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OREGON STATE SANITARY AUTHORITY MEETING MATERIALS

State of Oregon
Department of Environmental Quality

AGENDA

State Sanitary Authority Executive Meeting

9:00 a.m., March 27, 1969

Room 72, Portland State Office Building

A. Program priorities

B. OSU Air Resources Center

C. Western Kraft pulp mill expansion proposal, Albany

D. Off-stream cooling for thermal power plants old bill

E. 1969 Legislative Proposals

(1) Reorganization of OSSA (SB 391, SB 396)

(2) Prohibition of ocean discharges (HB 1697) — 166 substitute to SA

F. Proposals for STP Expansions in Tualatin Basin How to be part of Hearing (2)

(1) City of Tigard

(2) Somerset West

G. Miscellaneous items of interest

(1) Tualatin Basin report by ST & R

(2) Central Lane Planning Council receiving federal grants

PRIORITIES

AIR QUALITY CONTROL

(Revised Feb. 22, 1969 Listing)

1. AIR QUALITY STANDARDS (Ambient Air)

a)	Carbon Monoxide	Tentative hearing - April 24
b)	Suspended Particulates (Revised)	Present to Authority - May 15
	Particle Fallout (Revised)	Present to Authority - May 15
c)	Fluorides (in combination with reg.)	Present to Authority - May 30
d)	Sulfur dioxide	Present to Authority - July 15
e)	Oxidant	Present to Authority - August 1

2. REGULATIONS AND EMISSION STANDARDS

a)	Motor Vehicles	Tentative hearing - April 24
b)	Kraft Pulp Mill	Hearing - March 27
c)	Aluminum Reduction	Present to Authority - May 30
d)	Sulfite Pulp Mills	Plan approved
e)	Metallurgical Plants	
(f)	General Standards for Incinerators, boilers	

3. PROGRAM OPERATION

   a) Compliance with Rendering Plant Regulations

   b) Compliance with Hot Mix Asphalt Regulations

   c) Wigwam Waste Burners

      1) Accellerate enforcement in Jackson and Josephine Counties. — by July 1 controlled by 50% July 1 (Meeting July Aug Sept)

      2) Finalize Wigwam Burner Manual "Section II".

      3) Institute training and enforcement programs in Douglas and Coos Counties.

      4) Provide Authority staff and mill operator training to Regional Authorities.

      5) Provide Assistance to Forest Research Laboratory in their burner modification and testing program.

   d) Emission Inventory

   e) Source Sampling Capability

   f) Coos County Study

PRIORITIES

WATER POLLUTION CONTROL

1. Waste discharge permits

   (a) Process remaining applications

   (b) Follow-up and compliance

   (c) Data processing

2. Water quality standards for Lost River interstate waters

3. Water quality standards for major intrastate waters

   (a) Rogue
   (b) Umpqua
   (c) Deschutes
   (d) Sandy
   (e) Clackamas
   (f) McKenzie
   (g) Coos Bay
   (h) Netarts Bay
   (i) Inland lakes

4. Policies and standards pertaining to:

   (a) Waste disposal wells

   (b) Logging and forest management practices

   (c) Gravel and other mining

   (d) Agricultural wastes

   (e) Solid wastes

   (f) Sewage treatment plant operators training and experience

TO : MEMBERS OF THE STATE SANITARY AUTHORITY

John D. Mosser, Chairman
B. A. McPhillips, Member
Storrs Waterman, Member
E. C. Harms, Jr., Member
Herman Meierjurgen, Member

FROM : AIR QUALITY CONTROL STAFF

DATE : February 25, 1969

SUBJECT: AMBIENT AIR STANDARDS, EMISSION STANDARDS, REGULATIONS

During the coming months, ambient air and emission standards and regulations will be presented and discussed. It is important that the staff, the Authorities, agencies and public have a consensus of the meaning of these measures. If there are any differences in understanding they should be explained or resolved so that work and reports of the staff are continually oriented in the most effective direction consistent with the policies of the Sanitary Authority.

The following outline and discussion emphasizes the guidelines the staff is using in the conduction of the air quality program.

Air Quality Criteria: Criteria in reference to air quality or a contaminant is generally considered to be the sum total of available or known effects of air contaminants at various levels, or the available knowledge of the effects of that contaminant for various concentrations and duration of exposure. Once the criteria for a contaminant have been determined, air quality standards can be derived on the basis of acceptable effects or effects the state, region, or community is willing to pay for in terms of control of emissions.

The Oregon-Washington Air Quality Committee has compiled criteria for carbon monoxide (the report and recommended standards have been distributed), for particulates (the report and recommended standards for suspended particulates has been distributed for expert review), and is working on fluorides, oxidant and sulfur dioxide.

On January 31, 1969, the federal government issued criteria in the form of a text discussion for particulates and sulfur. Criteria for other contaminants are being developed.

Ambient Air Standards: (Oregon statutes pertaining to air pollution do not use these terms, but rather refer to standards of quality and purity. No problems are known to exist relative to this omission.)

