 and thereafter.[64] The technical analyses supporting the CPAC process indicated that implementation of these standards (known as the Pavley standards) could reduce Puget Sound transportation sector emissions by 10% or 2.96 $MMtCO_2e$ in 2020. This would result in a 17% overall reduction in GHG emissions from Puget Sound light-duty vehicles by 2020.[65]

**Table 3: Summary of California Vehicle Standards Costs and Benefits in 2020**

| California Vehicle Standards | 2020 Emissions ($MMtCO_2e$) | 2020 $/$MtCO_2e$ (cost effectiveness) | Net Benefits 2020 ('000) | NPV (2005 -2020) (millions) |
|---|---|---|---|---|
| Low Emission Vehicles (LEVII) | 0.14 | $14 | ($456) | $4 |
| GHG Tailpipe Standards (Pavley) | 2.96 | ($126) | ($438,900) | ($1,175) |
| **Total** | **3.10** | **($112)** | **($439,356)** | **($1,171)** |

[62] As defined by California Air Resources Board, zero emission vehicles are vehicles which produce no emissions from the on-board source of power (e.g., an electric vehicle)

[63] AB 1493, signed August, 13, 2002 (www.arb.ca.gov/cc/ab1493.pdf).

[64] CARB is also to provide flexibility, to the maximum extent feasible, in terms of complying with the regulations. CARB must ensure that any alternative methods for compliance achieve equivalent or greater reduction in GHGs.

[65] This was based upon a rate-base vehicle analysis from CARB that estimated the average reduction in GHGs from new cars (vs. current vehicles) would be 22 percent in 2012 and approximately 30 percent in 2016 and assumes the Assuming Pavley regulation takes effect in mode year 2009. For more information, see http://www.arb.ca.gov/newsrel/nr092404.htm

## Key Issues Regarding California Motor Vehicles Standards

All CPAC members, except for the Association of International Automobile Manufacturers, support state adoption of the California Motor Vehicle standards. This single action, in particular the Pavley standards described above, produces a significant amount of the emission reductions estimated for all of the recommended actions combined, second only to the energy efficiency recommendations. (3.1 $MMTCO_2e$ versus 3.5 $MMTCO_2e$ respectively.) It also accounts for a significant amount of the financial benefits estimated for the collection of recommendations in this report. A brief summary of the CPAC's recommendation and the opposing view are included below.

## Majority View—Adopt California Vehicle Standards in Washington

With transportation accounting for half of the Puget Sound's GHG emissions and more cars entering the region, meaningful progress toward lower GHG emissions is not possible without better vehicle technology. Adopting California State standards is the most straightforward means to achieve that goal through state action. Adoption of California standards would deliver:

- → **Significant reduction in the region's global warming pollution and toxic air emissions.** California standards would yield a 17% reduction in fleet-wide transportation global warming pollution by 2020 in the Puget Sound region.[66] They would also reduce conventional air pollution and cancer-causing air toxics such as benzene and formaldehyde.
- → **Large and sustained economic benefits to the region and to vehicle owners.** The value of aggregate savings would exceed $1 billion by 2020. A purchaser of a new car financed over 5 years would reap net savings of $11 per month due to fuel savings, after subtracting for additional capital costs.[67]
- → **Technology and consumer benefits.** Vehicles that meet the current California LEV II standards have much longer warranties (up to 10 years and 150,000 miles) on emission control equipment to ensure clean performance over time. Pavley

[66] By 2020, the average new vehicle sold in Puget Sound will emit 30% fewer GHGs than the same average vehicle does today.

[67] This analysis assumes gas would continue to cost $2 per gallon. Regarding cost effectiveness, Sierra Research testified on behalf of the Alliance of Automobile Manufacturers at the CARB September Board meeting that the CARB cost-effective analysis was incorrect because it did not adequately account for manufacturing costs due to issues such as research and development, the ability of manufactures to add new technologies to motor vehicles, and assumptions about the mileage accumulated over the lifetime of the vehicle. CARB responded that their assumptions regarding the cost of research/development and warranties were accurate, and that the technologies could be added to new car models with little additional costs to manufacturers. CARB also presented testimony showing an example of the impacts of a lower total mileage assumption. The results indicated that their total cost savings would be reduced. However, the savings of the new requirements still outweighed the additional costs. CARB presented an example showing the net present value being reduced from $1472 to $923, for an average vehicle. See California Air Resources Board. Board Meeting Minutes, Testimony for September 24, 2004. Los Angeles, CA. <http://www.arb.ca.gov/board/mt/mt092404.txt>
California Air Resources Board. Board Meeting Minutes, Testimony for September 23, 2004. Los Angeles, CA. <http://www.arb.ca.gov/board/mt/mt092304.txt> The cost-effectiveness of California standards remains a subject of debate.

standards will likely increase the availability of popular hybrid car models in Washington, reducing waiting periods and increasing vehicle choice.

- → **Implementation issues:** LEV II standards have already been adopted in eight states, and are not currently subject to legal challenge. Administrative requirements associated with the stronger state standards are modest, since the standards must be identical in all of the states that adopt them. This provision reduces both administrative burden and provides manufacturers with assurance that they will only have to meet one uniform state standard, in addition to the federal standards.

## Minority View—Federal Standards Only

The Association of International Automobile Manufacturers does not support state adoption of the California Motor Vehicle standards. The design and manufacture of motor vehicles is necessarily a national industry. It is premature for other states to consider the California Pavley standards since California has not completed its adoption or applied to EPA for the necessary approval waiver.[68]

- → **Emission reductions**: Potential air pollution benefits associated with the LEV II standards are questionable, as California LEV II reduction estimations are based on the use of California fuels, which are cleaner than fuels currently available in Washington.[69]
- → **Costs and Savings:** There are open questions regarding the actual costs and benefits of the Pavley standards being adopted in California. Comments provided to the California Air Resources Board by the auto manufacturers pointed out that its costs projections were vastly understated. Auto manufacturers believe that vehicle costs could rise as much as $3,000 per vehicle, exceeding the value of related fuel savings over the life of the vehicle. (See footnote 67) In addition to the increased costs of vehicles, there are additional burdens/costs for motor vehicle manufacturers, dealers, and the state[70]. In particular, internal administration of different warranties, accounting changes, monitoring of vehicle distribution, state reporting requirements, and other related administrative activities that would be additional costs for the dealers and manufacturers. Washington automobile dealers might also lose revenue if consumers travel to neighboring states that have not adopted California standards to purchase motor vehicles.
- → **Technology and Consumer Impacts:** With or without adoption of California standards, Washington consumers will have the option of purchasing a greater

[68] It was noted that section 177 allows other states to consider adoption of California standards only for those standards for which a waiver has been granted by EPA.

[69] Washington already receives some low sulfur gasoline from three refineries. BP supplies about 25% of Puget Sound fuel and produces gasoline with very low sulfur and reduced benzene levels comparable to California fuel, though this fuel does not necessarily meet all of the specifications of California fuels at this point in time. It is anticipated that Washington State will have low sulfur fuels widely available by 2006.

[70] The Washington Department of Ecology estimates that the LEV II program would require one additional staff person for implementation.

variety of hybrid-electric and other advanced technology vehicles in the future. Many automakers have already announced plans to introduce more types of hybrid vehicles in the next several model years, including hybrid SUVs and pickup trucks being introduced in 2005. These models will be sold nationwide just as current hybrid models are. Ironically, one vehicle class, light duty diesel vehicles, which are inherently about 35 to 40 percent more fuel efficient than comparatively sized gasoline vehicles, have not yet been certified to meet California LEV II emissions standards, despite the fact that ultra clean diesels have now been developed.

→ **Legal Uncertainties:** There are many outstanding legal issues associated with the Pavley standards; therefore, it would be prudent to wait until those uncertainties are resolved before Washington State considers whether or not to pursue the program. Lawsuits have been filed in both federal and state courts challenging the California motor vehicle greenhouse gas standards.

## REDUCE MOTOR VEHICLE MILES TRAVELED

**Key Action Items:**

1. Establish a VMT reduction goal.
2. Aggressively implement a series of transit, land use and demand side oriented strategies.
3. Incorporate climate change into regional transportation and land use planning.

The CPAC believes that the region must take steps to reduce the number of vehicle miles traveled. Without additional action, the number of vehicle miles traveled is projected to increase by 16.1% in the year 2020.[71] If this growth rate continues, VMT for the Puget Sound region will be 33 billion miles in 2020.[72] To reduce the vehicle miles traveled associated with projected growth, climate-friendly development and a transit backbone are required to serve new residential and commercial developments.[73]

The CPAC applauds the many efforts now occurring in the Puget Sound region to reduce vehicle miles traveled and identified its task as effectively building upon the work that has been done-to-date. The CPAC recognizes that there is no single strategy to achieve the stated goal of reducing VMT; rather, a series of complementary strategies that can have the significant impact needed.

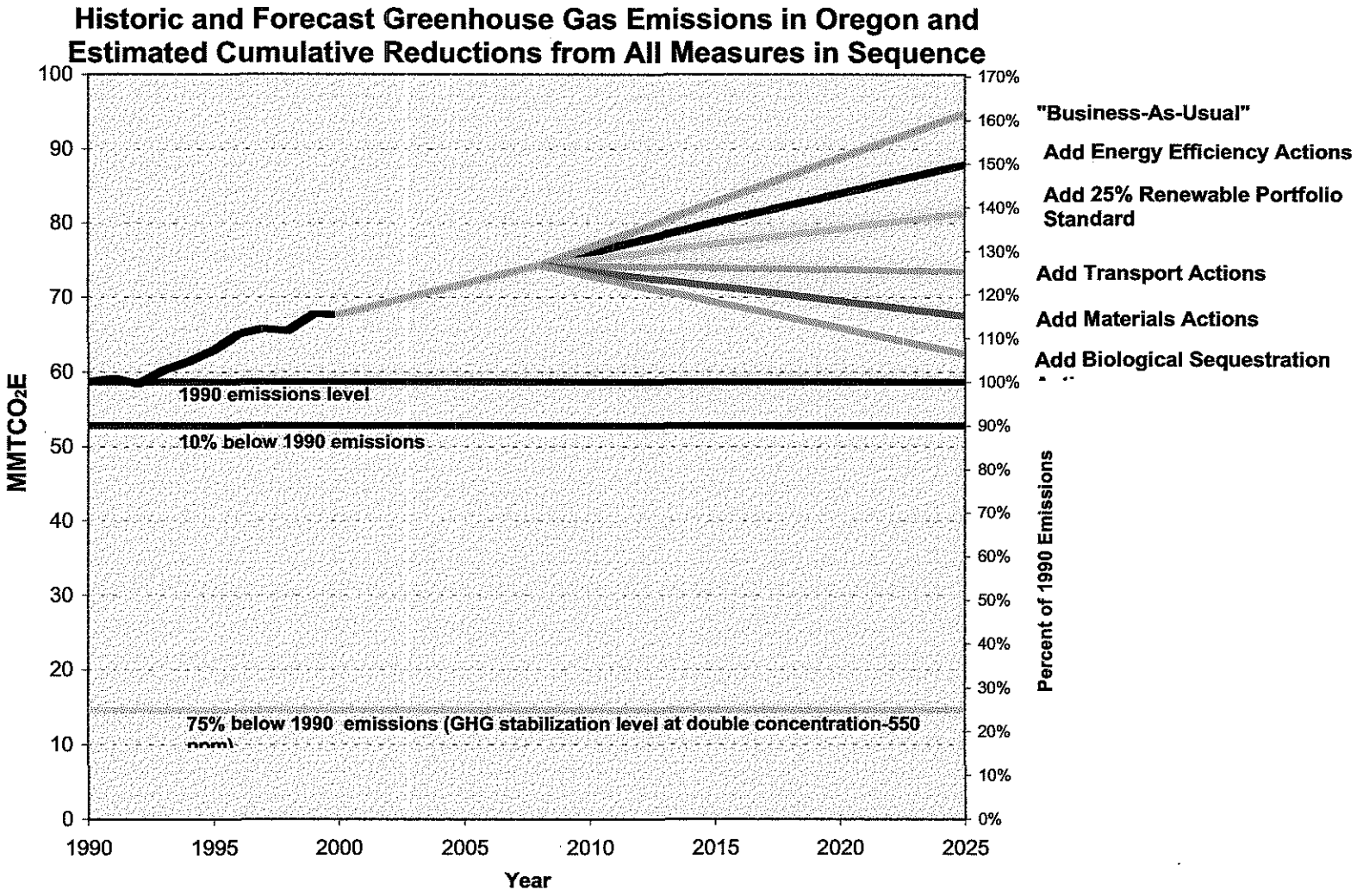
## 1. Establish a regional VMT reduction goal

[71] Based on the Puget Sound Regional Council's forecast.

[72] Based on the Puget Sound Regional Council's forecast and additional data from PSRC.

[73] Development patterns are also critical to saving existing biomass for purposes of carbon sequestration.

2/4/05 EQC Meeting, Item E Handout.



EQC Meeting 2/4/05 Item E Handout

## SECTION 2: VISION -- OREGON ACTS ON GLOBAL WARMING

### 2.1 Principles

The Advisory Group began with the following principles to guide our selection of goals and measures to reduce Oregon's greenhouse gas emissions:

A. Oregon's greenhouse gas (GHG) reduction goals and solutions must be meaningful, firmly grounded in science, and lead to effective reductions in Oregon's greenhouse gas emissions, commensurate with our share of the larger global problem.

B. We will begin with the most cost-effective solutions first.

C. To the fullest extent possible, Oregon's actions should be designed to serve both the long-term economic well-being of the state and the goal of climate stabilization.

D. We recognize that there are always tradeoffs between a long-term investment strategy and near-term costs and cash flow. Oregon can and should be a leader - but we can't get so far ahead that Oregon's businesses are not competitive in the short-term. We will need some safety valves to relieve short-term competitive pressures if others aren't living up to their responsibilities along with us.

E. We create long-term economic well-being with an "investment strategy" that buys us efficiency savings, new technologies, energy price stability and a competitive edge in marketing – and profiting from – the tools we develop and the lessons we learn.

F. We won't take actions that impair energy reliability.

G. We will look for ways to support innovation, especially if it leads to marketable products and services.

H. We will partner with other states, Canadian provinces, tribal nations, and other nations, where doing so will enhance the effectiveness of our actions and their co-benefits for Oregonians.

I. We know that reducing our greenhouse gas emissions won't eliminate the need to adapt to the warming climate that will result from changes already fixed in the atmosphere. We must develop an adaptation strategy next.

J. We are committed to equity in allocating both costs and benefits of this enterprise.

2/4/05 EQC Meeting, Item E Handout by Didi Malarkey



[Original Message]
From: Sharon Banks <sharon@lrapa.org>
To: <didim@mindspring.com>
Date: 1/21/2005 2:20:45 PM
Subject: LRAPA Diesel Projects update

Hi Deirdre,

Here is a status of the projects and grants we are working on:

1. Clean School Bus USA - We have $500,000 to buy exhaust after-treatment devices for school busses in Oregon. LRAPA's Sharon Banks and DEQ's Kevin Downing are working at the present to have the 4J school district bid out all the EPA verified technology so that the schools can select the equipment they want and not have to go out for bids individually. LRAPA will reimburse the schools for the equipment. Each grant will be about $50,000 to 10 school districts.

2. Oregon Solutions Project - Lane Clean Diesel - Lane Clean Diesel is a group of public officials, private businesses and schools that have the objective of securing a supply of Ultra Low Sulfur Diesel for Lane County. We are just finishing up our Declaration of Cooperation that will outline each fleet's commitment to the project. So far we have over raised over $160,000 in private match dollars and have received an EPA grant for $40,000 to help offset the cost to our local fuel distributors. Part of the $40,000 will go to subsidize a clean fuel cardlock tank in Oakridge that will be used by the school district, the City of Oakridge, and the Forest Service Ranger Station. Oakridge, Oregon has the worst PM problem in Oregon and is #5 in the nation. The cardlock will also be available for private citizens and fleets--as there is no law against diesel self-service. We have signed up our first large fleet and anticipate this project will result in over 2 million gallons of Ultra Low Sulfur Diesel and biodiesel blends. We will be having a press conference in early March to celebrate the program.

3. ULSD Buydown - LRAPA is paying 5 cents a gallon for subsidy for ULSD. We have signed of the City of Portland, the Port of Portland, the City of Eugene, Lane Transit District and a few others.

4. APU Project - We are busy financing leases to the trucking industry. We have installed about 20 units so far and we are installing at a rate of 3-5 per week. We are stressing the importance of adding a shorepower connection at the same time we install an APU. We expect to have 100 completed by July or August. This program is very popular with the trucking industry and we now have 3 companies doing installations. These three companies have 15 installation centers on the I-5 corridor, so I believe that our mission to jumpstart industry is working.

LRAPA will continue to submit grants for retrofits. The new engine regulations in 2007 will help, but diesel engines last a long time, so much more money is needed for retrofits. The $50K to each school district will retrofit only about 8 buses with a DPF, so we need more $$. I am hoping to get this money spent soon so that I can get another batch of funds for next year from EPA.

Please call me or write if you need any further information.

Thanks, Sharon

2/4/05 EQC Meeting Item E handout.

# KEY RECOMMENDATIONS IN THE *OREGON STRATEGY FOR GREENHOUSE GAS REDUCTIONS* FOR THE DEPARTMENT OF ENERGY

## Integrating Actions

URGE THE GOVERNOR TO RENEW THE CHARTER OF THE ADVISORY GROUP ON GLOBAL WARMING (OR A SUCCESSOR BODY) TO CONTINUE THE ADVISORY GROUP'S UNFINISHED AGENDA. (IA-2)

- **Develop a "Global Warming Adaptation Strategy for Oregon."**
- **Evaluate and report on implementation progress.**
- **Reconsider deferred actions.**
- **Develop an education plan.**
- **Advise the Governor on influencing and integrating Oregon actions with international, federal and other state-level greenhouse gas reduction policies and activities.**

THE ADVISORY GROUP SHOULD WORK WITH STATE AGENCIES, COLLEGES AND UNIVERSITIES, SCHOOLS, NON-PROFIT ORGANIZATIONS AND BUSINESSES TO DEVELOP A GLOBAL WARMING EDUCATION PROGRAM THAT WILL PROVIDE INFORMATION AND OUTREACH TO THE PUBLIC. (IA-4)

## State Operations

STATE AGENCIES SHOULD USE THEIR AGENCY SUSTAINABILITY PLANS AS THE TOOL FOR AGENCIES DYNAMIC INVOLVEMENT IN GREENHOUSE GAS REDUCTIONS WITH RESPECT TO BOTH THEIR INTERNAL OPERATIONS, AND THEIR EXTERNAL PROGRAM OR REGULATORY ACTIVITIES… (GOV-1)

THROUGH A COLLABORATIVE EFFORT, THE DEPARTMENTS OF ENERGY, ENVIRONMENTAL QUALITY AND ADMINISTRATIVE SERVICES SHOULD DEVELOP A PROCESS TO EDUCATE AGENCY PERSONNEL ABOUT OPPORTUNITIES FOR GHG REDUCTIONS, INCLUDING HOW TO SET GOALS AND CALCULATE GHG REDUCTIONS. (GOV-2)

## Energy Efficiency

MEET OREGON'S 960 AVERAGE MEGAWATT SHARE OF THE NORTHWEST POWER AND CONSERVATION COUNCIL (NWPCC) GOAL OF IMPLEMENTING COST-EFFECTIVE ELECTRICITY EFFICIENCY MEASURES FOR ELECTRIC USERS AND AN EQUIVALENT GOAL FOR NATURAL GAS USERS. (EE-1)

- **Improve utility and tax incentives**
- **Reduce energy use by at least 15 percent by 2015 through new building codes**
- **Set minimum space and water heating/cooling standards.**
- **Adopt state appliance and equipment efficiency standards for Oregon.**
- **Advocate for federal equipment and appliance standards.**

## Electric Generation and Supply

RECOMMEND THAT THE GOVERNOR TO CREATE A SPECIAL INTERIM WORKING GROUP TO EXAMINE THE FEASIBILITY OF, AND DEVELOP A DESIGN FOR, A LOAD-BASED GREENHOUSE GAS ALLOWANCE STANDARD. (GEN-2)

ALSO CONSIDER AN OREGON RENEWABLE PORTFOLIO STANDARD AND POTENTIAL CHANGES TO PUBLIC PURPOSE CHARGES AS TOOLS TO MEET $CO_2$ GOALS. (GEN-2A)

INCREASE THE RENEWABLE CONTENT OF ELECTRICITY. (GEN-1)

**Gain about 150 average megawatts (MW) of new renewables each biennium through the following kinds of projects:**

- **300 megawatts (MW) of new wind energy capacity**
- **500 additional solar photo-voltaic electric installations (about 1 new MW)**
- **25 MW of new biomass-fueled electric generation of which 5 MW will be from new biogas generation facilities from wastewater treatment, dairies and landfills.**
- **25 MW of efficient new combined heat and power generation**
- **1 MW of new fuel cells**
- **20 MW or more of geothermal generation projects built or under construction.**
- **1 to 4 MW of additional environmentally sustainable hydroelectric capacity**

INCREASE RETAIL ENERGY SALES FROM RENEWABLE RESOURCES BY ONE PERCENT OR MORE ANNUALLY IN OREGON THROUGH 2015. (GEN-1A)

## Transportation

PROMOTE BIOFUEL USE AND PRODUCTIONS. RECOMMENDED BIOFUELS INCLUDE BIODIESEL AND ETHANOL THAT REDUCE GHG EMISSIONS (TRAN-3)

- **Establish fuel standards**
- **Statewide biofuel content standards**
  - **2 % biodiesel by 2006**
  - **10 % ethanol by 2010**
- **Minimum biofuel content for state-owned fueling stations**
  - **10 % of all state vehicles utilize E-85 by 2010**
  - **20 % of all diesel vehicles use B20 by 2010**
- **Review effectiveness of federal and state incentives for producers, blenders and retailers**

## Presentation to the Oregon Environmental Quality Commission

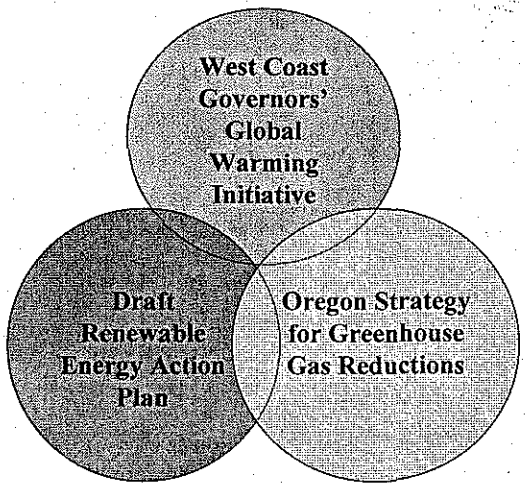
# Oregon's Greenhouse Gas Reduction Strategy

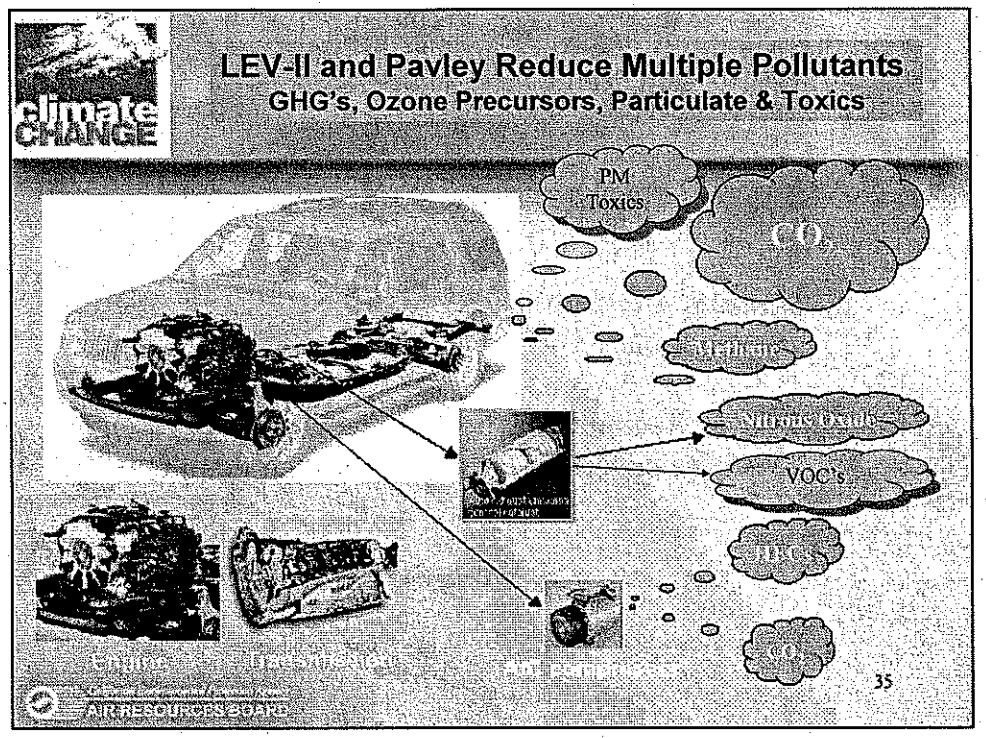
Governor's Advisory Group on Global Warming

Recommendations Related to Energy
Recommendations Related to Air and Land Quality

February 4, 2005

## Oregon's Integrated Efforts on Energy and Global Warming

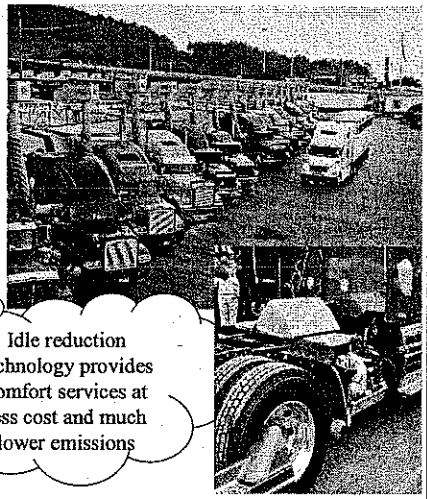



climate CHANGE
LEV-II and Pavley Reduce Multiple Pollutants
GHG's, Ozone Precursors, Particulate & Toxics
PM
Toxics
$CO_2$
VOC's
35


Steering California's Fight on Emissions
Automakers Try to Block Legislator's Plan for Tougher Standards

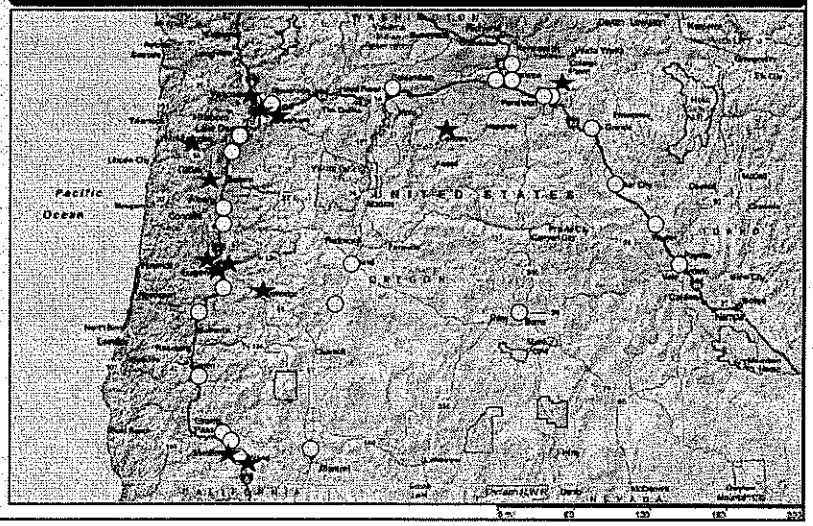
## Diesel and Global Warming

Diesel particulate filters reduce carbon soot and other emissions by 95%+

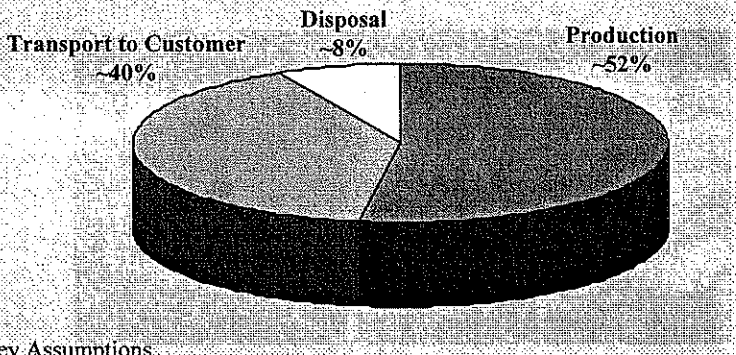


Idle reduction technology provides comfort services at less cost and much lower emissions

## Diesel Projects in Oregon



## Example of "Life Cycle" Greenhouse Gas Emissions




Key Assumptions

Corrugated box (38% post-consumer content) and newsprint dunnage (10% post-consumer content) used in order fulfillment for catalog sales.

Shipped ~2,100 miles via ground transport.

All materials landfilled at end of life in "average" landfill.

Forestry-related emissions and credits not included.

DEQ

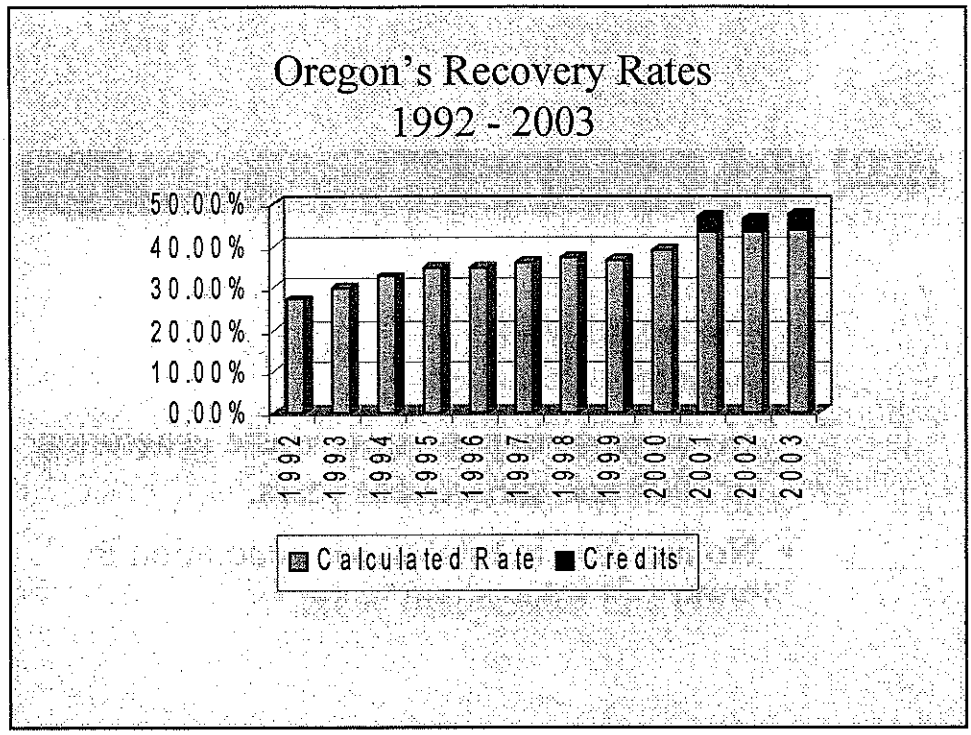
## Recommendation MW-1

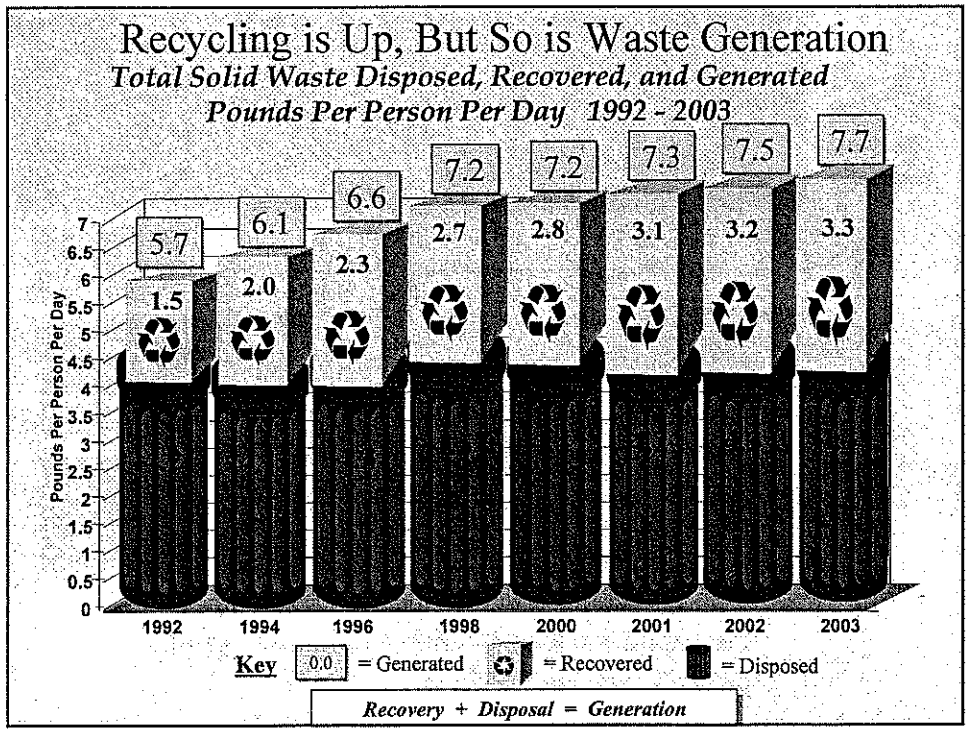
- Achieve recovery and generation goals in statute, to the extent they are cost effective.

Recovery Goals

Recovery = recycling, composting, some energy recovery

- 45% recovery rate in 2005.
- 50% recovery rate in 2009.


Oregon's Recovery Rates
1992 - 2003
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calculated Rate
Credits


Recycling is Up, But So is Waste Generation
Total Solid Waste Disposed, Recovered, and Generated
Pounds Per Person Per Day 1992 - 2003
Pounds Per Person Per Day
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
5.7
6.1
6.6
7.2
7.2
7.3
7.5
7.7
1.5
2.0
2.3
2.7
2.8
3.1
3.2
3.3
1992
1994
1996
1998
2000
2001
2002
2003
Key
0.0 = Generated
= Recovered
= Disposed
Recovery + Disposal = Generation

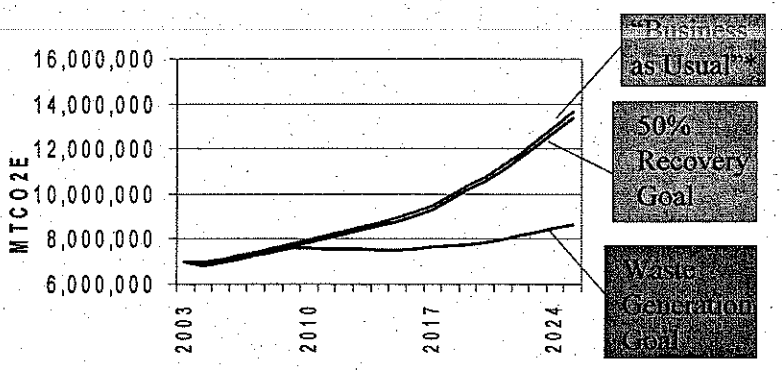
## Recommendation MW-1 (continued): New (2001) Generation Goals

Generation Goals

Generation = all discards

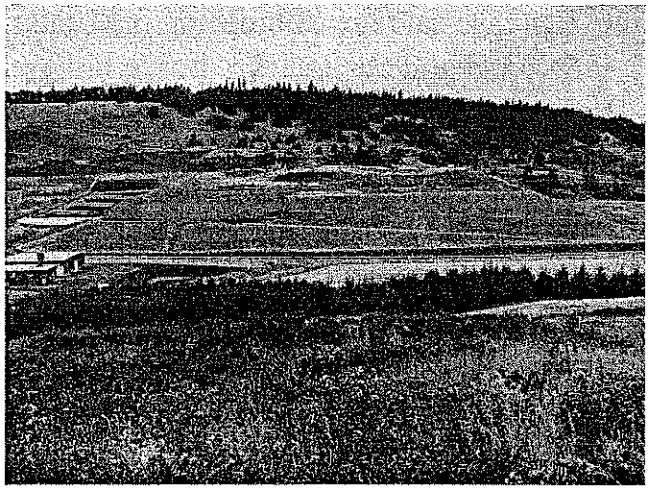
- No increase in per-capita waste generation in 2005 and subsequent years.
- No increase in total waste generation in 2009 and subsequent years.

## Recommendation MW-1 (continued): Projected Greenhouse Gas Emissions (Materials & Waste)

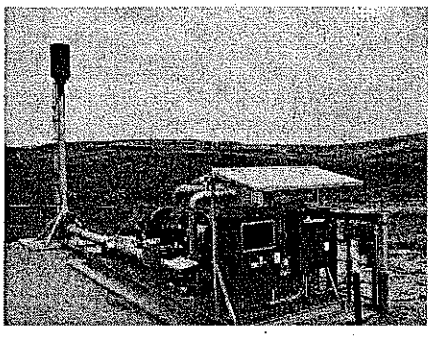


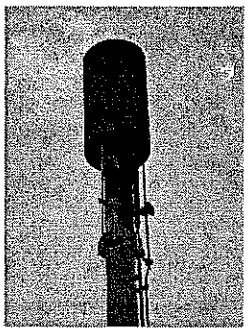

*Per-capita waste generation continues to grow, recovery rate stays at 47%

## Recommendation MW-2: Modify Standards for Alternative Final Landfill Covers



## Recommendation MW-3: Provide New Financial Incentives for Landfill Gas Collection





## Category II Recommendations

- Increase salvage of building materials.
- Expand and change the "bottle bill".
- Increase reuse and recycling of consumer electronics waste.
- Change land use rules to facilitate composting.
- Reduce burning of garbage.
- Continue landfill regulation and improve reporting and analysis.
- Evaluate methane emissions at small, closed landfills.

# Air Quality Program Statutory Overview

| AQ Concerns | Federal Lead | Federal Delegated | EPA Approved State Efforts | State Initiative |
|---|---|---|---|---|
| **Ambient Air Quality Protection** | • National Ambient Air Quality Standards (CAA §109)<br>• National Engine and Fuel Standards (CAA Title II) | • New Source Performance Standards (NSPS) (CAA §111; ORS 468A.025) | • Attainment and maintenance Plan SIPs (CAA §110 & Title I, Part D; ORS 468A.035)<br>• SIP Control Strategies (CAA §110), e.g.:<br>  • Air Contaminant Discharge Permit (ACDP) (ORS 468A.040-060)<br>  • Major New Source Review (ORS 468A.025)<br>  • Vehicle Inspection Program (ORS 468A.350-455)<br>  • Employee Commute Options (ORS 468A.363)<br>  • Woodstove Curtailment (ORS 468A.460-520)<br>  • Reasonably Available Control Technology (ORS 468A.025)<br>• Federal Operating Permit (CAA Title V; ORS 468A.300-330) | • Oregon Ambient Air Quality Standards (Particle fallout, Calcium Oxide, Sulfur Dioxide) (ORS 468A.025)<br>• Growth allowances (ORS 468A.035) |
| **Prevention of Air Quality Degradation & Visibility Protection** | • Class I & II increments (CAA Title I, Part C)<br>• National Engine and Fuel Standards (CAA Title II) | • New Source Performance Standards (NSPS) (CAA §111; ORS 468A.025) | • Visibility and Regional Haze SIPs (CAA Title I, Part C)<br>• SIP Control Strategies (CAA §110) e.g.:<br>  • Smoke Management, Field Burning, Open Burning (ORS 468A.550-620)<br>  • Major New Source Review/PSD (ORS 468A.025)<br>  • Air Contaminant Discharge Permit (ACDP) (ORS 468A.040-060)<br>• Emission Guidelines (CAA §111d; ORS 468A.025)<br>• Federal Operating Permit (Title V; ORS 468A.300-330) | • Prevention Plans (ORS 468A.035)<br>• Columbia River Gorge Air Quality Protection (ORS 468A.025)<br>• Nuisance, Odors, Best Work Practices Agreement (ORS 468A.025) |
| **Air Toxics** | • List of HAPs (CAA §111b) and source categories (CAA §111c)<br>• Accidental Releases (CAA §111r)<br>• National Fuel Standards (CAA Title II) | • National Emission Standards for Hazardous Air Pollutants (NESHAP) (CAA §112d; ORS 468A.025)<br>• Residual Risk (CAA §112f; ORS 468A.025)<br>• Urban Air Toxics (CAA §112k; ORS 468A.025) | • Urban Air Toxics (CAA §112k; ORS 468A.025)<br>• Federal Operating Permit (CAA Title V; ORS 468A.300-330)<br>• Air Contaminant Discharge Permit (ORS 468A.040-060) | • State Air Toxics Program (ORS 468A.025)<br>• Clean Diesel Initiative |
| **Asbestos** | | • Asbestos NESHAP(§112; ORS 468A.025 & 468A.700-760) | | • Asbestos Abatement (ORS 468A.700-760) |
| **Acid Rain** | • Emission trading (CAA Title IV) | | • Federal Operating Permit (Title V; ORS 468A.300-330) | |
| **Stratospheric Ozone Protection** | • Chlorofluorocarbon phase-out (CAA Title VI) | | • Federal Operating Permit (CAA Title V; ORS 468A.300-330) | • Chlorofluorocarbon, Halon and Aerosol Control ORS (468A.625-645) |
| **Climate Protection** | • Energy Star/voluntary programs | | | • Oregon Office of Energy<br>• Harmonizing Air Quality and Climate Protection |

2/4/05 EQC Meeting, Item F handout

December 29, 2004

# Guest Viewpoint: Kulongoski right to address global warming

**By Ronald B. Mitchell and Randy Berggren**

Gov. Ted Kulongoski's Advisory Group on Global Warming has proposed important, effective and realistic steps that Oregon should take to reduce our contributions to global warming and climate change.

Many of these steps will be cost-effective in the short term. Others involve investments designed to reduce future impacts from climate change or to make Oregon more competitive in a world in which most of the world's governments, industries and consumers will demand climate-sensitive products and policies.

California, Washington, the New England states and more than 140 American cities are already taking action to help avert climate change. All of the European Union countries, Japan, Russia and more than 100 other countries have signed the Kyoto Protocol, the major international approach to reducing global greenhouse gas emissions that will become international law early next year.

Oregon can afford to take these steps. Indeed, we cannot afford not to.

Scientists are in all but unanimous agreement that humans are causing significant changes to the Earth's climate. In the next several decades, Oregonians can expect to see higher average temperatures, significantly lower annual snowpack, decreased water availability in summer, higher sea levels, more harmful and frequent floods and coastal erosion, and many difficult-to-predict changes to land and ocean ecosystems. Many of these impacts, though hard to observe in our daily lives, have already become evident through careful scientific measurement.

These dramatic changes are largely due to the carbon dioxide released as we use fossil fuels to build, heat and light our homes and offices, to drive our cars, and to create the products we buy.

The Governor's Advisory Group has recommended ways both the public and private sector can address this global problem. These efforts involve improving energy efficiency, shifting to sources of energy for electricity and transportation that do not emit greenhouse gases, using farms and forests to capture and store carbon dioxide already emitted into the atmosphere, and promoting education, research and technology development.

All Oregonians should support the governor's efforts to take on the problem of global warming.

First, rather than being costly, early efforts by companies such as Dupont, British Petroleum, Hewlett-Packard, IBM and Intel have shown that reducing greenhouse gas emissions often lowers production costs, creates new business opportunities and leads to improved marketing.

Second, these strategies will help Oregon companies remain globally competitive. As the effects of climate change become more evident, consumers are likely to demand climate-sensitive products.

Third, if we fail to work with others around the globe to reduce our emissions today, we will be forced to increase taxes in years to come to pay for larger dams to hold water no longer stored as snowpack, to rebuild houses and factories damaged by flooding and coastal erosion, and to help farmers maintain a strong food supply in the face of increasing threats from higher temperatures and agricultural pests. Our best strategy for avoiding these costs involves reducing our emissions of carbon dioxide and other greenhouse gases.

Fourth, actions by Oregon, when combined with the efforts of other states and countries, constitute an important contribution to solving this problem while also encouraging other states and countries that have not yet taken action to do so.

In short, the strategies proposed by the Governor's Advisory Group represent crucial ways Oregonians can help. Kulongoski deserves our support in his efforts to steer Oregon to a leadership position on this

important global issue.

*Ronald B. Mitchell is an associate professor of political science at the University of Oregon. Randy Berggren is general manager of the Eugene Water & Electric Board. The Draft Oregon Strategy for Greenhouse Gas Reductions is available at www.energy.state.or.us/climate/Warming/Draft_Intro.htm. A report titled ``Scientific Consensus Statement on the Likely Impacts of Climate Change on the Pacific Northwest'' is available at: inr.oregonstate.edu/policyclimate_impacts_consensus_statement.pdf.*

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# Panel calls for stricter emissions standards

**A recommendation for Oregon to follow California's lead on reducing greenhouse gases draws quick criticism from automakers**

Saturday, December 18, 2004

**RICHARD L. HILL**

A proposal to adopt California's stricter auto-emissions standards in Oregon has generated early opposition as the governor's advisory group on global warming made final changes to a plan that would slash greenhouse-gas emissions.

The 27-member committee unanimously approved its report Friday, which urges steps to return emissions of heat-trapping greenhouse gases to 1990 levels. It will go to Gov. Ted Kulongoski next month for review.

Although the report includes dozens of proposals, a recommendation to adopt California's tougher tailpipe-emission standards already has drawn fire from automakers.

The Alliance of Automobile Manufacturers, which represents General Motors, Ford, Toyota and other carmakers, is suing California, arguing the state can't regulate fuel use in cars under federal law. The group opposes Oregon adopting the California standards.

"If California does not have authority to do what it did, neither does Oregon," said Paul Cosgrove, an Oregon lobbyist for the automakers.

Member Angus Duncan said the advisory group -- made up of business executives, environmental leaders, government officials and scientists -- wants the governor and the Legislature to consider California's rules.

California's regulations require cars and trucks to reduce carbon dioxide emissions beginning with 2009 models. Gov. Gary Locke of Washington last week urged his state to adopt the same standards, which he said could cut emissions in cars and light trucks by 25 percent and in larger trucks and SUVs by 18 percent.

Cosgrove said that stricter emission standards would have a direct impact on Oregon. "We are the West Coast's biggest importer of cars, including, ironically, hybrids of Honda and Toyota, as well as many other cars that would be impossible or difficult to sell here. Those two companies specifically and dramatically oppose these California standards."

David Van'thof, an environmental adviser to Kulongoski, said the governor will not make any decisions about the recommendations until he studies the report.

The panel is headed by Mark Dodson, chief executive officer of Northwest Natural Gas,

and Jane Lubchenco, a marine ecologist at Oregon State University. More than 150 people worked on the report, and three public hearings were held after a draft was released in October.

Members want Oregon to curb the growth of greenhouse gas emissions by 2010 and reduce them 10 percent below 1990 greenhouse gas levels by 2020.

Besides calling for reductions in tailpipe emissions, the panel urges the use of biofuels, including ethanol; cleaner technologies in generating energy; upgraded building codes to increase energy efficiency; state tax credits for home builders who use solar power and heat-pump water heaters; and promoting the sale of vehicles that don't emit as much greenhouse gases.

Kulongoski created the panel after forming the West Coast Governors Global Warming Initiative last year with the governors of California and Washington.

Last month, the three governors approved 36 recommendations to combat global warming -- from collaborating on buying hybrid cars to emphasizing energy efficiency in building codes -- and directed their staffs to work on strategies to cut emissions.

Researchers project that the Northwest could see higher temperatures, declining snowpacks and a rise in sea level as the climate continues to warm as it has in the past few decades.

Lubchenco said more research is needed about the impact of climate change on Oregon and the economic effects of many of the panel's recommendations.

"Our proposals aren't pie-in-the-sky goals," Lubchenco said. "They are very concrete and doable."

The report is available online at www.energy.state.or.us/climate/Warming/Draft_Intro.htm.

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StatesmanJournal.com SALEM • OREGON



# Panel suggests ways to cut emissions

BETH CASPER
Statesman Journal
*December 18, 2004*

Oregon is a small state, but its contribution to the world's global-warming gases is surprisingly high, according to the governor's global-warming advisory group.

The group unanimously approved a report Friday that recommends ways for Oregon to reduce carbon dioxide and other greenhouse gases. Based on population, Oregon produces six times its share of carbon dioxide.

By the end of January, Gov. Ted Kulongoski is expected to review the plan and decide whether to approve it.

"The government is about short term, and politicians are about short term," Kulongoski said. "One of the difficulties is for us to sit down and look at issues and realize these are long-term issues and you have to take some risk to reach long-term solutions."

Kulongoski said that the advisory group succeeded by recognizing the serious problem at hand.

The report recommends reducing greenhouse-gas emissions by adopting California's emission standards for vehicles, increasing the state's use of renewable energy resources and meeting a goal of reducing greenhouse-gas emissions to 10 percent below 1990 levels by 2020.

Some of the more specific recommendations included installing

## Information

After a year of meetings, the governor's advisory group on global warming unanimously approved a report Friday to reduce Oregon's greenhouse-gas emissions. Greenhouse gases contribute to global warming.

The governor is expected to decide in January whether to approve the plan.

Some of the recommendations include:

Adopting California's emission standards for vehicles

Increasing the state's use of renewable energy resources

Installing electric outlets for trucks to prevent idling

Purchasing more hybrid vehicles for the state government fleet

Adopting efficiency standards for some appliances not regulated by the federal government

Find the report at:
www.energy.state.or.us/climate/Warming/Global.htm

electric outlets for trucks to prevent idling, purchasing more hybrid vehicles for the state government fleet and adopting efficiency standards for some appliances not regulated by the federal government.

Group members were enthusiastic about the report.

Jean Wilkinson, an advisory member who represented the Oregon Farm Bureau, said farmers are eager to see how they can play a part in reducing greenhouse gases. She said that incentives for growing crops for biodiesel or to keep carbon out of the atmosphere are important to farmers.

Other programs -- which might increase costs of electricity -- might negatively impact farmers, she said.

But the group's members agreed that everyone will have to do their part to solve the problem.

"We can do (what's in the report) in ways that will also strengthen the economy, improve public health and create energy-price stability," said Angus Duncan, president of the Bonneville Environmental Foundation and member of the advisory group. "We are doing this because it is clear beyond a reasonable doubt that global warming is occurring. We've already seen evidence of it in Oregon."

Duncan noted that half of the region's snowpack disappeared between 1950 and 2000, and experts expect half of the remaining snowpack to disappear in the next 50 years.

"This is a problem of our making and that we have the means to fix," he said.

*bcasper@StatesmanJournal.com or (503) 589-6994*

# Enviros back state move to curb greenhouse gases

Prev | Next

*From Bend.com news sources*
Posted: Thursday, December 16, 2004 9:48 AM
Reference Code: PR-20018

**December 16** - The Oregon Environmental Council applauds Governor Kulongoski for convening the Governor's Advisory Group on Global Warming.

The Advisory Group and technical subcommittees have outlined a number of sensible actions Oregon can take to reduce greenhouse gas emissions.

Recommended actions cover energy efficiency, transportation, renewable energy, recycling and other areas. The proposed state strategy will set Oregon on the path to deep reductions in global warming pollution while rewarding us with all the health, economic and ecosystem benefits that come with climate protection. The Advisory Group will finalize its recommendations on Friday, Dec. 17.

"This effort puts Oregon in the category of climate leaders," said OEC executive director Jeff Allen, a member of the Advisory Group. "The rest of the world's advanced economies and a growing number of states and cities are moving forward – we can't wait for federal action."

The Advisory Group received comments from more than 250 citizens, businesses, elected officials, not-for-profits and others, the vast majority in favor of the draft plan.

As the problem of global warming looms ever larger, a number of like-minded citizens are banding together around Oregon to insist that state and local leaders take action. Two examples of note include the Engineers for Global Responsibility and the Douglas County Global Warming Coalition.

Engineers for Global Responsibility was launched by a Portland engineer who is adding to the fold engineers of many different types who are advocating in support of federal and state action to combat global warming.

"As engineers, we are acutely aware of our responsibility to protect public safety by basing our designs and plans on the best scientific and economic information possible," said Mike Unger, founder of Engineers for Global Responsibility. "We expect our leaders to do the same regarding climate change. The actions proposed by the advisory group are a responsible first step for the State of Oregon."

The Douglas County Global Warming Coalition, based in Roseburg, serves as a local catalyst for promoting a healthy climate in their community by identifying and sharing solutions.

"We believe Oregon's leadership role will be beneficial to the state as other regions of the country will ultimately rely on our accumulated experience and expertise," said Stuart Liebowitz, coordinator of the Douglas County Global Warming Coalition.

Founded in 1968, The Oregon Environmental Council (OEC) is a nonprofit, nonpartisan organization with more than 2,000 members throughout the state. We bring Oregonians together for a healthy environment. Via programs such as the Bottle Bill, curbside recycling and the creation of local watershed councils, OEC has played a leadership role in helping Oregonians be part of the solution to environmental problems. Our current programs focus on protecting kids' health from toxic pollution, cleaning up Oregon's rivers, and protecting our climate by curbing vehicle pollution. For more information about OEC, visit our website at www.orcouncil.org.

Mike P

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February 4, 2005

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Re: Ozone/Greenhouse Gas/Governor's Task Force

Dear Commissioners:

I am writing on behalf of the Oregon Center for Environmental Health, of which I am Board President. Due to scheduling constraints, I was unable to address the EQC meeting Friday, February 4, concerning Agenda Item E: Oregon's Greenhouse Gas Reduction Strategy. These comments are submitted to address impressions of the Governor's advisory group report on global warming.

Thank you for the presentation concerning the Governor's Task Force on Greenhouse Gas. As everyone clearly understood, the work of this blue ribbon committee was extensive and laudable. However, it was not comprehensive or complete and contradicts the DEQ's own practices in the field. During the presentation to EQC, it became abundantly clear that electrical generation, transportation, and waste management were the enumerated priorities. I believe there was one glaring omission, specifically industrial sources of air pollution.

In DEQ's files right now is a permit application from the Owens Corning Corporation to emit at least 245 tons a year of HCFC-142b. HCFC-142b is known to be 2,000 to 2,400 times more potent than $CO_2$ in terms of its destructive impact on the atmosphere.

The Owens Corning Corporation constructed a facility in Gresham that would make insulation. The company constructed their facility without benefit of permit or any sort of agency review. The U.S. District Court for the District of Oregon has enjoined Owens Corning thanks to the hard work of citizen activists, including the Oregon Center for Environmental Health, the Northwest Environmental Defense Center, and the Sierra Club. A permit application is pending.

Presently, the Governor's strategy for greenhouse gas reductions gives virtually no guidance to DEQ for handling industrial sources that seek to emit high volumes of greenhouse gases. This is unfortunate because the Owens Corning facility, as an example, would emit the equivalent of **500,000 tons** per year of $CO_2$. Such a disconnect is alarming and indicates a glaring weakness in the Oregon strategy for greenhouse gas reductions.

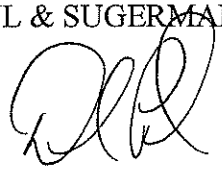
Oregon DEQ is now permitting this facility without even considering an alternatives analysis. Facilities within the EU undertake this identical process without any greenhouse gas emissions. The entirety of this blue ribbon panel's work is being contradicted by the agency's own practice. It is time for EQC to promulgate clearly understandable standards concerning $CO_2$ emissions. This embarrassment at Owens Corning should not have occurred in the first place, and DEQ's follow-up has further undermined the agency's credibility in terms of achieving reductions in greenhouse gases from industrial sources.

With this letter, my colleagues and I hope that EQC will look beyond the "blue ribbon panel" and into the agency's own "on-the-ground" practices, policies and procedures concerning permitting greenhouse gas emissions. There is no reason for this disconnect to continue into the future.

Thank you for your attention to these comments.

Very truly yours,

PAUL & SUGERMAN



David Paul

DP:cb
cc (via mail): Governor Theodore R. Kulongoski
Jeff Allen, Oregon Environmental Council and Member of Panel
cc (via e-mail): Mark Riskedahl, Northwest Environmental Defense Center
Jane Harris, Oregon Center for Environmental Health
Karl Anuta
Melissa Powers
Bob Palzer, Sierra Club
Brent Foster
Allison LaPlante

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February 7, 2005

Dear Members of the Oregon Environmental Quality Commission:

The Oregon Environmental Council (OEC) appreciates your interest in global warming, as witnessed at the Environmental Quality Commission meeting on February 4, 2005. I'm writing today to give you some background on OEC's work to protect the climate and to encourage you to incorporate global warming concerns into your deliberations.

OEC focuses on curbing global warming pollution from the transportation sector. More than one-third of Oregon's $CO_2$ emissions are from cars, trucks, and buses. $CO_2$ is the main greenhouse gas of concern, but cars also belch methane, nitrogen oxides, volatile organic compounds, and carbon monoxide, all of which impact the climate (as well as the quality of the air we breathe). Recent evidence also suggests that carbon soot from diesel exhaust contributes significantly to global warming. In order to play our role in stabilizing the world's climate, we must substantially reduce greenhouse gas emissions from our cars and trucks. The best science shows we must eventually reduce greenhouse gas emissions by 75-85% to stabilize the world's climate; thus it is critical that we begin to take steps now.

OEC focuses on changing the three most important factors that cause excess greenhouse gas emissions from cars: the amount we drive them and how much and what kind of fuel they burn. Specifically, we are pursuing the following projects:

"Hey, Cool Car!" In 2003, OEC surveyed nearly 600 hybrid car owners—45% of hybrid owners in Oregon. In 2004, we released a marketing publication highlighting the stories of six of these owners. We've held "drive-ins" for hybrid owners in Medford, Bend and Portland and are undertaking other efforts to promote hybrids in 2005. Our near-term goal is to double the number of hybrids on Oregon's roads. Based on the results of our survey, the average hybrid car owner achieves an additional 25 miles per gallon when they upgrade to a hybrid. See the enclosed brochure "Oregonians Love Their Hybrid Cars."

Tough Standards for Auto Emissions. By 2007, OEC will work to ensure that Oregon "opts in" to California's tailpipe standards requiring automakers to manufacture and sell cars that emit less air pollution and fewer greenhouse gases.

Green Your Fleet. OEC will soon launch a major campaign to green Oregon's fleets. We will seek commitments from the state, local governments and private corporations to decrease their fleet $CO_2$ emissions by an average of 3-6% a year through the purchase of cleaner vehicles, cleaner fuels and low rolling resistance tires. Through this effort, we will also leverage a strong constituency for future clean car programs and standards.

Biodiesel for Oregon. OEC is working to expand the use and production of biodiesel in Oregon. Biodiesel is a cleaner alternative to petroleum diesel. Made from waste grease or oil-rich plants, such as canola, biodiesel can be used in a conventional diesel engine. Through a marketing campaign, technical assistance to businesses and agriculturalists, coalition building, and legislation, OEC will reach its goal of displacing at least 15 million gallons of petroleum diesel with biodiesel. To learn more about biodiesel see the enclosed "Biodiesel for Oregon" backgrounder. Visit "www.biofuels4oregon.org" for more information on biofuels legislation and other statewide efforts to promote biofuels. And consider joining us in Salem to learn more about biofuels—see the enclosed "March 2, 2005 Biofuels Events."

Green Auto Maintenance. Working with the Northwest Auto Trades Association, OEC is developing a partnership with the automotive service industry to offer "green" auto maintenance options to drivers in conjunction with maintenance work or oil changes. The green option will include re-refined motor oil and other environmentally preferred products, such as recycled antifreeze. Drivers will receive educational materials at time-of-service to increase their awareness that the way a vehicle is driven can be equally important (in terms of environmental benefits) as maintenance.

"Pay-As-You-Drive" (PAYD) Insurance. PAYD insurance will give drivers the option to pay for their insurance by the mile, rather than in an annual lump sum, saving participating drivers up to 25% on their premium and reducing driving by up to 15%. OEC passed legislation in 2003 providing tax credits for corporations that offer a per-mile insurance option. We are currently encouraging insurance companies to test per-mile premiums in Oregon and managing a growing database of drivers who want a PAYD insurance option. See the enclosed brochure.

Regional Advocacy. OEC is a founding member of Northwest Climate Connections, a network of businesses and organizations concerned about climate change. Along with other members of this network, OEC actively supports the McCain-Lieberman Climate Stewardship Act, which represents an historic opportunity for the U.S. to enact federal limits on greenhouse gas emissions. In addition, as a member of Governor Kulongoski's Advisory Group on Global Warming, OEC has contributed to both Oregon and West Coast climate leadership efforts.

There is a growing movement in support of cleaner cars and cleaner fuels in Oregon. We hope the Environmental Quality Commission will be part of this movement.

Sincerely,

Chris Hagerbaumer

Chris Hagerbaumer, Program Director

Enclosures: Oregonians Love Their Hybrid Cars
Biodiesel for Oregon
March 2, 2005 Biofuels Events
PAYD insurance brochure

# March 2, 2005 Biofuels Events

**Forum for Business & the Environment**
**Bioenergy: A Boost for Oregon's Economy**

March 2, 2005 – 7:00 AM-9:00 AM
Salem: The Montag Center at Willamette University, 900 State Street

Glenn Montgomery Sustainable Business Liaison for the Oregon Economic & Community Development Department, will share the action plan from a recent renewable energy cluster analysis that examined the potential for a biofuels industry cluster in Oregon. Ralph Groschen, Senior Marketing Specialist with the Minnesota Department of Agriculture, will speak on Minnesota's multi-million dollar biofuels industry and how the state played a role in its development. And Tomas Endicott of SeQuential Biofuels will hone in on Oregon's potential for biodiesel production.

Please register for this Forum for Business & the Environment by February 25th at www.orcouncil.org/Events/0405%20BusinessForum.htm, or call Cheryl Bristah at 503-222-1963 x100.

**Biofuels Lobby Day**

On March 2nd, biofuels enthusiasts will converge on Salem in support of legislation promoting the use and production of biodiesel and ethanol in Oregon. OEC is co-sponsoring the day's activities with SeQuential Biofuels, a biodiesel distributor based in Oregon.

Biofuels Lobby Day will provide an opportunity for legislators and citizens alike to learn more about biofuels. Biofuel-powered vehicles and equipment will grace the Capitol Mall, and biofuel co-ops, producers, distributors and advocates will have exhibits. OEC has also set up meetings with legislators to ensure they hear directly from constituents as to how important it is to kick the oil habit and substitute cleaner, renewable, home-grown fuels.

Contact Kathy Hyzy at OEC (503-222-1963 x105; kathyh@oeconline.org) to sign up for Biofuels Lobby Day.

OREGON ENVIRONMENTAL COUNCIL

# Biodiesel for Oregon

## Biodiesel Basics

Biodiesel is a safer, cleaner-burning alternative to petroleum diesel. Produced from vegetable oil or animal fats, biodiesel is a homegrown, renewable fuel. Pure biodiesel (B100) can be used undiluted in a diesel engine or blended in any proportion with petroleum diesel. Engines built before 1994 running B100 may require the replacement of natural rubber seals and hoses, but biodiesel blends of up to 20% (B20) require no engine modifications. At very low blends of 1-2%, biodiesel adds needed lubrication to ultra-low sulfur diesel.

Rudolph Diesel, the inventor of the diesel engine, designed it to run on vegetable oil. He used peanut oil to power his demonstration engines in Paris in 1904.

Biodiesel is good for Oregon's environment and economy. Using biodiesel improves air and water quality, supports rural economies, curbs global warming, and increases energy security. It is far less toxic than petroleum diesel, safer to store and transport, and biodegrades quickly in water.

## Biodiesel for Economic Growth

When Oregonians spend a dollar on diesel or gasoline, we support a finite, non-renewable resource that is imported from elsewhere and that will never be produced in Oregon. If we spend a dollar on biodiesel or ethanol[1] instead, we support a renewable fuel that can be produced in Oregon, providing new markets for Oregon crops and new jobs for Oregon workers. Instead of sending our dollars out of the state, our dollars recirculate in the Oregon economy.

### *From the Field to the Fuel Tank*

Biodiesel can be processed from any type of plant oil or animal fat, including used cooking oils from restaurants. In Oregon, the most applicable crops include canola and mustard. These oilseed crops are good rotational crops, particularly for wheat and grass seed, two of Oregon's main agricultural products.

[1] Ethanol is biodiesel's renewable fuel cousin. It is an alcohol-based fuel, cleaner than gasoline, easily used in gasoline engines when blended with gasoline at levels up to 15%.

## Biodiesel vs. Diesel

Here's why biodiesel beats diesel:

*Renewable*

Diesel comes from petroleum, a non-renewable resource whose supplies are dwindling.

Biodiesel is produced from oilseed crops, animal fats and waste cooking oils.

*Healthy*

Because of its respiratory impacts and carcinogenic properties, diesel exhaust is regulated as a toxic air pollutant by the California Air Resources Board.

Pure biodiesel exhaust is far cleaner (toxic emissions are 60-90% lower), and it smells like French fries or donuts!

*Locally Produced*

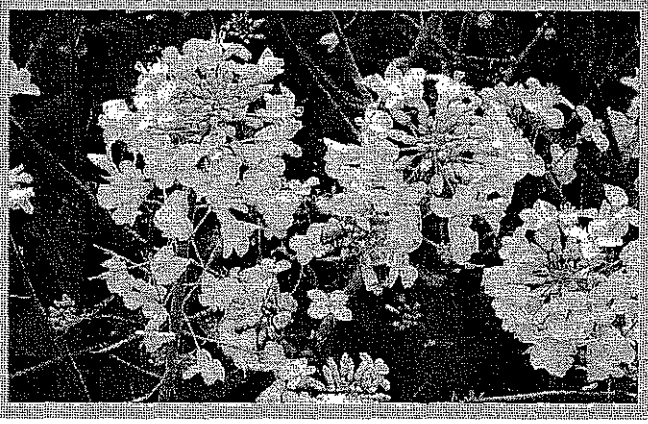
Diesel is refined from petroleum oil, much of which is imported from other countries.

Biodiesel can be grown and produced right here in Oregon, supporting local farmers and local economies.

*Energy Efficient*

It takes energy to produce fuels like diesel and biodiesel. A lifecycle analysis of diesel conducted by the US Dept. of Energy and US Dept. of Agriculture shows that it actually takes more energy to drill, transport and refine diesel than it produces when combusted! Petroleum diesel use results in a net energy loss of 19.5%.

Biodiesel produces 3.2 units of fuel for every unit of energy consumed throughout its lifecycle, creating a net energy gain of 220%.



Biodiesel is made through a relatively simple process of bonding alcohol (usually methanol) to the oils or fats. Manufacturing plants may choose to produce biodiesel alone, or to produce higher-value biolubricants, with biodiesel as a byproduct.

## Byproducts of Biodiesel Production

Biodiesel is only one of many products connected to biodiesel production process. By-products and co-products help make biodiesel production profitable for farmers and producers and help lower the cost of biodiesel for everyone.

**By-products of Biodiesel Production**

**Oilseed Crushing: Oilseed Meal**

| | | | |
|---|---|---|---|
| **Products** | crop fertilizer, livestock feed, crop pesticides | **Markets** | farmers, ranchers |

**Refinement: Glycerin**

| | | | |
|---|---|---|---|
| **Products** | food products, lubricants, soaps, alcohols, pharmeceuticals, cosmetics, polymers | **Markets** | food industry, pharmaceutical industry, cosmetics and soap manufacturers, plastics production |

**Co-products of Biodiesel Production**

| | |
|---|---|
| **Industrial biolubricants** | metalworking industry, engine coolant and lubricant, cleaning solvent |
| **Erucic acid** | plastics production, lubricant |

Prior to processing into biodiesel, the oilseed must be crushed, leaving high-protein meal as a saleable byproduct. Oilseed crushing operations allow a crop like canola to be transformed from a mere agricultural commodity into a value-added product. Oregon farmers growing oilseed crops for biodiesel production will profit the most by being part of the oilseed crushing process.

Renewable fuels have proven their economic worth elsewhere in the country. In the past several years, over a dozen states have launched initiatives in support of biofuels, and many are reaping the benefits. In 1997, Minnesota passed a law requiring all gasoline sold in the state to be blended with ethanol. Since then, Minnesota's ethanol industry has grown to produce over 400 million gallons a year of corn-based ethanol. The Minnesota Department of Agriculture estimates the ethanol industry brings over $580 million in net annual benefit to the state. Thanks to ethanol, gasoline consumption in Minnesota has been reduced by roughly 10%, and gasoline prices have remained competitive with those in surrounding states.

Encouraged by ethanol's economic benefits, Minnesota's state legislature passed a law requiring a 2% biodiesel blend in all diesel fuels sold in the state by July 2005. The law is expected to create an annual market for approximately 8 million gallons, and Minnesota's governor has established a Biodiesel Task Force to ensure that the biodiesel is locally grown and produced, keeping dollars in the state.

# Biodiesel for Oregon's Environment

## *Better Air Quality*

According to Oregon's Department of Environmental Quality, diesel exhaust is the #1 source of airborne toxins in Oregon, and Oregonians across the state are exposed to diesel particulate matter at levels well above health benchmarks. Using biodiesel helps clean up Oregon's air. Biodiesel has significantly lower tailpipe emissions of such pollutants as carbon monoxide, particulate matter, unburned hydrocarbons and sulfates. It is also less likely to cause cancer than petroleum diesel. Biodiesel's nitrous oxide emissions tend to be higher, but the overall smog-creating potential is reduced by 50% because of lower hydrocarbon emissions. Researchers are currently seeking ways to reduce biodiesel's nitrous oxide emissions.

## *Less Global Warming Pollution*

According to the National Renewable Energy Laboratory, lifecycle carbon dioxide ($CO_2$) emissions from biodiesel are 78.45% less than diesel: the crops that are used to produce biodiesel pull $CO_2$ out of the atmosphere with every planting. Methane, another important greenhouse gas, is reduced by 2.57% and 0.51% for B100 and B20, respectively, compared to petroleum diesel, on a lifecycle basis. Though tailpipe emissions of these gases may be higher, global-level lifecycle $CO_2$ emissions are of concern in addressing global warming, not tailpipe emissions.

## Breathing Easier with Biodiesel

| Pollutant (tailpipe emissions) | B100 vs. Diesel (2D) | B20 vs Diesel (2D) |
|---|---|---|
| Hydrocarbons | -80% to -90% | -20% to -30% |
| Carbon Monoxide | - 40% to -50% | -10% to -20% |
| Particulate Matter | -30% to -50% | -5% to -15% |
| Nitrous Oxides | + 12% | +4% |
| Smog forming potential | -50% | - |
| Sulfur oxides and sulfates | -100% | - |
| PAH (aromatic compounds) | -75% to -85% | - |
| NPAH (aromatic compounds) | -90% | - |

US EPA and National Biodiesel Board Health and Environmental Effects Testing, 1998.

**Particulate Matter:** asthma attacks, probable carcinogen, greenhouse contributor
**PAHs & NPAHs:** carcinogens
**Carbon Monoxide:** harms heart & respiratory system
**Hydrocarbons, Sulfur & Nitrous Oxides:** contributors to smog

# Biodiesel for Energy Security

Currently, the United States imports over 2.25 *trillion* gallons of crude oil and refined petroleum products annually. This dependence on foreign oil supplies leaves Oregonians vulnerable to price spikes in the global oil market, and sends a steady stream of millions of dollars out of the region -- dollars we could use to fuel Oregon's economy.

It is estimated that the world will soon reach peak production of petroleum. As production decreases and demand increases, prices will rise. Investing in renewable fuels now will help us hedge against price spikes in the near-term and help forestall serious fuel shortages in the long-term.

# A Renewable Fuel Standard for Biodiesel in Oregon

odiesel's benefits are tremendous, but they won't be realized unless Oregon actively supports the fledgling biodiesel industry. More than anything, would-be biodiesel producers need assurance of a steady market for their product. There is no better way to guarantee this market than to require a minimum biodiesel content in all petroleum diesel sold in the state.

Due to the serious health impacts of diesel exhaust, the federal government is mandating that diesel fuel be refined to dramatically reduce its sulfur content. As of mid-2006, all diesel sold for use by on-road engines (trucks, buses, etc.) must be ultra-low sulfur diesel (ULSD). By 2010, the ULSD mandate will take effect for off-road engines (generators, locomotives, construction equipment, etc.). The refinery process that reduces sulfur also reduces lubricity, which in turn increases wear on fuel-injection equipment and could result in catastrophic engine failure.

erefore, ULSD requires the addition of a lubricity agent. At a blend of just 2%, biodiesel is an excellent lubricity enhancing additive and the only one that can be produced in Oregon.

## Biodiesel Use FAQs

**Where can I use biodiesel?**
You can use biodiesel or a biodiesel/diesel blend in any diesel motor (cars, generators, woodchippers, home oil tanks, etc).

**Will biodiesel hurt my engine?**
No. Engines built before 1994 may have natural rubber seals or hoses, which will need to be replaced with synthetic materials. When you first burn biodiesel, or switch back from burning regular diesel for thousands of miles, you will probably have to replace your fuel filter a couple of times. Biodiesel's solvent effects will clean out deposits left in the system by petroleum diesel and clog the filter.

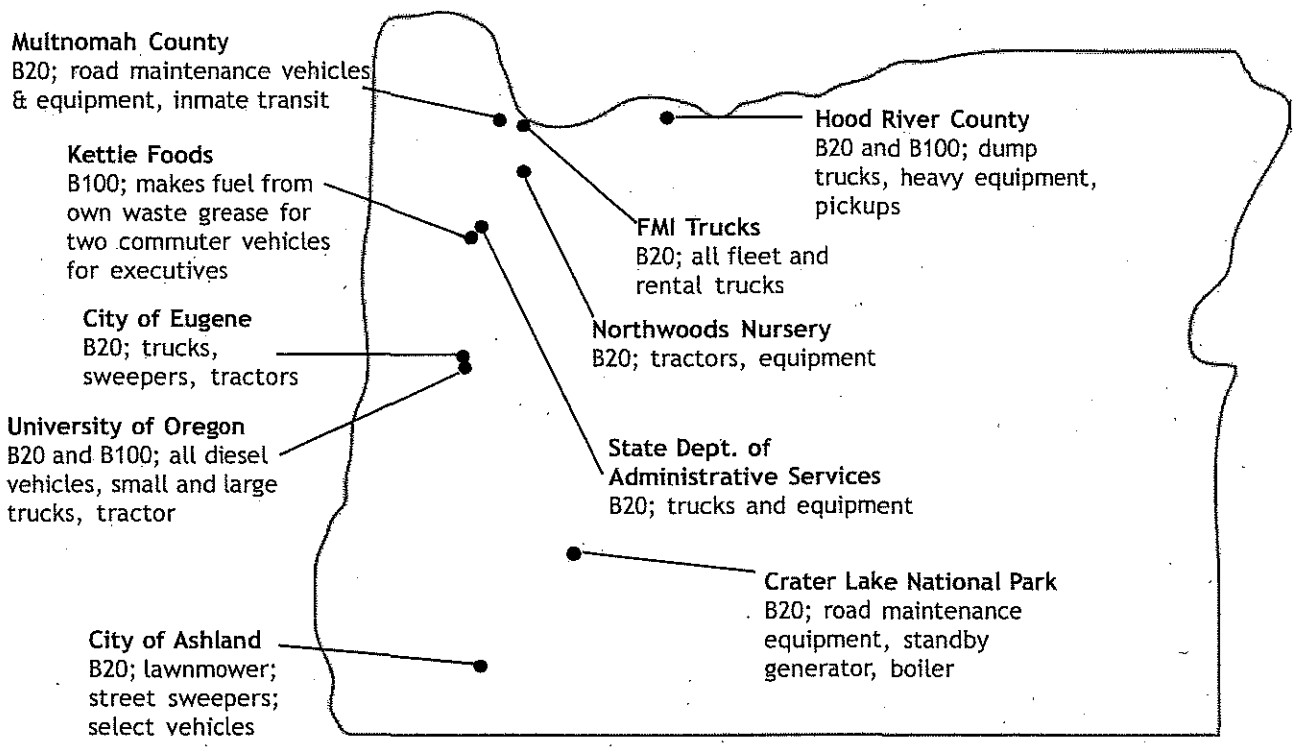
**Can I switch between biodiesel and regular diesel?**
Yes, biodiesel users report that switching back and forth between diesel, B100 and any blend in between causes no ill effects, though filter replacements may be necessary.

**Does switching to biodiesel lower my fuel economy?**
Biodiesel does contain less energy than petroleum diesel, but biodiesel's higher lubricity increases engine efficiency, effectively canceling out the difference. Users of biodiesel have reported no noticeable changes in engine performance.

**Will using biodiesel affect my warranty?**
If you are buying your biodiesel from the pump or another ASTM-certified source, it shouldn't void your warranty. Fuel from small-scale and home producers is probably not certified. To be safe, please check with the manufacturer before making the switch.

# Biodiesel in Oregon

Here are just a few of the hundreds of biodiesel users around the state.




There are a number of retailers selling biodiesel and biodiesel blends in locations around the state, as listed below. For the most recent listing of retailers, or to find biodiesel retailers around the country, visit the National Biodiesel Board's website: www.biodiesel.org/buyingbiodiesel/guide.

**Bend**
Retail Pump
Red Carpet Express
B20; cash/credit
764 N Greenwood Ave; 8-5/7

Co-Op
Bend Biofuels Co-Op
B100 Bulk purchasing co-op
Contact:
Michael Hippenhammer
541-322-1910

**Corvallis**
Co-Op
Grease Works!
B100 Bulk purchasing co-op
245 SW Cummings Ave.; 9-5 M-F
541-754-1897

**Eugene**
Retail Pump
Tyree Oil
B100; cash/check
1355 West 1st Ave.
10-2 Sat.

Cardlock
Tyree Oil
B20; bi-monthly billing
1355 West 1st Ave.; 24/7

**Medford**
Cardlock
Hays Oil Co.
B100; credit/billing
1890 S. Pacific Hwy.; 24/7

**Portland**
Retail Pumps
SeQuential Biofuels
B100; cash/credit
11330 NW St. Helens Rd.
M-F 6-9, S&S 7-8

Star Oilco
B100; cash/credit/check
232 SE Middlefield Rd.
M-F 8:30-4:30

Cardlock
Star Oilco
B20; bi-monthly billing
4505 SE 17th Ave; 24/7

Star Oilco
B20; bi-monthly billing
3537 NW St. Helens Rd.; 24/7

Co-Op
Go Biodiesel
Producer co-op with several meetings/month
www.gobiodiesel.org

**Bulk purchasing** of B100 is available through many of these retailers. Phoenix Organics in Phoenix also offers bulk purchasing; call 541-535-1134 for information. **Cardlocks** are self-service fueling stations which require a specially encoded credit card to gain access to the pumps. Call the biodiesel retailer for details and an application.

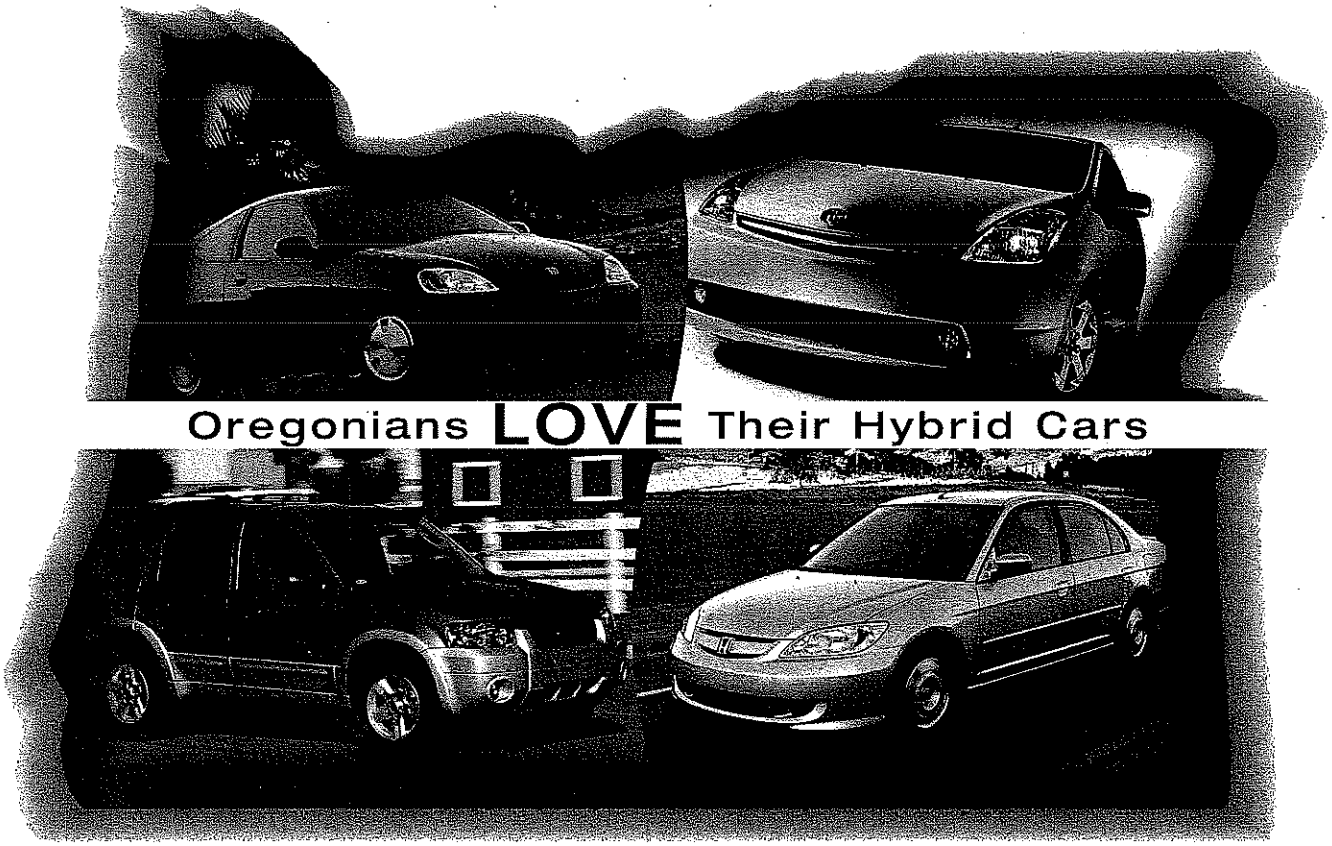
## For More Information

www.biofuels4oregon.org

Chris Hagerbaumer, OEC Program Director, 503-222-1963 x 102, chrish@oeconline.org
Kathy Hyzy, OEC Program Assistant, 503-222-1963 x 105, kathyh@oeconline.org



Oregon Environmental Council, 222 N.W. Davis Street, Suite 309, Portland, OR 97209-3900
phone: 503-222-1963 fax: 503-222-1405 info@oeconline.org www.orcouncil.org



## Oregonians LOVE Their Hybrid Cars

*And there are many reasons why...*

98%

## SURVEY OF OREGON HYBRID CAR OWNERS

A statewide survey of Oregon hybrid gas-electric car owners in 2003 found that 98% would recommend their hybrid to a friend. We've captured some of their enthusiasm in the six testimonials presented here.

Environmental values figured highly into survey participants' reasons for buying a hybrid car, but the quality of the car and its handling on the road made them real fans. 89% of survey participants indicated they chose a hybrid to pollute the air less, and 77% chose their hybrid to emit less climate-changing carbon dioxide. Many also mentioned their desire to reduce dependence on foreign oil, to convince automakers to produce more hybrids, and to demonstrate their personal values. However, when asked what they liked best about their hybrid, responses leaned toward the quality of the car. 68% mentioned something about the technology, style, or handling of their hybrid.

To view the results of this survey, conducted by the Oregon Environmental Council and the Oregon Department of Energy, visit **www.orcouncil.org**.

**Best car this 83-year-old has ever driven**

The first car 83-year-old Dr. A.C. Germann drove was a 1927 Studebaker. He chauffeured his father, a physician, to his appointments and has driven every kind of car imaginable since. "This is by far the best car I've ever driven – bar none," said retired professor Germann. "I've driven cars made all over the world, including French and German cars. The Prius accelerates faster, holds the road, has perfect 180 degree visibility, good braking and is ergonomically comfortable." His wife Margot Howe readily agreed, "We're totally satisfied."

The couple has always purchased cars with good environmental qualities and named their hybrid "Pachamama," a South American term for Mother Earth. They noted the sense of comradery that hybrid owners feel – they all wave or nod to each other when they see each other on the road.

*Dr. A.C. Germann & Margot Howe*
*Ashland, Oregon*

**Savings on gas prompted two Honda hybrid purchases**

A teacher at Culver High School, Loyd Morrow commutes 80 miles round-trip. Good gas mileage is important to him. In 2000, he bought a Honda Insight, the most fuel-efficient hybrid. Although Bobbi Morrow's commute to downtown Bend is much shorter, she decided in 2003 to purchase the other Honda hybrid – the Civic.

"I used to teach with the Department of Defense's overseas school system," said Loyd. "The gas mileage of European cars was phenomenal." Added Bobbi, "America has huge, hulking V8s instead of the high speed, high performance cars of Europe. We're happy with the performance and fuel economy of our hybrids."

The Morrows drove their Civic to Atlanta and back. "We went up and over the Continental Divide," said Bobbi. "And it kept right on going. The only difference was the price of gas."

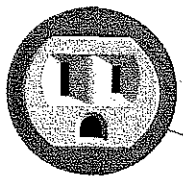
*Loyd & Bobbi Morrow*
*Bend, Oregon*

**Pacific islander concerned about global warming**

Before moving to Oregon from the Republic of Palau, Pacific islander Francis Toribiong read about the promise of hybrid cars in an issue of National Geographic. He saw his first hybrid, a Toyota Prius, while doing contractor work for Clint Newell's dealership in Roseburg. He convinced Clint to let him rent the Prius for a trip to Portland, and as soon as he and his wife got out on the road, they fell in love. "We could not run out of gas," said Francis. "We passed every car on the freeway." They returned the car to the dealership, told Clint they wanted it, and the dealership's first Prius sale was to the Toribiongs.

As managers of vacation rental properties, Susan and Francis put nearly 3,000 miles each month on their Prius. They appreciate the savings on gas, but their main motivation for buying a hybrid was to spew fewer global warming gasses. Francis' homeland is threatened by rising sea levels. "Many people don't notice global warming," said Francis. "But for people who live on Kayangel (the northernmost island in Palau), the changes are obvious. It's already happening."

*Francis & Susan Toribiong*
*Roseburg, Oregon*



**YES, IT'S ELECTR BUT YOU DON NEED TO PLUG IT IN.** The battery in a hybrid car charges automatically while you coast and while you brake.

# ...would recommend their hybrid to a friend

### Electrician enthused about hybrid technology

Scott Cousins, an industrial electrician, has an intimate knowledge of cars and understands how hybrid gas-electrics work. He bought his Prius to support the advancement of the technology. Having worked on his own cars his whole life, the Prius is the first new car Scott has ever bought. "I never thought any other car was worth it," he said.