Ambient air standards are stated levels of contaminant concentrations which should not be exceeded in ambient air. The Oregon-Washington Air Quality Committee has adopted the definition "An established concentration, exposure time and frequency of occurrence of a contaminant or multiple contaminants in the ambient air which shall not be exceeded."

In developing an ambient air standard, acceptable effects are considered as established by the criteria. Considerations usually included are that the health of the most sensitive population group should not be affected, vegetation damage should not occur with the most sensitive plants, materials should not be affected, and that the frequency of occurrence of the adopted level should not be exceeded (ie. 1% of the time, or once per month, or 50% of the samples, etc.) The cost or available technology to achieve the desired standard may be further considerations in setting a standard.

In the standard-setting process, the methodology for measurement of the contaminant must be an integral part of the standard. Methods and instruments must be standardized to the degree that concentrations can be determined and valid comparisons made of data from different areas.

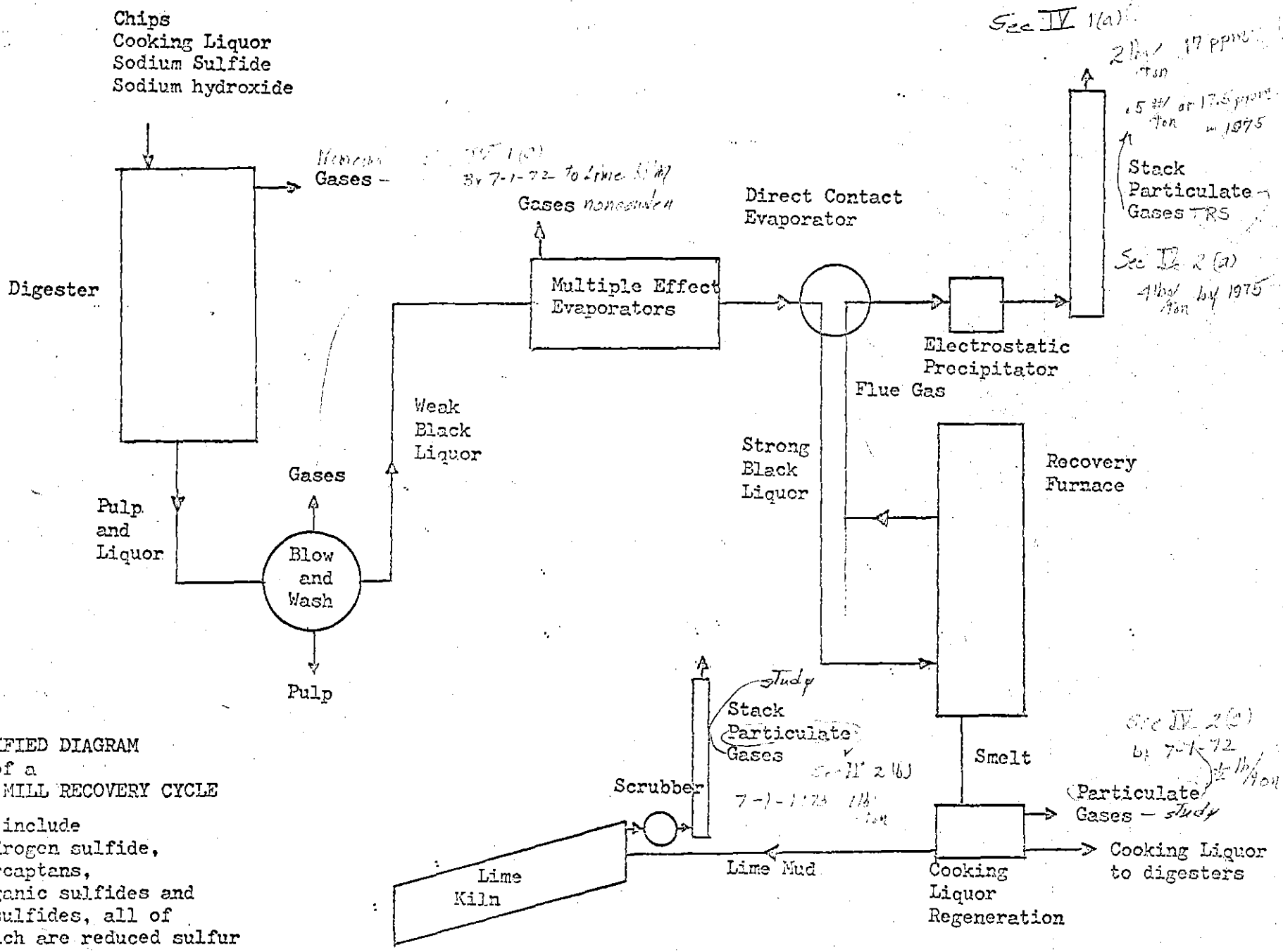
Ambient Air Standards Application: Once established, air quality standards provide control officials and the public an objective means of assessing the effectiveness of an air pollution control program. Concentrations above the standard in a particular area would indicate that contaminant control may be necessary in order to bring concentrations to the level prescribed by the ambient air standard. Generally ambient air standards are not used directly as an enforcement tool unless the source is isolated, can be isolated, or the contaminant by its nature is readily identifiable with the source.