Scott's younger boy has an all wheel drive, turbocharged sportscar. When Scott drives it, he wishes he were driving the Prius. "There's an incredible amount of torque with an electric motor," said Scott. "In fact I have to be careful taking off from a stop." With a look of bemusement, he adds, "Why can't we let go of the romance of the internal combustion engine?"

Another primary motivation for Scott was cleaner air. "Thirty years ago when I was rock climbing and mountain climbing, I remember being able to see much further," said Scott. "When you don't see the views, it really ticks you off. Also, when my wife and I ride bicycles, we hate breathing the fumes."

*Scott Cousins*
*Scappoose, Oregon*

### All in the family

After Leila Snow and Roy List bought their Toyota Prius, other family members soon followed. Their daughter, Tamara, bought a Honda Insight, which Leila's brother also chose. "Once people experience a hybrid, it becomes a must have," said Leila. Will their daughter Anandha, follow suit?

Leila and Roy's teenage daughter, Bridget, just got her driver's license. "High school kids are intrigued by the hybrid car and don't see it as nerdy at all," said Bridget.

Leila and Roy bought their hybrid for environmental reasons. "Once the technology became available, we had to get one," said Leila. "Cars are the primary polluter on the planet," Roy added. "The fossil fuel thing – it's just not sustainable."

Savings at the fuel pump are an additional benefit. "Believe me. When I pull up to the pump these days, everyone is envious," said Leila with a laugh.

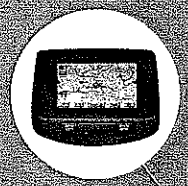
*Leila Snow & Roy List*
*Eugene, Oregon*

### Native Oregonian believes in living lightly

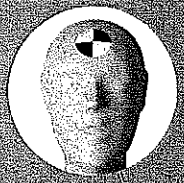
"I remember when Governor Tom McCall launched the Willamette River clean up," said Beth Murphy, an administrator at the Klamath Falls Oregon Institute of Technology. "I believe in what Oregon stood for then and hopefully still does." Beth and her husband, Sam, find their Civic Hybrid helps them express their environmental values. "We try as much as we can to live lightly on the planet," said Beth.

Living in Klamath Falls, there's lots of cold and snowy weather. The Civic Hybrid has worked well for the Murphys, who chose to buy studless snow tires and have had the "best snow experience."

*Beth Murphy*
*Klamath Falls, Oregon*

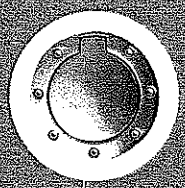


**YES, IT'S LOADED WITH COOL FEATURES.** Hybrids have all the latest amenities, from touch-screen controls to automatic climate control to global positioning systems.

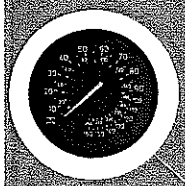


**YES, IT'S SAFE.** Hybrid cars are as safe or safer than the conventional models they are based on.

**YES, IT CAN CARRY YOUR FAMILY AND YOUR STUFF.** Hybrid SUVs, vans, wagons and trucks are coming soon. The new Prius carries five comfortably, and the Civic Hybrid, four.



**YES, HYBRIDS STILL HAVE A GAS CAP.** But you won't need to use it as often. A new Prius, for instance, averages 600 miles between fill-ups.

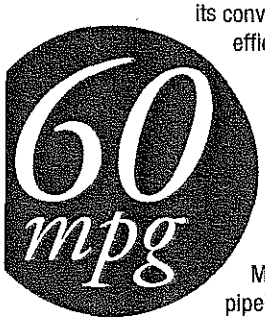


**YES, YOU CAN BURN RUBBER.** The electric motor provides instant torque, which means fast acceleration.

## WHY HYBRIDS?

### SAVE AT THE GAS PUMP

The average passenger vehicle on Oregon's roads achieves only 20 miles per gallon. The 2004 Toyota Prius averages 55 mpg; the 2004 Honda Civic Hybrid averages 48 mpg; and the 2005 Ford Escape Hybrid SUV is expected to average nearly twice the mileage of its conventional counterpart in stop-and-go traffic – 33-36 mpg. The most fuel-efficient hybrid, the 2004 Honda Insight, averages more than 60 mpg.




### USE LESS OIL

Over half the oil consumed in the United States is imported. Passenger cars and trucks consume the largest share of this oil – 40%. America's *Annual Energy Outlook 2004*, the most recent U.S. government projection, predicts we'll be importing 70% of our oil by 2025.

Most of the oil consumed in the Northwest originates via the Alaska pipeline. Proposed drilling in the Arctic National Wildlife Refuge, the last completely undisturbed wilderness area in North America, simply cannot be done in an environmentally sensitive way.

### KEEP COOL

Cars, trucks and buses contribute more heat-trapping emissions of carbon dioxide than any other source in Oregon. Every gallon of gas burned forms nearly 20 pounds of carbon dioxide in the atmosphere. The more fuel-efficient your car is, the less it contributes to global warming.

### BREATHE EASY

More than half of Oregon's air pollution is transportation-related. Today's hybrids use state-of-the-art pollution control technology and are among the cleanest cars on the road. They meet or beat the stringent California Super Ultra Low Emission Vehicle standard and far outdo the most stringent federal standards.

## CLEANER CARS AND CLEANER FUELS

Hydrogen fuel cells may power the car of tomorrow. When hydrogen is produced from renewable energy sources, like wind power, transportation can be pollution-free. In the mean time, drivers can:

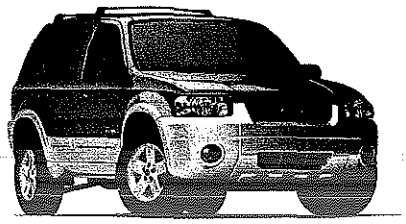
**Choose a cleaner, more fuel-efficient conventional car.** Don't buy a car that's bigger than your needs. Likewise, avoid heavy options and accessories that decrease fuel economy, such as 6- or 8-cylinder engines, four-wheel drive, and automatic transmission.

**Buy a hybrid electric or an electric car.** Pure electric vehicles are powered by rechargeable batteries. Their range is currently limited to 100 miles or less, but the technology is improving all the time. Hybrid electric vehicles combine an internal combustion engine with a battery and match or beat the driving range of a conventional car.

**Power a diesel car with biodiesel.** Biodiesel is a cleaner, nontoxic and renewable alternative to petroleum diesel. Made from waste grease or oil-rich plants, biodiesel can be run in a conventional diesel engine.

**Choose an alternate fuel vehicle (AFV).** Some AFVs use cleaner-burning fossil fuels like propane and compressed natural gas. Other AFVs burn renewable fuels like ethanol.

**For more information on these options,** visit OEC's website at **www.orcouncil.org.**



## HYBRID CAR TAX BREAKS

The Internal Revenue Service offers a tax deduction of $1,500 in 2004, $1,000 in 2005 and $500 in 2006, after which it goes away. Visit **www.fueleconomy.org/feg/tax_hybrid.shtml** or consult your tax agent.

Oregon offers a tax break of up to $1,500. Visit **www.energy.state.or.us/trans/hybridcr.htm** or call 1-800-221-8035.

## HYBRID CAR BUYERS GUIDE

**CARS** *available now or in the near future include the* Toyota Prius, Honda Civic Hybrid, Honda Insight, and Honda Accord Hybrid.

**SUVS** available now or in the near future include the Ford Escape Hybrid, Lexus RX Hybrid, and Toyota Highlander Hybrid.

**OTHER HYBRIDS** are in the works, including a Toyota Sienna/Estima minivan and a Mercedes Vision Grand Sport Tourer station wagon.

Visit **www.hybridcars.com** for the latest news on these and other models. And be aware that some so-called hybrids may not deliver on fuel economy – these "pseudo" hybrids will boost gas mileage only slightly over their conventional counterparts.

Oregon Environmental Council

CLEAN **AIR** CLEAN **WATER** CLEAR **THINKING**

### THE OREGON ENVIRONMENTAL COUNCIL

Founded in 1968, the Oregon Environmental Council (OEC) is a nonprofit, nonpartisan organization with more than 2000 members throughout the state. We bring Oregonians together for a healthy environment.

Oregon Environmental Council
520 SW 6th Avenue, Suite 940
Portland, Oregon 97204-1535
(503) 222-1963
oec@orcouncil.org
www.orcouncil.org

*September 2004* *Printed on recycled paper.*

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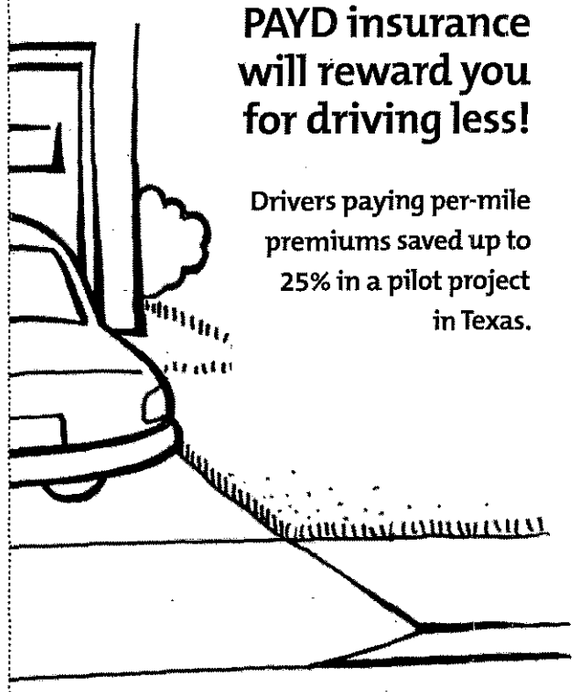
# The Oregon Environmental Council is promoting a revolutionary new auto insurance product — Pay-As-You-Drive (PAYD) insurance.

PAYD insurance converts a portion of your annual fixed premium into a per-mile fee.

## PAYD insurance will reward you for driving less!

Drivers paying per-mile premiums saved up to 25% in a pilot project in Texas.



Clean air
Clean water
Clear thinking

Founded in 1968, the Oregon Environmental Council (OEC) is a nonprofit, nonpartisan organization with more than 2,000 members throughout the state.

OEC membership is $30 per year. Contact OEC for more information. Ask for a complimentary copy of our newsletter *EarthWatch Oregon.*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(503) 222-1963 (phone)
(503) 222-1405 (fax)
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www.orcouncil.org



CONTAINS 30% POST-CONSUMER RECYCLED FIBER

08/02


You only pay for electricity when you turn on the lights.

You only pay for water when you run the taps.

You only pay for gas when you drive your car.

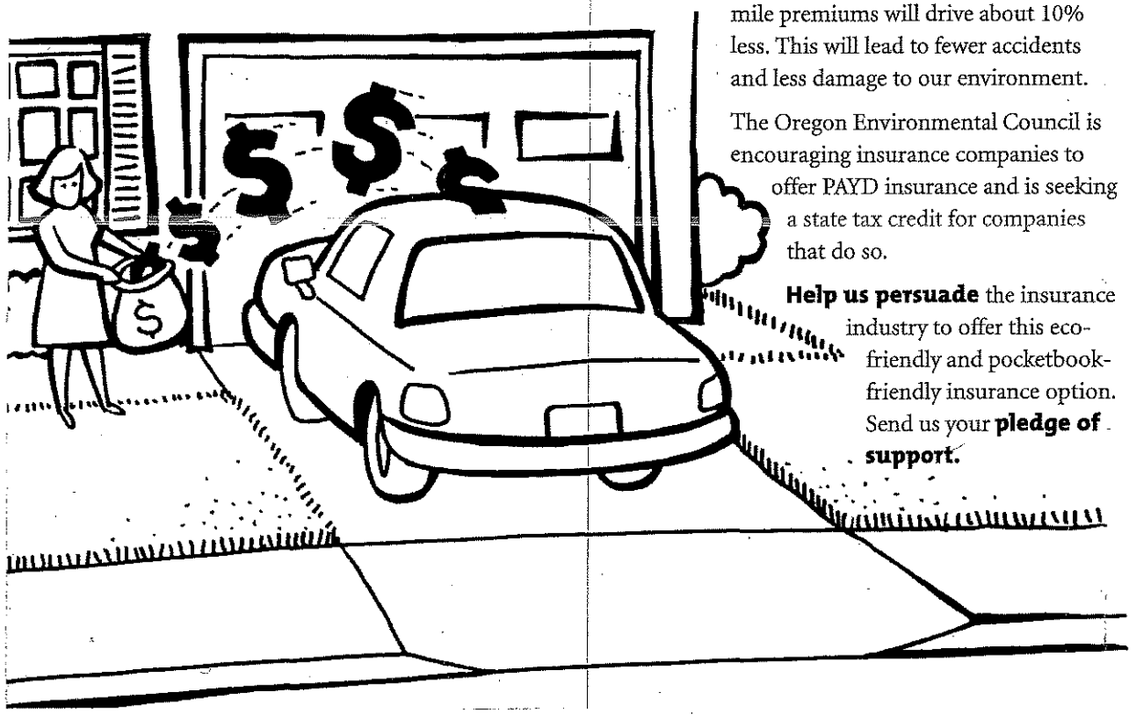
***But what about auto insurance?***

**Unfortunately, your insurance company charges you even when your car is parked, going nowhere.**

**Charging insurance for a parked car is unfair because driving even one mile less is a sure way to reduce your risk of being in an accident.**

Introducing

# PAYD



## Pay-As-You-Drive insurance... a low cost alternative to traditional auto insurance

PAYD insurance converts a portion of your annual fixed premium into a per-mile fee. All existing rating factors (such as your driving history, vehicle type and household location) are incorporated into the per-mile price.

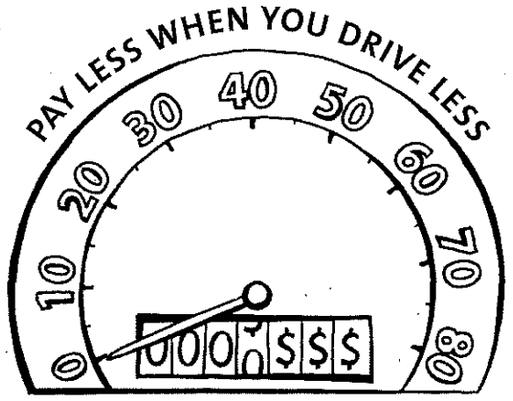
PAYD insurance **better reflects your risk** of being in an accident because it reflects how much you actually drive.

PAYD insurance **gives you more control** over your driving expenses.

PAYD insurance also **rewards you for driving less.** It's estimated that motorists choosing per-mile premiums will drive about 10% less. This will lead to fewer accidents and less damage to our environment.

The Oregon Environmental Council is encouraging insurance companies to offer PAYD insurance and is seeking a state tax credit for companies that do so.

**Help us persuade** the insurance industry to offer this eco-friendly and pocketbook-friendly insurance option. Send us your **pledge of support.**




**Too much driving damages our environment.** Consider these facts:

- More than one-third of Oregon's carbon dioxide ($CO_2$) emissions are produced by cars and trucks. Excess $CO_2$ is creating a blanket around Earth and causing global warming.
- Cars and trucks are responsible for more than half of Oregon's air pollution.
- Toxic runoff from roads and parking lots pollutes Oregon's rivers, harming salmon and fouling drinking water supplies.

The average Oregonian drives 12,000 miles each year. By driving less, we reduce our impact on the climate, make our water and air cleaner, and reduce the need to build expensive new roads.

## Pledge of Support

**Dear Auto Insurance Provider:**

I support Pay-As-You-Drive (PAYD) auto insurance policies that are tied to miles driven. This type of policy offers consumers real cost savings for driving less. If you offer me a price-competitive PAYD policy, I will purchase auto insurance from you.

By offering PAYD insurance, you will help reduce traffic, leading to fewer accidents and a healthier environment. Please provide me with a PAYD option!

NAME: _____

ADDRESS: _____

_____

PHONE: _____

E-MAIL: _____

☐ PLEASE KEEP ME INFORMED ABOUT PROGRESS TOWARD MAKING PAYD INSURANCE AVAILABLE IN THE MARKET PLACE.

MY CURRENT AUTO INSURANCE CARRIER IS: _____

WE WILL CONTACT YOU WHEN A COMPANY BEGINS TO OFFER PAYD INSURANCE IN OREGON. YOUR NAME WILL NOT BE SHARED OUTSIDE OEC.

Learn more about PAYD insurance and pledge on-line at www.orcouncil.org/Pollution/PAYD.htm

BEAVERTON VALLEY TIMES
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Phone: 503-684-0360 • Fax: 503-620-3433



# Sexton methane work earns honors

**By CHRISTINA LENT**
Of the Times

PORTLAND — Sexton Mountain residents Elise Smith and Susan Cook set an impressive example as good neighbors.

Both citizen activists are not afraid to tackle tough issues and work to help their neighborhood.

During the past several years, the friends and next-door neighbors played key roles in establishing statewide methane cleanup rules that identify methane as a hazardous substance.

Oregon's Department of Environmental Quality and the Environmental Quality Commission recognized Smith and Cook Friday in Portland for their dedication to protecting Oregon's environment and willingness to take action.

"This was an excellent opportunity to recognize these two citizen leaders for the exceptional work they did," said Mikell O'Mealy, special assistant to the DEQ director and the commission. "They went above and beyond what citizens usually do when faced with what they felt was a significant environmental and human health problem in their community.

"I hope they walked away knowing how grateful the commission and DEQ are for their work and what a great example they left for Oregonians in taking care to protect our environment and our community."

SUBMITTED PHOTO / DEQ Communications Office

**GOOD NEIGHBORS** — Sexton Mountain neighbors Elise Smith and Susan Cook receive certificates recognizing their neighborhood activism from members of the Oregon Environmental Quality Commission Friday in Portland. Commissioner Deirdre Malarkey congratulates Smith, as EQC Chairman Mark Reeve and Commissioner Ken Williamson look on.

### Everyone benefited

In 2001, Smith and Cook joined with other concerned Sexton Mountain neighbors to form a neighborhood group called CLEAN to share their concerns about the Cobb's Quarry landfill redevelopment projects located near their homes.

Investigations of the proposed Sexton Crest residential development and Haggen Foods grocery store discovered high levels of methane gas at the Cobb's Quarry site.

At the time, methane was not listed as a hazardous substance under DEQ's cleanup regulations. The state's solid waste program lacked authority to regulate the substance at historic, un-permitted landfills, said Tim Spencer, a DEQ environmental engineer.

Recognizing the problem, Smith and Cook joined DEQ officials to make sure the quarry's development was completed safely. They also worked to help ensure that the state agency would be able to regulate methane.

"They put forth an extraordinary amount of effort in getting the methane rule in place for the good of Oregon," Spencer said. "Likewise, they invested a tremendous amount of effort in the Cobb's Quarry development to make sure it was as safe as it could be for future residents, customers and employees.

"Everybody that uses that site has benefited from their work."

### Power of neighbors

Smith and Cook were overwhelmed by the attention.

"I was so honored and humbled," Smith said. "I had to work at making sure I didn't get emotional.

"It felt very good to hear Tim say that we asked some of the toughest questions. We were not alone though; there were other people involved. Sue and I received a lot of support from our neighbors who encouraged us with their letters and phone calls."

Cook admitted that she was a little embarrassed by the award.

"I appreciate their effort to recognize us, but the most rewarding part for me was achieving our goal of making things safer and better for everybody," Cook said. "I'm a strong believer in citizen participation.

"At the end of the day, we walked away knowing that this was the right thing to do and it was necessary."

Smith agreed.

"You don't seek a cause," Smith said. "Sometimes, the things you do in life are not what you seek out — they find you.

"We just kept going until we reached the point it was out of our hands and in the right hands."

Along the way, Smith and Cook said they learned a lot and made some new friends.

"Never underestimate the power of good neighbors and good friends," Smith said. "The DEQ did not."

**THE BEAT GOES ON**
*People who helped shape Beaverton*

# Smith helped local jewelry customers shine

**By JEANNE LEESON**
For the Times

For the past four decades, Larry Smith has helped Beaverton-area residents sparkle just a little bit more.

Smith is part of the Smith & Bevill Jewelers store, which is in a new shop on Beaverton-Hillsdale Highway.

Area residents have been buying their gems from him since 1959, when he opened a small shop on Southwest Broadway in downtown Beaverton.

Smith purchased the shop that year from the widow of the Bolton Jewelry store owner. He was 39 and had become a capable jeweler and watchmaker and wanted his own business.

The shop cost $15,000. Smith had saved $10,000. On a handshake, Jim Higgins at U S Bank loaned Smith the remaining $5,000.

"His bank office was just across the railroad tracks where the dance studio is now," Smith said. "Jim said he could use a spy glass and see how my cash register was doing."

SMITH

### Learning the trade

Smith had learned his trade well. Through the federal Civilian Conservation Corps, employers were paid $30 a month to train young people. Just out of high school, Smith took advantage of the offer, working for a Sellwood jeweler and earning his jeweler's license.

Next, during World War II, Smith fought in Gen. George Patton's divisions, where Patton's army met the Russians in Austria.

After the war, Smith worked for a number of jewelers. He knew every aspect of the trade. He could repair watches, understood the romance of diamonds and could fix any jewelry item anyone brought in.

More than that, Smith understood what pieces of jewelry meant to his customers. He also shared their pleasure in ownership of special items for birthdays, anniversaries and special events.

### Moving store

The business grew and Smith hired Bill Bevill, a young watchmaker from Chicago.

In 1976, Bevill and Smith shook hands and became partners. They opened a second store in the Beaverton Town Square.

They intended to have two stores, but a problem with the city forced them to give up the Broadway location in less than a year.

"The city of Beaverton was forever keeping Broadway torn up," Smith said. "We lost customers. Jack Nelson was mayor and he begged us to stay, but after eight months, we closed the Broadway store."

For 22 years, Bevill and Smith enjoyed good business in the Town Square shopping center. Twice they enlarged the store.

"Bill is like a son to me," Smith said. "I was 70. I was tired. We shook hands and he bought the business. That was in 1989."

"We had a wonderful relationship," Bevill said. "In all the years I never remember having a cross word."

### Beautiful pieces

In 2003, Bevill purchased an 8,500-square-foot store at 9875 S.W. Beaverton-Hillsdale Highway. The company moved there last year.

Smith appreciates the items carried in the store, handmade pieces from around the world: Cyma Swiss watches, unusual enamel pieces come from Masriera and Barcelona.

"I'm proud of him," Smith said of Bevill. "It's a perfect location, an acre of land with beautiful trees, plenty of parking, and inside, the displays show off the beautiful pieces."

Smith also still has a role in the business. Whenever anyone brings in a clock for repair, Smith returns it to perfect working order.

*Jeanne Leeson is a Beaverton freelance writer and a longtime newspaperwoman.*

The Oregonian 2/3/05

# The bottom line: How shall we then live?

Thursday, February 03, 2005

I n the end, the homes were built on the ridges above the old Cobb's Quarry in Beaverton. Haggen Food is going in, pretty much on schedule. Several miles away, as the backhoe crawls, Crate & Barrel is open for business and the rest of Bridgeport Village is climbing up out of the Durham landfill.

At first glance, then, you can't see that Susan Cook and Elise Smith made much of a difference. That's as it should be. They usually labored far from the limelight. They were invariably focused on a hazardous substance naked to the human eye and plainly invisible -- or was that just plain inconvenient? -- to city governments.

During its monthly meeting Friday in Portland, the Oregon Environmental Quality Commission will honor Cook and Smith for their inventive, indefatigable community activism. The two women, next-door neighbors in the shadow of Sexton Mountain, spent years investigating methane, then persuaded DEQ to classify the odorless gas as a hazardous substance and monitor the stuff at previously unregulated historic landfills.

Cobb's Quarry, in the women's backyard, was such a slumbering beast. When Cook and Smith realized developers and the city were minimizing the threat of methane on the site, they stepped into the breach. Their concern was for the young, naive families who might move in, oblivious to the dangers of the methane and carbon monoxide beneath their property.

"We realized that if we didn't do something, no one else would," Cook says. "And if something happened, how would we live with ourselves? That was the bottom line: How would we live with ourselves?"

The Beaverton bureaucrats, of course, had a different bottom line. The city was busy promoting the Haggen buzz. "I learned things can happen in a city that you don't think could happen, and the city isn't there to protect you," Cook says. "That's how I always viewed the city's role. I learned that's not how it works. That's why I got involved."

The two friends also took the time to discover that DEQ is not a watchdog but a regulatory agency, and to effect change, they needed to change the regulations.

That took an incredible amount of patience, concedes Tim Spencer, a DEQ engineer. "That was a difficult time to enact new regulations because of the state budget crunch," he says. "There was quite a bit of resistance. They provided a lot of positive pressure from the outside to get things moving and overcome that inertia.

"Considering DEQ's lack of regulatory authority, methane was clearly a potential threat to public health and safety at Cobb's Quarry site and at other historic landfills in Oregon," Spencer adds. Smith and Cook changed all that. They did the research. They attended the meetings. They schooled the staff. They armed the agency to deal with the threat.

And while the city, both women argued, threw up barricades, DEQ was receptive to their concerns and impressed by their diligence. "What I'd like to see in the city, and what we got at

cont

DEQ," Cook says, "is an open mind."

Smith calls the experience "one of the most meaningful times of my life," an opportunity to put her education, her healthy skepticism and her civic conscience to good use. In the summer of 2003, she and Cook reinvested all of the above when high levels of methane were discovered in the quarry behind Durham's City Hall, the site of the $100 million Bridgeport Village development.

"They have a bigger vision than most people," Spencer says. "They want to help all Oregonians rather than look out for their own interests."

Credit Cook and Smith for caring. Credit DEQ for noticing. (When you throw in its weekend fund-raising concert for the governor's food drive, you gotta love DEQ.) And remember these two women when you need a little inspiration to leave this land in better shape than you found it.

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State of Oregon
# Department of Environmental Quality Memorandum

**Date:** January 13, 2005

**To:** Environmental Quality Commission

**From:** Stephanie Hallock, Director S. Hallock

**Subject:** Agenda Item F, Air Quality Rule Adoption: Incorporation of National Emission Standards for Hazardous Air Pollutants (NESHAP), revisions of New Source Performance Standards (NSPS), and adoption of Title V Permitting Regulation Amendments
February 4, 2005 EQC Meeting

**Department Recommendation**

The Department of Environmental Quality (DEQ, Department) recommends that the Environmental Quality Commission (EQC, Commission) adopt proposed rules to incorporate new NESHAP standards and update existing rules as presented in Attachment A. The amendments made to OAR 340 Division 200, if adopted, will be submitted to the U.S. Environmental Protection Agency (EPA) as a revision to the State Implementation Plan (SIP), which is a requirement of the Clean Air Act.

**Background and Need for Rulemaking**

NESHAPs control emissions of hazardous air pollutants from specific types of emission sources (i.e. pulp and paper mills, chromium electroplaters, see Appendix G for a complete list) and implement the requirements of section 112 of the Clean Air Act. NSPSs control emissions from types of emission sources (i.e. bulk gasoline terminals, landfills, see Appendix H for a complete list) that EPA determines "cause, or contribute significantly to, air pollution" to implement the requirements of section 111 of the Clean Air Act. Title V of the Clean Air Act requires each state to develop a comprehensive operating permit program for major industrial sources of air pollution. Title V permits contain the environmental obligations of a business by organizing in one document all of a business' air pollution control requirements.

The EPA periodically adopts new NSPS and NESHAP standards and occasionally modifies existing NSPS and NESHAP standards and Title V regulations. Appendices G and H contain lists of each NSPS and NESHAP standard adopted in this rulemaking, when EPA established each standard, and if and when each standard was modified since the last NSPS and NESHAP rulemaking that covered new standards and modifications through July 1, 2002. Adopting these new federal standards and changes made to existing federal standards at this time ensures that Oregon's rules are consistent with federal rules and allows the Department to be the primary implementing agency. Although the Department is the lead for implementing the delegated NSPS and NESHAP standards in Oregon, EPA retains authority to enforce any applicable emission standard or requirement, if needed. Even if the Commission does not adopt these rules, affected sources still must comply with the federal requirements.

**Effect of Rule**

This proposal would:

- Title V Permitting Program. Update Title V permitting program regulations to incorporate changes the EPA made to the federal Title V permitting program regulations. These changes are minor and include:
  - An addition to the list of applicable requirements for a Title V permit;
  - A change to the definition of a major source; and
  - Changes made to the Title V compliance certification requirement. (Attachment A, OAR 340-200, 340-218, p. 1-35)
- New Source Performance Standards (NSPS). Update existing regulations to incorporate changes through July 1, 2004. These changes are made to correct errors, provide additional compliance options, give affected sources additional flexibility in meeting the standards, and to incorporate information not available to EPA at the time the standards were established. (Attachment A, OAR 340-230, 340-238, p. 35-56, and Attachment H)
- National Emission Standards for Hazardous Air Pollutants (NESHAP).
  - Adopt by reference the federal NESHAPs for thirty-six new source categories. Thirteen of the thirty-six new NESHAPs currently affect sources in Oregon. Affected sources are required to achieve a level of emission reduction currently achieved by the best performing sources in the nation. Emission reductions may include pollution prevention techniques, coating reformulation, work practices, and add-on control devices.
  - Update existing regulations to incorporate changes through July 1, 2004. These changes are made to correct errors, provide additional compliance options, give affected sources additional flexibility in meeting the standards, and to incorporate information not available to EPA at the time the standards were established. (Attachment A, OAR 340-244, p. 56-93, and Attachment G).

**Commission Authority**

The Commission has authority to take this action under ORS 468.020, 468A.025, and 468A.310.

**Stakeholder Involvement**

No advisory committee was convened for this rulemaking because the rulemaking incorporates existing federal regulations.

This rulemaking proposal would adopt by reference federal NESHAPs for thirty-six new source categories affecting as many as 50 sources in Oregon. As part of this rulemaking, the Department notified all potentially affected sources about the rulemaking. The letter sent to these sources included the NESHAP(s) each source is potentially affected by and the applicable compliance and notification deadlines.

**Public Comment** A public comment period extended from August 16, 2004 to September 24, 2004 and included a public hearing in Portland. Attachment B provides results of public input and the Department's response to the comments. No persons testified at the public hearing; six written comments were received. Minor changes were made to the rules as a result of the comments received.

**Key Issues** This rulemaking does not add new control requirements for sources affected by the NESHAPs. Sources must comply with the control requirements mandated in the NESHAPs whether or not the Department adopts the NESHAPs.

**Next Steps** The following summarizes steps contained in the Rule Implementation Plan:

- Delegation. At the conclusion of this rulemaking, the Department will submit a request to EPA to update Oregon's NSPS and NESHAP delegation. Delegation gives the Department primary implementation and enforcement responsibility.
- Permitting. As permits come up for renewal, the Department will incorporate the new NESHAP standards and amendments made to the existing NSPS and NESHAP standards into the permits. Staff regularly reviews proposed permits to ensure new and amended standards are incorporated into the permits.
- SIP Revision. Changes made to the definitions in OAR 340-200-0020 will be submitted to EPA as revisions to Oregon's SIP.
- Staff Training. Whenever possible, staff training will rely on EPA and industry training, workshops, and implementation materials. EPA and industry associations have increased the quantity and quality of training materials for recent NESHAPs. Department staff will track training opportunities, workshops, and implementation materials to get the appropriate staff the necessary resources to implement the new NESHAPs. Department staff will also visit regional offices and meet with industry groups when requested to discuss the new and amended standards.
- Additional Resources. This rulemaking does not cause increased costs for the Department. The work associated with modifying permits and defining compliance requirements occurs regardless of this rulemaking because the requirements are in effect whether or not the Department adopts them.

The Rule Implementation Plan is available upon request.

**Attachments**

A. Proposed Rule Revisions
B. Summary of Public Comments and Agency Responses
C. Presiding Officer's Report on Public Hearings
D. Statement of Need and Fiscal and Economic Impact
E. Land Use Evaluation Statement
F. Relationship to Federal Requirements Questions
G. New & Amended NESHAPs Proposed for EQC Adoption
H. Amended NSPSs Proposed for EQC Adoption

**Available Upon Request**

1. Legal Notice of Hearing
2. Cover Memorandum from Public Notice
3. Written Comment Received
4. Rule Implementation Plan

Approved:

Section: Brandy M. Albertson

Division: Andy Graser

Report Prepared By: Jerry Ebersole

Phone: (503) 229-6974

Attachment A

# DEPARTMENT OF ENVIRONMENTAL QUALITY

## Rulemaking Proposal For Incorporation of National Emission Standards for Hazardous Air Pollutants (NESHAP), Revisions of New Source Performance Standards (NSPS), and Adoption of Title V Permitting Regulation Amendments

## Proposed Rule Changes

### Division 200
### GENERAL AIR POLLUTION
### PROCEDURES AND DEFINITIONS
### General

**340-200-0020**
**General Air Quality Definitions**

As used in divisions 200 through 268, unless specifically defined otherwise:

(1) "Act" or "FCAA" means the Federal Clean Air Act, 42 U.S.C.A. §§ 7401 to 7671q.

(2) "Activity" means any process, operation, action, or reaction (e.g., chemical) at a source that emits a regulated pollutant.

(3) "Actual emissions" means the mass emissions of a pollutant from an emissions source during a specified time period.

(a) For determining actual emissions as of the baseline period:

(A) Except as provided in paragraph (B), actual emissions equal the average rate at which the source actually emitted the pollutant during a baseline period and that represents normal source operation;

(B) The Department presumes that the source-specific mass emissions limit included in a source's permit that was effective on September 8, 1981 is equivalent to the source's actual emissions during the baseline period if it is within 10% of the actual emissions calculated under paragraph (A).

(C) For any source that had not begun normal operation, actual emissions equal the potential to emit of the source.

(b) For determining actual emissions for Emission Statements under OAR 340-214-0200 through 340-214-0220 and Oregon Title V Operating Permit Fees under OAR 340 division 220, actual emissions include, but are not limited to, routine process emissions, fugitive emissions, excess emissions from maintenance, startups and shutdowns, equipment malfunction, and other activities, except categorically insignificant activities and secondary emissions.

(c) For Oregon Title V Operating Permit Fees under OAR 340 division 220, actual emissions must be directly measured with a continuous monitoring system or calculated using a material balance or verified emission factor in combination with the source's actual operating hours, production rates, or types of materials processed, stored, or combusted during the specified time period.

(4) "Adjacent" means interdependent facilities that are nearby to each other.

(5) "Affected source" means a source that includes one or more affected units that are subject to emission reduction requirements or limitations under Title IV of the FCAA.
(6) "Affected states" means all states:
(a) Whose air quality may be affected by a proposed permit, permit modification, or permit renewal and that are contiguous to Oregon; or
(b) That are within 50 miles of the permitted source.
(7) "Aggregate insignificant emissions" means the annual actual emissions of any regulated air pollutant from one or more designated activities at a source that are less than or equal to the lowest applicable level specified in this section. The total emissions from each designated activity and the aggregate emissions from all designated activities must be less than or equal to the lowest applicable level specified.
(a) One ton for total reduced sulfur, hydrogen sulfide, sulfuric acid mist, any Class I or II substance subject to a standard promulgated under or established by Title VI of the Act, and each criteria pollutant, except lead;
(b) 120 pounds for lead;
(c) 600 pounds for fluoride;
(d) 500 pounds for PM10 in a PM10 nonattainment area;
(e) The lesser of the amount established in OAR 340-244-0040, **Table 1** or OAR 340-244-0230, **Table 3**, or 1,000 pounds;
(f) An aggregate of 5,000 pounds for all Hazardous Air Pollutants.
(8) "Air Contaminant" means a dust, fume, gas, mist, odor, smoke, vapor, pollen, soot, carbon, acid or particulate matter, or any combination thereof.
(9) "Air Contaminant Discharge Permit" or "ACDP" means a written permit issued, renewed, amended, or revised by the Department, pursuant to OAR 340 division 216.
(10) "Alternative method" means any method of sampling and analyzing for an air pollutant that is not a reference or equivalent method but has been demonstrated to the Department's satisfaction to, in specific cases, produce results adequate for determination of compliance. An alternative method used to meet an applicable federal requirement for which a reference method is specified must be approved by EPA unless EPA has delegated authority for the approval to the Department.
(11) "Applicable requirement" means all of the following as they apply to emissions units in an Oregon Title V Operating Permit program source or ACDP program source, including requirements that have been promulgated or approved by the EPA through rule making at the time of issuance but have future-effective compliance dates:
(a) Any standard or other requirement provided for in the applicable implementation plan approved or promulgated by the EPA through rulemaking under Title I of the Act that implements the relevant requirements of the Act, including any revisions to that plan promulgated in **40 CFR Part 52** ~~**(July 1, 1997)**~~;
(b) Any standard or other requirement adopted under OAR 340-200-0040 of the State of Oregon Clean Air Act Implementation Plan, that is more stringent than the federal standard or requirement which has not yet been approved by the EPA, and other state-only enforceable air pollution control requirements;
(c) Any term or condition in an ACDP, OAR 340 division 216, including any term or condition of any preconstruction permits issued pursuant to OAR 340 division 224, New Source Review,

until or unless the Department revokes or modifies the term or condition by a permit modification;
(d) Any term or condition in a Notice of Construction and Approval of Plans, OAR 340-210-0200 through 340-210-0240, until or unless the Department revokes or modifies the term or condition by a Notice of Construction and Approval of Plans or a permit modification;
(e) Any term or condition in a Notice of Approval, OAR 340-218-0190, issued before July 1, 2001, until or unless the Department revokes or modifies the term or condition by a Notice of Approval or a permit modification;
(f) Any term or condition of a PSD permit issued by the EPA until or unless the EPA revokes or modifies the term or condition by a permit modification;
(g) Any standard or other requirement under section 111 of the Act, including section 111(d);
(h) Any standard or other requirement under section 112 of the Act, including any requirement concerning accident prevention under section 112(r) (7) of the Act;
(i) Any standard or other requirement of the acid rain program under Title IV of the Act or the regulations promulgated thereunder;
(j) Any requirements established pursuant to section 504(b) or section 114(a)(3) of the Act;
(k) Any standard or other requirement under section 126(a)(1) and (c) of the Act;
(~~l~~k) Any standard or other requirement governing solid waste incineration, under section 129 of the Act;
(m~~l~~) Any standard or other requirement for consumer and commercial products, under section 183(e) of the Act;
(n~~m~~) Any standard or other requirement for tank vessels, under section 183(f) of the Act;
(o~~n~~) Any standard or other requirement of the program to control air pollution from outer continental shelf sources, under section 328 of the Act;
(p~~o~~) Any standard or other requirement of the regulations promulgated to protect stratospheric ozone under Title VI of the Act, unless the Administrator has determined that such requirements need not be contained in an Oregon Title V Operating Permit; and
(q~~p~~) Any national ambient air quality standard or increment or visibility requirement under part C of Title I of the Act, but only as it would apply to temporary sources permitted pursuant to section 504(e) of the Act.
(12) "Assessable Emission" means a unit of emissions for which the major source owner or operator will be assessed a fee. It includes an emission of a pollutant as specified in OAR 340-220-0060 from one or more emissions devices or activities within a major source.
(13) "Baseline Emission Rate" means the actual emission rate during the baseline period. Baseline emission rate does not include increases due to voluntary fuel switches or increased hours of operation that occurred after the baseline period.
(14) "Baseline Period" means any consecutive 12 calendar month period during calendar years 1977 or 1978. The Department may allow the use of a prior time period upon a determination that it is more representative of normal source operation.
(15) "Best Available Control Technology" or "BACT" means an emission limitation, including, but not limited to, a visible emission standard, based on the maximum degree of reduction of each air contaminant subject to regulation under the Act which would be emitted from any proposed major source or major modification which, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, is achievable for such source or modification through application of production processes or available methods, systems, and

techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such air contaminant. In no event may the application of BACT result in emissions of any air contaminant that would exceed the emissions allowed by any applicable new source performance standard or any standard for hazardous air pollutant. If an emission limitation is not feasible, a design, equipment, work practice, or operational standard, or combination thereof, may be required. Such standard must, to the degree possible, set forth the emission reduction achievable and provide for compliance by prescribing appropriate permit conditions.
(16) "Capacity" means the maximum regulated pollutant emissions from a stationary source under its physical and operational design.
(17) "Capture system" means the equipment (including but not limited to hoods, ducts, fans, and booths) used to contain, capture and transport a pollutant to a control device.
(18) "Categorically insignificant activity" means any of the following listed pollutant emitting activities principally supporting the source or the major industrial group. Categorically insignificant activities must comply with all applicable requirements.
(a) Constituents of a chemical mixture present at less than 1% by weight of any chemical or compound regulated under divisions 200 through 268 excluding divisions 248 and 262 of this chapter, or less than 0.1% by weight of any carcinogen listed in the U.S. Department of Health and Human Service's Annual Report on Carcinogens when usage of the chemical mixture is less than 100,000 pounds/year;
(b) Evaporative and tail pipe emissions from on-site motor vehicle operation;
(c) Distillate oil, kerosene, and gasoline fuel burning equipment rated at less than or equal to 0.4 million Btu/hr;
(d) Natural gas and propane burning equipment rated at less than or equal to 2.0 million Btu/hr;
(e) Office activities;
(f) Food service activities;
(g) Janitorial activities;
(h) Personal care activities;
(i) Groundskeeping activities including, but not limited to building painting and road and parking lot maintenance;
(j) On-site laundry activities;
(k) On-site recreation facilities;
(l) Instrument calibration;
(m) Maintenance and repair shop;
(n) Automotive repair shops or storage garages;
(o) Air cooling or ventilating equipment not designed to remove air contaminants generated by or released from associated equipment;
(p) Refrigeration systems with less than 50 pounds of charge of ozone depleting substances regulated under Title VI, including pressure tanks used in refrigeration systems but excluding any combustion equipment associated with such systems;
(q) Bench scale laboratory equipment and laboratory equipment used exclusively for chemical and physical analysis, including associated vacuum producing devices but excluding research and development facilities;
(r) Temporary construction activities;
(s) Warehouse activities;
(t) Accidental fires;

(u) Air vents from air compressors;
(v) Air purification systems;
(w) Continuous emissions monitoring vent lines;
(x) Demineralized water tanks;
(y) Pre-treatment of municipal water, including use of deionized water purification systems;
(z) Electrical charging stations;
(aa) Fire brigade training;
(bb) Instrument air dryers and distribution;
(cc) Process raw water filtration systems;
(dd) Pharmaceutical packaging;
(ee) Fire suppression;
(ff) Blueprint making;
(gg) Routine maintenance, repair, and replacement such as anticipated activities most often associated with and performed during regularly scheduled equipment outages to maintain a plant and its equipment in good operating condition, including but not limited to steam cleaning, abrasive use, and woodworking;
(hh) Electric motors;
(ii) Storage tanks, reservoirs, transfer and lubricating equipment used for ASTM grade distillate or residual fuels, lubricants, and hydraulic fluids;
(jj) On-site storage tanks not subject to any New Source Performance Standards (NSPS), including underground storage tanks (UST), storing gasoline or diesel used exclusively for fueling of the facility's fleet of vehicles;
(kk) Natural gas, propane, and liquefied petroleum gas (LPG) storage tanks and transfer equipment;
(ll) Pressurized tanks containing gaseous compounds;
(mm) Vacuum sheet stacker vents;
(nn) Emissions from wastewater discharges to publicly owned treatment works (POTW) provided the source is authorized to discharge to the POTW, not including on-site wastewater treatment and/or holding facilities;
(oo) Log ponds;
(pp) Storm water settling basins;
(qq) Fire suppression and training;
(rr) Paved roads and paved parking lots within an urban growth boundary;
(ss) Hazardous air pollutant emissions of fugitive dust from paved and unpaved roads except for those sources that have processes or activities that contribute to the deposition and entrainment of hazardous air pollutants from surface soils;
(tt) Health, safety, and emergency response activities;
(uu) Emergency generators and pumps used only during loss of primary equipment or utility service due to circumstances beyond the reasonable control of the owner or operator, or to address a power emergency as determined by the Department;
(vv) Non-contact steam vents and leaks and safety and relief valves for boiler steam distribution systems;
(ww) Non-contact steam condensate flash tanks;
(xx) Non-contact steam vents on condensate receivers, deaerators and similar equipment;
(yy) Boiler blowdown tanks;

(zz) Industrial cooling towers that do not use chromium-based water treatment chemicals;
(aaa) Ash piles maintained in a wetted condition and associated handling systems and activities;
(bbb) Oil/water separators in effluent treatment systems;
(ccc) Combustion source flame safety purging on startup;
(ddd) Broke beaters, pulp and repulping tanks, stock chests and pulp handling equipment, excluding thickening equipment and repulpers;
(eee) Stock cleaning and pressurized pulp washing, excluding open stock washing systems; and
(fff) White water storage tanks.
(19) "Certifying individual" means the responsible person or official authorized by the owner or operator of a source who certifies the accuracy of the emission statement.
(20) "CFR" means Code of Federal Regulations.
(21) "Class I area" means any Federal, State or Indian reservation land which is classified or reclassified as Class I area. Class I areas are identified in OAR 340-204-0250.
(22) "Commence" or "commencement" means that the owner or operator has obtained all necessary preconstruction approvals required by the Act and either has:
(a) Begun, or caused to begin, a continuous program of actual on-site construction of the source to be completed in a reasonable time; or
(b) Entered into binding agreements or contractual obligations, which cannot be canceled or modified without substantial loss to the owner or operator, to undertake a program of construction of the source to be completed in a reasonable time.
(23) "Commission" or "EQC" means Environmental Quality Commission.
(24) "Constant Process Rate" means the average variation in process rate for the calendar year is not greater than plus or minus ten percent of the average process rate.
(25) "Construction":
(a) Except as provided in subsection (b) of this section means any physical change including, but not limited to, fabrication, erection, installation, demolition, or modification of a source or part of a source;
(b) As used in OAR 340 division 224 means any physical change including, but not limited to, fabrication, erection, installation, demolition, or modification of an emissions unit, or change in the method of operation of a source which would result in a change in actual emissions.
(26) "Continuous compliance determination method" means a method, specified by the applicable standard or an applicable permit condition, which:
(a) Is used to determine compliance with an emission limitation or standard on a continuous basis, consistent with the averaging period established for the emission limitation or standard; and
(b) Provides data either in units of the standard or correlated directly with the compliance limit.
(27) "Continuous Monitoring Systems" means sampling and analysis, in a timed sequence, using techniques which will adequately reflect actual emissions or concentrations on a continuing basis in accordance with the Department's Continuous Monitoring Manual, and includes continuous emission monitoring systems, continuous opacity monitoring system (COMS) and continuous parameter monitoring systems.
(28) "Control device" means equipment, other than inherent process equipment, that is used to destroy or remove air pollutant(s) prior to discharge to the atmosphere. The types of equipment that may commonly be used as control devices include, but are not limited to, fabric filters, mechanical collectors, electrostatic precipitators, inertial separators, afterburners, thermal or

catalytic incinerators, adsorption devices (such as carbon beds), condensers, scrubbers (such as wet collection and gas absorption devices), selective catalytic or non-catalytic reduction systems, flue gas recirculation systems, spray dryers, spray towers, mist eliminators, acid plants, sulfur recovery plants, injection systems (such as water, steam, ammonia, sorbent or limestone injection), and combustion devices independent of the particular process being conducted at an emissions unit (e.g., the destruction of emissions achieved by venting process emission streams to flares, boilers or process heaters). For purposes of OAR 340-212-0200 through 340-212-0280, a control device does not include passive control measures that act to prevent pollutants from forming, such as the use of seals, lids, or roofs to prevent the release of pollutants, use of low-polluting fuel or feedstocks, or the use of combustion or other process design features or characteristics. If an applicable requirement establishes that particular equipment which otherwise meets this definition of a control device does not constitute a control device as applied to a particular pollutant-specific emissions unit, then that definition will be binding for purposes of OAR 340-212-0200 through 340-212-0280.
(29) "Criteria Pollutant" means nitrogen oxides, volatile organic compounds, particulate matter, $PM_{10}$, sulfur dioxide, carbon monoxide, or lead.
(30) "Data" means the results of any type of monitoring or method, including the results of instrumental or non-instrumental monitoring, emission calculations, manual sampling procedures, recordkeeping procedures, or any other form of information collection procedure used in connection with any type of monitoring or method.
(31) "De minimis emission level" means: [Table not included. See ED. NOTE.]
**Note:** De minimis is compared to all increases that are not included in the PSEL.
(32) "Department":
(a) Means Department of Environmental Quality; except
(b) As used in OAR 340 divisions 218 and 220 means Department of Environmental Quality or in the case of Lane County, Lane Regional Air Pollution Authority.
(33) "Device" means any machine, equipment, raw material, product, or byproduct at a source that produces or emits a regulated pollutant.
(34) "Director" means the Director of the Department or the Director's designee.
(35) "Draft permit" means the version of an Oregon Title V Operating Permit for which the Department or Lane Regional Air Pollution Authority offers public participation under OAR 340-218-0210 or the EPA and affected State review under OAR 340-218-0230.
(36) "Effective date of the program" means the date that the EPA approves the Oregon Title V Operating Permit program submitted by the Department on a full or interim basis. In case of a partial approval, the "effective date of the program" for each portion of the program is the date of the EPA approval of that portion.
(37) "Emergency" means any situation arising from sudden and reasonably unforeseeable events beyond the control of the owner or operator, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency does not include noncompliance to the extent caused by improperly designed equipment, lack of preventative maintenance, careless or improper operation, or operator error.
(38) "Emission" means a release into the atmosphere of any regulated pollutant or air contaminant.

(39) "Emission Estimate Adjustment Factor" or "EEAF" means an adjustment applied to an emission factor to account for the relative inaccuracy of the emission factor.
(40) "Emission Factor" means an estimate of the rate at which a pollutant is released into the atmosphere, as the result of some activity, divided by the rate of that activity (e.g., production or process rate). Where an emission factor is required sources must use an emission factor approved by EPA or the Department.
(41)(a) Except as provided in subsection (b) of this section, "Emission Limitation" and "Emission Standard" mean a requirement established by a State, local government, or the EPA which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis, including any requirements which limit the level of opacity, prescribe equipment, set fuel specifications, or prescribe operation or maintenance procedures for a source to assure continuous emission reduction.
(b) As used in OAR 340-212-0200 through 340-212-0280, "Emission limitation or standard" means any applicable requirement that constitutes an emission limitation, emission standard, standard of performance or means of emission limitation as defined under the Act. An emission limitation or standard may be expressed in terms of the pollutant, expressed either as a specific quantity, rate or concentration of emissions (e.g., pounds of $SO_2$ per hour, pounds of $SO_2$ per million British thermal units of fuel input, kilograms of VOC per liter of applied coating solids, or parts per million by volume of $SO_2$) or as the relationship of uncontrolled to controlled emissions (e.g., percentage capture and destruction efficiency of VOC or percentage reduction of $SO_2$). An emission limitation or standard may also be expressed either as a work practice, process or control device parameter, or other form of specific design, equipment, operational, or operation and maintenance requirement. For purposes of OAR 340-212-0200 through 340-212-0280, an emission limitation or standard does not include general operation requirements that an owner or operator may be required to meet, such as requirements to obtain a permit, to operate and maintain sources in accordance with good air pollution control practices, to develop and maintain a malfunction abatement plan, to keep records, submit reports, or conduct monitoring.
(42) "Emission Reduction Credit Banking" means to presently reserve, subject to requirements of OAR 340 division 268, Emission Reduction Credits, emission reductions for use by the reserver or assignee for future compliance with air pollution reduction requirements.
(43) "Emission Reporting Form" means a paper or electronic form developed by the Department that must be completed by the permittee to report calculated emissions, actual emissions, or permitted emissions for interim emission fee assessment purposes.
(44) "Emissions unit" means any part or activity of a source that emits or has the potential to emit any regulated air pollutant.
(a) A part of a source is any machine, equipment, raw material, product, or byproduct that produces or emits regulated air pollutants. An activity is any process, operation, action, or reaction (e.g., chemical) at a stationary source that emits regulated air pollutants. Except as described in subsection (d) of this section, parts and activities may be grouped for purposes of defining an emissions unit if the following conditions are met:
(A) The group used to define the emissions unit may not include discrete parts or activities to which a distinct emissions standard applies or for which different compliance demonstration requirements apply; and
(B) The emissions from the emissions unit are quantifiable.
(b) Emissions units may be defined on a pollutant by pollutant basis where applicable.

(c) The term emissions unit is not meant to alter or affect the definition of the term "unit" under Title IV of the FCAA.
(d) Parts and activities cannot be grouped for determining emissions increases from an emissions unit under OAR 340-224-0050 through OAR 340-224-0070, or OAR 340 division 210, or for determining the applicability of any New Source Performance Standard (NSPS).
(45) "EPA" or "Administrator" means the Administrator of the United States Environmental Protection Agency or the Administrator's designee.
(46) "Equivalent method" means any method of sampling and analyzing for an air pollutant that has been demonstrated to the Department's satisfaction to have a consistent and quantitatively known relationship to the reference method, under specified conditions. An equivalent method used to meet an applicable federal requirement for which a reference method is specified must be approved by EPA unless EPA has delegated authority for the approval to the Department.
(47) "Event" means excess emissions that arise from the same condition and occur during a single calendar day or continue into subsequent calendar days.
(48) "Exceedance" means a condition that is detected by monitoring that provides data in terms of an emission limitation or standard and that indicates that emissions (or opacity) are greater than the applicable emission limitation or standard (or less than the applicable standard in the case of a percent reduction requirement) consistent with any averaging period specified for averaging the results of the monitoring.
(49) "Excess emissions" means emissions in excess of a permit limit or any applicable air quality rule.
(50) "Excursion" means a departure from an indicator range established for monitoring under OAR 340-212-0200 through 340-212-0280 and 340-218-0050(3)(a), consistent with any averaging period specified for averaging the results of the monitoring.
(51) "Federal Land Manager" means with respect to any lands in the United States, the Secretary of the federal department with authority over such lands.
(52) Federal Major Source means a source with potential to emit any individual regulated pollutant, excluding hazardous air pollutants listed in OAR 340 division 244, greater than or equal to 100 tons per year if in a source category listed below, or 250 tons per year if not in a source category listed. Potential to emit calculations must include emission increases due to a new or modified source.
(a) Fossil fuel-fired steam electric plants of more than 250 million BTU/hour heat input;
(b) Coal cleaning plants with thermal dryers;
(c) Kraft pulp mills;
(d) Portland cement plants;
(e) Primary Zinc Smelters;
(f) Iron and Steel Mill Plants;
(g) Primary aluminum ore reduction plants;
(h) Primary copper smelters;
(i) Municipal Incinerators capable of charging more than 50 tons of refuse per day;
(j) Hydrofluoric acid plants;
(k) Sulfuric acid plants;
(l) Nitric acid plants;
(m) Petroleum Refineries;
(n) Lime plants;

(o) Phosphate rock processing plants;
(p) Coke oven batteries;
(q) Sulfur recovery plants;
(r) Carbon black plants, furnace process;
(s) Primary lead smelters;
(t) Fuel conversion plants;
(u) Sintering plants;
(v) Secondary metal production plants;
(w) Chemical process plants;
(x) Fossil fuel fired boilers, or combinations thereof, totaling more than 250 million BTU per hour heat input;
(y) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(z) Taconite ore processing plants;
(aa) Glass fiber processing plants;
(bb) Charcoal production plants.
(53) "Final permit" means the version of an Oregon Title V Operating Permit issued by the Department or Lane Regional Air Pollution Authority that has completed all review procedures required by OAR 340-218-0120 through 340-218-0240.
(54) "Fugitive Emissions":
(a) Except as used in subsection (b) of this section, means emissions of any air contaminant which escape to the atmosphere from any point or area that is not identifiable as a stack, vent, duct, or equivalent opening.
(b) As used to define a major Oregon Title V Operating Permit program source, means those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.
(55) "General permit":
(a) Except as provided in subsection (b) of this section, means an Oregon Air Contaminant Discharge Permit established under OAR 340-216-0060;
(b) As used in OAR 340 division 218 means an Oregon Title V Operating Permit established under OAR 340-218-0090.
(56) "Generic PSEL" means: [Table not included. See ED. NOTE.]
**Note:** Sources are eligible for a generic PSEL if expected emissions are less than or equal to the levels listed in the table above. Baseline emission rate and netting basis do not apply to pollutants at sources using generic PSELs.
(57) "Growth Allowance" means an allocation of some part of an airshed's capacity to accommodate future proposed major sources and major modifications of sources.
(58) "Immediately" means as soon as possible but in no case more than one hour after a source knew or should have known of an excess emission period.
(59) "Inherent process equipment" means equipment that is necessary for the proper or safe functioning of the process, or material recovery equipment that the owner or operator documents is installed and operated primarily for purposes other than compliance with air pollution regulations. Equipment that must be operated at an efficiency higher than that achieved during normal process operations in order to comply with the applicable emission limitation or standard is not inherent process equipment. For the purposes of OAR 340-212-0200 through 340-212-0280, inherent process equipment is not considered a control device.

(60) "Insignificant Activity" means an activity or emission that the Department has designated as categorically insignificant, or that meets the criteria of aggregate insignificant emissions.
(61) "Insignificant Change" means an off-permit change defined under OAR 340-218-0140(2)(a) to either a significant or an insignificant activity which:
(a) Does not result in a redesignation from an insignificant to a significant activity;
(b) Does not invoke an applicable requirement not included in the permit; and
(c) Does not result in emission of regulated air pollutants not regulated by the source's permit.
(62) "Late Payment" means a fee payment which is postmarked after the due date.
(63) "Lowest Achievable Emission Rate" or "LAER" means that rate of emissions which reflects: the most stringent emission limitation which is contained in the implementation plan of any state for such class or category of source, unless the owner or operator of the proposed source demonstrates that such limitations are not achievable; or the most stringent emission limitation which is achieved in practice by such class or category of source, whichever is more stringent. The application of this term cannot permit a proposed new or modified source to emit any air contaminant in excess of the amount allowable under applicable New Source Performance Standards (NSPS) or standards for hazardous air pollutants.
(64) "Maintenance Area" means a geographical area of the State that was designated as a nonattainment area, redesignated as an attainment area by EPA, and redesignated as a maintenance area by the Environmental Quality Commission in OAR chapter 340, division 204.
(65) "Maintenance Pollutant" means a pollutant for which a maintenance area was formerly designated a nonattainment area.
(66) "Major Modification" means any physical change or change of operation of a source that results in the following for any regulated air pollutant:
(a) An increase in the PSEL by an amount equal to or more than the significant emission rate over the netting basis; and
(b) The accumulation of physical changes and changes of operation since baseline would result in a significant emission rate increase.
(A) Calculations of emission increases in (b) must account for all accumulated increases in actual emissions due to physical changes and changes of operation occurring at the source since the baseline period, or since the time of the last construction approval issued for the source pursuant to the New Source Review Regulations in OAR 340 division 224 for that pollutant, whichever time is more recent. These include emissions from insignificant activities.
(B) Emission increases due solely to increased use of equipment or facilities that existed during the baseline period are not included, if that increased use was possible during the baseline period under the baseline configuration of the source, and the increased use of baseline equipment capacity is not to support a physical change or change in operation.
(c) For new or modified major sources that were permitted to construct and operate after the baseline period and were not subject to New Source Review, a major modification means:
(A) Any change at a source, including production increases, that would result in a Plant Site Emission Limit increase of 1 ton or more for any regulated pollutant for which the source is a major source; or
(B) The addition or modification of any stationary source or sources after the initial construction that have cumulative potential emissions greater than or equal to the significant emission rate, excluding any emission decreases.

(C) Changes to the PSEL solely due to the availability of better emissions information are exempt from being considered an increase.
(d) The following are not considered major modifications:
(A) Except as provided in (c), proposed increases in hours of operation or production rates that would cause emission increases above the levels allowed in a permit and would not involve a physical change or change in method of operation in the source;
(B) Pollution control projects that are determined by the Department to be environmentally beneficial;
(C) Routine maintenance, repair, and replacement of components;
(D) Temporary equipment installed for maintenance of the permanent equipment if the temporary equipment is in place for less than six months and operated within the permanent equipment's existing PSEL;
(E) Use of alternate fuel or raw materials, that were available and the source was capable of accommodating in the baseline period.
(67) "Major Source":
(a) Except as provided in subsection (b), means a source that emits, or has the potential to emit, any regulated air pollutant at a Significant Emission Rate. This includes emissions from insignificant activities.
(b) As used in OAR 340 division 210, Stationary Source Notification Requirements, OAR 340 division 218, Rules Applicable to Sources Required to Have Oregon Title V Operating Permits OAR 340 division 220, Oregon Title V Operating Permit Fees, and OAR 340-216-0066 Standard ACDPs, means any stationary source (or any group of stationary sources that are located on one or more contiguous or adjacent properties and are under common control of the same person (or persons under common control)) belonging to a single major industrial grouping or supporting the major industrial group and that is described in paragraphs (A), (B), or (C) of this subsection. For the purposes of this subsection, a stationary source or group of stationary sources is considered part of a single industrial grouping if all of the pollutant emitting activities at such source or group of sources on contiguous or adjacent properties belong to the same Major Group (i.e., all have the same two-digit code) as described in the Standard Industrial Classification Manual (U.S. Office of Management and Budget, 1987) or support the major industrial group.
(A) A major source of hazardous air pollutants, which means:
(i) For pollutants other than radionuclides, any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit, in the aggregate, 10 tons per year (tpy) or more of any hazardous air pollutants that has been listed pursuant to OAR 340-244-0040; 25 tpy or more of any combination of such hazardous air pollutants, or such lesser quantity as the Administrator may establish by rule. Emissions from any oil or gas exploration or production well, along with its associated equipment, and emissions from any pipeline compressor or pump station will not be aggregated with emissions from other similar units, whether or not such units are in a contiguous area or under common control, to determine whether such units or stations are major sources; or
(ii) For radionuclides, "major source" will have the meaning specified by the Administrator by rule.
(B) A major stationary source of air pollutants, as defined in section 302 of the Act, that directly emits or has the potential to emit 100 tpy or more of any regulated air pollutant, including any major source of fugitive emissions of any such pollutant. The fugitive emissions of a stationary

source are not considered in determining whether it is a major stationary source for the purposes of section 302(j) of the Act, unless the source belongs to one of the following categories of stationary source:
(i) Coal cleaning plants (with thermal dryers);
(ii) Kraft pulp mills;
(iii) Portland cement plants;
(iv) Primary zinc smelters;
(v) Iron and steel mills;
(vi) Primary aluminum ore reduction plants;
(vii) Primary copper smelters;
(viii) Municipal incinerators capable of charging more than 50 tons of refuse per day;
(ix) Hydrofluoric, sulfuric, or nitric acid plants;
(x) Petroleum refineries;
(xi) Lime plants;
(xii) Phosphate rock processing plants;
(xiii) Coke oven batteries;
(xiv) Sulfur recovery plants;
(xv) Carbon black plants (furnace process);
(xvi) Primary lead smelters;
(xvii) Fuel conversion plants;
(xviii) Sintering plants;
(xix) Secondary metal production plants;
(xx) Chemical process plants;
(xxi) Fossil-fuel boilers, or combination thereof, totaling more than 250 million British thermal units per hour heat input;
(xxii) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(xxiii) Taconite ore processing plants;
(xxiv) Glass fiber processing plants;
(xxv) Charcoal production plants;
(xxvi) Fossil-fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input; or
(xxvii) Any~~All~~ other stationary source category~~ies~~, which as of August 7, 1980 is being regulated ~~by a standard promulgated~~ under section 111 or 112 of the Act~~, but only with respect to those air pollutants that have been regulated for that category~~.
(C) A major stationary source as defined in part D of Title I of the Act, including:
(i) For ozone nonattainment areas, sources with the potential to emit 100 tpy or more of VOCs or oxides of nitrogen in areas classified as "marginal" or "moderate," 50 tpy or more in areas classified as "serious," 25 tpy or more in areas classified as "severe," and 10 tpy or more in areas classified as "extreme"; except that the references in this paragraph to 100, 50, 25, and 10 tpy of nitrogen oxides do not apply with respect to any source for which the Administrator has made a finding, under section 182(f)(1) or (2) of the Act, that requirements under section 182(f) of the Act do not apply;
(ii) For ozone transport regions established pursuant to section 184 of the Act, sources with the potential to emit 50 tpy or more of VOCs;

(iii) For carbon monoxide nonattainment areas:
(I) That are classified as "serious;" and
(II) In which stationary sources contribute significantly to carbon monoxide levels as determined under rules issued by the Administrator, sources with the potential to emit 50 tpy or more of carbon monoxide.
(iv) For particulate matter (PM10) nonattainment areas classified as "serious," sources with the potential to emit 70 tpy or more of PM10.
(68) "Material Balance" means a procedure for determining emissions based on the difference in the amount of material added to a process and the amount consumed and/or recovered from a process.
(69) "Modification", except as used in the term "major modification", means any physical change to, or change in the method of operation of, a stationary source that results in an increase in the stationary source's potential to emit any regulated air pollutant on an hourly basis. Modifications do not include the following:
(a) Increases in hours of operation or production rates that do not involve a physical change or change in the method of operation;
(b) Changes in the method of operation due to using an alternative fuel or raw material that the stationary source was physically capable of accommodating during the baseline period; and
(c) Routine maintenance, repair and like-for-like replacement of components unless they increase the expected life of the stationary source by using component upgrades that would not otherwise be necessary for the stationary source to function.
(70) "Monitoring" means any form of collecting data on a routine basis to determine or otherwise assess compliance with emission limitations or standards. Monitoring may include record keeping if the records are used to determine or assess compliance with an emission limitation or standard (such as records of raw material content and usage, or records documenting compliance with work practice requirements). Monitoring may include conducting compliance method tests, such as the procedures in appendix A to 40 CFR part 60, on a routine periodic basis. Requirements to conduct such tests on a one-time basis, or at such times as a regulatory authority may require on a non-regular basis, are not considered monitoring requirements for purposes of this definition. Monitoring may include one or more than one of the following data collection techniques as appropriate for a particular circumstance:
(a) Continuous emission or opacity monitoring systems.
(b) Continuous process, capture system, control device or other relevant parameter monitoring systems or procedures, including a predictive emission monitoring system.
(c) Emission estimation and calculation procedures (e.g., mass balance or stoichiometric calculations).
(d) Maintaining and analyzing records of fuel or raw materials usage.
(e) Recording results of a program or protocol to conduct specific operation and maintenance procedures.
(f) Verifying emissions, process parameters, capture system parameters, or control device parameters using portable or in situ measurement devices.
(g) Visible emission observations and recording.
(h) Any other form of measuring, recording, or verifying on a routine basis emissions, process parameters, capture system parameters, control device parameters or other factors relevant to assessing compliance with emission limitations or standards.

(71) "Netting Basis" means the baseline emission rate MINUS any emission reductions required by rule, orders, or permit conditions required by the SIP or used to avoid SIP requirements, MINUS any unassigned emissions that are reduced from allowable under OAR 340-222-0045, MINUS any emission reduction credits transferred off site, PLUS any emission increases approved through the New Source Review regulations.
(a) With the first permitting action for a source after July 1, 2002, the baseline emissions rate will be frozen and recalculated only if:
(A) A better emission factor is established for the baseline period and approved by the Department;
(B) A currently operating emissions unit that the Department formerly thought had negligible emissions, is determined to have non-de minimis emissions and needs to be added to the baseline emission rate; or
(C) A new pollutant is added to the regulated pollutant list (e.g., PM2.5). For a pollutant that is newly regulated after 11/15/90, the initial netting basis is the actual emissions during any 12 consecutive month period within the 24 months immediately preceding its designation as a regulated pollutant. The Department may allow a prior 12 consecutive month time period to be used if it is shown to be more representative of normal source operation.
(b) Netting basis is zero for:
(A) any source constructed after the baseline period and has not undergone New Source Review;
(B) Any pollutant that has a generic PSEL in a permit;
(C) Any source permitted as portable; and
(D) Any source with a netting basis calculation resulting in a negative number.
(c) If a source relocates to an adjacent site, and the time between operation at the old and new sites is less than six months, the source may retain the netting basis from the old site.
(d) Emission reductions required by rule, order, or permit condition affect the netting basis if the source currently has devices or emissions units that are subject to the rules, order, or permit condition. The baseline emission rate is not affected.
(e) Netting basis for a pollutant with a revised definition will be adjusted if the source is emitting the pollutant at the time of redefining and the pollutant is included in the permit's netting basis.
(f) Where EPA requires an attainment demonstration based on dispersion modeling, the netting basis will be established at no more than the level used in the dispersion modeling to demonstrate attainment with the ambient air quality standard (i.e., the attainment demonstration is an emission reduction required by rule).
(72) "Nitrogen Oxides" or "$NO_x$" means all oxides of nitrogen except nitrous oxide.
(73) "Nonattainment Area" means a geographical area of the State, as designated by the Environmental Quality Commission or the EPA, that exceeds any state or federal primary or secondary ambient air quality standard.
(74) "Nonattainment Pollutant" means a pollutant for which an area is designated a nonattainment area.
(75) "Normal Source Operation" means operations which do not include such conditions as forced fuel substitution, equipment malfunction, or highly abnormal market conditions.
(76) "Offset" means an equivalent or greater emission reduction that is required before allowing an emission increase from a proposed major source or major modification of an existing source.
(77) "Oregon Title V Operating Permit" means any permit covering an Oregon Title V Operating Permit source that is issued, renewed, amended, or revised pursuant to division 218.

(78) "Oregon Title V Operating Permit program" means a program approved by the Administrator under 40 CFR Part 70 ~~(July 1, 1997)~~.
(79) "Oregon Title V Operating Permit program source" means any source subject to the permitting requirements, OAR 340 division 218.
(80) "Ozone Season" means the contiguous 3 month period during which ozone exceedances typically occur (i.e., June, July, and August).
(81) "Particulate Matter" means all finely divided solid or liquid material, other than uncombined water, emitted to the ambient air as measured by an applicable reference method in accordance with the Department's Source Sampling Manual, (January, 1992).
(82) "Permit" means an Air Contaminant Discharge Permit or an Oregon Title V Operating Permit.
(83) "Permit modification" means a permit revision that meets the applicable requirements of OAR 340 division 216, OAR 340 division 224, or OAR 340-218-0160 through 340-218-0180.
(84) "Permit revision" means any permit modification or administrative permit amendment.
(85) "Permitted Emissions" as used in OAR division 220 means each assessable emission portion of the PSEL, as identified in an ACDP, Oregon Title V Operating Permit, review report, or by the Department pursuant to OAR 340-220-0190.
(86) "Permittee" means the owner or operator of the facility, authorized by the ACDP or the Oregon Title V Operating Permit to operate the source~~.~~
(87) "Person" means individuals, corporations, associations, firms, partnerships, joint stock companies, public and municipal corporations, political subdivisions, the State of Oregon and any agencies thereof, and the federal government and any agencies thereof.
(88) "Plant Site Emission Limit" or "PSEL" means the total mass emissions per unit time of an individual air pollutant specified in a permit for a source. The PSEL for a major source may consist of more than one assessable emission.
(89) "$PM_{10}$":
(a) When used in the context of emissions, means finely divided solid or liquid material, including condensible particulate, other than uncombined water, with an aerodynamic diameter less than or equal to a nominal 10 micrometers, emitted to the ambient air as measured by an applicable reference method in accordance with the Department's **Source Sampling Manual** (January, 1992);
(b) When used in the context of ambient concentration, means airborne finely divided solid or liquid material with an aerodynamic diameter less than or equal to a nominal 10 micrometers as measured in accordance with **40 CFR Part 50**, Appendix J ~~(July, 1997)~~.
(90) "Pollutant-specific emissions unit" means an emissions unit considered separately with respect to each regulated air pollutant.
(91) "Potential to emit" or "PTE" means the lesser of:
(a) The capacity of a stationary source; or
(b) The maximum allowable emissions taking into consideration any physical or operational limitation, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, if the limitation is enforceable by the Administrator.
(c) This definition does not alter or affect the use of this term for any other purposes under the Act or the term "capacity factor" as used in Title IV of the Act and the regulations promulgated thereunder. Secondary emissions are not considered in determining the potential to emit.

(92) "Predictive emission monitoring system (PEMS)" means a system that uses process and other parameters as inputs to a computer program or other data reduction system to produce values in terms of the applicable emission limitation or standard.
(93) "Process Upset" means a failure or malfunction of a production process or system to operate in a normal and usual manner.
(94) "Proposed permit" means the version of an Oregon Title V Operating Permit that the Department or a Regional Authority proposes to issue and forwards to the Administrator for review in compliance with OAR 340-218-0230.
(95) "Reference method" means any method of sampling and analyzing for an air pollutant as specified in **40 CFR Part 60, 61 or 63** ~~(July 1, 1997)~~.
(96) "Regional Authority" means Lane Regional Air Pollution Authority.
(97) "Regulated air pollutant" or "Regulated Pollutant":
(a) Except as provided in subsections (b) and (c) of this rule, means:
(A) Nitrogen oxides or any VOCs;
(B) Any pollutant for which a national ambient air quality standard has been promulgated;
(C) Any pollutant that is subject to any standard promulgated under section 111 of the Act;
(D) Any Class I or II substance subject to a standard promulgated under or established by Title VI of the Act; or
(E) Any pollutant listed under OAR 340-244-0040 or OAR 340-244-0230.
(b) As used in OAR 340 division 220, means any air pollutant as included in subsection (a) of this rule, except the following:
(A) Carbon monoxide;
(B) Any pollutant that is a regulated pollutant solely because it is a Class I or Class II substance subject to a standard promulgated under or established by Title VI of the Federal Clean Air Act; or
(C) Any pollutant that is a regulated air pollutant solely because it is subject to a standard or regulation under section 112(r) of the Federal Clean Air Act.
(c) As used in OAR 340 division 224 any pollutant listed under OAR 340-244-0040 or OAR 340-244-0230 is not a regulated pollutant.
(98) "Renewal" means the process by which a permit is reissued at the end of its term.
(99) "Responsible official" means one of the following:
(a) For a corporation: a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and either:
(A) The facilities employ more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars); or
(B) The delegation of authority to such representative is approved in advance by the Department or Lane Regional Air Pollution Authority.
(b) For a partnership or sole proprietorship: a general partner or the proprietor, respectively;
(c) For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. For the purposes of this Division, a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall

operations of a principal geographic unit of the agency (e.g., a Regional Administrator of the EPA); or
(d) For affected sources:
(A) The designated representative in so far as actions, standards, requirements, or prohibitions under Title IV of the Act or the regulations promulgated thereunder are concerned; and
(B) The designated representative for any other purposes under the Oregon Title V Operating Permit program.
(100) "Secondary Emissions" means emissions that are a result of the construction and/or operation of a source or modification, but that do not come from the source itself. Secondary emissions must be specific, well defined, quantifiable, and impact the same general area as the source associated with the secondary emissions. Secondary emissions may include, but are not limited to:
(a) Emissions from ships and trains coming to or from a facility;
(b) Emissions from off-site support facilities that would be constructed or would otherwise increase emissions as a result of the construction or modification of a source.
(101) "Section 111" means section 111 of the FCAA which includes Standards of Performance for New Stationary Sources (NSPS).
(102) "Section 111(d)" means subsection 111(d) of the FCAA which requires states to submit to the EPA plans that establish standards of performance for existing sources and provides for implementing and enforcing such standards.
(103) "Section 112" means section 112 of the FCAA which contains regulations for Hazardous Air Pollutants (HAP).
(104) "Section 112(b)" means subsection 112(b) of the FCAA which includes the list of hazardous air pollutants to be regulated.
(105) "Section 112(d)" means subsection 112(d) of the FCAA which directs the EPA to establish emission standards for sources of hazardous air pollutants. This section also defines the criteria to be used by the EPA when establishing the emission standards.
(106) "Section 112(e)" means subsection 112(e) of the FCAA which directs the EPA to establish and promulgate emissions standards for categories and subcategories of sources that emit hazardous air pollutants.
(107) "Section 112(r)(7)" means subsection 112(r)(7) of the FCAA which requires the EPA to promulgate regulations for the prevention of accidental releases and requires owners or operators to prepare risk management plans.
(108) "Section 114(a)(3)" means subsection 114(a)(3) of the FCAA which requires enhanced monitoring and submission of compliance certifications for major sources.
(109) "Section 129" means section 129 of the FCAA which requires the EPA to establish emission standards and other requirements for solid waste incineration units.
(110) "Section 129(e)" means subsection 129(e) of the FCAA which requires solid waste incineration units to obtain Oregon Title V Operating Permits.
(111) "Section 182(f)" means subsection 182(f) of the FCAA which requires states to include plan provisions in the State Implementation Plan for NOx in ozone nonattainment areas.
(112) "Section 182(f)(1)" means subsection 182(f)(1) of the FCAA which requires states to apply those plan provisions developed for major VOC sources and major NOx sources in ozone nonattainment areas.

(113) "Section 183(e)" means subsection 183(e) of the FCAA which requires the EPA to study and develop regulations for the control of certain VOC sources under federal ozone measures.
(114) "Section 183(f)" means subsection 182(f) of the FCAA which requires the EPA to develop regulations pertaining to tank vessels under federal ozone measures.
(115) "Section 184" means section 184 of the FCAA which contains regulations for the control of interstate ozone air pollution.
(116) "Section 302" means section 302 of the FCAA which contains definitions for general and administrative purposes in the Act.
(117) "Section 302(j)" means subsection 302(j) of the FCAA which contains definitions of "major stationary source" and "major emitting facility."
(118) "Section 328" means section 328 of the FCAA which contains regulations for air pollution from outer continental shelf activities.
(119) "Section 408(a)" means subsection 408(a) of the FCAA which contains regulations for the Title IV permit program.
(120) "Section 502(b)(10) change" means a change which contravenes an express permit term but is not a change that:
(a) Would violate applicable requirements;
(b) Would contravene federally enforceable permit terms and conditions that are monitoring, recordkeeping, reporting, or compliance certification requirements; or
(c) Is a Title I modification.
(121) "Section 504(b)" means subsection 504(b) of the FCAA which states that the EPA can prescribe by rule procedures and methods for determining compliance and for monitoring.
(122) "Section 504(e)" means subsection 504(e) of the FCAA which contains regulations for permit requirements for temporary sources.
(123) "Significant Air Quality Impact" means an additional ambient air quality concentration equal to or greater than in the concentrations listed in **Table 1**. The threshold concentrations listed in Table 1 are used for comparison against the ambient air quality standard and do not apply for protecting PSD Class I increments or air quality related values (including visibility). For sources of VOC or $NO_x$, a major source or major modification has a significant impact if it is located within the Ozone Precursor Significant Impact Distance defined in OAR 340-225-0020.
(124) "Significant Emission Rate" or "SER", except as provided in subsections (a) through (c) of this section, means an emission rate equal to or greater than the rates specified in **Table 2.**
(a) For the Medford-Ashland Air Quality Maintenance Area, the Significant Emission Rate for $PM_{10}$ is defined in **Table 3**.
(b) For regulated air pollutants not listed in **Table 2** or **3**, the significant emission rate is zero unless the Department determines the rate that constitutes a significant emission rate.
(c) Any new source or modification with an emissions increase less than the rates specified in **Table 2** or **3** associated with a new source or modification which would construct within 10 kilometers of a Class I area, and would have an impact on such area equal to or greater than 1 $ug/m^3$ (24 hour average) is emitting at a significant emission rate.
(125) "Significant Impairment" occurs when the Department determines that visibility impairment interferes with the management, protection, preservation, or enjoyment of the visual experience within a Class I area. The Department will make this determination on a case-by-case basis after considering the recommendations of the Federal Land Manager and the geographic extent, intensity, duration, frequency, and time of visibility impairment. These factors will be

considered along with visitor use of the Class I areas, and the frequency and occurrence of natural conditions that reduce visibility.
(126) "Source" means any building, structure, facility, installation or combination thereof that emits or is capable of emitting air contaminants to the atmosphere, is located on one or more contiguous or adjacent properties and is owned or operated by the same person or by persons under common control. The term includes all pollutant emitting activities that belong to a single major industrial group (i.e., that have the same two-digit code) as described in the **Standard Industrial Classification Manual**, (U.S. Office of Management and Budget, 1987) or that support the major industrial group.
(127) "Source category":
(a) Except as provided in subsection (b) of this section, means all the pollutant emitting activities that belong to the same industrial grouping (i.e., that have the same two-digit code) as described in the **Standard Industrial Classification Manual**, (U.S. Office of Management and Budget, 1987).
(b) As used in OAR 340 division 220, Oregon Title V Operating Permit Fees, means a group of major sources that the Department determines are using similar raw materials and have equivalent process controls and pollution control equipment.
(128) "Source Test" means the average of at least three test runs conducted during operating conditions representative of the period for which emissions are to be determined and in accordance with the Department's **Source Sampling Manual** or other Department approved methods.
(129) "Startup" and "shutdown" means that time during which an air contaminant source or emission-control equipment is brought into normal operation or normal operation is terminated, respectively.
(130) "State Implementation Plan" or "SIP" means the State of Oregon Clean Air Act Implementation Plan as adopted by the Commission under OAR 340-200-0040 and approved by EPA.
(131) "Stationary source" means any building, structure, facility, or installation at a source that emits or may emit any regulated air pollutant.
(132) "Substantial Underpayment" means the lesser of ten percent (10%) of the total interim emission fee for the major source or five hundred dollars.
(133) "Synthetic minor source" means a source that would be classified as a major source under OAR 340-200-0020, but for limits on its potential to emit air pollutants contained in a permit issued by the Department under OAR 340 division 216 or 218.
(134) "Title I modification" means one of the following modifications pursuant to Title I of the FCAA:
(a) A major modification subject to OAR 340-224-0050, Requirements for Sources in Nonattainment Areas;
(b) A major modification subject to OAR 340-224-0060, Requirements for Sources in Maintenance Areas;
(c) A major modification subject to OAR 340-224-0070, Prevention of Significant Deterioration Requirements for Sources in Attainment or Unclassified Areas;
(d) A modification that is subject to a New Source Performance Standard under Section 111 of the FCAA; or
(e) A modification under Section 112 of the FCAA.

(135) "Total Reduced Sulfur" or "TRS" means the sum of the sulfur compounds hydrogen sulfide, methyl mercaptan, dimethyl sulfide, dimethyl disulfide, and any other organic sulfides present expressed as hydrogen sulfide ($H_2S$).
(136) "Typically Achievable Control Technology" or "TACT" means the emission limit established on a case-by-case basis for a criteria pollutant from a particular emissions unit in accordance with OAR 340-226-0130. For existing sources, the emission limit established will be typical of the emission level achieved by emissions units similar in type and size. For new and modified sources, the emission limit established will be typical of the emission level achieved by well controlled new or modified emissions units similar in type and size that were recently installed. TACT determinations will be based on information known to the Department while considering pollution prevention, impacts on other environmental media, energy impacts, capital and operating costs, cost effectiveness, and the age and remaining economic life of existing emission control equipment. The Department may consider emission control technologies typically applied to other types of emissions units where such technologies could be readily applied to the emissions unit. If an emission limitation is not feasible, a design, equipment, work practice, operational standard, or combination thereof, may be required.
(137) "Unassigned Emissions" means the amount of emissions that are in excess of the PSEL but less than the Netting Basis.
(138) "Unavoidable" or "could not be avoided" means events that are not caused entirely or in part by poor or inadequate design, operation, maintenance, or any other preventable condition in either process or control equipment.
(139) "Upset" or "Breakdown" means any failure or malfunction of any pollution control equipment or operating equipment that may cause ~~a~~ excess emissions.
(140) "Visibility Impairment" means any humanly perceptible change in visual range, contrast or coloration from that which existed under natural conditions. Natural conditions include fog, clouds, windblown dust, rain, sand, naturally ignited wildfires, and natural aerosols.
(141) "Volatile Organic Compounds" or "VOC" means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, that participates in atmospheric photochemical reactions.
(a) This includes any such organic compound except the following, which have been determined to have negligible photochemical reactivity in the formation of tropospheric ozone: methane; ethane; methylene chloride (dichloromethane); 1,1,1-trichloroethane (methyl chloroform); 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113); trichlorofluoromethane (CFC-11); dichlorodifluoromethane (CFC-12); chlorodifluoromethane (HCFC-22); trifluoromethane (HFC-23); 1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114); chloropentafluoroethane (CFC-115); 1,1,1-trifluoro 2,2-dichloroethane (HCFC-123); 1,1,1,2-tetrafluoroethane (HFC-134a); 1,1-dichloro 1-fluoroethane (HCFC-141b); 1-chloro 1,1-difluoroethane (HCFC-142b); 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124); HCFC 225ca and cb; HFC 43-10mee; pentafluoroethane (HFC-125); 1,1,2,2-tetrafluoroethane (HFC-134); 1,1,1-trifluoroethane (HFC-143a); 1,1-difluoroethane (HFC-152a); parachlorobenzotrifluoride (PCBTF); cyclic, branched, or linear completely methylated siloxanes; acetone; perchloroethylene (tetrachloroethylene); difluoromethane (HFC-32); ethylfluoride (HFC-161); 1,1,1,3,3,3-hexafluoropropane (HFC-236fa); 1,1,2,2,3-pentafluoropropane (HFC-245ca); 1,1,2,3,3-pentafluoropropane (HFC-245ea); 1,1,1,2,3-pentafluoropropane (HFC-245eb); 1,1,1,3,3-pentafluoropropane (HFC-245fa); 1,1,1,2,3,3-hexafluoropropane (HFC-236ea); 1,1,1,3,3-pentafluorobutane (HFC-365mfc);

chlorofluoromethane (HCFC-31); 1 chloro-1-fluoroethane (HCFC-151a); 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a); 1,1,1,2,2,3,3,4-nonafluoro-4-methoxy-butane ($C_4F_9OCH_3$); 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OCH_3$); 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane ($C_4F_9OC_2H_5$); 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OC_2H_5$); methyl acetate and perfluorocarbon compounds that fall into these classes:
(A) Cyclic, branched, or linear, completely fluorinated alkanes;
(B) Cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
(C) Cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and
(D) Sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.
(b) For purposes of determining compliance with emissions limits, VOC will be measured by an applicable reference method in accordance with the Department's **Source Sampling Manual**, January, 1992. Where such a method also measures compounds with negligible photochemical reactivity, the latter may be excluded as VOC if the amount of such compounds is accurately quantified, and the Department approves the exclusion.
(c) The Department may require an owner or operator to provide monitoring or testing methods and results demonstrating, to the Department's satisfaction, the amount of negligibly-reactive compounds in the source's emissions.
(142) "Year" means any consecutive 12 month period of time.
[**NOTE:** This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the EQC under OAR 340-200-0040.]
[ED. NOTE: The tables referenced in this rule are not printed in the OAR Compilation. Copies are available from the agency.]
[Publications: The publications referenced in this rule are available from the agency.]
Stat. Auth.: ORS 468.020
Stats. Implemented: ORS 468A.025
Hist.: [DEQ 15-1978, f. & ef. 10-13-78; DEQ 4-1993, f. & cert. ef. 3-10-93]; [DEQ 47, f. 8-31-72, ef. 9-15-72; DEQ 63, f. 12-20-73, ef. 1-11-74; DEQ 107, f. & ef. 1-6-76; Renumbered from 340-020-0033.04; DEQ 25-1981, f. & ef. 9-8-81; DEQ 5-1983, f. & ef. 4-18-83; DEQ 18-1984, f. & ef. 10-16-84; DEQ 8-1988, f. & cert. ef. 5-19-88 (and corrected 5-31-88); DEQ 14-1989, f. & cert. ef. 6-26-89; DEQ 42-1990, f. 12-13-90, cert. ef. 1-2-91; DEQ 2-1992, f. & cert. ef. 1-30-92; DEQ 7-1992, f. & cert. ef. 3-30-92; DEQ 27-1992, f. & cert. ef. 11-12-92; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 12-1993, f. & cert. ef. 9-24-93; Renumbered from 340-020-0145, 340-020-0225, 340-020-0305, 340-020-0355, 340-020-0460 & 340-020-0520; DEQ 19-1993, f. & cert. ef. 11-4-93; DEQ 20-1993(Temp), f. & cert. ef. 11-4-93; DEQ 13-1994, f. & cert. ef. 5-19-94; DEQ 21-1994, f. & cert. ef. 10-14-94; DEQ 24-1994, f. & cert. ef. 10-28-94; DEQ 10-1995, f. & cert. ef. 5-1-95; DEQ 12-1995, f. & cert. ef. 5-23-95; DEQ 22-1995, f. & cert. ef. 10-6-95; DEQ 19-1996, f. & cert. ef. 9-24-96; DEQ 22-1996, f. ; DEQ 9-1997, f. & cert. ef. 5-9-97; DEQ 14-1998, f. & cert. ef. 9-14-98; DEQ 16-1998, f. & cert. ef. 9-23-98; DEQ 21-1998, f. & cert. ef. 10-14-98; DEQ 1-1999, f. & cert. ef. 1-25-99; DEQ 6-1999, f. & cert. ef. 5-21-99]; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-020-0205, 340-028-0110; DEQ 6-2001, f. 6-18-01, cert. ef. 7-1-01

## DIVISION 218
## OREGON TITLE V OPERATING PERMITS

**340-218-0080**
**Compliance Requirements**
All Oregon Title V Operating Permits must contain the following elements with respect to compliance:
(1) Consistent with OAR 340-218-0050(3), compliance certification, testing, monitoring, reporting, and recordkeeping requirements sufficient to assure compliance with the terms and conditions of the permit.
(2) A requirement that any document (including but not limited to reports) required by an Oregon Title V Operating Permit must contain a certification by a responsible official or the designated representation for the acid rain portion of the permit that meets the requirements of OAR 340-218-0040(5).
(3) Inspection and entry requirements that require that, upon presentation of credentials and other documents as may be required by law, the permittee must allow the Department or an authorized representative to perform the following:
(a) Enter upon the permittee's premises where an Oregon Title V Operating Permit program source is located or emissions-related activity is conducted, or where records must be kept under the conditions of the permit;
(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;
(c) Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and
(d) As authorized by the FCAA or state rules, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit or applicable requirements.
(4) A schedule of compliance consistent with OAR 340-218-0040(3)(n)(c).
(5) Progress reports consistent with an applicable schedule of compliance and OAR 340-218-0040(3)(n)(c) to be submitted at least semi-annually, or at a more frequent period if specified in the applicable requirement or by the Department. Such progress reports must contain the following:
(a) Dates for achieving the activities, milestones, or compliance required in the schedule of compliance, and dates when such activities, milestones or compliance were achieved; and
(b) An explanation of why any dates in the schedule of compliance were not or will not be met, and any preventive or corrective measures adopted.
(6) Requirements for compliance certification with terms and conditions contained in the permit, including emission limitations, standards, or work practices. Permits must include each of the following:
(a) The frequency (not less than annually or such more frequent periods as specified in the applicable requirement or by the Department) of submissions of compliance certifications;
(b) In accordance with OAR 340-218-0050(3), a means for monitoring the compliance of the source with its emissions limitations, standards, and work practices;
(c) A requirement that the compliance certification include all of the following (provided that the identification of applicable information may cross-reference the permit or previous reports, as applicable):

(A) The identification of each term or condition of the permit that is the basis of the certification;
(B) The identification of the method(s) or other means used by the owner or operator for determining the compliance status with each term and condition during the certification period~~, and whether such methods or other means provide continuous or intermittent data~~. Such methods and other means must include, at a minimum, the methods and means required under OAR 340-218-0050(3). If necessary, the owner or operator also must identify any other material information that must be included in the certification to comply with section 113(c)(2) of the FCAA, which prohibits knowingly making a false certification or omitting material information;
(C) The status of compliance with the terms and conditions of the permit for the period covered by the certification, including whether compliance during the period was continuous or intermittent. The certification must be based on the method or means designated in paragraph (6)(c)(B) of this rule. The certification must identify each deviation and take it into account in the compliance certification. The certification must also identify as possible exceptions to compliance any periods during which compliance is required and in which an excursion or exceedance as defined under OAR 340-200-0020 and 40 CFR part 64 occurred; and
(D) Such other facts as the Department may require to determine the compliance status of the source.
(d) A requirement that all compliance certifications be submitted to the EPA as well as to the Department; and
(e) Notwithstanding any other provision contained in any applicable requirement, the owner or operator may use monitoring as required under OAR 340-218-0050(3) and incorporated into the permit, in addition to any specified compliance methods, for the purpose of submitting compliance certifications.
(7) Annual certification that the risk management plan is being properly implemented, OAR 340-224-0230.
(8) Such other provisions as the Department may require in order to protect human health or the environment.
Stat. Auth.: ORS 468.020 & ORS 468A.310
Stats. Implemented: ORS 468.020 & ORS 468A.310
Hist.: DEQ 12-1993, f. & cert. ef. 9-24-93; DEQ 22-1995, f. & cert. ef. 10-6-95; DEQ 21-1998, f. & cert. ef. 10-14-98; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-028-2160; DEQ 6-2001, f. 6-18-01, cert. ef. 7-1-01

## DIVISION 230
## INCINERATOR REGULATIONS

**340-230-0030**
**Definitions**
The definitions in OAR 340-200-0020, 340-238-0040 and this rule apply to this division. If the same term is defined in this rule and OAR 340-200-0020 or 340-238-0040, the definition in this rule applies to this division. Applicable definitions have the same meaning as those provided in **40 CFR 60.51c** including, but not limited to:
(1) "Acid Gases" means any exhaust gas that includes hydrogen chloride and sulfur dioxide.

(2) "Air curtain incinerator" means an incinerator that operates by forcefully projecting a curtain of air across an open chamber or pit in which combustion occurs. Incinerators of that type can be constructed above or below ground and with or without refractory walls and floor.
(3) "Best Available Control Technology (BACT)" means an emission limitation as defined in OAR 340-200-0020.
(4) **"CFR"** means **Code of Federal Regulations** and, unless otherwise expressly identified, refers to the ~~revised as of~~ July 1, ~~2002~~ 2004 edition.
(5) "Chemotherapeutic waste" means waste material resulting from the production or use of antineoplastic agents used for the purpose of stopping or reversing the growth of malignant cells.
~~(6)~~ "Co-fired combustor" means a unit combusting hospital waste and/or medical/infectious waste with other fuels or wastes (e.g., coal, municipal solid waste) and subject to an enforceable requirement limiting the unit to combusting a fuel feed stream, 10 percent or less of the weight of which is comprised, in aggregate, of hospital waste and medical/infectious waste as measured on a calendar quarter basis. For purposes of this definition, pathological waste, chemotherapeutic waste, and low-level radioactive waste are considered "other" wastes when calculating the percentage of hospital waste and medical/infectious waste combusted.
(7) "Commercial and industrial solid waste incineration unit (CISWI) means any combustion device that combusts commercial and industrial waste, as defined in this subpart. The boundaries of a CISWI unit are defined as, but not limited to the commercial or industrial solid waste fuel feed system, grate system, flue gas system, and bottom ash. The CISWI unit does not include air pollution control equipment or the stack. The CISWI unit boundary starts at the commercial and industrial solid waste hopper (if applicable) and extends through two areas:
(a) The combustion unit flue gas system, which ends immediately after the last combustion chamber.
(b) The combustion unit bottom ash system, which ends at the truck loading station or similar equipment that transfers the ash to final disposal. It includes all ash handling systems connected to the bottom ash handling system.
(8) "Commercial and industrial waste" means solid waste combusted in an enclosed device using controlled flame combustion without energy recovery that is a distinct operating unit of any commercial or industrial facility (including field-erected, modular, and custom built incineration units operating with starved or excess air), or solid waste combusted in an air curtain incinerator without energy recovery that is a distinct operating unit of any commercial or industrial facility.
(9) "Continuous Emission Monitoring (CEM)" means a monitoring system for continuously measuring the emissions of a pollutant from an affected incinerator. Continuous monitoring equipment and operation must be certified in accordance with EPA performance specifications and quality assurance procedures outlined in **40 CFR 60**, Appendices B and F, and the Department's CEM Manual.
(10) "Crematory Incinerator" means an incinerator used solely for the cremation of human and animal bodies.
(11) "Department" means the Department of Environmental Quality.
(12) "Dry Standard Cubic Foot" means the amount of gas that would occupy a volume of one cubic foot, if the gas were free of uncombined water at standard conditions. When applied to combustion flue gases from waste or refuse burning, "Standard Cubic Foot (SCF)" implies adjustment of gas volume to that which would result at a concentration of seven percent oxygen or 50 percent excess air.

(13) "Existing" means constructed or modified before March 13, 1990.
(14) "Emission" means a release into the atmosphere of air contaminants.
(15) "Fluidized bed combustion unit" means a unit where municipal waste is combusted in a fluidized bed of material. The fluidized bed material may remain in the primary combustion zone or may be carried out of the primary combustion zone and returned through a recirculation loop.
(16) "Fugitive Emissions" means the same as defined in OAR 340-200-0020(50).
(17) "Hospital" means any facility that has an organized medical staff, maintains at least six inpatient beds, and where the primary function of the institution is to provide diagnostic and therapeutic patient services and continuous nursing care primarily to human inpatients who are not related and who stay on average in excess of 24 hours per admission. This definition does not include facilities maintained for the sole purpose of providing nursing or convalescent care to human patients who generally are not acutely ill but who require continuous medical supervision.
(18) "Hospital/medical/infectious waste incinerator" or HMIWI means any device that combusts any amount of hospital waste and/or medical/infectious waste.
(19) "Hospital waste" means discards generated at a hospital, except unused items returned to the manufacturer. This definition does not include human corpses, remains and anatomical parts intended for interment or cremation.
(20) "Incinerator" means any structure or furnace in which combustion takes place, the primary purpose of which is the reduction in volume and weight of unwanted material.
(21) "Infectious agent" means any organism such as a virus or bacteria that is capable of being communicated by invasion and multiplication in body tissues and capable of causing disease or adverse health impacts in humans.
(22) "Infectious Waste" means waste as defined in ORS Chapter 763, Oregon Laws 1989, that contains or may contain any disease producing microorganism or material, and includes, but is not limited to the following:
(a) "Biological waste", which includes blood and blood products, and body fluids that cannot be directly discarded into a municipal sewer system, and waste materials saturated with blood or body fluids, but does not include soiled diapers;
(b) "Cultures and stocks", which includes etiologic agents and associated biologicals; including specimen cultures and dishes, devices used to transfer, inoculate and mix cultures, wastes from production of biologicals, and serums and discarded live and attenuated vaccines. "Cultures" does not include throat and urine cultures;
(c) "Pathological waste", which includes biopsy materials and all human tissues, anatomical parts that emanate from surgery, obstetrical procedures, autopsy and laboratory procedures and animal carcasses exposed to pathogens in research and the bedding and other waste from such animals. "Pathological wastes" does not include teeth or formaldehyde or other preservative agents;
(d) "Sharps", which includes needles, IV tubing with needles attached, scalpel blades, lancets, glass tubes that could be broken during handling and syringes that have been removed from their original sterile containers.
(23) "Infectious Waste Facility" or "Infectious Waste Incinerator" means an incinerator that is operated or utilized for the disposal or treatment of infectious waste, including combustion for the recovery of heat, and which utilizes high temperature thermal destruction technologies.
(24) "Large HMIWI", except as provided in Subsection (d)(A) and (B) means:
(a) A HMIWI whose maximum design waste burning capacity is more than 500 pounds per hour; or

(b) A continuous or intermittent HMIWI whose maximum charge rate is more than 500 pounds per hour; or
(c) A batch HMIWI whose maximum charge rate is more than 4,000 pounds per day;
(d) The following are not large HMIWI:
(A) A continuous or intermittent HMIWI whose maximum charge rate is less than or equal to 500 pounds per hour; or
(B) A batch HMIWI whose maximum charge rate is less than or equal to 4,000 pounds per day.
(25) "Low-level radioactive waste" means waste material which contains radioactive nuclides emitting primarily beta or gamma radiation, or both, in concentrations or quantities that exceed applicable federal or state standards for unrestricted release. Low-level radioactive waste is not high-level radioactive waste, spent nuclear fuel, or by-product material as defined by the Atomic Energy Act of 1954 (42 U.S.C. 2014(e)(2)).
(26) "Mass burn refractory municipal waste combustion unit" means a field-erected municipal waste combustion unit that combusts municipal solid waste in a refractory wall furnace. Unless otherwise specified, that includes municipal waste combustion units with a cylindrical rotary refractory wall furnace.
(27) "Mass burn rotary waterwall municipal waste combustion unit" means a field-erected municipal waste combustion unit that combusts municipal solid waste in a cylindrical rotary waterwall furnace.
(28) "Mass burn waterwall municipal waste combustion unit" means a field-erected municipal waste combustion unit that combusts municipal solid waste in a waterwall furnace.
(29) "Medical/infectious waste" means any waste generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production of testing of biologicals that is listed in paragraphs (a) through (g) of this definition. The definition of medical/infectious waste does not include hazardous waste identified or listed under the regulations in part 261 of Chapter I; household waste as defined in Subsection 261.4(b)(1) of Chapter I; ash from incineration of medical/infectious waste once the incineration process is completed; human corpses, remains, and anatomical parts intended for interment or cremation and domestic sewage materials identified in Subsection 261.4(a)(1) of Chapter I:
(a) Cultures and stocks of infectious agents and associated biologicals, including: cultures from medical and pathological laboratories; cultures and stocks of infectious agents from research and industrial laboratories; wastes from the production of biologicals; discarded live and attenuated vaccines; and culture dishes and devices used to transfer, innoculate and mix cultures;
(b) Human pathological waste, including tissues, organs, and body parts and body fluids that are removed during surgery or autopsy, or other medical procedures, and specimens of body fluids and their containers;
(c) Human blood and blood products including:
(A) Liquid waste human blood;
(B) Products of blood;
(C) Items saturated and/or dripping with human blood; or
(D) Items that were saturated and/or dripping with human blood that are now caked with dried human blood; including serum, plasma, and other blood components, and their containers that were used or intended for use in either patient care, testing and laboratory analysis or the development of pharmaceuticals. Intravenous bags are also included in this category.

(d) Sharps that have been used in animal or human patient care or treatment or in medical, research, or industrial laboratories, including hypodermic needles, syringes (with or without the attached needle), pasteur pipettes, scalpel blades, blood vials, needles with attached tubing, and culture dishes (regardless of presence of infectious agents). Also included are other types of broken or unbroken glassware that were in contact with infectious agents, such as used slides and cover slips;
(e) Animal waste including contaminated animal carcasses, body parts and bedding of animals that were known to have been exposed to infectious agents during research (including research in veterinary hospitals), production of biologicals or testing of pharmaceuticals;
(f) Isolation wastes including biological waste and discarded materials contaminated with blood, excretions, exudates or secretions from humans who are isolated to protect others from certain highly communicable diseases, or isolated animals known to be infected with highly communicable diseases;
(g) Unused sharps including the following unused, discarded sharps: hypodermic needles, suture needles, syringes and scalpel blades.
(30) "Medium HMIWI", except as provided in (i) means:
(a) A HMIWI whose maximum design waste burning capacity is more than 200 pounds per hour but less than or equal to 500 pounds per hour; or
(b) A continuous or intermittent HMIWI whose maximum charge rate is more than 200 pounds per hour but less than or equal to 500 pounds per hour; or
(c) A batch HMIWI whose maximum charge rate is more than 1,600 pounds per day but less than or equal to 4,000 pounds per day. The following are not medium HMIWI:
(A) A continuous or intermittent HMIWI whose maximum charge rate is less than or equal to 200 pounds per hour or more than 500 pounds per hour; or
(B) A batch HMIWI whose maximum charge rate is more than 4,000 pounds per day or less than or equal to 1,600 pounds per day.
(31) "Modification or modified hospital/medical/infectious waste incinerator" means any change to a HMIWI unit after the effective date of these standards such that:
(a) The cumulative costs of the modifications, over the life of the unit, exceed 50 per cent of the original cost of the construction and installation of the unit (not including the cost of any land purchased in connection with such construction or installation) updated to current costs; or
(b) The change involves a physical change or change in the method of operation of the unit that increases the amount of any air pollutant emitted by the unit for which standards have been established under Section 129 or Section 111.
(32) "Modular excess-air municipal waste combustion unit" means a municipal waste combustion unit that combusts municipal solid waste, is not field-erected, and has multiple combustion chambers, all of which are designed to operate at conditions with combustion air amounts in excess of theoretical air requirements.
(33) "Modular starved-air municipal waste combustion unit" means a municipal waste combustion unit that combusts municipal solid waste, is not field-erected, and has multiple combustion chambers in which the primary combustion chamber is designed to operate at substoichiometric conditions.
(34) "Municipal waste combustor plant" means one or more municipal waste combustor units at the same location for which construction was commenced on or before September 20, 1994.

(35) "Municipal waste combustor plant capacity" means the aggregate municipal waste combustor unit capacity of all municipal waste combustor units at a municipal waste combustor plant for which construction was commenced on or before September 20, 1994.
(36) "New" means constructed or modified on or after March 13, 1990.
(37) "Opacity" means the degree to which an emission reduces transmission of light and obscures the view of an object in the background.
(38) "Particulate Matter" means all solid or liquid material, other than uncombined water, emitted to the ambient air as measured by EPAMethod 5 or an equivalent test method in accordance with the **Department Source Test Manual**. Particulate matter emission determinations by EPA Method 5 must consist of the average of three separate consecutive runs having a minimum sampling time of 60 minutes each and a minimum sampling volume of 30.0 dscf each.
(39) "Parts Per Million (ppm)" means parts of a contaminant per million parts of gas by volume on a dry-gas basis (1 ppm equals 0.0001 percent by volume).
(40) "Pathological waste" means waste material consisting of only human or animal remains, anatomical parts, and/or tissue, the bags/containers used to collect and transport the waste material and animal bedding (if applicable).
(41) "Person" means individuals, corporations, associations, firms, partnerships, joint stock companies, public and municipal corporations, political subdivisions, the state and any agencies thereof, and the federal government and any agencies thereof.
(42) "Primary Combustion Chamber" means the discrete equipment, chamber or space in which drying of the waste, pyrolysis, and essentially the burning of the fixed carbon in the waste occurs.
(43) "Pyrolisis" means the endothermic gasification of hospital waste and/or medical/infectious waste using external energy.
(44) "Refuse-derived fuel" means a type of municipal solid waste produced by processing municipal solid waste through shredding and size classification. That includes all classes of refuse-derived fuel including two fuels:
(a) Low-density fluff refuse-derived fuel through densified refuse-derived fuel
(b) Pelletized refuse-derived fuel.
(45) "Secondary" or "Final Combustion Chamber" means the discrete equipment, chamber, or space in which the products of pyrolysis are combusted in the presence of excess air such that essentially all carbon is burned to carbon dioxide.
(46) "Small hospital/medical/infectious waste incinerator", except as provided in (i), means:
(a) A HMIWI whose maximum design waste burning capacity is less than or equal to 200 pounds per hour; or
(b) A continuous or intermittent HMIWI whose maximum charge rate is less than or equal to 200 pounds per hour; or
(c) A batch HMIWI whose maximum charge rate is less than or equal to 1,600 pounds per day.
The following are not small HMIWI:
(A) A continuous or intermittent HMIWI whose maximum charge rate is more than 200 pounds per hour;
(B) A batch HMIWI whose maximum charge rate is more than 1,600 pounds per day.

(47) "Solid Waste" means refuse, more than 50 percent of which is waste consisting of a mixture of paper, wood, yard wastes, food wastes, plastics, leather, rubber, and other combustible materials, and noncombustible materials such as metal, glass, and rock.
(48) "Solid Waste Facility" or "Solid Waste Incinerator" means an incinerator that is operated or utilized for the disposal or treatment of solid waste including combustion for the recovery of heat, and that utilizes high temperature thermal destruction technologies.
(49) "Spreader stoker, mixed fuel-fired (coal/refuse-derived fuel) combustion unit" means a municipal waste combustion unit that combusts coal and refuse-derived fuel simultaneously, in which coal is introduced to the combustion zone by a mechanism that throws the fuel onto a grate from above. Combustion takes place both in suspension and on the grate.
(50) "Standard Conditions" means temperature of 68 degrees Fahrenheit (15.6 degrees Celsius) and a pressure of 14.7 pounds per square inch absolute (1.03 kilograms per square centimeter).
(51) "Startup/Shutdown" means the time during which an air contaminant source or emission control equipment is brought into normal operation and normal operation is terminated, respectively.
(52) "Transmissometer" means a device that measures opacity and conforms to EPA Specification Number 1 in **40 CFR 60, Appendix B.**
[Publications: Publications referenced are available from the agency.]
Stat. Auth.: ORS 183, ORS 468 & ORS 468A
Stats. Implemented: ORS 468A.025
Hist.: [DEQ 22-1998, f. & cert. ef. 10-21-98]; [DEQ 9-1990, f. & cert. ef. 3-13-90; DEQ 4-1993, f. & cert. ef. 3-10-93]; [DEQ 27-1996, f. & cert. ef. 12-11-96]; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-025-0750, 340-025-0855, 340-025-0950; DEQ 4-2003, f. & cert. ef. 2-06-03

**340-230-0410**
**Emission Limitations and Citations**
(1) Except as provided in subsection (b) of this section, all HMIWI shall comply with the following requirements within one year after EPA approval of the State Plan:
(a) Emission limits:
(A) **Small HMIWI**:
(i) Particulate matter: 115 milligrams per dry standard cubic meter (mg/dscm);
(ii) Carbon monoxide: 40 parts per million by volume (ppm);
(iii) Dioxins/furans: 125 nanograms per dry standard cubic meter (ng/dscm);
(iv) Hydrogen chloride: 100 ppm or 93% reduction;
(v) Sulfur dioxide: 55 ppm;
(vi) Nitrogen oxides: 250 ppm;
(vii) Lead: 1.2 mg/dscm or 70% reduction;
(viii) Cadmium: 0.16 mg/dscm or 65% reduction;
(ix) Mercury: 0.55 mg/dscm or 85% reduction.
(B) **Medium HMIWI**:
(i) Particulate matter: 69 mg/dscm;
(ii) Carbon monoxide: 40 ppm;
(iii) Dioxins/furans: 125 ng/dscm;
(iv) Hydrogen chloride: 100 ppm or 93% reduction;

(v) Sulfur dioxide: 55 ppm;
(vi) Nitrogen oxides: 250 ppm;
(vii) Lead: 1.2 mg/dscm or 70% reduction;
(viii) Cadmium: 0.16 mg/dscm or 65% reduction;
(ix) Mercury: 0.55 mg/dscm or 85% reduction.
(C) **Large HMIWI**:
(i) Particulate matter: 34 mg/dscm;
(ii) Carbon monoxide: 40 ppm;
(iii) Dioxins/furans: 125 ng/dscm;
(iv) Hydrogen chloride: 100 ppm or 93% reduction;
(v) Sulfur dioxide: 55 ppm;
(vi) Nitrogen oxides: 250 ppm;
(vii) Lead: 1.2 mg/dscm or 70% reduction;
(viii) Cadmium: 0.16 mg/dscm or 65% reduction;
(ix) Mercury: 0.55 mg/dscm or 85% reduction.
(b) Stack opacity requirements as provided in **40 CFR Section 60.52c(b) of Subpart Ec**;
(c) Operator training and qualification requirements as provided in **40 CFR Section 60.53c** of **Subpart Ec**;
(d) Waste management plan as provided in **40 CFR Section 60.55c** of **Subpart Ec**;
(e) Compliance and performance testing as provided in **40 CFR Section 60.56c of Subpart Ec** excluding the fugitive emissions testing requirements under **Section 60.56c(b)(12) and (c)(3) of Subpart Ec**;
(f) Monitoring requirements as provided in **40 CFR Section 60.57c of Subpart Ec**;
(g) Reporting and recordkeeping requirements as provided in **40 CFR Section 60.58c(b)-(f) of Subpart Ec** excluding fugitive emissions under **Section 60.58c(b)(2)(ii)** and siting under **Section 60.58c(b)(7)**;
(h) Permit requirements. Beginning September 15, 2000 ~~or on the effective date of an EPA-approved operating permit program under Clean Air Act Title V and the implementing regulations under **40 CFR Part 70**, whichever date is later~~, affected facilities ~~shall~~ must operate pursuant to a permit issued under the EPA-approved state operating permit program.
(2) Small HMIWI that are located more than 50 miles from the boundary of the nearest Standard Metropolitan Statistical Area and which burn less than 2,000 pounds per week of hospital/medical/infectious waste, ~~shall~~ must comply with the following requirements within one year after EPA approval of the State plan in lieu of the requirements in subsection (a) of this section:
(a) Emission Limits:
(A) Particulate matter: 197 mg/dscm;
(B) Carbon monoxide: 40 ppm;
(C) Dioxins/furans: 800 ng/dscm;
(D) Hydrogen chloride: 3100 ppm;
(E) Sulfur dioxide: 55 ppm;
(F) Nitrogen oxides: 250 ppm;
(G) Lead: 10 mg/dscm;
(H) Cadmium: 4 mg/dscm;
(I) Mercury: 7.5 mg/dscm.

(b) Stack opacity requirements as provided in **40 CFR Section 60.52c(b) of Subpart Ec**;
(c) Initial equipment inspection which, at a minimum includes the following:
(A) Inspect all burners, pilot assemblies, and pilot sensing devices for proper operation; clean pilot flame sensor, as necessary;
(B) Ensure proper adjustment of primary and secondary chamber combustion air, and adjust as necessary;
(C) Inspect hinges and door latches, and lubricate as necessary;
(D) Inspect dampers, fans, and blowers for proper operation;
(E) Inspect HMIWI door and door gaskets for proper sealing;
(F) Inspect motors for proper operation;
(G) Inspect primary chamber refractory lining; clean and repair/replace lining as necessary;
(H) Inspect incinerator shell for corrosion and/or hot spots;
(I) Inspect secondary/tertiary chamber and stack, clean as necessary;
(J) Inspect mechanical loader, including limit switches, for proper operation, if applicable;
(K) Visually inspect waste bed (grates), and repair/seal, as appropriate;
(L) For the burn cycle that follows the inspection, document that the incinerator is operating properly and make any necessary adjustments;
(M) Inspect air pollution control device(s) for proper operation, if applicable;
(N) Inspect waste heat boiler systems to ensure proper operation, if applicable;
(O) Inspect bypass stack components;
(P) Ensure proper calibration of thermocouples, sorbent feed systems and any other monitoring equipment; and
(Q) Generally observe that the equipment is maintained in good operating condition.
(d) Equipment repairs. Within 10 operating days following an equipment inspection, all necessary repairs ~~shall~~ must be completed unless the owner or operator obtains written approval from the Department establishing a date whereby all necessary repairs of the designated facility ~~shall~~ must be completed;
(e) Equipment inspection. Equipment inspections ~~shall~~ must be conducted annually (no more than 12 months following the previous annual equipment inspection), as outlined in (4)(b)(C) and (D) of this section;
(f) Compliance and performance testing requirements as follows:
(A) Compliance and performance testing requirements as provided in **40 CFR Section 60.56c(a)(b)(1) through (b)(9), (b)(11) (Hg only), and (c)(1) of Subpart Ec**. The 2,000 lb/week limitation under (4)(b) of this section does not apply during performance tests;
(B) Establish maximum charge rate and minimum secondary chamber temperature as site-specific operating parameters during the initial performance test to determine compliance with applicable emission limits;
(C) Following the date on which the initial performance test is completed or is required to be completed under **40 CFR Section 60.8**, whichever date comes first, ensure that the designated facility does not operate above the maximum charge rate or below the minimum secondary chamber temperature measured as 3-hour rolling averages (calculated each hour as the average of the previous 3 operating hours) at all times except during periods of startup, shutdown and malfunction. Operating parameter limits do not apply during performance tests. Operation above the maximum charge rate or below the minimum secondary chamber temperature shall constitute a violation of the established operating parameter(s);

(D) Except as provided in Subsection (v) of this section, operation of the designated facility above the maximum charge rate and below the minimum secondary chamber temperature (each measured on a 3 hour rolling average) simultaneously shall constitute a violation of the PM, CO, and dioxin/furan emission limits;
(E) The owner or operator of a designated facility may conduct a repeat performance test within 30 days of violation of applicable operating parameter(s) to demonstrate that the designated facility is not in violation of the applicable emission limit(s). Repeat performance tests conducted pursuant to this paragraph must be conducted using the identical operating parameters that indicated a violation under Subsection (iv) of this section.
(g) Monitoring requirements as follows:
(A) Install, calibrate (to manufacturers' specifications), maintain, and operate a device for measuring and recording the temperature of the secondary chamber on a continuous basis, the output of which shall be recorded, at a minimum, once every minute throughout operation;
(B) Install, calibrate (to manufacturers' specifications), maintain, and operate a device which automatically measures and records the date, time, and weight of each charge fed into the HMIWI;
(C) The owner or operator of a designated facility ~~shall~~ must obtain monitoring data at all times during HMIWI operation except during periods of monitoring equipment malfunction, calibration, or repair. At a minimum, valid monitoring data ~~shall~~ must be obtained for 75 percent of the operating hours per day and for 90 percent of the operating hours per calendar quarter that the designated facility is combusting hospital waste and/or medical/infectious waste.
(h) Reporting and recordkeeping requirements as follows:
(A) Maintain records of the annual equipment inspections, any required maintenance, and any repairs not completed within 10 days of an inspection or the timeframe established by the Department; and
(B) Submit an annual report containing information recorded under subsection (i) of this section no later than 60 days following the year in which data were collected. Subsequent reports ~~shall~~ must be sent no later than 12 calendar months following the previous report, once the unit is subject to permitting requirements under Title V of the Act, the owner or operator must submit these reports semiannually. The report ~~shall~~ must be signed by the facilities manager.
~~(3) Citations in this rule to **40 CFR**, refer to **The Code of Federal Regulations, Title 40 Part 60**, revised as of July 1, 1998.~~
[Publications: The Publication(s) referred to or incorporated by reference in this rule are available from the office of the agency.]
Stat. Auth.: ORS 468.020
Stats. Implemented: ORS 468A.025
Hist.: DEQ 22-1998, f. & cert. ef. 10-21-98; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-025-0750

## DIVISION 238
## NEW SOURCE PERFORMANCE STANDARDS

**340-238-0040**
**Definitions**

The definitions in OAR 340-200-0020 and this rule apply to this division. If the same term is defined in this rule and OAR 340-200-0020, the definition in this rule applies to this division.
(1) "Administrator" means the Administrator of the EPA or authorized representative.
(2) "Alternative method" means any method of sampling and analyzing for an air pollutant that is not a reference or equivalent method but that has been demonstrated to the Department's satisfaction to, in specific cases, produce results adequate for determination of compliance.
(3) "Capital expenditures" means an expenditure for a physical or operational change to an existing facility that exceeds the product of the applicable "annual asset guideline repair allowance percentage" specified in Internal Revenue Service (IRS) Publication 534 and the existing facility's basis, as defined by section 1012 of the Internal Revenue Code. However, the total expenditure for a physical or operational change to an existing facility must not be reduced by any "excluded additions" as defined in IRS Publication 534, as would be done for tax purposes.
(4) "**CFR**" means **Code of Federal Regulations** and, unless otherwise expressly identified, refers to the ~~revised as of~~ July 1, ~~2002~~2004 edition.
(5) "Closed municipal solid waste landfill" (closed landfill) means a landfill in which solid waste is no longer being placed, and in which no additional solid wastes will be placed without first filing a notification of modification as prescribed under 40 CFR 60.7(a)(4). Once a notification of modification has been filed, and additional solid waste is placed in the landfill, the landfill is no longer closed. A landfill is considered closed after meeting the criteria of 40 CFR 258.60.
(6) "Commenced", with respect to the definition of "new source" in section 111(a)(2) of the federal Clean Air Act, means that an owner or operator has undertaken a continuous program of construction or modification or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction or modification.
(7) "Construction" means fabrication, erection, or installation of a facility.
(8) "Department" means the Department of Environmental Quality or, in the case of Lane County, the Lane Regional Air Pollution Authority.
(9) "Environmental Protection Agency" or "EPA" means the United States Environmental Protection Agency.
(10) "Existing municipal solid waste landfill" (existing landfill) means a municipal solid waste landfill that began construction, reconstruction or modification before 5/30/91 and has accepted waste at any time since 11/08/87 or has additional design capacity available for future waste deposition.
(11) "Equivalent method" means any method of sampling and analyzing for an air pollutant that has been demonstrated to the Department's satisfaction to have a consistent and quantitatively known relationship to the reference method, under specified conditions.
(12) "Existing facility", with reference to a stationary source, means any apparatus of the type for which a standard is promulgated in 40 CFR Part 60, and the construction or modification of which commenced before the date of proposal by EPA of that standard; or any apparatus that could be altered in such a way as to be of that type.
(13) "Facility" means all or part of any public or private building, structure, installation, equipment, vehicle or vessel, including, but not limited to, ships.
(14) "Fixed capital cost" means the capital needed to provide all the depreciable components.

(15) "Large municipal solid waste landfill" (large landfill) means a municipal solid waste landfill with a design capacity greater than or equal to 2.5 million megagrams or 2.5 million cubic meters.
(16) "Modification:"
(a) except as provided in subsection (b) of this section, means any physical change in, or change in the method of operation of, an existing facility that increases the amount of any air pollutant (to which a standard applies) emitted into the atmosphere by that facility or that results in the emission of any air pollutant (to which a standard applies) into the atmosphere not previously emitted;
(b) As used in OAR 340-238-0100 means an action that results in an increase in the design capacity of a landfill.
(17) "Municipal solid waste landfill" (landfill) means an entire disposal facility in a contiguous geographical space where household waste is placed in or on land. A municipal solid waste landfill may also receive other types of RCRA Subtitle D wastes such as commercial solid waste, nonhazardous sludge, conditionally exempt small quantity generator waste, and industrial solid waste. Portions of a municipal solid waste landfill may be separated by access roads and may be publicly or privately owned. A municipal solid waste landfill may be a new municipal solid waste landfill, an existing municipal solid waste landfill, or a lateral expansion (modification).
(18) "New municipal solid waste landfill" (new landfill) means a municipal solid waste landfill that began construction, reconstruction or modification or began accepting waste on or after 5/30/91.
(19) "Particulate matter" means any finely divided solid or liquid material, other than uncombined water, as measured by an applicable reference method, or an equivalent or alternative method.
(20) "Reconstruction" means the replacement of components of an existing facility to such an extent that:
(a) The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility; and
(b) It is technologically and economically feasible to meet the applicable standards set forth in 40 CFR Part 60.
(21) "Reference method" means any method of sampling and analyzing for an air pollutant as specified in 40 CFR Part 60 .
(22) "Small municipal solid waste landfill" (small landfill) means a municipal solid waste landfill with a design capacity less than 2.5 million megagrams or 2.5 million cubic meters.
(23) "Standard" means a standard of performance proposed or promulgated under 40 CFR Part 60.
(24) "State Plan" means a plan developed for the control of a designated pollutant provided under 40 CFR Part 60.
(25) "Stationary source" means any building, structure, facility, or installation that emits or may emit any air pollutant subject to regulation under the federal Clean Air Act.
(26) "Volatile organic compounds" or "VOC" means any organic compounds that participate in atmospheric photochemical reactions; or that are measured by a reference method, an equivalent method, an alternative method, or that are determined by procedures specified under any applicable rule.
[Publications: Publications referenced are available from the agency.]

Stat. Auth.: ORS 468.020
Stats. Implemented: ORS 468A.025
Hist.: DEQ 97, f. 9-2-75, ef. 9-25-75; DEQ 22-1982, f. & ef. 10-21-82; DEQ 17-1983, f. & ef. 10-19-83; DEQ 16-1984, f. & ef. 8-21-84; DEQ 15-1985, f. & ef. 10-21-85; DEQ 19-1986, f. & ef. 11-7-86; DEQ 17-1987, f. & ef. 8-24-87; DEQ 24-1989, f. & cert. ef. 10-26-89; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 17-1993, f. & cert. ef. 11-4-93; DEQ 22-1995, f. & cert. ef. 10-6-95; DEQ 27-1996, f. & cert. ef. 12-11-96; DEQ 8-1997, f. & cert. ef. 5-6-97; DEQ 22-1998, f. & cert. ef. 10-21-98; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-025-0510; DEQ 22-2000, f. & cert. ef. 12-18-00; DEQ 4-2003, f. & cert. ef. 2-06-03

**340-238-0060**
**Federal Regulations Adopted by Reference**
(1) Except as provided in section (2) of this rule, **40 CFR Part 60 Subparts D** through **XX** and **BBB** through **NNN** and **PPP** through **WWW, AAAA** and **CCCC** are by this reference adopted and incorporated herein, and 40 **CFR Part 60 Subpart OOO** is by this reference adopted and incorporated herein for major sources only.
(2) Where "Administrator" or "EPA" appears in **40 CFR Part 60**, "Department" is substituted, except in any section of **40 CFR Part 60** for which a federal rule or delegation specifically indicates that authority must not be delegated to the state.
(3) **40 CFR Part 60** Subparts adopted by this rule are titled as follows:
(a) Subpart D - Fossil-fuel-fired steam generators for which construction is commenced after August 17, 1971;
(b) Subpart Da - Electric utility steam generating units for which construction is commenced after September 18, 1978;
(c) Subpart Db - Industrial-commercial-institutional steam generating units;
(d) Subpart Dc - Small industrial-commercial-institutional steam generating units;
(e) Subpart E - Incinerators;
(f) Subpart Ea - Municipal waste combustors for which construction is commenced after December 20, 1989 and on or before September 20, 1994;
(g) Subpart Eb - Municipal waste combustors for which construction is commenced after September 20, 1994;
(h) Subpart Ec - Hospital/Medical/Infectious waste incinerators that commenced construction after June 20, 1996, or for which modification is commenced after March 16, 1998;
(i) Subpart F - Portland cement plants;~~(i) Subpart G - Nitric acid plants;~~
(j) Subpart G - Nitric acid plants;
(k) Subpart H - Sulfuric acid plants;
(l) Subpart I - Hot mix asphalt facilities;
(m) Subpart J - Petroleum refineries;
(n) Subpart K - Storage vessels for petroleum liquids for which construction, reconstruction, or modification commenced after June 11, 1973, and before May 19, 1978;
(o) Subpart Ka - Storage vessels for petroleum liquids for which construction, reconstruction, or modification commenced after May 18, 1978, and before July 23, 1984;

(p) Subpart Kb - Volatile organic liquid storage vessels (including petroleum liquid storage vessels) for which construction, reconstruction, or modification commenced after July 23, 1984;
(q) Subpart L - Secondary lead smelters;
(r) Subpart M - Secondary brass and bronze production plants;
(s) Subpart N - Primary emissions from basic oxygen process furnaces for which construction is commenced after June 11, 1973;
(t) Subpart Na - Secondary emissions from basic oxygen process steelmaking facilities for which construction is commenced after January 20, 1983;
(u) Subpart O - Sewage treatment plants;
(v) Subpart P - Primary copper smelters;
(w) Subpart Q - Primary Zinc smelters;
(x) Subpart R - Primary lead smelters;
(y) Subpart S - Primary aluminum reduction plants;
(z) Subpart T - Phosphate fertilizer industry: wet-process phosphoric acid plants;
(aa) Subpart U - Phosphate fertilizer industry: superphosphoric acid plants;
(bb) Subpart V - Phosphate fertilizer industry: diammonium phosphate plants;
(cc) Subpart W - Phosphate fertilizer industry: triple superphosphate plants;
(dd) Subpart X - Phosphate fertilizer industry: granular triple superphosphate storage facilities;
(ee) Subpart Y - Coal preparation plants;
(ff) Subpart Z - Ferroalloy production facilities;
(gg) Subpart AA - Steel plants: electric arc furnaces constructed after October 21, 1974 and on or before August 17, 1983;
(hh) Subpart AAa - Steel plants: electric arc furnaces and argon-oxygen decarburization vessels constructed after august 7, 1983;
(ii) Subpart BB - Kraft pulp mills;
(jj) Subpart CC - Glass manufacturing plants;
(kk) Subpart DD - Grain elevators.
(ll) Subpart EE - Surface coating of metal furniture;
(mm) Subpart GG - Stationary gas turbines;
(nn) Subpart HH - Lime manufacturing plants;
(oo) Subpart KK - Lead-acid battery manufacturing plants;
(pp) Subpart LL - Metallic mineral processing plants;
(qq) Subpart MM - Automobile and light-duty truck surface coating operations;
(rr) Subpart NN - Phosphate rock plants;
(ss) Subpart PP - Ammonium sulfate manufacture;
(tt) Subpart QQ - Graphic arts industry: publication rotogravure printing;
(uu) Subpart RR - pressure sensitive tape and label surface coating operations;
(vv) Subpart SS - Industrial surface coating: large appliances;
(ww) Subpart TT - Metal coil surface coating;
(xx) Subpart UU - Asphalt processing and asphalt roofing manufacture;
(yy) Subpart VV - Equipment leaks of VOC in the synthetic organic chemicals manufacturing industry;
(zz) Subpart WW - Beverage can surface coating industry;
(aaa) Subpart XX - Bulk gasoline terminals;
(bbb) Subpart BBB - Rubber tire manufacturing industry;

(ccc) Subpart DDD - Volatile organic compound (VOC) emissions for the polymer manufacture industry;
(ddd) Subpart FFF - Flexible vinyl and urethane coating and printing;
(eee) Subpart GGG - equipment leaks of VOC in petroleum refineries;
(fff) Subpart HHH - Synthetic fiber production facilities;
(ggg) Subpart III - Volatile organic compound (VOC) emissions from the synthetic organic chemical manufacturing industry (SOCMI) air oxidation unit processes;
(hhh) Subpart JJJ - Petroleum dry cleaners;
(iii) Subpart KKK - Equipment leaks of VOC from onshore natural gas processing plants;
(jjj) ubpart LLL - Onshore natural gas processing; SO2 emissions;
(kkk) Subpart NNN - Volatile organic compound (VOC) emissions from synthetic organic chemical manufacturing industry (SOCMI) distillation operations;
(lll) Subpart OOO - Nonmetallic mineral processing plants (adopted by reference for major sources only);
(mmm) Subpart PPP - Wool fiberglass insulation manufacturing plants;
(nnn) Subpart QQQ - VOC emissions from petroleum refinery wastewater systems;
(ooo) Subpart RRR - Volatile organic compound emissions from synthetic organic chemical manufacturing industry (SOCMI) reactor processes;
(ppp) Subpart SSS - Magnetic tape coating facilities;
(qqq) Subpart TTT - Industrial surface coating: surface coating of plastic parts for business machines;
(rrr) Subpart UUU - Calciners and dryers in mineral industries;
(sss) Subpart VVV - Polymeric coating of supporting substrates facilities;
(ttt) Subpart WWW - Municipal solid waste landfills, as clarified by OAR 340-238-0100;
(uuu) Subpart AAAA - Small municipal waste combustion units;
(vvv) Subpart CCCC - Commercial and iIndustrial sSolid wWaste iIncineration uUnits.
[Publications: Publications referenced are available from the agency.]
Stat. Auth.: ORS 468.020
Stats. Implemented: ORS 468A.025
Hist.: DEQ 97, f. 9-2-75, ef. 9-25-75; DEQ 16-1981, f. & ef. 5-6-81; sections (1) thru (12) of this rule renumbered to 340-025-0550 thru 340-025-0605; DEQ 22-1982, f. & ef. 10-21-82; DEQ 17-1983, f. & ef. 10-19-83; DEQ 16-1984, f. & ef. 8-21-84; DEQ 15-1985, f. & ef. 10-21-85; DEQ 19-1986, f. & ef. 11-7-86; DEQ 17-1987, f. & ef. 8-24-87; DEQ 24-1989, f. & cert. ef. 10-26-89; DEQ 17-1993, f. & cert. ef. 11-4-93; DEQ 22-1995, f. & cert. ef. 10-6-95; DEQ 27-1996, f. & cert. ef. 12-11-96; DEQ 8-1997, f. & cert. ef. 5-6-97; DEQ 22-1998, f. & cert. ef. 10-21-98; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-025-0535; DEQ 22-2000, f. & cert. ef. 12-18-00; DEQ 4-2003, f. & cert. ef. 2-06-03

## DIVISION 244
## OREGON FEDERAL HAZARDOUS AIR POLLUTANT PROGRAM

### General Provisions for Stationary Sources

**340-244-0030**

**Definitions**

The definitions in OAR 340-200-0020, 340-218-0030 and this rule apply to this division. If the same term is defined in this rule and OAR 340-200-0020 or 340-218-0030, the definition in this rule applies to this division.

(1) "Accidental Release" means an unanticipated emission of a regulated substance or other extremely hazardous substance into the ambient air from a stationary source.

(2) "Act" and "FCAA" mean the Federal Clean Air Act, Public Law 88-206 as last amended by Public Law 101-549.

(3) "Actual Emissions" means the mass emissions of a pollutant from an emissions source during a specified time period.

(a) Actual emissions shall equal the average rate at which the source actually emitted the pollutant and which is representative of normal source operation. Actual emissions shall be directly measured with a continuous monitoring system or calculated using a material balance or verified emission factor in combination with the source's actual operating hours, production rates and types of materials processed, stored, or combusted during the specified time period;

(b) For any source which had not yet begun normal operation in the specified time period, actual emissions shall equal the potential to emit of the source;

(c) For purposes of OAR 340-244-0100 through OAR 340-244-0180 actual emissions shall equal the actual rate of emissions of a pollutant, but does not include excess emissions from a malfunction, or startups and shutdowns associated with a malfunction.

(4) "Area Source" means any stationary source which has the potential to emit hazardous air pollutants but is not a major source of hazardous air pollutants.

(5) "Artificially or Substantially Greater Emissions" means abnormally high emissions such as could be caused by equipment malfunctions, accidents, unusually high production or operating rates compared to historical rates, or other unusual circumstances.

(6) "Base Year Emissions" for purposes of Early Reductions only (OAR 340-244-0100), means actual emissions in the calendar year 1987 or later.

(7) **"CFR"** means **Code of Federal Regulations** and, unless otherwise expressly identified, refers to the July 1, 2004 edition.

(~~8~~7) "Commission" means the Oregon Environmental Quality Commission.

(~~9~~8) "Construct a major Source" means to fabricate, erect, or install at any greenfield site a stationary source or group of stationary sources which is located within a contiguous area and under common control and which emits or has the potential to emit 10 tons per year oaf any HAPs or 25 tons per year of any combination of HAP, or to fabricate, erect, or install at any developed site a new process or production unit which in and of itself emits or has the potential to emit 10 tons per year of any HAP or 25 tons per year of any combination of HAP, unless the process or production unit satisfies criteria a through f of this paragraph:

(a) All HAP emitted by the process or production unit that would otherwise be controlled under the requirements of this subpart will be controlled by emission control equipment which was previously installed at the same site as the process or production unit;

(b)(A) The permitting authority has determined within a period of 5 years prior to the fabrication, erection, or installation of the process or production unit that the existing emission control equipment represented the best available control technology (BACT), lowest achievable emission rate (LAER) under 40 CFR part 51 or 52, toxics-best available control technology (T-

BACT) or MACT abased on State air toxic rules for the category of pollutants which includes those HAP to be emitted by the process or production unit; or
(B) The permitting authority determines that the control of HAP emissions provided by the existing equipment will be equivalent to that level of control currently achieved by other well-controlled similar sources (i.e., equivalent to the level of control that would be provided by a current BACT, LAER, T-BACT, or State air toxic rule MACT determination).
(c) The permitting authority determines that the percent control efficiency for emission of HAP from all sources to be controlled by the existing control equipment will be equivalent to the percent control efficiency provided by the control equipment prior to the inclusion of the new process or production unit;
(d) The permitting authority has provided notice and an opportunity for public comment concerning its determination hat criteria in paragraphs (a), (b), and (c) of this definition apply and concerning the continued adequacy of any prior LAER, BACT, T-BACT, or State air toxic rule MACT determination;
(e) If any commenter has asserted that a prior LAER, BACT, T-BACT, or State air toxic rule MACT determination is no longer adequate, the permitting authority has determined that the level of control required by that prior determination remains adequate; and
(f) Any emission limitations, work practice requirements, or other terms and conditions upon which the above determinations by the permitting authority are predicated will be construed by the permitting authority as applicable requirements under section 504(a) and either have been incorporated into any existing title V permit for the affected facility or will be incorporated into such permit upon issuance.
(10~~9~~) "Department" means the Department of Environmental Quality.
(11~~0~~) "Director" means the Director of the Department or Regional authority, and authorized deputies or officers.
(12~~1~~) "Early Reductions Unit" means a single emission point or group of emissions points defined as a unit for purposes of an alternative emissions limit issued under OAR 340-244-0100 through 340-244-0180.
(13~~2~~) "Emission" means a release into the atmosphere of any regulated pollutant or air contaminant.
(14~~3~~) "Emissions Limitation" and "Emissions Standard" mean a requirement adopted by the Department or regional authority, or proposed or promulgated by the Administrator of the EPA, which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis, including any requirements which limit the level of opacity, prescribe equipment, set fuel specifications, or prescribe operation or maintenance procedures for a source to assure continuous emission reduction.
(15~~4~~) "Emissions Unit" means any part or activity of a stationary source that emits or has the potential to emit any regulated air pollutant.
(a) A part of a stationary source is any machine, equipment, raw material, product, or by-product that produces or emits air pollutants. An activity is any process, operation, action, or reaction (e.g., chemical) at a stationary source that emits air pollutants. Except as described in subsection (d) of this section, parts and activities may be grouped for purposes of defining an emissions unit provided the following conditions are met:

(A) The group used to define the emissions unit may not include discrete parts or activities to which a distinct emissions standard applies or for which different compliance demonstration requirements apply; and
(B) The emissions from the emissions unit are quantifiable.
(b) Emissions units may be defined on a pollutant by pollutant basis where applicable;
(c) The term "emissions unit" is not meant to alter or affect the definition of the term "unit" for purposes of Title IV of the FCAA;
(d) Parts and activities shall not be grouped for purposes of determining emissions increases from an emissions unit under OAR 340-244-0050, 340-244-0070, or 340-218-0190, or for purposes of determining the applicability of a New Source Performance Standard (NSPS).
(16~~5~~) "EPA" means the Administrator of the United States Environmental Protection Agency or the Administrator's designee.
(17~~6~~) "EPA Conditional Method" means any method of sampling and analyzing for air pollutants which has been validated by the EPA but which has not been published as an EPA reference method.
(18~~7~~) "EPA Reference Method" means any method of sampling and analyzing for an air pollutant as described in 40 CFR Part 60, 61, or 63 ~~(July 1, 1998)~~.
(19~~8~~) "Equipment leaks" means leaks from pumps, compressors, pressure relief devices, sampling connection systems, open ended valves or lines, valves, connectors, agitators, accumulator vessels, and instrumentation systems in hazardous air pollutant service.
(20~~19~~) "Existing Source" means any source, the construction of which commenced prior to proposal of an applicable standard under sections 112 or 129 of the FCAA.
(21~~0~~) "Facility" means all or part of any public or private building, structure, installation, equipment, or vehicle or vessel, including but not limited to ships.
(22~~1~~) "Fugitive Emissions" means emissions of any air contaminant that escape to the atmosphere from any point or area that is not identifiable as a stack, vent, duct or equivalent opening.
(23~~2~~) "Generally Available Control Technology (GACT)" means an alternative emission standard promulgated by EPA for non-major sources of hazardous air pollutants which provides for the use of control technology or management practices which are generally available.
(24~~3~~) "Hazardous Air Pollutant" (HAP) means an air pollutant listed by the EPA pursuant to section 112(b) of the FCAA or determined by the Commission to cause, or reasonably be anticipated to cause, adverse effects to human health or the environment.
(25~~4~~) "High-Risk Pollutant" means any air pollutant listed in Table 2 of OAR 340-244-0140 for which exposure to small quantities may cause a high risk of adverse public health effects.
(26~~5~~) "Major Source" means any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants. The EPA may establish a lesser quantity, or in the case of radionuclides different criteria, for a major source on the basis of the potency of the air pollutant, persistence, potential for bioaccumulation, other characteristics of the air pollutant, or other relevant factors.
(27~~6~~) "Maximum Achievable Control Technology (MACT)" means an emission standard applicable to major sources of hazardous air pollutants that requires the maximum degree of reduction in emissions deemed achievable for either new or existing sources.

(28~~7~~) "New Source" means a stationary source, the construction of which is commenced after proposal of a federal MACT or January 3, 1993 of this Division, whichever is earlier.
(29~~8~~) "Not Feasible to Prescribe or Enforce a Numerical Emission Limit" means a situation in which the Department determines that a pollutant or stream of pollutants listed in OAR 340-244-0040 cannot be emitted through a conveyance designed and constructed to emit or capture such pollutant, or that any requirement for, or use of, such a conveyance would be inconsistent with any state or federal law or regulation; or the application of measurement technology to a particular source is not practicable due to technological or economic limitations.
(30~~29~~) "Person" means the United States Government and agencies thereof, any state, individual, public or private corporation, political subdivision, governmental agency, municipality, industry, co-partnership, association, firm, trust, estate, or any other legal entity whatsoever.
(31~~0~~) "Potential to Emit" means the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation is enforceable by the EPA. This section does not alter or affect the use of this section for any other purposes under the Act, or the term "capacity factor" as used in Title IV of the Act or the regulations promulgated thereunder. Secondary emissions shall not be considered in determining the potential to emit of a source.
(32~~1~~) "Reconstruct a Major Source" means the replacement of components at an existing process or production unit that in and of itself emits or has the potential to emit 10 tons per year of any HAP or 25 tons per year of any combination of HAP, whenever: the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable process or production unit; and; it is technically and economically feasible for the reconstructed major source to meet the applicable maximum achievable control technology emission limitation for new sources established under 40 CFR Part 63 Subpart B.
(33~~2~~) "Regional Authority" means Lane Regional Air Pollution Authority.
(34~~3~~) "Regulated Air Pollutant" as used in this Division means:
(a) Any pollutant listed under OAR 340-200-0400 or OAR 340-244-0230; or
(b) Any pollutant that is subject to a standard promulgated pursuant to Section 129 of the Act.
(35~~4~~) "Secondary Emissions" means emissions from new or existing sources which occur as a result of the construction and/or operation of a source or modification, but do not come from the source itself. Secondary emissions shall be specific, well defined, and quantifiable, and impact the same general area as the source associated with the secondary emissions. Secondary emissions may include but are not limited to:
(a) Emissions from ships and trains coming to or from a facility;
(b) Emissions from offsite support facilities which would be constructed or would otherwise increase emissions as a result of the construction of a source or modification.
(36~~5~~) "Section 111" means that section of the FCAA that includes standards of performance for new stationary sources.
(37~~6~~) "Section 112(b)" means that subsection of the FCAA that includes the list of hazardous air pollutants to be regulated.
(38~~7~~) "Section 112(d)" means that subsection of the FCAA that directs the EPA to establish emission standards for sources of hazardous air pollutants. This section also defines the criteria to be used by EPA when establishing the emission standards.

(398) "Section 112(e)" means that subsection of the FCAA that directs the EPA to establish and promulgate emissions standards for categories and subcategories of sources that emit hazardous air pollutants.
(4039) "Section 112(n)" means that subsection of the FCAA that includes requirements for the EPA to conduct studies on the hazards to public health prior to developing emissions standards for specified categories of hazardous air pollutant emission sources.
(410) "Section 112(r)" means that subsection of the FCAA that includes requirements for the EPA promulgate regulations for the prevention, detection and correction of accidental releases.
(421) "Section 129" means that section of the FCAA that requires EPA to promulgate regulations for solid waste combustion.
(432) "Solid Waste Incineration Unit" as used in this Division shall have the same meaning as given in Section 129(g) of the FCAA.
(443) "Stationary Source":
(a) As used in OAR 340- division 244 means any building, structure, facility, or installation which emits or may emit any regulated air pollutant;
(b) As used in OAR 340-244-0230 means any buildings, structures, equipment, installations, or substance emitting stationary activities:
(A) That belong to the same industrial group;
(B) That are located on one or more contiguous properties;
(C) That are under the control of the same person (or persons under common control); and
(D) From which an accidental release may occur.
[Publications: The publication(s) referred to or incorporated by reference in this rule are available from the agency.]
Stat. Auth.: ORS 468.020 & ORS 468A.025
Stats. Implemented: ORS 468A.040
Hist.: DEQ 13-1993, f. & cert. ef. 9-24-93; DEQ 18-1993, f. & cert. ef. 11-4-93; DEQ 24-1994, f. & cert. ef. 10-28-94; DEQ 22-1995, f. & cert. ef. 10-6-95; DEQ 26-1996, f. & cert. ef. 11-26-96; DEQ 20-1997, f. & cert. ef. 9-25-97; DEQ 18-1998, f. & cert. ef. 10-5-98; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-032-0120

**340-244-0040**
**List of Hazardous Air Pollutants**
For purposes of this Division the Commission adopts by reference the pollutants, including groups of substances and mixtures, listed in section 112(b), as Hazardous Air Pollutants (Table 1).
Stat. Auth.: ORS 468.020 & ORS 468A.025
Stats. Implemented: ORS 468A.040
Hist.: DEQ 13-1993, f. & cert. ef. 9-24-93; DEQ 2-1996, f. & cert. ef. 1-2-96; DEQ 20-1997, f. & cert. ef. 9-25-97; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-032-0130

**Compliance Extensions for Early Reductions**

**340-244-0120**
**General Provisions for Compliance Extensions**
(1) The Department will,~~shall~~ by permit~~,~~ issued in accordance with OAR 340 division 218, allow an existing source to meet an alternative emission limitation for an Early Reductions Unit in lieu

of an emission limitation promulgated under Section 112(d) of the FCAA for a period of six years from the compliance date of the otherwise applicable standard, provided the owner or operator demonstrates:
(a) According to the requirements of OAR 340-244-0140 that the Early Reductions Unit has achieved a reduction of at least 90 percent (95 percent or more in the case of HAP that are particulate) in emissions of:
(A) Total HAP from the Early Reductions Unit; or
(B) Total HAP from the Early Reductions Unit as adjusted for high-risk pollutant weighing factors (**Table 2**), if applicable.
(b) That such reduction was achieved before the otherwise applicable standard issued under Section 112(d) of the FCAA was first proposed.
(2) A source granted an alternative emission limitation ~~shall~~must comply with an applicable standard issued under Section 112(d) of the FCAA immediately upon expiration of the six-year compliance extension period specified in section (1) of this rule.
(3) For each facility issued a permit under section (1) of this rule, there must~~shall~~ be established as part of the permit an enforceable alternative emission limitation for HAP for each Early Reductions Unit reflecting the reduction that qualified the Early Reductions Unit for the alternative emission limitation.
(4) Any source that has received an alternative emissions limit from EPA, either pursuant to **40 CFR 63.75 Enforceable Commitments** dated **December 29, 1992**, or as a Title V specialty permit, ~~shall~~ must have the alternative emission limit(s) incorporated as an applicable requirement in its operating permit pursuant to OAR 340-218-0150 upon permit issuance or renewal.
(5) If a source fails to submit a timely and complete application according to OAR 340-218-0040, or does not adequately demonstrate the required reductions in emissions pursuant to OAR 340-244-0140, the Department ~~shall~~will not approve the source's application for a compliance extension and alternative emission limit, and the source must~~is required to~~ comply with any applicable emission standard established pursuant to 112(d) of the FCAA by the compliance date prescribed in the applicable standard.
Stat. Auth.: ORS 468.020 & ORS 468A.310
Stats. Implemented: ORS 468A.310
Hist.: DEQ 13-1993, f. & cert. ef. 9-24-93; DEQ 24-1994, f. & cert. ef. 10-28-94; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-032-0320

## Emission Standards

**340-244-0210**
**Emissions Limitation for Existing Sources**
(1) Federal MACT. Existing major and area sources must comply with the applicable emissions standards for existing sources promulgated by the EPA pursuant to section 112(d), section 112(n), or section 129 of the FCAA and adopted by rule within this Division.
(2) State MACT. If the EPA fails to meet its schedule for promulgating a MACT standard for a source category or subcategory, the Department must approve HAP emissions limitations for existing major sources within that category or subcategory according to **40 CFR Part 63, Subpart B**.

(a) The owner or operator of each existing major source within that category will file permit applications in accordance with OAR 340-218-0040 and **40 CFR Part 63, Subpart B.**
(b) If, after a permit has been issued, the EPA promulgates a MACT standard applicable to a source that is more stringent than the one established pursuant to this section, the Department may revise the permit upon the next renewal to reflect the standard promulgated by the EPA. The source will~~must~~ be given a reasonable time to comply, but no longer than 8 years after the standard is promulgated;
(c) The Department will~~must~~ not establish a case-by-case State MACT:
(A) For existing solid waste incineration units where an emissions standard will be established for these units by the EPA pursuant to section 111 of the FCAA. These sources are subject to applicable emissions standards under OAR chapter 340, division 25; or
(B) For existing major HAP sources where an emissions standard or alternative control strategy will be established by the EPA pursuant to section 112(n) of the FCAA.
(3) Compliance schedule:
(a) The owner or operator of the source must comply with the emission limitation:
(A) Within the time frame established in the applicable Federal MACT standard, but in no case later than three years from the date of federal promulgation of the applicable MACT requirements; or
(B) Within the time frame established by the Department where a s~~S~~tate-determined MACT has been established or a case-by-case determination has been made.
(b) The owner or operator of the source may apply for, and the Commission may grant, a compliance extension of up to one year if such additional period is necessary for the installation of controls;
(c) Notwithstanding the requirements of this section, no existing source that has installed Best Available Control Technology or has been required to meet Lowest Achievable Emission Rate before the promulgation of a federal MACT applicable to that emissions unit is be required to comply with such MACT standard until 5 years after the date on which such installation or reduction has been achieved, as determined by the Department.
Stat. Auth.: ORS 468 & ORS 468A
Stats. Implemented: ORS 468A.310
Hist.: DEQ 13-1993, f. & cert. ef. 9-24-93; DEQ 7-1998, f. & cert. ef. 5-5-98; DEQ 18-1998, f. & cert. ef. 10-5-98, Renumbered from 340-032-2500; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-032-0505; DEQ 4-2003, f. & cert. ef. 2-06-03

**340-244-0220**
**Federal Regulations Adopted by Reference**
(1) Except as provided in sections (2) and (3) of this rule, **40 CFR Part 61, Subparts A** through **F, I, J, L, N** through **P, V,** ~~and~~ **Y, BB** ~~through~~ and **FF** ~~(July 1, 2002)~~ and **40 CFR Part 63, Subparts A, F, G, H, I, J, L, M, N, O, Q, R, S, T, U, W, X, Y, AA, BB, CC, DD, EE, GG, HH, II, JJ, KK, LL, MM, OO, PP, QQ, RR, SS, TT, UU, VV, WW, XX, YY, CCC, DDD, EEE, GGG, HHH, III, JJJ, LLL, MMM, NNN, OOO, PPP, QQQ, RRR, TTT, UUU, VVV, XXX, AAAA, CCCC, EEEE, FFFF, GGGG, HHHH, IIII, JJJJ, KKKK, MMMM, NNNN, OOOO, PPPP, QQQQ, RRRR, SSSS, TTTT, UUUU,** ~~and~~ **VVVV, WWWW, XXXX, YYYY, ZZZZ, AAAAA, BBBBB, CCCCC, EEEEE, FFFFF, GGGGG, HHHHH, IIIII, JJJJJ,**

**KKKKK, LLLLL, MMMMM, NNNNN, PPPPP, QQQQQ, RRRRR, SSSSS,** and **TTTTT** ~~(July 1, 2002)~~ are adopted by reference and incorporated herein.
(2) Where "Administrator" or "EPA" appears in 40 CFR Part 61 or 63, "Department" is substituted, except in any section of 40 CFR Part 61 or 63, for which a federal rule or delegation specifically indicates that authority will not be delegated to the state.
(3) 40 CFR Part 63 Subpart M - Dry Cleaning Facilities using Perchloroethylene: The exemptions in 40 CFR 63.320(d) and (e) do not apply.
(4) 40 CFR Part 61 Subparts adopted by this rule are titled as follows:
(a) Subpart A - General Provisions;
(b) Subpart B - Radon Emissions from Underground Uranium Mines;
(c) Subpart C - Beryllium;
(d) Subpart D - Beryllium Rocket Motor Firing;
(e) Subpart E - Mercury;
(f) Subpart F - Vinyl Chloride;
(g) Subpart I - Radionuclide Emissions from Federal Facilities Other than Nuclear Regulatory Commission Licensee and Not Covered by Subpart H;
(h) Subpart J - Equipment Leaks (Fugitive Emission Sources) of Benzene;
(i) Subpart L - Benzene Emissions from Coke By-Product Recovery Plants;
(j) Subpart N - Inorganic Arsenic Emissions from Glass Manufacturing Plants;
(k) Subpart O - Inorganic Arsenic Emissions from Primary Copper Smelters;
(l) Subpart P - Inorganic Arsenic Emissions from Arsenic Trioxide and Metal Arsenic Facilities;
(m) Subpart V - Equipment Leaks (Fugitive Emission Sources);
(n) Subpart Y - Benzene Emissions from Benzene Storage Vessels;
(o) Subpart BB - Benzene Emissions from Benzene Transfer Operations; and
(p) Subpart FF - Benzene Waste Operations.
(5) 40 CFR Part 63 Subparts adopted by this rule are titled as follows:
(a) Subpart A - General Provisions;
(b) Subpart F - SOCMI;
(c) Subpart G - SOCMI - Process Vents, Storage Vessels, Transfer Operations, and Wastewater;
(d) Subpart H - SOCMI - Equipment Leaks;
(e) Subpart I - Certain Processes Subject to the Negotiated Regulation for Equipment Leaks;
(f) Subpart J - Polyvinyl Chloride and Copolymers Production;
(~~g~~f) Subpart L - Coke Oven Batteries;
(~~h~~g) Subpart M - Perchloroethylene Air Emission Standards for Dry Cleaning Facilities ~~using Perchloroethylene~~;
(~~i~~h) Subpart N - Chromium Emissions from Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks;
(~~j~~i) Subpart O - Ethylene Oxide Emissions Standards for Sterilization Facilities;
(~~k~~j) Subpart Q - Industrial Process Cooling Towers;
(~~l~~k) Subpart R - Gasoline Distribution (Bulk Gasoline Terminals and Pipeline Breakout Stations);
(~~m~~l) Subpart S - Pulp and Paper Industry;
(~~n~~m) Subpart T - Halogenated Solvent Cleaning;
(~~o~~n) Subpart U - Group I Polymers and Resins;
(~~p~~o) Subpart W - Epoxy Resins and Non-Nylon Polyamides Production;

(qp) Subpart X - Secondary Lead Smelting;
(rq) Subpart Y - Marine Tank Vessel Loading Operations;
(sr) Subpart AA - Phosphoric Acid Manufacturing Plants;
(ts) Subpart BB - Phosphate Fertilizer Production Plants;
(ut) Subpart CC - Petroleum Refineries;
(vu) Subpart DD - Off-Site Waste and Recovery Operations;
(wv) Subpart EE - Magnetic Tape Manufacturing Operations;
(xw) Subpart GG - Aerospace Manufacturing and Rework ~~Operations~~Facilities;
(yx) Subpart HH - Oil and Natural Gas Production Facilities;
(zy) Subpart II - Shipbuilding and Ship Repair (Surface Coating);
(aaz) Subpart JJ - Wood Furniture Manufacturing Operations;
(bbaa) Subpart KK - Printing and Publishing Industry;
(ccbb) Subpart LL - Primary Aluminum Reduction Plants;
(ddee) Subpart MM - Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite and Stand-Alone Semi-Chemical Pulp Mills
(eedd) Subpart OO - Tanks - Level 1;
(ffee) Subpart PP - Containers;
(ggff) Subpart QQ - Surface Impoundments;
(hhgg) Subpart RR - Individual Drain Systems;
(iihh) Subpart SS - Closed Vent Systems, Control Devices, Recovery Devices and Routing to a Fuel Gas System or a Process;
(jjii) Subpart TT - Equipment Leaks - Control Level 1;
(kkjj) Subpart UU - Equipment Leaks - Control Level 2;
(llkk) Subpart VV - Oil-Water Separators and Organic-Water Separators;
(mmll) Subpart WW - Storage Vessels (Tanks) - Control Level 2;
(nn) Subpart XX - Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations;
(oomm) Subpart YY - Generic Maximum Achievable Control Technology Standards;
(ppnn) Subpart CCC - Steel Pickling - HCl Process Facilities and Hydrochloric Acid Regeneration Plants;
(qqoo) Subpart DDD - Mineral Wool Production;
(rrpp) Subpart EEE - Hazardous Waste Combustors;
(ssqq) Subpart GGG - Pharmaceuticals Production;
(ttrr) Subpart HHH - Natural Gas Transmission and Storage Facilities;
(uuss) Subpart III - Flexible Polyurethane Foam Production;
(vvtt) Subpart JJJ - Group IV Polymers and Resins;
(wwuu) Subpart LLL - Portland Cement Manufacturing ~~Facilities~~Industry;
(xxvv) Subpart MMM - Pesticide Active Ingredient Production;
(yyww) Subpart NNN - Wool Fiberglass Manufacturing;
(zzxx) Subpart OOO - Manufacture of Amino/Phenolic Resins;
(aaayy) Subpart PPP - Polyether Polyols Production;
(bbbzz) Subpart QQQ - Primary Copper Smelting;
(cccaaa) Subpart RRR - Secondary Aluminum Production;
(dddbbb) Subpart TTT - Primary Lead Smelting;

(~~eeeeee~~) Subpart UUU - Petroleum Refineries - Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur ~~Plant Units~~Recovery Units;
(~~fffddd~~) Subpart VVV - Publicly Owned Treatment Works;
(~~gggeee~~) Subpart XXX - Ferroalloys Production: Ferromanganese and Ssilicomanganese;
(hhh) Subpart AAAA - Municipal Solid Waste Landfills;
(~~iiifff~~) Subpart CCCC - Manufacturing of Nutritional Yeast;
(jjj) Subpart EEEE - Organic Liquids Distribution (non-gasoline);
(kkk) Subpart FFFF - Miscellaneous Organic Chemical Manufacturing;
(~~lllggg~~) Subpart GGGG - Solvent Extraction for Vegetable Oil Production;
(~~mmmhhh~~) Subpart HHHH - Wet Formed Fiberglass Mat Production;
(nnn) Subpart IIII - Surface Coating of Automobiles and Light-Duty Trucks;
(ooo) Subpart JJJJ - Paper and Other Web Coating;
(ppp) Subpart KKKK - Surface Coating of Metal Cans;
(qqq) Subpart MMMM - Surface Coating of Miscellaneous Metal Parts and Products;
(rrr) Subpart NNNN - Surface Coating of Large Appliances;
(sss) Subpart OOOO - Printing, Coating, and Dyeing of Fabrics and Other Textiles;
(ttt) Subpart PPPP - Surface Coating of Plastic Parts and Products;
(uuu) Subpart QQQQ - Surface Coating of Wood Building Products;
(vvv) Subpart RRRR - Surface Coating of Metal Furniture;
(~~wwwiii~~) Subpart SSSS - Surface Coating of Metal Ceoil ~~(Surface Coating)~~;
(~~xxxjjj~~) Subpart TTTT - Leather Finishing Operations;
(~~yyykkk~~) Subpart UUUU - Cellulose Production Manufacturing;
(~~zzzlll~~) Subpart VVVV - Boat Manufacturing;
(aaaa) Subpart WWWW - Reinforced Plastics Composites Production;
(bbbb) Subpart XXXX - Rubber Tire Manufacturing;
(cccc) Subpart YYYY - Stationary Combustion Turbines;
(dddd) Subpart ZZZZ - Reciprocating Internal Combustion Engines;
(eeee) Subpart AAAAA - Lime Manufacturing;
(ffff) Subpart BBBBB - Semiconductor Manufacturing;
(gggg) Subpart CCCCC - Coke Ovens: Pushing, Quenching & Battery Stacks;
(hhhh) Subpart EEEEE - Iron and Steel Foundries;
(iiii) Subpart FFFFF - Integrated Iron and Steel Manufacturing Facilities;
(jjjj) Subpart GGGGG - Site Remediation;
(kkkk) Subpart HHHHH - Misc. Coating Manufacturing;
(llll) Subpart IIIII - Mercury Cell Chlor-Alkali Plants;
(mmmm) Subpart JJJJJ - Brick and Structural Clay Products Manufacturing;
(nnnn) Subpart KKKKK - Clay Ceramics Manufacturing;
(oooo) Subpart LLLLL - Asphalt Processing & Asphalt Roofing Manufacturing;
(pppp) Subpart MMMMM - Flexible Polyurethane Foam Fabrication Operations;
(qqqq) Subpart NNNNN - Hydrochloric Acid Production;
(rrrr) Subpart PPPPP - Engine Tests Cells/Stands;
(ssss) Subpart QQQQQ - Friction Materials Manufacturing Facilities;
(tttt) Subpart RRRRR - Taconite Iron Ore Processing;
(uuuu) Subpart SSSSS - Refractory Products Manufacturing;
(vvvv) Subpart TTTTT - Primary Magnesium Refining.

[Publications: Publications referenced are available from the agency.]
Stat. Auth.: ORS 468.020
Stats. Implemented: ORS 468A.025
Hist.: [DEQ 16-1995, f. & cert. ef. 6-21-95; DEQ 28-1996, f. & cert. ef. 12-19-96; DEQ 18-1998, f. & cert. ef. 10-5-98]; [DEQ 18-1993, f. & cert. ef. 11-4-93; DEQ 32-1994, f. & cert. ef. 12-22-94]; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-032-0510, 340-032-5520; DEQ 11-2000, f. & cert. ef. 7-27-00; DEQ 15-2001, f. & cert. ef. 12-26-01; DEQ 4-2003, f. & cert. ef. 2-06-03

**340-244-0230**
**Accidental Release Prevention**
(1) List. For purposes of this rule, the Commission adopts by reference the list of regulated substances and thresholds for accidental release prevention codified at **40 CFR Part 68.130** ~~(July 1, 2002)~~ which includes the Department of Transportation Division 1.1 Explosive Standards List **(49 CFR 172.101). (Table 3).**
(2) Risk Management Plan. The owner or operator of a stationary source at which a substance listed in **Table 3** is present in greater than the threshold quantity must prepare and implement a written risk management plan to detect and prevent or minimize accidental releases, and to provide a prompt emergency response to any such releases in order to protect human health and the environment.
(3) Compliance. The owner or operator of a stationary source required to prepare and implement a risk management plan under section (2) of this rule must:
(a) Register the risk management plan with the EPA;
(b) Submit copies of the risk management plan to the U.S. Chemical Safety and Hazard Identification Board, the Department, and the Oregon Office of Emergency Management; and
(c) Submit as part of the compliance certification required under OAR 340-218-0080, annual certification to the Department that the risk management plan is being properly implemented.
(4) Compliance schedule:
(a) The owner or operator of a stationary source must prepare and implement a risk management plan under section (2) of this rule according to the schedule promulgated by the EPA;
(b) The owner or operator of a stationary source that adds a listed substance or exceeds the threshold must prepare and implement a risk management plan according to the schedule promulgated by the EPA.
[ED. NOTE: Tables referenced are available from the agency.]
[Publications: Publications referenced are available from the agency.]
Stat. Auth.: ORS 468.020 & ORS 468A.310
Stats. Implemented: ORS 468A.025
Hist.: DEQ 13-1993, f. & cert. ef. 9-24-93; DEQ 18-1993, f. & cert. ef. 11-4-93; DEQ 24-1994, f. & cert. ef. 10-28-94; DEQ 18-1998, f. & cert. ef. 10-5-98; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-032-5400; DEQ 11-2000, f. & cert. ef. 7-27-00; DEQ 15-2001, f. & cert. ef. 12-26-01; DEQ 4-2003, f. & cert. ef. 2-06-03

**TABLE 1**

| (OAR 340-244-0040)<br>LIST OF HAZARDOUS AIR POLLUTANTS | |
|---|---|
| **CAS Number** | **Chemical Name** |
| 75-07-0 | Acetaldehyde |
| 60-35-5 | Acetamide |
| 75-05-8 | Acetonitrile |
| 98-86-2 | Acetophenone |
| 53-96-3 | 2-Acetylaminofluorene |
| 107-02-8 | Acrolein |
| 79-06-1 | Acrylamide |
| 79-10-7 | Acrylic acid |
| 107-13-1 | Acrylonitrile |
| 8107-05-1 | Allyl chloride |
| 92-67-1 | 4-Aminobiphenyl |
| 62-53-3 | Aniline |
| 90-04-0 | o-Anisidine |
| 1332-21-4 | Asbestos |
| 71-43-2 | Benzene (including benzene from gasoline) |
| 92-87-5 | Benzidine |
| 98-07-7 | Benzotrichloride |
| 100-44-7 | Benzyl chloride |
| 92-52-4 | Biphenyl |
| 117-81-7 | Bis(2-ethylhexyl) phthalate |

| | |
|---|---|
| | (DEHP) |
| 542-88-1 | Bis(chloromethyl)ether |
| 75-25-2 | Bromoform |
| 106-99-0 | 1,3-Butadiene |
| 156-62-7 | Calcium cyanamide |
| 133-06-2 | Captan |
| 63-25-2 | Carbaryl |
| 75-15-0 | Carbon disulfide |
| 56-23-5 | Carbon tetrachloride |
| 463-58-1 | Carbonyl sulfide |
| 120-80-9 | Catechol |
| 133-90-4 | Chloramben |
| 57-74-9 | Chlordane |
| 7782-50-5 | Chlorine |
| 79-11-8 | Chloroacetic acid |
| 532-27-4 | 2-Chloroacetophenone ~~0.6~~ |
| 108-90-7 | Chlorobenzene |
| 510-15-6 | Chlorobenzilate |
| 67-66-3 | Chloroform |
| 107-30-2 | Chloromethyl methyl ether ~~0.1~~ |
| 126-99-8 | Chloroprene |
| 1319-77-3 | Cresols/Cresylic acid (isomers and mixture) |

| | |
|---|---|
| 95-48-7 | o-Cresol |
| 108-39-4 | m-Cresol |
| 106-44-5 | p-Cresol |
| 98-82-8 | Cumene |
| 94-75-7 | 2,4-D, salts and esters |
| 3547-04-4 | DDE |
| 334-88-3 | Diazomethane |
| 132-64-9 | Dibenzofurans |
| 96-12-8 | 1,2-Dibromo-3-chloropropane ~~0.008~~ |
| 84-74-2 | Dibutylphthalate |
| 106-46-7 | 1,4-Dichlorobenzene(p) ~~3.0~~ |
| 91-94-1 | 3,3-Dichlorobenzidene ~~0.2~~ |
| 111-44-4 | Dichloroethyl ether (Bis(2-chloroethyl)ether) |
| 542-75-6 | 1,3-Dichloropropene |
| 62-73-7 | Dichlorvos |
| 111-42-2 | Diethanolamine |
| 121-69-7 | N,N-Diethyl aniline (N,N-Dimethylaniline) |
| 64-67-5 | Diethyl sulfate |
| 119-90-4 | 3,3-Dimethoxybenzidine |
| 60-11-7 | Dimethyl aminoazobenzene |
| 119-93-7 | 3,3'-Dimethyl benzidine |

| | |
|---|---|
| 79-44-7 | Dimethyl carbamoyl chloride |
| 68-12-2 | Dimethyl formamide |
| 57-14-7 | 1,1-Dimethyl hydrazine |
| 131-11-3 | Dimethyl phthalate |
| 77-78-1 | Dimethyl sulfate |
| 534-52-1 | 4,6-Dinitro-o-cresol, and salts |
| 51-28-5 | 2,4-Dinitrophenol |
| 121-14-2 | 2,4-Dinitrotoluene |
| 123-91-1 | 1,4-Dioxane (1,4-Diethyleneoxide) |
| 122-66-7 | 1,2-Diphenylhydrazine |
| 106-89-8 | Epichlorohydrin (l-Chloro-2,3-epoxypropane) |
| 106-88-7 | 1,2-Epoxybutane |
| 140-88-5 | Ethyl acrylate |
| 100-41-4 | Ethyl benzene |
| 51-79-6 | Ethyl carbamate (Urethane) |
| 75-00-3 | Ethyl chloride (Chloroethane) |
| 106-93-4 | Ethylene dibromide (Dibromoethane) |
| 107-06-2 | Ethylene dichloride (1,2-Dichloroethane) |
| 107-21-1 | Ethylene glycol |
| 151-56-4 | Ethylene imine (Aziridine) |
| 75-21-8 | Ethylene oxide |

| | |
|---|---|
| 96-45-7 | Ethylene thiourea |
| 75-34-3 | Ethylidene dichloride (1,1-Dichloroethane) |
| 50-00-0 | Formaldehyde |
| 76-44-8 | Heptachlor |
| 118-74-1 | Hexachlorobenzene |
| 87-68-3 | Hexachlorobutadiene |
| 77-47-4 | Hexachlorocyclopentadiene |
| 67-72-1 | Hexachloroethane |
| 822-06-0 | Hexamethylene-1,6-diisocyanate |
| 680-31-9 | Hexamethylphosphoramide |
| 110-54-3 | Hexane |
| 302-01-2 | Hydrazine |
| 7647-01-0 | Hydrochloric acid |
| 7664-39-3 | Hydrogen fluoride (Hydrofluoric acid) |
| 123-31-9 | Hydroquinone |
| 78-59-1 | Isophorone |
| 58-89-9 | Lindane (all isomers) |
| 108-31-6 | Maleic anhydride |
| 67-56-1 | Methanol |
| 72-43-5 | Methoxychlor |
| 74-83-9 | Methyl bromide (Bromomethane) |
| 74-87-3 | Methyl chloride (Chloromethane) |

| | |
|---|---|
| 71-55-6 | Methyl chloroform (1,1,1-Trichloroethane) |
| 78-93-3 | Methyl ethyl ketone (2-Butanone) |
| 60-34-4 | Methyl hydrazine |
| 74-88-4 | Methyl iodide (Iodomethane) |
| 108-10-1 | Methyl isobutyl ketone (Hexone) |
| 624-83-9 | Methyl isocyanate |
| 80-62-6 | Methyl methacrylate |
| 1634-04-4 | Methyl tert butyl ether |
| 101-14-4 | 4,4-Methylene bis-(2-chloroaniline) |
| 75-09-2 | Methylene chloride (Dichloromethane) |
| 101-68-8 | Methylene diphenyl diisocyanate (MDI) |
| 101-77-9 | 4,4-Methylenedianiline |
| 91-20-3 | Naphthalene |
| 98-95-3 | Nitrobenzene |
| 92-93-3 | 4-Nitrobiphenyl |
| 100-02-7 | 4-Nitrophenol |
| 79-46-9 | 2-Nitropropane |
| 684-93-5 | N-Nitroso-N-methylurea |
| 62-75-9 | N-Nitrosodimethylamine |
| 59-89-2 | N-Nitrosomorpholine |
| 56-38-2 | Parathion |

| | |
|---|---|
| 82-68-8 | Pentachloronitrobenzene (Quintobenzene) |
| 87-86-5 | Pentachlorophenol |
| 108-95-2 | Phenol |
| 106-50-3 | p-Phenylenediamine |
| 75-44-5 | Phosgene |
| 7803-51-2 | Phosphine |
| 7723-14-0 | Phosphorus |
| 85-44-9 | Phthalic anhydride |
| 1336-36-3 | Polychlorinated biphenyls (Aroclors) |
| 1120-71-4 | 1,3-Propane sultone |
| 57-57-8 | beta-Propiolactone |
| 123-38-6 | Propionaldehyde |
| 114-26-1 | Propoxur (Baygon) |
| 78-87-5 | Propylene dichloride (1,2-Dichloropropane) |
| 75-56-9 | Propylene oxide |
| 75-55-8 | 1,2-Propylenimine (2-Methyl aziridine) |
| 91-22-5 | Quinoline |
| 106-51-4 | Quinone |
| 100-42-5 | Styrene |
| 96-09-3 | Styrene oxide |
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p- |

| | |
|---|---|
| | dioxin |
| 79-34-5 | 1,1,2,2-Tetrachloroethane |
| 127-18-4 | Tetrachloroethylene (Perchloroethylene) |
| 7550-45-0 | Titanium tetrachloride |
| 108-88-3 | Toluene |
| 95-80-7 | 2,4-Toluene diamine |
| 584-84-9 | 2,4-Toluene diisocyanate ~~0.1~~ |
| 95-53-4 | o-Toluidine |
| 8001-35-2 | Toxaphene (chlorinated camphene) |
| 120-82-1 | 1,2,4-Trichlorobenzene ~~10.0~~ |
| 79-00-5 | 1,1,2-Trichloroethane |
| 79-01-6 | Trichloroethylene |
| 95-95-4 | 2,4,5-Trichlorophenol |
| 88-06-2 | 2,4,6-Trichlorophenol |
| 121-44-8 | Triethylamine |
| 1582-09-8 | Trifluralin |
| 540-84-1 | 2,2,4-Trimethylpentane |
| 108-05-4 | Vinyl acetate |
| 593-60-2 | Vinyl bromide |
| 75-01-4 | Vinyl chloride |
| 75-35-4 | Vinylidene chloride (1,1-Dichloroethylene) ~~0.4~~ |
| 1330-20-7 | Xylenes (isomers and mixture) |

| | |
|---|---|
| 95-47-6 | o-Xylenes |
| 108-38-3 | m-Xylenes |
| 106-42-3 | p-Xylenes |
| 0 | Antimony Compounds |
| 0 | Arsenic Compounds (inorganic including arsine) |
| 0 | Beryllium Compounds ~~0.008~~ |
| 0 | Cadmium Compounds |
| 0 | Chromium Compounds |
| 0 | Cobalt Compounds |
| 0 | Coke Oven Emissions |
| 0 | Cyanide Compounds[1] |
| 0 | Glycol ethers[2] |
| 0 | Lead Compounds |
| 0 | Manganese Compounds |
| 0 | Mercury Compounds |
| 0 | Fine mineral fibers[3] |
| 0 | Nickel Compounds |
| 0 | Polycyclic Organic Matter[4] |
| 0 | Radionuclides (including radon)[5] |
| 0 | Selenium Compounds |

**NOTE:** ***For all listings above <u>that</u>~~which~~ contain the word "compounds" and for glycol ethers, the following applies:*** Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's infrastructure.

*1 X'CN where X = H' or any other group where a formal dissociation may occur. For example KCN or $Ca(CN)_2$

*2 Glycol ethers ~~i~~Includes~~s~~ mono- and di-~~-~~ethers of ethylene glycol, diethylene glycol, and triethylene glycol $R\text{-}(OCH_2CH_2)_n\text{-}OR'$.

Wwhere:

n = 1, 2, or 3;
R = alkyl C7 or less; or
R = phenyl or alk~~r~~yl substituted phenyl~~groups~~;
R' = ~~R,~~ H, or alkyl C7 or less; or
OR' consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.~~groups which, when removed, yield glycol ethers with the structure: $R\text{-}(OCH_2CH)_n\text{-}OH$. Polymers are excluded from the glycol category.~~

*3 Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.

*4 Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100°C.

*5 A type of atom which spontaneously undergoes radioactive decay.

Stat. Auth.: ORS 468 & 468A

Stats Implemented: ORS 468.020 and 468A.025.

Hist.: DEQ 13-1993, f. & cert. Ef. 9-24-93; DEQ 2-1996, f..& cert. Ef.1-2-96; DEQ 20-1997, f. & cert. Ef. 9-25-97

**TABLE 2**
**(OAR 340-244-0120)**

**LIST OF EARLY REDUCTIONS HIGH-RISK POLLUTANTS**

| CAS Number | Chemical Name | Weighing Factor |
|---|---|---|
| 53-96-3 | 2-Acetylaminofluorene | 100 |
| 107-02-8 | Acrolein | 100 |
| 79-06-1 | Acrylamide | 10 |
| ~~79-10-7~~ | ~~Acrylic acid~~ | ~~10~~ |

| | | |
|---|---|---|
| 107-13-1 | Acrylonitrile | 10 |
| 1332-21-4 | Asbestos | 100 |
| 71-43-2 | Benzene | 10 |
| 92-87-5 | Benzidine | 1000 |
| 542-88-1 | Bis(chloromethyl)ether | 1000 |
| 106-99-0 | 1,3-Butadiene | 10 |
| 57-74-9 | Chlordane | 100 |
| 532-27-4 | 2-Chloroacetophenone | 100 |
| 107-30-2 | Chloromethyl methyl ether | 10 |
| 334-88-3 | Diazomethane | 10 |
| 132-64-9 | Dibenzofurans | 10 |
| 96-12-8 | 1,2-Dibromo-3-chloropropane | 10 |
| 111-44-4 | Dichloroethyl ether (Bis(2-chloroethyl)ether) | 10 |
| 79-44-7 | Dimethylcarbamoyl chloride | 100 |
| 122-66-7 | 1,2-Diphenylhydrazine | 10 |
| 106-93-4 | Ethylene dibromide | 10 |
| 151-56-4 | Ethyleneimine (Aziridine) | 100 |
| 75-21-8 | Ethylene oxide | 10 |
| 76-44-8 | Heptachlor | 100 |
| 118-74-1 | Hexachlorobenzene | 100 |
| 77-47-4 | Hexachlorocyclopentadiene | 10 |

| | | |
|---|---|---|
| 302-01-2 | Hydrazine | 100 |
| ~~101-68-8~~ | ~~Methylene diphenyl diisocyanante (MDI)~~ | ~~10~~ |
| 60-34-4 | Methyl hydrazine | 10 |
| 624-83-9 | Methyl isocyanante | 10 |
| 62-75-9 | N-Nitrosodimethylamine | 100 |
| 684-93-5 | N-Nitroso-N-methylurea | 1000 |
| 56-38-2 | Parathion | 10 |
| 75-44-5 | Phosgene | 10 |
| 7803-51-2 | Phosphine | 10 |
| 7723-14-0 | Phosphorus | 10 |
| 75-55-8 | 1,2-Propylenimine | 100 |
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 100,000 |
| 8001-35-2 | Toxaphene (chlorinated camphene) | 100 |
| 75-01-4 | Vinyl chloride | 10 |
| 0 | Arsenic Compounds | 100 |
| 0 | Beryllium Compounds | 10 |
| 0 | Cadmium Compounds | 10 |
| 0 | Chromium Compounds | 100 |
| 0 | Coke Oven Emissions | 10 |
| 0 | Manganese Compounds | 10 |

| | | |
|---|---|---|
| 0 | Mercury Compounds | 100 |
| 0 | Nickel Compounds | 10 |

Stat. Auth.: ORS 468.020 & 468A.310

Stats Implemented: ORS 468A.310.

Hist.: DEQ 13-1993, f. & cert. Ef. 9-24-93; DEQ 24-1994, f. & cert. Ef. 10-28-94

**TABLE 3**
**(OAR 340-244-0230)**

**LIST OF REGULATED TOXIC AND FLAMMABLE SUBSTANCES FOR PURPOSES OF ACCIDENTAL RELEASE PREVENTION**

**Part A - Regulated Toxic Substances**

| CAS Number | Chemical Name | Threshold Quantity (lbs.) |
|---|---|---|
| 107-02-8 | Acrolein [2-Propenal] | 5,000 |
| 107-13-1 | Acrylonitrile [2-Propenenitrile] | 20,000 |
| 814-68-6 | Acrylyl chloride [2-Propenoyl chloride] | 5,000 |
| 107-18-6 | Allyl alcohol [2-Propen-1-ol] | 15,000 |
| 107-11-9 | Allylamine [2-Propen-1-amine] | 10,000 |
| 7664-41-7 | Ammonia (anhydrous) | 10,000 |
| 7664-41-7 | Ammonia (concentration 20% or greater) | 20,000 |
| 7784-34-1 | Arsenous trichloride | 15,000 |
| 7784-42-1 | Arsine | 1,000 |
| 10294-34-5 | Boron trichloride [Borane, trichloro-] | 5,000 |

| | | |
|---|---|---|
| 7637-07-2 | Boron trifluoride [Borane, trifluoro-] | 5,000 |
| 353-42-4 | Boron trifluoride compound with methyl ether (1:1) [Boron, trifluoro[oxybis[metane]]-, T-4- | 15,000 |
| 7726-95-6 | Bromine | 10,000 |
| 75-15-0 | Carbon disulfide | 20,000 |
| 7782-50-5 | Chlorine | 2,500 |
| 10049-04-4 | Chlorine dioxide [Chlorine oxide ($ClO_2$)] | 1,000 |
| 67-66-3 | Chloroform [Methane, trichloro-] | 20,000 |
| 542-88-1 | Chloromethyl ether [Methane, oxybis[chloro-]] | 1,000 |
| 107-30-2 | Chloromethyl methyl ether [Methane, chloromethoxy-] | 5,000 |
| 4170-30-3 | Crotonaldehyde [2-Butenal] | 20,000 |
| 123-73-9 | Crotonaldehyde, (E)- [2-Butenal, (E)-] | 20,000 |
| 506-77-4 | Cyanogen chloride | 10,000 |
| 108-91-8 | Cyclohexylamine [Cyclohexanamine] | 15,000 |
| 19287-45-7 | Diborane | 2,500 |
| 75-78-5 | Dimethyldichlorosilane [Silane, dichlorodimethyl-] | 5,000 |
| 57-14-7 | 1,1-Dimethylhydrazine [Hydrazine, 1,1-dimethyl-] | 15,000 |
| 106-89-8 | Epichlorohydrin [Oxirane, (chloromethyl)-] | 20,000 |
| 107-15-3 | Ethylenediamine [1,2-Ethanediamine] | 20,000 |
| 151-56-4 | Ethyleneimine [Aziridine] | 10,000 |

| | | |
|---|---|---|
| 75-21-8 | Ethylene oxide [Oxirane] | 10,000 |
| 7782-41-4 | Fluorine | 1,000 |
| 50-00-0 | Formaldehyde (solution) | 15,000 |
| 110-00-9 | Furan | 5,000 |
| 302-01-2 | Hydrazine | 15,000 |
| 7647-01-0 | Hydrochloric acid (concentration 37% or greater) | 15,000 |
| 74-90-8 | Hydrocyanic acid | 2,500 |
| 7647-01-0 | Hydrogen chloride (anhydrous) [Hydrochloric acid] | 5,000 |
| 7664-39-3 | Hydrogen fluoride/Hydrofluoric acid (concentration 50% or greater) [Hydrofluoric acid] | 1,000 |
| 7783-07~~3~~9-5~~3~~ | Hydrogen selenide | 500 |
| 7783-06-4 | Hydrogen sulfide | 10,000 |
| 13463-40-6 | Iron, pentacarbonyl- [Iron carbonyl (Fe9(CO)5), (TB-5-11)-] | 2,500 |
| 78-82-0 | Isobutyronitrile [Propanenitrile, 2-methyl-] | 20,000 |
| 108-23-6 | Isopropyl chloroformate [Carbonochloridic acid, 1-methylethyl ester] | 15,000 |
| 126-98-7 | Methacrylonitrile [2-Propenenitrile, 2-methyl-] | 10,000 |
| 74-87-3 | Methyl chloride [Methane, chloro-] | 10,000 |
| 79-22-1 | Methyl chloroformate [Carbonochloridic acid, methylester] | 5,000 |

| | | |
|---|---|---|
| 60-34-4 | Methyl hydrazine [Hydrazine, methyl-] | 15,000 |
| 624-83-9 | Methyl isocyanante [Methane, isocyanato-] | 10,000 |
| 74-93-1 | Methyl mercaptan [Methanethiol] | 10,000 |
| 556-64-9 | Methyl thiocyanate [Thiocyanic acid, methyl ester] | 20,000 |
| 75-79-6 | Methyltrichlorosilane [Silane, trichloromethyl-] | 5,000 |
| 13463-39-3 | Nickel carbonyl | 1,000 |
| 7697-37-2 | Nitric acid (concentration 80% or greater) | 15,000 |
| 10102-43-9 | Nitric oxide [Nitrogen oxide (NO)] | 10,000 |
| 8014-95-7 | Oleum (Fuming Sulfuric acid) [Sulfuric acid, mixture with sulfur trioxide][1] | 10,000 |
| 79-21-0 | Peracetic acid [Ethaneperoxoic acid] | 10,000 |
| 594-42-3 | Perchloromethylmercaptan [Methanesulfenyl chloride, trichloro-] | 10,000 |
| 75-44-5 | Phosgene [Carbonic dichloride] | 500 |
| 7803-51-2 | Phosphine | 5,000 |
| 10025-87-3 | Phosphorus oxychloride [Phosphoryl chloride] | 5,000 |
| 7719-12-2 | Phosphorus trichloride [Phosphorus trichloride] | 15,000 |
| 110-89-4 | Piperidine | 15,000 |
| 107-12-0 | Propionitrile [Propanenitrile] | 10,000 |
| 109-61-5 | Propyl chloroformate [Carbonochloridic acid, propylester] | 15,000 |

| | | |
|---|---|---|
| 75-55-8 | ~~1,2~~ Propyleneimine [Aziridine, 2-methyl-] | 10,000 |
| 75-56-9 | Propylene oxide [Oxirane, methyl-] | 10,000 |
| 7446-09-5 | Sulfur dioxide (anhydrous) | 5,000 |
| 7783-60-0 | Sulfur tetrafluoride [Sulfur fluoride (SF4), (T-4)-] | 2,500 |
| 7446-11-9 | Sulfur trioxide | 10,000 |
| 75-74-1 | Tetramethyllead [Plumbane, tetramethyl-] | 10,000 |
| 509-14-8 | Tetranitromethane [Methane, tetranitro-] | 10,000 |
| 7550-45-0 | Titanium tetrachloride [Titanium chloride ($TiCl_4$) (T-4)-] | 2,500 |
| 584-84-9 | Toluene 2,4-diisocyanate [Benzene, 2,4-diisocyanato-1-methyl-][1] | 10,000 |
| 91-08-7 | Toluene 2,6-diisocyanate [Benzene, 1,3-diisocyanato-2-methyl-][1] | 10,000 |
| 26471-62-5 | Toluene diisocyanate (unspecified isomer) [Benzene, 1,3-diisocyanatomethyl-][1] | 10,000 |
| 75-77-4 | Trimethylchlorosilane [Silane, chlorotrimethyl-] | 10,000 |
| 108-05-4 | Vinyl acetate monomer [Acetic acid ethenyl ester] | 15,000 |

[1] The mixture exemption in 40 CFR Part 68.115(b)(1) does not apply to the substance.

| TABLE 3<br>(OAR 340-244-0230)<br><br>LIST OF REGULATED TOXIC AND FLAMMABLE SUBSTANCES FOR PURPOSES OF ACCIDENTAL RELEASE PREVENTION | | |
|---|---|---|
| **Part B - Regulated Flammable Substances[1]** | | |
| **CAS Number** | **Chemical Name** | **Threshold Quantity (lbs.)** |
| 75-07-0 | Acetaldehyde | 10,000 |
| 74-86-2 | Acetylene [Ethyne] | 10,000 |
| 598-73-2 | Bromotrifluorethylene [Ethene, bromotrifluoro-] | 10,000 |
| 106-99-0 | 1,3-Butadiene | 10,000 |
| 106-97-8 | Butane | 10,000 |
| 106-98-9 | 1-Butene | 10,000 |
| 107-01-7 | 2-Butene | 10,000 |
| 25167-67-3 | Butene | 10,000 |
| 590-18-1 | 2-Butene-cis | 10,000 |
| 624-64-6 | 2-Butene-trans [2-Butene, (E)] | 10,000 |
| 463-58-1 | Carbon oxysulfide [Carbon oxide sulfide (COS)] | 10,000 |
| 7791-21-1 | Chlorine monoxide [Chlorine oxide] | 10,000 |
| 557-98-2 | 2-Chloropropylene [1-Propene, 2-chloro-] | 10,000 |
| 590-21-6 | 1-Chloropropylene [1-Propene, 1-chloro-] | 10,000 |
| 460-19-5 | Cyanogen [Ethanedinitrile] | 10,000 |

| | | |
|---|---|---|
| 75-19-4 | Cyclopropane | 10,000 |
| 4109-96-0 | Dichlorosilane [Silane, dichloro-] | 10,000 |
| 75-37-6 | Difluoroethane [Ethane, 1,1-difluoro-] | 10,000 |
| 124-40-3 | Dimethylamine [Methanamine, N-methyl-] | 10,000 |
| 463-82-1 | 2,2-Dimethylpropane [Propane, 2,2-dimethyl-] | 10,000 |
| 784-84-0 | Ethane | 10,000 |
| 107-00-6 | Ethyl acetylene [1-Butyne] | 10,000 |
| 75-04-7 | Ethylamine [Ethanamine] | 10,000 |
| 75-00-3 | Ethyl chloride [Ethane, chloro-] | 10,000 |
| 74-85-1 | Ethylene [Ethene] | 10,000 |
| 60-29-7 | Ethyl ether [Ethane, 1,1'-oxybis-] | 10,000 |
| 75-08-1 | Ethyl mercaptan [Ethanethiol] | 10,000 |
| 109-95-5 | Ethyl nitrite [Nitrous acid, ethyl ester] | 10,000 |
| 1333-74-0 | Hydrogen | 10,000 |
| 75-28-5 | Isobutane [Propane, 2-methyl] | 10,000 |
| 78-78-4 | Isopentane [Butane, 2-methyl-] | 10,000 |
| 78-79-5 | Isoprene [1,3-Butadiene, 2-methyl-] | 10,000 |
| 75-31-0 | Isopropylamine [2-Propanamine] | 10,000 |
| 75-29-6 | Isopropyl chloride [Propane, 2-chloro-] | 10,000 |
| 74-82-8 | Methane | 10,000 |
| 74-89-5 | Methylamine [Methanamine] | 10,000 |

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|---|---|---|
| 563-45-1 | 3-Methyl-1-butene | 10,000 |
| 563-46-2 | 2-Methyl-1-butene | 10,000 |
| 115-10-6 | Methyl ether [Methane, oxybis-] | 10,000 |
| 107-31-3 | Methyl formate [Formic acid, methyl ester] | 10,000 |
| 115-11-7 | 2-Methylpropene [1-Propene, 2-methyl-] | 10,000 |
| 504-60-9 | 1,3-Pentadiene | 10,000 |
| 109-66-0 | Pentane | 10,000 |
| 109-67-1 | 1-Pentene | 10,000 |
| 646-04-8 | 2-Pentene, (E)- | 10,000 |
| 627-20-3 | 2-Pentene, (Z)- | 10,000 |
| 463-49-0 | Propadiene [1,2-Propadiene] | 10,000 |
| 74-98-6 | Propane | 10,000 |
| 115-07-1 | Propylene [1-Propene] | 10,000 |
| 74-99-7 | Propyne [1-Propyne] | 10,000 |
| 7803-62-5 | Silane | 10,000 |
| 116-14-3 | Tetrafluoroethylene [Ethene, tetrafluoro-] | 10,000 |
| 75-76-3 | Tetramethylsilane [Silane, tetramethyl-] | 10,000 |
| 10025-78-2 | Trichlorosilane [Silane, trichloro-] | 10,000 |
| 79-38-9 | Trifluorochloroethylene [Ethene, chlorotrifluoro-] | 10,000 |
| 75-50-3 | Trimethylamine [Methanamine, N,N-dimethyl-] | 10,000 |

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|---|---|---|
| 689-97-4 | Vinyl acetate [1-Buten-3-yne] | 10,000 |
| 75-01-4 | Vinyl chloride [Ethene, chloro-] | 10,000 |
| 109-92-2 | Vinyl ethyl ether [Ethene, ethoxy-] | 10,000 |
| 75-02-5 | Vinyl fluoride [Ethene, fluoro-] | 10,000 |
| 75-35-4 | Vinylidene chloride [Ethene, 1,1-dichloro-] | 10,000 |
| 75-38-7 | Vinylidene fluoride [Ethene, 1,1-difluoro-] | 10,000 |
| 107-25-5 | Vinyl methyl ether [Ethene, methoxy-] | 10,000 |

*1 A flammable substance when used as a fuel or held for sale as a fuel at a retail facility is excluded from all provisions of 40 CFR part 68

Stat. Auth.: ORS 468.020 & 468A.310

Stat. Implemented: ORS 468A.025

Hist.: DEQ 13-1993, f. & cert. ef. 9-24-93; DEQ 18-1993, f. & cert. ef. 11-4-93; DEQ 24-1994, f. & ef. 10-28-94

Attachment B

## Summary of Public Comment and Agency Response

**RAI-082: Incorporation of National Emission Standards for Hazardous Air Pollutants (NESHAP), revisions of New Source Performance Standards (NSPS), and adoption of Title V Permitting Regulation Amendments:**
**Prepared by: Jerry Ebersole & Gregg Dahmen** **Date: September 27, 2004**

***Comment period*** The public comment period opened on August 16, 2004 and closed at 5:00 pm on September 24, 2004. DEQ held a public hearing on September 17, 2004, at 3:00 pm, at DEQ Headquarters office in Portland, in Room 3A. No one attended the public hearing. Six commenters submitted written comments.

***Organization of comments and responses*** Summaries of individual comments and the Department's responses are provided below. Comments are summarized in categories. The persons who provided each comment are referenced by number. A list of commenters and their reference numbers follows the summary of comments and responses.

| *Summary of Comments and Agency Responses* | | |
|---|---|---|
| ***Commenter*** | ***Comment*** | ***Response*** |
| ***1,2*** | These commenters are concerned about pollution caused by field burning in the Willamette Valley and associated health effects. | Even though field burning in Oregon is regulated by the Department of Agriculture, it is still of concern to the Department. Field burning, however, is not part of this rulemaking. |
| ***2*** | This commenter asks if there are plans in the works to eliminate wood burning stoves and implement air quality controls on cars and machinery. | Wood burning stoves and mobile sources are not part of this rulemaking. The Department does not currently plan to eliminate wood stoves. We do, however, have a woodstove program to promote the purchase of cleaner burning wood stoves and to help home owners burn wood more efficiently and with less pollution. Federal law already imposes numerous requirements on auto manufacturers that have significantly reduced emissions. The Department is also working with the Environmental Protection Agency (EPA) to reduce emissions from diesel engines. |
| ***3*** | This commenter is concerned that this rulemaking does not fully integrate Executive Order (EO) 12898. The commenter feels that if these rules are to "keep state standards consistent with federal requirements" then they should | EO 12898, entitled 'Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populated', requires federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority |

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| | be consistent with the spirit and intent of EO 12898. | populations and low-income populations. The NESHAP and NSPS programs are cited in EPA's Environmental Justice action plan as part of EPA's overall strategy to achieve environmental justice. |
| ***3*** | The commenter does not believe the proposed rules go far enough because they do not capture all emitters of hazardous chemicals, do not capture all hazardous chemicals, do not support citizen monitoring, and do not provide for adequate cleanup. | This rulemaking proposes to adopt by reference 36 new NESHAPs. These new NESHAPs are in addition to the 70 or so existing NESHAPs. The EPA estimates the NESHAP program will reduce hazardous air pollutant emissions by more than 2.5 million tons per year nationally. In addition, EPA is required to assess the risk to the public posed by NESHAP affected sources after those sources are in compliance with the applicable NESHAP(s). Based on these assessments, the EPA may amend certain NESHAPs to ensure that those NESHAPs provide adequate protection for the public. |
| ***3*** | The commenter is concerned that the proposed rules do not go far enough to protect people of color from disproportionate impacts of hazardous air borne emissions, and may be laying the foundation for a violation of Title VI of the 1964 Civil Rights Act. | The NESHAP and NSPS programs are cited in EPA's Environmental Justice action plan to achieve environmental justice. Therefore, these rules are part of a plan to protect people of color from disproportionate impacts of hazardous air borne emissions |
| ***4,6*** | These commenters question the basis for the proposed change to the definition of glycol ether found in OAR 340-244-0040. | EPA changed the definition of glycol ethers on August 2, 2000:<br><br>http://www.epa.gov/ttn/atw/fr02au00.html |
| ***5*** | EPA made the following comments:<br>• OAR 340-218-0080(6)(c)(C): The last sentence should reference 40 CFR part 64, as well as DEQ's version of it (OAR 340-200-0020) because 40 CFR part 64 applies directly to sources in Oregon.<br>• OAR 340-244-0220(4): The titles for some of the subparts have minor differences in wording in the title adopted when compared to the title | The requested changes have been made. |

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| | adopted in the Code of Federal Regulations (CFR).<br>• There are a few other minor typos in these titles. | |

| ***List of Commenters and Reference Numbers*** | | | | |
|---|---|---|---|---|
| **Commenter** | **Name** | **Organization** | **Address** | **Date on comments** |
| 1 | Frank & Carol Hamel | | 167 Cascade Hwy NE<br>Salem, OR 97301-9025 | 9/3/2004 |
| 2 | Chuck & Sue Cammack | | P.O. Box 1452<br>Albany, OR 97321 | 9/3/2004 |
| 3 | Robert Collin | Willamette University | 302 Smullin Hall<br>Public Policy Research Ctr<br>900 State Street<br>Salem, OR 97301 | 9/8/2004 |
| 4 | Thomas R. Wood | Stoel Rives LLP | 900 SW 5th Avenue<br>Suite 2600<br>Portland, OR 97204 | 9/13/2004 |
| 5 | Jeff KenKnight | US EPA<br>Region X | 1200 Sixth Avenue<br>Seattle, WA 98101 | 9/23/2004 |
| 6 | Kathryn VanNatta | Northwest Pulp and Paper Association | | 9/24/2004 |

**State of Oregon**
**Department of Environmental Quality** **Memorandum**

Date: September 20, 2004

To: Environmental Quality Commission

From: Gregg Dahmen, Air Quality Program Department

Subject: Presiding Officer's Report for Rulemaking Hearing
Title of Proposal: **RAI-082: Incorporation of National Emission Standards for Hazardous Air Pollutants (NESHAP), revisions of New Source Performance Standards (NSPS), and adoption of Title V Permitting Regulation Amendments**
Hearing Date and Time: September 17, 2004 at 3:00 PM PDT
Hearing Location: DEQ Headquarters Building, Room 3A
Portland, Oregon

The Department convened the rulemaking hearing on the proposal referenced above at 3:10 PM after no one showed up. Additional time was allotted for possible late arrivals, and the hearing was closed at 3:40 PM.

No people attended the hearing; no people testified.

Attending for the Department of Environmental Quality were the Hearing Officer, Gregg Dahmen, and the lead rule writer, Jerry Ebersole.

**Attachment D**

**DEPARTMENT OF ENVIRONMENTAL QUALITY**
**Chapter 340**
**Proposed Rulemaking**
**STATEMENT OF NEED AND FISCAL AND ECONOMIC IMPACT**

| | |
|---|---|
| **Title of Proposed Rulemaking:** | **RAI-082: Incorporation of National Emission Standards for Hazardous Air Pollutants (NESHAP), revisions of New Source Performance Standards (NSPS), and adoption of Title V Permitting Regulation Amendments.**<br><br>Amend Oregon Administrative Rules (OARs):<br>340-200-0020, **General Air Quality Definitions;**<br>340-200-0040, **State of Oregon Clean Air Act Implementation Plan**<br>340-218-0080, **Compliance Requirements;**<br>340-230-0030, **Definitions;**<br>340-230-0410, **Emission Limitations and Citations;**<br>340-238-0040, **Definitions;**<br>340-238-0060, **Federal Regulations Adopted by Reference;**<br>340-244-0030, **Definitions;**<br>340-244-0040, **List of Hazardous Air Pollutants;**<br>340-244-0120, **General Provisions for Compliance Extensions;**<br>340-244-0210, **Emissions Limitation for Existing Sources;**<br>340-244-0220, **Federal Regulations Adopted by Reference;**<br>340-244-0230, **Accidental Release Prevention** |
| **Need for the Rule(s)** | The Environmental Protection Agency (EPA) has changed its NSPS, NESHAP and Title V regulations. The proposed adoption of these changes will make Oregon's rules consistent with EPA's so that the Department can implement and keep its delegation of these regulations which benefits industrial sources. These benefits include quicker approval of applicability determination requests and alternative testing, monitoring, recordkeeping and reporting requests. Adopting the NESHAP standards allows the Department to ensure that the required hazardous air pollutant emission reductions are achieved in the state. |
| **Documents Relied Upon for Rulemaking** | The Department relied primarily on the Federal Register (FR), the Code of Federal Regulations (CFR), and the Oregon Revised Statues (ORS), in developing this rulemaking proposal. |
| **Fiscal and Economic Impact** | |
| **Overview** | Federal NSPSs and NESHAPs apply to affected sources whether or not the Environmental Quality Commission (EQC) adopts these rules. EPA addressed the economic impact of the NSPSs and NESHAPs when it adopted the federal regulations.<br><br>ORS 183.335(2)(b)(G) requests public comment on whether other options should be considered for achieving the rule's substantive goals while reducing negative economic impact of the rule on business. |
| **General public** | The costs associated with the proposed rules do not adversely impact the general public. The only costs to the general public would be possible pass-through costs to customers, but the cost to any given customer is assumed to be negligible. |
| **Small Business** | The new NESHAPs and the revisions to the existing NSPSs and NESHAPs affect small businesses. NSPS and NESHAP standards apply to affected sources when they are promulgated by the EPA. By adopting the NSPSs and NESHAPs by reference, this rulemaking does not add any new requirements. Therefore, these rules are not expected to add any costs to any small business.<br><br>Small businesses in Oregon may be subject to the following new NESHAP standards: Reinforced Plastic Composite Manufacturing, Site Remediation, Paper and Other Web, Metal Cans, Misc. Metal Parts and Products, Plastic Parts, Wood Building Products, and Metal Furniture. |
| **Large Business** | Large businesses can be either non-major sources or major sources of Hazardous Air Pollutants (HAPs), and the Department's rules require that non-major sources subject to either a NSPS or NESHAP obtain an Air Contaminant Discharge Permit (ACDP). The Department's rules require major sources to have a Title V permit. All sources affected by these rules already have permits, and this rulemaking will result in conditions being added to existing Title V and ACDP permits. Implementing the NSPS and NESHAPs through existing permits will not add additional fees or permitting costs. |

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| | As previously stated, the NSPSs and NESHAPs apply to affected sources when EPA adopts them. By adopting the NSPS and NESHAP standards by reference, this rulemaking does not add any new control requirements. Therefore, these rules are not expected to add any capital or operating costs to any large business.<br><br>Large businesses in Oregon may be subject to the following new NESHAP standards: Asphalt Processing and Asphalt Roofing Manufacturing, Combustion Turbines, Metal Cans, Metal Furniture, Misc. Metal Parts and Products, Misc. Organic Chemical Production and Processes, Paper and Other Web, Plastic Parts, Reciprocating Internal Combustion Engines, Site Remediation, and Wood Building Products.<br><br>Businesses that are major sources of HAPs already have Title V permits. OAR 340-218-0200(1)(a)(A) requires the incorporation of new federal requirements into existing Title V permits not later than 18 months after promulgation by the EPA or upon renewal if less than 3 years remains on the permit on the promulgation date. |
| **Local Government** | Local government agencies may be affected directly or indirectly by the new NESHAPs rules affecting Municipal Solid Waste Landfills and Site Remediation. Local government agencies may also be affected since they may operate/own facilities in categories included in the rule revisions. Affected local government agencies, however, are already subject to these rules whether the Department adopts them or not. Therefore, these rules are not expected to add any costs to any local government agency. |
| **State Agencies** | The Department does not anticipate any fiscal or economic impacts from this proposed rulemaking on other state agencies. |
| **DEQ** | This rulemaking in and of itself does not incur increased costs for the Department. The work associated with modifying permits and defining compliance requirements occurs without regard to this rulemaking because the requirements are in effect whether or not the Department adopts them. |
| **Other agencies** | Other government agencies may be affected directly or indirectly by the new NESHAPs rules affecting Municipal Solid Waste Landfills and Site Remediation. Other government agencies may also be affected because they may operate/own facilities in categories included in the rule revisions. Affected government agencies, however, are already subject to these rules whether the Department adopts them or not. Therefore, these rules are not expected to add any costs to any government agency. |
| **Assumptions** | None. EPA already adopted the rules. The EPA determined cost impacts of these rules during its rulemaking process. |
| **Housing Costs** | The Department has determined that this proposed rulemaking will have no effect on the cost of development of a 6,000 square foot parcel and the construction of a 1,200 square foot detached single family dwelling on that parcel. |
| **Administrative Rule Advisory Committee** | An Advisory Committee was not needed for this rulemaking because the proposed rules have already been adopted by the EPA. The rules were developed with full input from environmental groups, industry, and state and local agencies. |

| Prepared by | Printed name | Date |
|---|---|---|
| J R Ruyo | Jim Roys | 12-16-2004 |
| Approved by DEQ Budget Office | Printed name | Date |

Attachment E

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

# Rulemaking Proposal
for
**RAI-082: Incorporation of National Emission Standards for Hazardous Air Pollutants (NESHAP), revisions of New Source Performance Standards (NSPS), and adoption of Title V Permitting Regulation Amendments**

# Land Use Evaluation Statement

1. **Explain the purpose of the proposed rules.**

   The U.S. Environmental Protection Agency (EPA) recently adopted NESHAPs for thirty-six new source categories. The Oregon Department of Environmental Quality (Department) proposes that the Environmental Quality Commission (EQC) adopt, by reference, these new NESHAP rules and update the adoption by reference of existing NSPS and NESHAP rules by adopting changes through July 1, 2004. The Department also proposes that the EQC adopt changes the EPA made to regulations applicable to the Department's Title V permitting program.

2. **Do the proposed rules affect existing rules, programs or activities that are considered land use programs in the DEQ State Agency Coordination (SAC) Program?**

   **Yes X No ___**

   a. **If yes, identify existing program/rule/activity:**

      The issuance of air permits is a DEQ Land Use Program. The Department will implement the proposed NSPS and NESHAPs for major source categories through the Department's Title V Operating Permit Program and the NSPS and NESHAPs for non-major source categories through the Department's Air Contaminant Discharge Permit (ACDP) Program.

   b. **If yes, do the existing statewide goal compliance and local plan compatibility procedures adequately cover the proposed rules?**

      **Yes X No___ (if no, explain):**

The Department will implement these rules through the ACDP and Title V permitting programs. Currently, cities and counties must provide a Land Use Compatibility Statement approval before the Department issues these permits or approves a Notice of Construction.

**c. If no, apply the following criteria to the proposed rules.**

Not applicable.

**In the space below, state if the proposed rules are considered programs affecting land use. State the criteria and reasons for the determination.**

Not applicable.

**3. If the proposed rules have been determined a land use program under 2. above, but are not subject to existing land use compliance and compatibility procedures, explain the new procedures the Department will use to ensure compliance and compatibility.**

Not applicable.

| | | |
|---|---|---|
| Division | Intergovernmental Coord. | 12-15-04<br>Date |

# Relationship to Federal Requirements

Rulemaking Proposal

for

**RAI-082: Incorporation of National Emission Standards for Hazardous Air Pollutants (NESHAP), revisions of New Source Performance Standards (NSPS), and adoption of Title V Permitting Regulation Amendments**

**Answers to the following questions identify how the proposed rulemaking relates to federal requirements and potential justification for differing from federal requirements. The questions are required by OAR 340-011-0029.**

**1. Are there federal requirements that are applicable to this situation? If so, exactly what are they?**

Yes. This rulemaking involves adopting federal rules by reference. The federal Clean Air Act requires that the Environmental Quality Commission (EQC) adopt certain federal requirements by reference or develop equivalent regulations in order to maintain delegation of the Title V program.

**2. Are the applicable federal requirements performance based, technology based, or both with the most stringent controlling?**

Yes, in each of the rules adopted, the most stringent control method was chosen by the Environmental Protection Agency (EPA) when there was an option.

**3. Do the applicable federal requirements specifically address the issues that are of concern in Oregon? Was data or information that would reasonably reflect Oregon's concern and situation considered in the federal process that established the federal requirements?**

Yes. The federal requirements address control of criteria pollutants and hazardous air pollutants of concern. EPA considered data and information representative of human health and environmental effects of criteria pollutants, hazardous air pollutants, and available emission control technology during its rulemaking. In addition, when it develops the NESHAP, the EPA requests information from all sources in a given source category. Therefore, when it developed the NESHAPs, EPA used information on Oregon sources.

**4. Will the proposed requirement improve the ability of the regulated community to comply in a more cost effective way by clarifying confusing or potentially conflicting requirements (within or cross-media), increasing certainty, or preventing or reducing the need for costly retrofit to meet more stringent requirements later?**

This rulemaking will avoid conflicting or confusing requirements by making the Department's rules consistent with EPA's rules.

**5. Is there a timing issue which might justify changing the time frame for implementation of federal requirements?**

No. The regulations as adopted by EPA are currently being implemented.

**6. Will the proposed requirement assist in establishing and maintaining a reasonable margin for accommodation of uncertainty and future growth?**

Not applicable

**7. Does the proposed requirement establish or maintain reasonable equity in the requirements for various sources? (level the playing field)**

Yes. This rulemaking involves adopting national standards that apply to all sources in the country in a given source category.

**8. Would others face increased costs if a more stringent rule is not enacted?**

This rulemaking is an adoption of federal requirements by reference. The Department has not considered adopting standards that are more stringent than the federal requirements.

**9. Does the proposed requirement include procedural requirements, reporting or monitoring requirements that are different from applicable federal requirements? If so, Why? What is the "compelling reason" for different procedural, reporting or monitoring requirements?**

No. This rulemaking is an adoption of federal requirements by reference.

**10. Is demonstrated technology available to comply with the proposed requirement?**

Yes. NESHAP and NSPS standards are based on the best controlled sources in a given source category. In other words the technologies needed to comply with the NESHAP and NSPS standards are currently being used by at least one source and usually more. Rarely are NESHAP and NSPS standards established based on unproven technologies.

**11. Will the proposed requirement contribute to the prevention of pollution or address a potential problem and represent a more cost effective environmental gain?**

Yes. This rulemaking is an adoption by reference of federal requirements that prevent pollution. The Department has not considered adopting standards that differ from the federal requirements and expects the same gain.

**RAI-082: New and Amended NESHAPs Proposed for EQC Adoption**

| Subpart | Source Category | Oregon Affected Sources | EPA Promulgated | | Last DEQ Adoption | | | Subsequent EPA Revisions | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Covered EPA Revisions Through | | | |
| | | | Date | FR Citation | Date | Date | FR Citation | Date | FR Citation |
| **PART 61** | | | | | | | | | |
| A | General Provisions | 0 | 4/6/1973 | 38 FR 8826 | 7/1/2002 | 12/14/2000 | 65 FR 78280 | 9/9/2002 | 67 FR 57166 |
| | | | | | | | | 10/7/2002 | 67 FR 62399 |
| | | | | | | | | 5/28/2003 | 68 FR 31615 |
| | | | | | | | | 6/17/2003 | 68 FR 35792 |
| | | | | | | | | 12/11/2003 | 68 FR 69043 |
| | | | | | | | | 3/26/2004 | 68 FR 15693 |
| B | Radon Emissions from Underground Storage Tanks | 0 | 12/15/1989 | 54 FR 51694 | 7/1/2002 | | | | |
| C | Beryllium | 0 | 4/6/1973 | 38 FR 8826 | 7/1/2002 | 11/7/1985 | 50 FR 46294 | | |
| D | Beryllium Rocket Motor Firing | 0 | 4/6/1973 | 38 FR 8826 | 7/1/2002 | 11/7/1985 | 50 FR 46294 | | |
| E | Mercury | 1 | 4/6/1973 | 38 FR 8826 | 7/1/2002 | 9/23/1988 | 53 FR 36972 | | |
| F | Vinyl Chloride | 0 | 10/21/1976 | 41 FR 46564 | 7/1/2002 | 12/23/1992 | 57 FR 60999 | | |
| I | Radionuclide Emissions from Federal Facilities Other than Nuclear Regulatory Comission Licensee and Not Covered by Subpart H | 0 | 12/15/1989 | 54 FR 51697 | 7/1/2002 | 12/30/1996 | 61 FR 68981 | | |
| J | Equipment Leaks (Fugitive Emission Sources) of Benzene | | 6/6/1984 | 49 FR 23513 | 7/1/2002 | 12/14/2000 | 65 FR 78280 | | |
| L | Benzene Emissions from Coke By-Product Recovery Plants | 0 | 9/14/1989 | 54 FR 38073 | 7/1/2002 | 2/12/1999 | 64 FR 7467 | | |
| N | Inorganic Arsenic Emissions from Glass Manufacturing Plants | 0 | 8/4/1986 | 51 FR 28025 | 7/1/2002 | 2/12/1999 | 64 FR 7467 | | |
| O | Inorganic Arsenic Emissions from Primary Copper Smelters | 0 | 8/4/1986 | 51 FR 28029 | 7/1/2002 | 5/31/1990 | 55 FR 22027 | | |
| P | Inorganic Arsenic Emissions from Arsenic Trioxide and Metal Arsenic Facilities | 0 | 8/4/1986 | 51 FR 28033 | 7/1/2002 | 10/3/1986 | 51 FR 35355 | | |
| V | Equipment Leaks (Fugitive Emission Sources) | 0 | 6/6/1984 | 49 FR 23513 | 7/1/2002 | 12/14/2000 | 65 FR 78280 | | |
| Y | Benzene Emissions from Benzene Storage Vessels | 0 | 9/14/1989 | 54 FR 38077 | 7/1/2002 | 12/14/2000 | 65 FR 78283 | | |
| FF | Benzene Waste Operations | 0 | 3/7/1990 | 55 FR 8346 | 7/1/2002 | 1/7/1993 | 58 FR 3095 | 11/12/2002 | 67 FR 68527 |
| | | | | | | | | 2/6/2003 | 68 FR 6082 |
| | | | | | | | | 12/4/2003 | 68 FR 67935 |



Attachment G

**Attachment G**

**RAI-082: New and Amended NESHAPs Proposed for EQC Adoption**

| Subpart | Source Category | Oregon Affected Sources | EPA Promulgated | | Last DEQ Adoption | | | Subsequent EPA Revisions | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Covered EPA Revisions Through | | | |
| | | | Date | FR Citation | Date | Date | FR Citation | Date | FR Citation |
| **PART 63** | | | | | | | | | |
| A | General Provisions | N/A | 3/16/1994 | 59 FR 12430 | 7/1/2002 | 6/10/2002 | 67 FR 39811 | 7/23/2002 | 67 FR 48262 |
| | | | | | | | | 9/16/2002 | 67 FR 58342 |
| | | | | | | | | 12/4/2002 | 67 FR 72341 |
| | | | | | | | | 2/18/2003 | 68 FR 7713 |
| | | | | | | | | 4/21/2003 | 68 FR 19402 |
| | | | | | | | | 5/6/2003 | 68 FR 23898 |
| | | | | | | | | 5/20/2003 | 68 FR 27663 |
| | | | | | | | | 5/23/2003 | 68 FR 28619 |
| | | | | | | | | 5/27/2003 | 68 FR 28785 |
| | | | | | | | | 5/28/2003 | 68 FR 31615 |
| | | | | | | | | 5/28/2003 | 68 FR 31760 |
| | | | | | | | | 5/29/2003 | 68 FR 32188 |
| | | | | | | | | 5/30/2003 | 68 FR 32600 |
| | | | | | | | | 6/17/2003 | 68 FR 35792 |
| | | | | | | | | 12/19/2003 | 68 FR 70965 |
| | | | | | | | | 1/2/2004 | 69 FR 157 |
| | | | | | | | | 2/3/2004 | 69 FR 5063 |
| | | | | | | | | 4/19/2004 | 69 FR 20990 |
| | | | | | | | | 4/26/2004 | 69 FR 22623 |
| | | | | | | | | 6/15/2004 | 69 FR 33506 |
| F | Synthetic Organic Chemical Manufacturing Industry (SOCMI) | 0 | 4/22/1994 | 59 FR 19454 | 7/1/2002 | 1/22/2001 | 66 FR 6927 | 6/23/2003 | 68 FR 37344 |
| G | SOCMI - Process Vents, Storage Vessels, Transfer Operations, and Wastewater | 0 | 4/22/1994 | 59 FR 19468 | 7/1/2002 | 1/22/2001 | 66 FR 6929 | 6/23/2003 | 68 FR 37344 |
| H | SOCMI - Equipment Leaks | 0 | 4/22/1994 | 59 FR 19568 | 7/1/2002 | 1/22/2001 | 66 FR 6936 | 6/23/2003 | 68 FR 37345 |
| I | Certain Processes Subject to the Negotiated Regulations for Equipment Leaks | 0 | 4/22/1994 | 59 FR 19587 | 7/1/2002 | 1/17/1997 | 62 FR 2792 | 6/23/2003 | 68 FR 37345 |
| J | **Polyvinyl Chloride and Copolymers Production** | 0 | 7/10/2002 | 67 FR 45892 | | | | | |
| L | Coke Oven Batteries | 0 | 10/27/1993 | 58 FR 57911 | 7/1/2002 | 10/17/2000 | 65 FR 62215 | 6/23/2003 | 68 FR 37345 |
| M | Perchloroethylene Dry Cleaning* | 319 | 9/22/1993 | 58 FR 49376 | 7/1/2002 | 12/14/1999 | 64 FR 69643 | 6/23/2003 | 68 FR 37347 |
| N | Hard and Decorative Chromium Electroplating and Chromium Anodizing* | 23 | 1/25/1995 | 60 FR 4963 | 7/1/2002 | 12/14/1999 | 64 FR 69643 | 6/23/2003 | 68 FR 37347 |
| O | Ethylene Oxide Sterilization* | 1 | 12/6/1994 | 59 FR 62589 | 7/1/2002 | 11/2/2001 | 66 FR 55582 | 6/23/2003 | 68 FR 37348 |
| Q | Industrial Process Cooling Towers | 0 | 9/8/1994 | 59 FR 46350 | 7/1/2002 | 7/23/1998 | 63 FR 39519 | 6/23/2003 | 68 FR 37348 |
| R | Gasoline Distribution Facilities | 0 | 12/14/1994 | 59 FR 64318 | 7/1/2002 | 1/16/1998 | 63 FR 2630 | 6/23/2003 | 68 FR 37348 |
| | | | | | | | | 12/19/2003 | 68 FR 70965 |

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| Subpart | Source Category | Oregon Affected Sources | EPA Promulgated | | Last DEQ Adoption | | | Subsequent EPA Revisions | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Covered EPA Revisions Through | | | |
| | | | Date | FR Citation | Date | Date | FR Citation | Date | FR Citation |
| S | Pulp and Paper Industry | 5 | 4/15/1998 | 63 FR 18616 | 7/1/2002 | 5/14/2001 | 66 FR 24269 | 6/23/2003 | 68 FR 37348 |
| | | | | | | | | 4/13/2004 | 69 FR 19740 |
| T | Halogenated Solvent Cleaning* | 17 | 12/2/1994 | 59 FR 61805 | 7/1/2002 | 9/8/2000 | 65 FR 54422 | 6/23/2003 | 68 FR 37349 |
| U | Group I Polymers and Resins | 0 | 9/5/1996 | 61 FR 46924 | 7/1/2002 | 7/16/2001 | 66 FR 36927 | 6/23/2003 | 68 FR 37349 |
| W | Epoxy Resins Production and Non-Nylon Polyamides Production | 0 | 3/8/1995 | 60 FR 12676 | 7/1/2002 | 7/6/2000 | 65 FR 41594 | 6/23/2003 | 68 FR 27350 |
| | | | | | | | | | |
| X | Secondary Lead Smelting* | 0 | 6/23/1995 | 60 FR 32594 | 7/1/2002 | 12/14/1999 | 64 FR 69643 | 6/23/2003 | 68 FR 37350 |
| Y | Marine Tank Loading Operations | 0 | 9/15/1995 | 60 FR 48399 | 7/1/2002 | | | 6/23/2003 | 68 FR 37350 |
| AA | Phosphoric Acid Manufacturing | 0 | 6/10/1999 | 64 FR 31376 | 7/1/2002 | 6/13/2002 | 67 FR 40817 | 6/23/2003 | 68 FR 37351 |
| BB | Phosphate Fertilizer Production | 0 | 6/10/1999 | 64 FR 31382 | 7/1/2002 | 6/13/2002 | 67 FR 40817 | 6/23/2003 | 68 FR 37351 |
| | | | | | | | | | |
| CC | Petroleum Refineries | 0 | 8/18/1995 | 60 FR 43260 | 7/1/2002 | 7/6/2000 | 65 FR 41594 | 6/23/2003 | 68 FR 37351 |
| DD | Off-Site Waste and Recovery | 0 | 7/1/1996 | 61 FR 34158 | 7/1/2002 | 1/8/2001 | 66 FR 1266 | 6/23/2003 | 68 FR 37351 |
| EE | Magnetic Tape Manufacturing | 0 | 12/15/1994 | 59 FR 64596 | 7/1/2002 | 4/9/1999 | 64 FR 17464 | 6/23/2003 | 68 FR 37352 |
| GG | Aerospace Manufacturing and Rework | 0 | 9/1/1995 | 60 FR 45956 | 7/1/2002 | 12/8/2000 | 65 FR 76945 | 6/23/2003 | 68 FR 37352 |
| | | | | | | | | | |
| HH | Oil and Natural Gas Production | 0 | 6/17/1999 | 64 FR 32628 | 7/1/2002 | 6/29/2001 | 66 FR 34550 | 6/23/2003 | 68 FR 37353 |
| II | Shipbuilding and Ship Repair (Surface Coating) | 2 | 12/15/1995 | 60 FR 64336 | 7/1/2002 | 10/17/2000 | 65 FR 62215 | 6/23/2003 | 68 FR 37353 |
| | | | | | | | | | |
| JJ | Wood Furniture Manufacturing | 8 | 12/7/1995 | 60 FR 62936 | 7/1/2002 | 12/28/1998 | 63 FR 71380 | 6/23/2003 | 68 FR 37353 |
| KK | Printing and Publishing | 0 | 5/30/1996 | 61 FR 27140 | 7/1/2002 | | | 6/23/2003 | 68 FR 37354 |
| LL | Primary Aluminum Reduction | 2 | 10/7/1997 | 62 FR 52407 | 7/1/2002 | | | 6/23/2003 | 68 FR 37354 |
| MM | Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills | 5 | 1/12/2001 | 66 FR 3193 | 7/1/2002 | 7/19/2001 | 66 FR 37593 | 2/18/2003 | 68 FR 7713 |
| | | | | | | | | 5/8/2003 | 68 FR 24653 |
| | | | | | | | | 7/18/2003 | 68 FR 42605 |
| | | | | | | | | 8/5/2003 | 68 FR 46108 |
| | | | | | | | | 12/5/2003 | 68 FR 67954 |
| | | | | | | | | 5/6/2004 | 69 FR 25353 |
| OO | Tanks - Level 1 | N/A | 7/1/1996 | 61 FR 34184 | 7/1/2002 | 7/20/1999 | 64 FR 38985 | 6/23/2003 | 68 FR 37354 |
| PP | Containers | N/A | 7/1/1996 | 61 FR 34186 | 7/1/2002 | 1/8/2001 | 66 FR 1267 | 6/23/2003 | 68 FR 37355 |
| QQ | Surface Impoundments | N/A | 7/1/1996 | 61 FR 34190 | 7/1/2002 | 7/20/1999 | 64 FR 38988 | 6/23/2003 | 68 FR 37355 |
| RR | Individual Drain Systems | N/A | 7/1/1996 | 61 FR 34193 | 7/1/2002 | 1/8/2001 | 66 FR 1267 | 6/23/2003 | 68 FR 37355 |
| SS | Closed Vent Systems, Control Devices, Recovery Devices and Routing to a Fuel Gas System or a | N/A | 6/29/1999 | 64 FR 34866 | 7/1/2002 | 11/22/1999 | 64 FR 63704 | 7/12/2002 | 67 FR 46277 |
| | | | | | | | | | |
| | | | | | | | | | |
| TT | Equipment Leaks - Control Level 1 | N/A | 6/29/1999 | 64 FR 34886 | 7/1/2002 | 11/22/1999 | 64 FR 63705 | 7/12/2002 | 67 FR 46278 |
| UU | Equipment Leaks - Control Level 2 | N/A | 6/29/1999 | 64 FR 34899 | 7/1/2002 | 11/22/1999 | 64 FR 63706 | 7/12/2002 | 67 FR 46279 |
| VV | Oil-Water Separators and Organic-Water Separators | N/A | 7/1/1996 | 61 FR 34195 | 7/1/2002 | 1/8/2001 | 66 FR 1268 | 6/23/2003 | 68 FR 37355 |
| | | | | | | | | | |

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| | | | Date | FR Citation | Date | Date | FR Citation | Date | FR Citation |
| WW | Storage Vessels (Tanks) - Control Level 2 | N/A | 6/29/1999 | 64 FR 34918 | 7/1/2002 | | | 7/12/2002 | 67 FR 46279 |
| XX | **Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations** | 0 | 7/12/2002 | 67 FR 46271 | | | | | |
| YY | Generic MACT | 0 | 6/29/1999 | 64 FR 34921 | 7/1/2002 | 6/7/2002 | 67 FR 39305 | 7/12/2002 | 67 FR 46279 |
| | | | | | | | | 7/12/2002 | 67 FR 46293 |
| | | | | | | | | 2/10/2003 | 68 FR 6635 |
| CCC | Steel Pickling-HCl Process Facilities and Hydrochloric Acid Regeneration Plants | 0 | 6/22/1999 | 64 FR 33218 | 7/1/2002 | | | 6/23/2003 | 68 FR 37356 |
| DDD | Mineral Wool Production | 0 | 6/1/1999 | 64 FR 29503 | 7/1/2002 | | | 6/23/2003 | 68 FR 37356 |
| EEE | Hazardous Waste Combustors* | 2 | 6/19/1998 | 63 FR 33820 | 7/1/2002 | 2/14/2002 | 67 FR 6986 | 12/19/2002 | 67 FR 77691 |
| | | | | | | | | 6/23/2003 | 68 FR 37356 |
| GGG | Pharmaceuticals Production | 0 | 9/21/1998 | 63 FR 50326 | 7/1/2002 | 4/2/2002 | 67 FR 15486 | 6/23/2003 | 68 FR 37356 |
| HHH | Natural Gas Transmission and Storage Facilities | 0 | 6/17/1999 | 64 FR 32647 | 7/1/2002 | 2/22/2002 | 67 FR 8204 | 6/23/2003 | 68 FR 37357 |
| III | Flexible Polyurethane Foam Production | 0 | 10/7/1998 | 63 FR 53996 | 7/1/2002 | | | 6/23/2003 | 68 FR 37357 |
| JJJ | Group IV Polymers and Resins | 0 | 9/12/1996 | 61 FR 48229 | 7/1/2002 | 8/6/2001 | 66 FR 40907 | 6/23/2003 | 68 FR 37357 |
| | | | | | | | | 6/2/2004 | 69 FR 31008 |
| LLL | Portland Cement Manufacturing* | 1 | 6/14/1999 | 64 FR 31925 | 7/1/2002 | 4/5/2002 | 67 FR 16619 | 7/2/2002 | 67 FR 44371 |
| | | | | | | | | 7/5/2002 | 67 FR 44769 |
| | | | | | | | | 12/6/2002 | 67 FR 72584 |
| | | | | | | | | 6/23/2003 | 68 FR 37358 |
| MMM | Pesticide Active Ingredient Production | 0 | 6/23/1999 | 64 FR 33589 | 7/1/2002 | 6/3/2002 | 67 FR 38203 | 9/20/2002 | 67 FR 59340 |
| | | | | | | | | 6/23/2003 | 68 FR 37358 |
| NNN | Wool Fiberglass Manufacturing | 0 | 6/14/1999 | 64 FR 31708 | 7/1/2002 | | | 6/23/2003 | 68 FR 37358 |
| OOO | Manufacture of Amino/Phenolic Resins | 1 | 1/20/2000 | 65 FR 3290 | 7/1/2002 | | | 6/23/2003 | 68 FR 37359 |
| PPP | Polyether Polyols Production | 0 | 6/1/1999 | 64 FR 29439 | 7/1/2002 | 7/6/2000 | 65 FR 41594 | 6/23/2003 | 68 FR 37359 |
| | | | | | | | | 7/1/2004 | 69 FR 39862 |
| QQQ | Primary Copper | 0 | 6/12/2002 | 67 FR 40491 | 7/1/2002 | | | | |
| RRR | Secondary Aluminum Production* | 3 | 3/23/2000 | 65 FR 15689 | 7/1/2002 | 6/14/2002 | 67 FR 41122 | 8/13/2002 | 67 FR 52616 |
| | | | | | | | | 9/24/2002 | 67 FR 59791 |
| | | | | | | | | 12/30/2002 | 67 FR 79815 |
| | | | | | | | | 6/23/2003 | 68 FR 37359 |
| TTT | Primary Lead Smelting | 0 | 6/4/1999 | 64 FR 30204 | 7/1/2002 | | | 6/23/2003 | 68 FR 37360 |

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| | | | Date | FR Citation | Date | Date | FR Citation | Date | FR Citation |
| UUU | Petroleum Refineries-Catalytic Cracking, Catalytic Reforming & Sulfur Recovery | 0 | 4/11/2002 | 67 FR 17773 | 7/1/2002 | | | | |
| VVV | Publicly Owned Treatment Works | 0 | 10/26/1999 | 64 FR 57579 | 7/1/2002 | | | 10/21/2002 | 67 FR 64745 |
| | | | | | | | | 6/23/2003 | 68 FR 37360 |
| XXX | Ferroalloys Production: Ferromanganese and Silicomanganese | 0 | 5/20/1999 | 64 FR 27458 | 7/1/2002 | 3/22/2001 | 66 FR 16012 | 6/23/2003 | 68 FR 37360 |
| AAAA | **Municipal Solid Waste Landfills*** | 8 | 1/16/2003 | 68 FR 2238 | | | | | |
| CCCC | Manufacturing Nutritional Yeast | 0 | 5/21/2001 | 66 FR 27884 | 7/1/2002 | | | | |
| EEEE | **Organic Liquids Distribution (non-gasoline)** | 1 | 2/3/2004 | 69 FR 5063 | | | | | |
| FFFF | **Misc. Organic Chemical Production and Processes (MON)** | 1 | 11/10/2003 | 68 FR 63888 | | | | | |
| GGGG | Solvent Extraction for Vegetable Oil Production | 0 | 4/12/2001 | 66 FR 19011 | 7/1/2002 | 4/5/2002 | 67 FR 16321 | | |
| HHHH | Wet Formed Fiberglass Mat Production | 0 | 4/11/2002 | 67 FR 17835 | 7/1/2002 | | | | |
| IIII | **Auto and Light Duty Trucks (Surface Coating** | 0 | 4/26/2004 | 69 FR 22623 | | | | | |
| JJJJ | **Paper & Other Web (Surface Coating)** | 3 | 12/4/2002 | 67 FR 72341 | | | | | |
| KKKK | **Metal Can (Surface Coating)** | 1 | 11/23/2003 | 68 FR 64446 | | | | | |
| MMMM | **Misc. Metal Parts and Products (Surface Coating)** | 11 | 1/2/2004 | 69 FR 157 | | | | | |
| NNNN | **Large Appliances (Surface Coating)** | 0 | 7/23/2002 | 67 FR 48262 | | | | | |
| OOOO | **Fabric Printing, Coating and Drying** | 0 | 5/29/2003 | 68 FR 32189 | | | | | |
| PPPP | **Plastic Parts (Surface Coating)** | 11 | 4/19/2004 | 69 FR 20990 | | | | | |
| QQQQ | **Wood Building Products (Surface Coating)** | 9 | 5/28/2003 | 68 FR 31760 | | | | | |
| RRRR | **Metal Furniture (Surface Coating)** | 0 | 5/23/2003 | 68 FR 28619 | | | | | |
| SSSS | Metal Coil | 0 | 6/10/2002 | 67 FR 39812 | 7/1/2002 | | | 3/17/2003 | 68 FR 12592 |
| TTTT | Leather Finishing Operations | 0 | 2/27/2002 | 67 FR 9162 | 7/1/2002 | | | | |
| UUUU | Cellulose Production Manufacturing | 0 | 6/11/2002 | 67 FR 40055 | 7/1/2002 | | | | |
| VVVV | Boat Manufacturing | 5 | 8/22/2001 | 66 FR 44232 | 7/1/2002 | 10/3/2001 | 66 FR 50504 | | |

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| | | | | | | Covered EPA Revisions Through | | | |
| | | | Date | FR Citation | Date | Date | FR Citation | Date | FR Citation |
| WWWW | **Reinforced Plastics Composites Production** | 14 | 4/21/2003 | 68 FR 19402 | | | | | |
| XXXX | **Tire Manufacturing** | 0 | 7/9/2002 | 67 FR 45598 | | | | 3/12/2003 | 68 FR 11747 |
| YYYY | **Combustion Turbines** | 0 | 3/5/2004 | 69 FR 10537 | | | | | |
| ZZZZ | **Reciprocating Internal Combustion Engines** | 0 | 6/15/2004 | 69 FR 33506 | | | | | |
| AAAAA | **Lime Manufacturing** | 1 | 1/5/2004 | 69 FR 416 | | | | | |
| BBBBB | **Semiconductor Manufacturing** | 0 | 5/22/2003 | 68 FR 27925 | | | | | |
| CCCCC | **Coke Oven: Pushing, Quenching & Battery Stacks** | 0 | 4/14/2003 | 68 FR 18025 | | | | 4/22/2003 | 68 FR 19885 |
| EEEEE | **Iron and Steel Foundries** | 0 | 4/22/2004 | 69 FR 21923 | | | | | |
| FFFFF | **Integrated Iron & Steel** | 0 | 5/20/2003 | 68 FR 27663 | | | | | |
| GGGGG | **Site Remediation** | 13 | 10/8/2003 | 68 FR 58190 | | | | | |
| HHHHH | **Misc. Coating Manufacturing** | 0 | 12/11/2003 | 68 FR 69185 | | | | 12/29/2003 | 68 FR 75033 |
| IIIII | **Mercury Cell Chlor-Alkali Plants*** | 0 | 12/19/2003 | 68 FR 70928 | | | | | |
| JJJJJ | **Brick and Structural Clay Products Manufacturing** | 0 | 5/16/2003 | 68 FR 26722 | | | | 5/28/2003 | 68 FR 31744 |
| KKKKK | **Clay Ceramics Manufacturing** | 0 | 5/16/2003 | 68 FR 26738 | | | | 5/28/2003 | 68 FR 31744 |
| LLLLL | **Asphalt Processing & Asphalt Roofing Manufacturing** | 0 | 4/29/2003 | 68 FR 22991 | | | | 5/7/2003 | 68 FR 24577 |
| MMMMM | **Flexible Polyurethane Foam Fabrication Operations** | 0 | 4/14/2003 | 68 FR 18070 | | | | | |
| NNNNN | **Hydrochloric Acid Production** | 0 | 4/17/2003 | 68 FR 19090 | | | | | |
| PPPPP | **Engine Test Cells/Stands** | 0 | 5/27/2003 | 68 FR 28785 | | | | | |
| QQQQQ | **Friction Products Manufacturing** | 0 | 10/18/2002 | 67 FR 64507 | | | | | |
| RRRRR | **Taconite Iron Ore Processing** | 0 | 10/30/2003 | 68 FR 61888 | | | | | |
| SSSSS | **Refractories Products Manufacturing** | 0 | 4/16/2003 | 68 FR 18747 | | | | | |
| TTTTT | **Primary Magnesium Refining** | 0 | 10/10/2003 | 68 FR 58620 | | | | | |

**New NESHAPs in bold.**
* Applies to area and major sources
Through 7/1/2004

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|---|---|---|---|---|---|---|---|---|
| | | | | | Covered EPA Revisions Through | | | |
| | | Date | FR Citation | Date | Date | FR Citation | Date | FR Citation |
| A | General Provisions | 12/23/1971 | 36 FR 24877 | 7/1/2002 | 8/27/2001 | 66 FR 44980 | 7/23/2002 | 67 FR 31876 |
| | | | | | | | 9/11/2002 | 67 FR 57521 |
| | | | | | | | 4/14/2003 | 68 FR 17997 |
| | | | | | | | 5/28/2003 | 68 FR 31611 |
| | | | | | | | 6/17/2003 | 68 FR 35792 |
| | | | | | | | 12/11/2003 | 68 FR 69043 |
| | | | | | | | 2/13/2004 | 69 FR 7145 |
| | | | | | | | 2/13/2004 | 69 FR 7156 |
| D | Fossil-Fuel-Fired Steam Generators | 6/14/1974 | 39 FR 20791 | 7/1/2002 | 10/17/2000 | 65 FR 61752 | | |
| Da | Electric Utility Steam Generating Units | 6/11/1979 | 44 FR 33613 | 7/1/2002 | 8/14/2001 | 66 FR 42610 | | |
| Db | Industrial-Commercial-Institutional Steam Generating Units | 12/16/1987 | 52 FR 47842 | 7/1/2002 | 10/1/2001 | 66 FR 49834 | | |
| Dc | Small Industrial-Commercial-Institutional Steam Generating Units | 9/12/1990 | 55 FR 37683 | 7/1/2002 | 10/17/2000 | 65 FR 61752 | | |
| | | | | | | | | |
| E | Incinerators | 12/23/1971 | 36 FR 24877 | 7/1/2002 | 10/17/2000 | 65 FR 61753 | | |
| Ea | Municipal Waste Combustors Constructed After 12/20/89 and on or Before 9/20/94 | 2/11/1991 | 56 FR 5507 | 7/1/2002 | 10/17/2000 | 65 FR 61753 | | |
| | | | | | | | | |
| Eb | Municipal Waste Combustors Constructed After 9/20/94 | 12/19/1995 | 60 FR 65419 | 7/1/2002 | 11/16/2001 | 66 FR 57827 | | |
| Ec | Hospital/Medical/Infectious Waste Incinerators Constructed After 6/20/96 or Modified After 3/16/98 | 9/15/1997 | 62 FR 48382 | 7/1/2002 | 10/17/2000 | 65 FR 61753 | | |
| | | | | | | | | |
| F | Portland Cement Plants | 6/14/1974 | 39 FR 20793 | 7/1/2002 | 10/17/2000 | 65 FR 61753 | | |
| G | Nitric Acid Plants | 6/14/1974 | 39 FR 20794 | 7/1/2002 | 2/14/1989 | 54 FR 6666 | | |
| H | Sulfuric Acid Plants | 12/23/1971 | 36 FR 24877 | 7/1/2002 | 10/17/2000 | 65 FR 61753 | | |
| I | Hot Mix Asphalt Facilities | 3/8/1974 | 39 FR 9314 | 7/1/2002 | 2/14/1989 | 54 FR 6667 | | |
| J | Petroleum Refineries | 3/8/1974 | 39 FR 9315 | 7/1/2002 | 10/17/2000 | 65 FR 61753 | 8/6/2003 | 68 FR 46489 |
| K | Storage Vessels for Petroleum Liquids Constructed, Reconstructed, Modified After 6/11/73 and Prior to 5/19/78 | 3/8/1974 | 39 FR 9317 | 7/1/2002 | 10/17/2000 | 65 FR 61755 | | |
| | | | | | | | | |
| Ka | Storage Vessels for Petroleum Liquids Constructed, Reconstructed, Modified After 5/18/78 and Prior to 7/23/84 | 4/4/1980 | 45 FR 23379 | 7/1/2002 | 12/14/2000 | 65 FR 78275 | | |
| | | | | | | | | |
| Kb | Volatile Organic Liquid Storage Vessels Constructed After 7/23/84 | 4/8/1987 | 52 FR 11429 | 7/1/2002 | 12/14/2000 | 65 FR 78275 | 10/15/2003 | 68 FR 59332 |
| | | | | | | | | |
| L | Secondary Lead Smelters | 3/8/1974 | 39 FR 9317 | 7/1/2002 | 10/17/2000 | 65 FR 61756 | | |
| M | Secondary Brass and Bronze Production Plants | 3/8/1974 | 39 FR 9318 | 7/1/2002 | 10/17/2000 | 65 FR 61756 | | |
| N | Primary Emissions from Basic Oxygen Process Furnaces Constructed After 6/11/73 | 3/8/1974 | 39 FR 9318 | 7/1/2002 | 10/17/2000 | 65 FR 61756 | | |
| | | | | | | | | |
| Na | Secondary Emissions from Basic Oxygen Process Steelmaking Furnaces Constructed After 1/20/83 | 1/2/1986 | 51 FR 161 | 7/1/2002 | 10/17/2000 | 65 FR 61756 | | |
| | | | | | | | | |

Attachment H

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| | | | | | Covered EPA Revisions Through | | | |
| | | Date | FR Citation | Date | Date | FR Citation | Date | FR Citation |
| O | Sewage Treatment Plants | 3/8/1974 | 39 FR 9319 | 7/1/2002 | 10/17/2000 | 65 FR 61756 | | |
| P | Primary Copper Smelters | 1/15/1976 | 41 FR 2338 | 7/1/2002 | 10/17/2000 | 65 FR 61756 | | |
| Q | Primary Zinc Smelters | 1/15/1976 | 41 FR 2340 | 7/1/2002 | 2/14/1989 | 54 FR 6668 | | |
| R | Primary Lead Smelters | 1/15/1976 | 41 FR 2340 | 7/1/2002 | 2/14/1989 | 54 FR 6668 | | |
| S | Primary Aluminum Reduction Plants | 7/25/1977 | 42 FR 37937 | 7/1/2002 | 10/17/2000 | 65 FR 61757 | | |
| T | Phosphate Fertilizer Industry: Wet-Process Phosphoric Acid Plants | 8/6/1975 | 40 FR 33154 | 7/1/2002 | 10/17/2000 | 65 FR 61757 | | |
| U | Phosphate Fertilizer Industry: Superphosphoric Acid Plants | 8/6/1975 | 40 FR 33155 | 7/1/2002 | 10/17/2000 | 65 FR 61757 | | |
| V | Phosphate Fertilizer Industry: Diammonium Phosphate | 8/6/1975 | 40 FR 33155 | 7/1/2002 | 10/17/2000 | 65 FR 61757 | | |
| W | Phosphate Fertilizer Industry: Triple Superphosphate Plants | 8/6/1975 | 40 FR 33156 | 7/1/2002 | 10/17/2000 | 65 FR 61757 | | |
| X | Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities | 8/6/1975 | 40 FR 33156 | 7/1/2002 | 10/17/2000 | 65 FR 61757 | | |
| Y | Coal Preparation Plants | 1/15/1976 | 41 FR 2234 | 7/1/2002 | 10/17/2000 | 65 FR 61757 | | |
| Z | Ferroalloy Production Facilities | 5/4/1976 | 41 FR 18501 | 7/1/2002 | 10/17/2000 | 65 FR 61758 | | |
| AA | Steel Plants: Electric Arc Furnaces Constructed After 10/21/74 and on or Before 8/17/83 | 9/23/1975 | 40 FR 43852 | 7/1/2002 | 10/17/2000 | 65 FR 61758 | | |
| AAa | Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After 8/7/83 | 10/31/1984 | 49 FR 43845 | 7/1/2002 | 10/17/2000 | 65 FR 61758 | | |
| BB | Kraft Pulp Mills | 2/23/1978 | 43 FR 7572 | 7/1/2002 | 10/17/2000 | 65 FR 61758 | | |
| CC | Glass Manufacturing Plants | 10/7/1980 | 45 FR 66751 | 7/1/2002 | 10/17/2000 | 65 FR 61759 | | |
| DD | Grain Elevators | 8/3/1978 | 43 FR 34347 | 7/1/2002 | 10/17/2000 | 65 FR 61759 | | |
| EE | Surface Coating of Metal Furnature | 10/29/1982 | 47 FR 49287 | 7/1/2002 | 10/17/2000 | 65 FR 61759 | | |
| GG | Stationary Gas Turbines | 9/10/1979 | 44 FR 52798 | 7/1/2002 | 10/17/2000 | 65 FR 61759 | 4/14/2003 | 68 FR 17997 |
| | | | | | | | 5/28/2003 | 68 FR 31611 |
| HH | Lime Manufacturing Plants | 4/26/1984 | 49 FR 18080 | 7/1/2002 | 10/17/2000 | 65 FR 61760 | | |
| KK | Lead-Acid Battery Manufacturing Plants | 4/16/1982 | 47 FR 16573 | 7/1/2002 | 10/17/2000 | 65 FR 61760 | | |
| LL | Metallic Mineral Processing Plants | 2/21/1984 | 49 FR 6464 | 7/1/2002 | 10/17/2000 | 65 FR 61760 | | |
| MM | Automobile and Light-Duty Truck Surface Coating Operations | 12/24/1980 | 45 FR 85415 | 7/1/2002 | 10/17/2000 | 65 FR 61760 | | |
| NN | Phosphate Rock Plants | 4/16/1982 | 47 FR 16589 | 7/1/2002 | 10/17/2000 | 65 FR 61760 | | |
| PP | Ammonium Sulfate Manufacture | 11/12/1980 | 45 FR 74850 | 7/1/2002 | 10/17/2000 | 65 FR 61760 | | |
| QQ | Graphic Arts Industry: Publication Rotogravure Printing | 11/8/1982 | 47 FR 50649 | 7/1/2002 | 10/17/2000 | 65 FR 61761 | | |
| RR | Pressure Sensitive Tape and Label Surface Coating Operations | 10/18/1983 | 48 FR 48375 | 7/1/2002 | 10/17/2000 | 65 FR 61761 | | |
| SS | Industrial Surface Coating: Large Appliances | 10/27/1982 | 47 FR 47785 | 7/1/2002 | 10/17/2000 | 65 FR 61761 | | |
| TT | Metal Coil Surface Coating | 11/1/1982 | 47 FR 49612 | 7/1/2002 | 10/17/2000 | 65 FR 61761 | | |
| UU | Asphalt Processing and Asphalt Roofing Manufacture | 8/6/1982 | 47 FR 34143 | 7/1/2002 | 10/17/2000 | 65 FR 61762 | | |
| VV | Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry | 10/18/1983 | 48 FR 48335 | 7/1/2002 | 12/14/2000 | 65 FR 78276 | | |

**Attachment H**
**RAI-082: Amended NSPSs Proposed for EQC Adoption**

| Subpart | Source Category | EPA Promulgated | | Last DEQ Adoption | | | Subsequent EPA Revisions | |
|---|---|---|---|---|---|---|---|---|
| | | Date | FR Citation | Date | Covered EPA Revisions Through Date | FR Citation | Date | FR Citation |
| WW | Beverage Can Surface Coating Industry | 8/25/1983 | 48 FR 38737 | 7/1/2002 | 10/17/2000 | 65 FR 61763 | | |
| XX | Bulk Gasoline Terminals | 8/18/1983 | 48 FR 37590 | 7/1/2002 | 10/17/2000 | 65 FR 61763 | 12/19/2003 | 68 FR 70965 |
| AAA | Residential Wood Heaters | 2/26/1988 | 53 FR 5873 | 7/1/2002 | 10/17/2000 | 65 FR 61763 | | |
| BBB | Rubber Tire Manufacturing Industry | 9/15/1987 | 52 FR 34874 | 7/1/2002 | 10/17/2000 | 54 FR 38635 | | |
| DDD | VOC Emissions from the Polymer Manufacture Industry | 12/11/1990 | 55 FR 51035 | 7/1/2002 | 12/14/2000 | 65 FR 78278 | | |
| FFF | Flexible Vinyl and Urethane Coating and Printing | 6/29/1984 | 49 FR 26892 | 7/1/2002 | 10/17/2000 | 65 FR 61768 | | |
| GGG | Equipment Leaks of VOC in Petroleum Refineries | 5/30/1984 | 49 FR 22606 | 7/1/2002 | 10/17/2000 | 65 FR 61768 | | |
| HHH | Synthetic Fiber Production Facilities | 4/5/1984 | 49 FR 13651 | 7/1/2002 | 10/17/2000 | 65 FR 61768 | | |
| III | VOC Emissions from the Synthetic Organic Chemical Manufacturing Industry Air Oxidation Unit Processes | 6/29/1990 | 55 FR 26922 | 7/1/2002 | 12/14/2000 | 65 FR 78278 | | |
| JJJ | Petroleum Dry Cleaners | 9/21/1984 | 49 FR 37331 | 7/1/2002 | 10/17/2000 | 65 FR 61773 | | |
| KKK | Equipment Leaks of VOC from Onshore Natural Gas Processing Plants | 6/24/1985 | 50 FR 26124 | 7/1/2002 | 10/17/2000 | 65 FR 61773 | | |
| LLL | Onshore Natural Gas Processing; $SO_2$ Emissions | 10/1/1985 | 50 FR 40160 | 7/1/2002 | 10/17/2000 | 65 FR 61773 | | |
| NNN | VOC Emissions from the Synthetic Organic Chemical Manufacturing Industry Distillation Operations | 6/29/1990 | 55 FR 26842 | 7/1/2002 | 12/14/2000 | 65 FR 78279 | | |
| OOO | Nonmetallic Mineral Processing Plants | 8/1/1985 | 51 FR 31337 | 7/1/2002 | 10/17/2000 | 65 FR 61778 | | |
| PPP | Wool Fiberglass Insulation Manufacturing Plants | 2/25/1995 | 50 FR 7699 | 7/1/2002 | 10/17/2000 | 65 FR 61778 | | |
| QQQ | VOC Emissions from Petroleum Refinery Wastewater Systems | 11/23/1985 | 53 FR 47623 | 7/1/2002 | 10/17/2000 | 65 FR 61778 | | |
| RRR | VOC Emissions from the Synthetic Organic Chemical Manufacturing Industry Distillation Operations | 8/31/1993 | 58 FR 45962 | 7/1/2002 | 12/14/2000 | 65 FR 78279 | | |
| SSS | Magnetic Tape Coating Facilities | 10/3/1988 | 53 FR 38914 | 7/1/2002 | 2/12/1999 | 64 FR 7467 | | |
| TTT | Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines | 1/29/1988 | 53 FR 2676 | 7/1/2002 | 10/17/2000 | 65 FR 61778 | | |
| UUU | Calciners and Dryers in Mineral Industries | 9/28/1992 | 57 FR 44503 | 7/1/2002 | 10/17/2000 | 65 FR 61778 | | |
| VVV | Polymetric Coating of Supporting Substrates Facilities | 9/11/1989 | 54 FR 37551 | 7/1/2002 | | | | |
| WWW | Municipal Solid Waste Landfills built after May, 1991 | 3/12/1996 | 61 FR 9919 | 7/1/2002 | 10/17/2000 | 65 FR 61778 | | |
| AAAA | Small Waste Combustion Units | 12/6/2000 | 65 FR 76355 | 7/1/2002 | | | 1/31/2003 | 68 FR 5144 |
| CCCC | Standards of Performance for New Commercial and Industrial Solid Waste Incineration Units | 12/1/2000 | 65 FR 75350 | 7/1/2002 | 3/27/2001 | 66 FR 16606 | 11/25/2002<br>10/3/2003 | 67 FR 70640<br>68 FR 57517 |

**Emission Guidelines and Compliance Times for Existing Sources**
**Adopted into existing DEQ regulations as indicated**

| Subpart | Emission Guidelines and Compliance Times for Source Category | EPA Promulgated and Last Revised | | Last DEQ Adoption | | Subsequent EPA Revisions | |
|---|---|---|---|---|---|---|---|
| | | Date | FR Citation | Last Date | Incorporated into OAR | Date | FR Citation |
| Cb | Large Municipal Waste Combustors Constructed on or Before 9/20/94 | 8/25/1997 | 62 FR 45115 | 7/1/2002 | 340-230-0300 | | |
| | | 11/12/1998 | 63 FR 63191 | | | | |
| Cc | Municipal Solid Waste Landfills | 1996 | 61 FR 9905 | 7/1/1998 | 340-230-0500 | | |
| | | 1999 | 64 FR 9258 | | | | |
| Cd | Sulfuric Acid Production Units | 12/19/1995 | 60 FR 65414 | 7/1/2002 | No sources | | |
| Ce | Hospital/Medical/Infectious Waste Incinerators | 9/15/1997 | 62 FR 48348 | 7/1/2002 | 340-230-0400 | | |
| | | | | | | | |
| BBBB | Emission Guidelines and Compliance Times for Existing Small Municipal Waste Combustion Units | 12/6/2000 | 65 FR 76355 | 7/1/2002 | 340-230-0365 | 1/31/2003 | 68 FR 5144 |
| | | | | | | | |
| DDDD | Emission Guidelines & Compliance Times - Existing Commercial and Industrial SW Incineration Units | 12/1/2000 | 65 FR 75338 | 7/1/2002 | No sources | 11/25/2002 | 67 FR 70640 |
| | | | | | | 10/3/2003 | 68 FR 57517 |

Part 60 Subpart Cb, Subpart Cc, and Subpart Ce, Emission Guidelines for various waste incinerators or combustors, were adopted into existing state rules in OAR 340 Division 230 - INCINERATOR REGULATIONS

Part 60 Subpart Cd, Emission Guidelines for Existing Sulfuric Acid Production Units was adopted, but Oregon has no sources subject to it. No Implementation Plans are required.

Part 60 Subpart BBBB, Emission Guidelines for Small Municipal Combustors was adopted, but Oregon has no sources subject to it. Any sources newly identified will be subject to Part 62 Subpart JJJ, Federal Plan Requirements, until a State Implementation Plan is submitted and approved by EPA.

Part 60 Subpart DDDD, Emission Guidelines for Existing Commercial and Industrial Solid Waste Incinerators was adopted, but Oregon has no sources subject to it. Any sources newly identified will be subject to Part 62 Subpart III Federal Plan Requirements, until a State Implementation Plan is submitted and approved by EPA.

# Talking Points: Global Warming EQC Information Item

**Welcome:** (20 min)

Introductions and agenda review (Stephanie Hallock – 10 min)

- Background
  - Global warming a priority for the Governor (West Coast Governor's Global Warming Initiative; Governor Kulongoski's Advisory Group on Global Warming)
  - Mike Grainey and I were ex-officio members of the Advisory Group
- Challenges and opportunities
  - Discuss resource constraints – can't take on new work without new resources
  - Mention co-benefits of many strategies to reduce global warming – air toxics, fine particulate, ozone, recycling, energy conservation, economic development opportunites
- Review agenda and introduce presenters
  - Purpose of item: review of Advisory Group's recommendations and discussion to seek guidance from the Commission
  - Big picture: David Van't Hof (Governor's Sustainability Coordinator)
  - Overview of recommendations: Angus Duncan (past president and CEO of the Bonneville Environmental Foundation) and Gail Achterman (Director of the Institute for National Resources at OSU). Angus and Gail served on the Advisory Group and are on the drafting team for the report.
  - Energy Related Recommendations: Mike Grainey, Director of the Oregon Department of Energy, with his staff Sam Sadler and Justin Klure. ODOE played a vital role in staffing the Advisory Group and providing technical assistance.
  - Air and Land Related Recommendations: Andy Ginsburg (DEQ Air Quality Administrator) and David Allaway (DEQ's expert on materials use and waste recovery, who chaired on of the Advisory Groups subcommittees)
  - Next Steps and Discussion
- Acknowledgements and handoff
  - DEQ staff in the audience and available to help answer questions: Kevin Downing (Diesel expert), Dave Nordberg (transportation expert), David Collier (AQ Planning)
  - Hand off to David Van't Hof – ask him to let us know the latest on the Governor's reaction to the report

**Notes on Commissioners' involvement in Diesel work:** *Ken Williamson is on the faculty of the engineering school at OSU. Kevin is working with Jim Lundy who is acting head of the Kiewit Center for Transportation at OSU, which is affiliated with the College of Engineering on the truck stop project. Lundy has also been involved with providing technical assistance to LRAPA on their truck idling project. Ken has been on at least one phone call with Kevin and OSU staff about their involvement in this project. Mark Reeve made the opening remarks at our September rollout of the truck stop project at Jubitz. Deidre Malarkey regularly attends LRAPA board meetings and is very aware of the work that LRAPA is doing around diesel.*

Relation to Governor's Priorities (David Van't Hof – 10 min)

- Big picture-how it all fits together (West Coast Governor's Global Warming Initiative, West Coast diesel collaborative, Oregon initiatives, etc.)
- Governor's reaction to the Advisory Group's report

**Overview of Report and Recommendations:** Angus Duncan and Gail Achterman (20 min)

- Why is Climate Change important to Oregon and the West Coast?
- Summary of the Advisory Group process and report

**Energy Related Recommendations:** (Mike Grainey, Sam Sadler, Justin Klure with intro by Andy Ginsburg – 20 min)

Intro: link from December EQC item on oxyfuels (Andy Ginsburg – 5 min)

- Introduction: During this segment of today's item, Mike Grainey and DOE staff will
  - Describe the Advisory Group's recommendations related to energy
  - Discuss the state's strategy to promote renewable fuels.
- Connect to EQC's December meeting:
  - During adoption of the Portland CO maintenance plan update in December, Commissioner Williamson asked how DEQ's efforts to reduce air pollution from fuels relates to the states overall renewable energy policy.
    - The CO plan included a phase-out of the oxygenated fuel requirement, which is being met by ethanol – a renewable fuel.
    - The EQC decided to delay the repeal of oxygenated fuel, which allowed time for the state to consider other incentives for ethanol
  - At the time, I noted that we would discuss renewable energy policy as part of today's information item.
  - DOE is lead for energy policy, but DEQ plays a supporting role:
    - Evaluating the air pollution and other environmental effects of fuel choices.
    - Evaluating the energy impacts from DEQ programs.
    - Permitting facilities, such as co-generation units and biofuel plants that produce or use renewable fuels.
    - Coordinating with DOA, DOF and others who promote use of biomass for fuel as an alternative to open burning. This work relates to the regional haze plan as well as PM2.5 and air toxics prevention work.
    - Supporting development of biodiesel as part of the clean diesel strategy.
  - So, need to coordinate closely with DOE.
- Handoff to Mike Grainey and staff.

Overivew of energy recommendations (Mike Grainey or Sam Sadler – 5 min)

Discuss Renewable Fuels Strategy (Mike Grainey or Justin Klure – 10 min)

## Air and Land Related Recommendations: (Andy Ginsburg and David Allaway – 20 min)

Air Quality - Transportation (Andy Ginsburg- 10 min)

California Motor Vehicle Standards (Trans-1)

- Advisory Group recommendation
  - Urges the Governor to form a working group to develop a proposal to adopt California motor vehicle emission standards
  - Would result in significant reductions in Global Warming emissions, but would also have substantial co benefits for air quality: reductions in ozone forming emissions, fine particulate (PM2.5), and air toxics.
  - There are two parts to the California motor vehicle standards.
    - LEV-II - Adopted to reduce ozone forming emissions. Went into effect in California with the 2004 model year and will phase-in through 2010.
    - Pavley – Recently adopted to reduce greenhouse gases. Goes into effect in California in the 2009 model year.
- Roles
  - The working group would be formed by the Governor's office.
  - DEQ would not lead this effort, but would likely be asked to provide technical support. As Stephanie noted, we do not have existing resources for this work.
- Key issues that would need to be addressed by the working group:
  - **What are the environmental benefits to Oregon of opting into the California standards?** LEV-II standards are more stringent than federal Tier-II standards because California requires a percentage of zero or nearly zero emission vehicles in the fleet. California estimates that Pavley will reduce greenhouse gas emissions from motor vehicles by about 17% in 2020 and 27% in 2030. The working group will need an Oregon specific analysis.
  - **What are the costs to Oregon's businesses and the public?** California estimates an up-front cost about $300 to $1,000 per vehicle, but that this cost is more than offset by fuel savings over the life of the car. The working group will need an Oregon specific analysis.
  - **How would California standards be implemented in Orgeon?** Most of the implementation work for these standards is done by California, which certifies vehicles as meeting their motor vehicle standards. To opt into California standards, a state must adopt a requirement that new cars sold in their state must be certified by California. The working group would need to make a number of decisions about how to implement the requirements, and then determine the resources needed to do that work. Other states report that the primary implementation cost is keeping rules current with California.

Clean Diesel (Trans-9 and Trans-11)

- Advisory Group recommendation
  - State and local governments should use clean diesel fuel and retrofit diesel engines. Also, reduce truck idling at truck and safety stops.
  - In addition to reducing greenhouse gas emissions, this strategy also has substantial co-benefits for air quality: diesel exhaust is the number 1 source of air toxics risk in Oregon.
- Roles
  - DEQ already plays a lead role in the clean diesel strategy.
  - DEQ's diesel work has focused on partnering with other states, other agencies, local communities and businesses to conduct a variety of diesel reduction projects.
- Some examples of our progress:
  - DEQ is part of an Oregon Solutions Team, working alongside Oregon State University and the Climate Trust to complete the most aggressive truck stop electrification project in the country, outfitting up to 10 % of all truck parking spaces in the state.
  - DEQ has been working with school districts and companies across the state on diesel retrofit projects. Some examples include the Beaverton School District, CSU Trucking (garbage hauling for Portland) and Rogue Disposal (waste hauling in the Rogue Valley).
  - DEQ has been working with the Burlington Northern and Santa Fe railroad to outfit switchyard locomotives with smaller, more efficient engines to power basic functions like keeping lubricating oils circulating and preventing radiator freeze-ups. This could save 3,000-4,000 gallons of diesel fuel per year and reduce CO2 emissions by 134 tons per engine per year. BNSF has agreed to begin equipping their switch engines in their Portland yard and DEQ is working with The Climate Trust to establish a revolving loan fund to support additional installations.
  - EQ is working closely with parties in west coast governments, businesses and non profit organizations through the West Coast Diesel Emissions Reduction Collaborative to identify and fund a variety of diesel reduction projects.

Materials Use, Recovery, and Waste Disposal (David Allaway - 10 min)

**Next Steps and Discussion:** (30 min)

Next steps (David Van't Hof - 5 min)

- Governor's Office plans
- Follow-up Working Group
- Governor's Office convening group on LEV/Pavley
- Expected legislative action
- Post-session activities

Discussion with Commission (Stephanie Hallock, Andy Ginsburg, David Van't Hof, Mike Grainey – 25 min)