Emission Standards: The emission standard is a limitation on the release of a contaminant or multiple contaminants to the ambient air and establishes the degree of control on sources of air contaminants necessary to attain the ambient air standards. Emission standards should be such that under the most unfavorable climatological conditions (accumulation, poor dispersion) the established air quality standard is not exceeded. This process, of course, presupposes a knowledge of total emissions and meteorological conditions.

Development of Standards and Regulations (as related to technology): In a number of instances, information has not been available or available information has not been compiled to provide a basis for air quality criteria and ambient air standards. In other instances methods are available to measure emissions, but the levels or concentration that occur in the ambient air are below currently known and accepted methods of collection and analysis. The staff is proceeding to develop criteria where none exists, propose ambient air standards, methods of measurement, and emission standards by source type as rapidly as possible.

Because of the previously discussed complexities, proposals will be made which do not follow what might be the normal development order, ie (1) criteria (2) ambient air standard, (3) emission standard. The kraft mill regulation, in addition to regulatory content, include emission standards, but because acceptable methods for measuring hydrogen sulfide or mercaptans are not now available, no ambient air standards for these contaminants are proposed at this time. Carbon monoxide ambient air levels are being recommended because of the importance of the contaminant and need to determine levels and extent of the contaminant, but no emission standards are proposed because it is currently not practical to apply such standards.

It will nevertheless be the continuing objective of the program to develop criteria, ambient air standards and emission standards as rapidly as possible. The program emphasis will be on development of emission standards and restrictions on processes to limit emissions consistent with the best technology.



SIMPLIFIED DIAGRAM
of a
KRAFT MILL RECOVERY CYCLE

Gases include
Hydrogen sulfide,
Mercaptans,
Organic sulfides and
Disulfides, all of
which are reduced sulfur
compounds

HMP

3/27/69

OSSA Staff Discussion of Proposed Kraft Mill AQC Regulations

These proposed Kraft mill regulations were developed by the Sanitary Authority staff in conjunction with representatives of the Washington State Air Pollution Control Authority and representatives of the Kraft pulping industry of both Oregon and Washington.

By this I do not mean to imply that all of the industry representatives necessarily agree with all of the provisions of these regulations as finally drafted for consideration here today.

Section II, Statement of Policy, acknowledges that a completely odorless Kraft mill is not immediately obtainable and sets forth the goals of these regulations which simply stated are:

1) to maximize application of existing knowledge to minimize air pollution from Kraft mills.

2) to require effective monitoring and reporting of emissions from all Kraft mills in Oregon. This has not been done previously because the technology for effective and continuous monitoring was only recently developed by the industry and the equipment still has not been obtained by a number of the mills.

3) to establish beginning standards and a procedure for progressing systematically towards more adequate standards and fully adequate control of air pollution from Kraft mills.

Section III establishes "highest and best practicable treatment and control", stated in Section II to be the policy of the Sanitary Authority, as a definite, binding requirement of these regulations.

Section IV establishes emission limits or control requirements for odorous gases and particulate emissions from the recognized principal sources in a Kraft mill.

The immediate limit for TRS gases from the recovery furnace stack is set as 2#/ton of Kraft pulp produced and by 1975 this limit is reduced to 1/2# of TRS per ton of Kraft pulp.

It is generally conceded that all Kraft mills can meet the initial standard of 2# of TRS per ton of Kraft pulp by installing equipment which will provide efficient oxidation of the black liquor ahead of the contact evaporators.

Based on very limited data, 2 of the 6 operating Kraft mills in Oregon are already meeting this standard. The remaining four mills will have to reduce the emissions of TRS from their recovery furnace stacks by an average of 86% in order to comply.

Meeting the 2#/T limit should significantly reduce the frequency, extent and intensity of Kraft odors associated with most Oregon Kraft mills.

The emission limit of 1/2# of TRS per ton of Kraft pulp, required to be met by 1975, represents the staff's best estimate of the levels that can be attained using the latest design in recovery furnaces which eliminate the direct contact evaporators, at least as an air pollution source.

Two of these new recovery furnaces are scheduled to go into operation this year, one at the Crown Zellerbach mill at Port Townsend, Washington, and one at the American Can Company mill at Halsey, Oregon. These two installations will provide actual operating experience and give a better indication of what can actually be accomplished by eliminating the direct contact evaporator as an air pollution source.

It is the intent of this Section as written to require by 1975 performance by all mills equivalent to that attainable utilizing the new design in furnaces.

This may require costly replacement of recovery furnaces at many existing Kraft mills.

The "limit" for non-condensibles established by sub-section 1(c) of Section IV is actually a control specification based on actual operating experience. Incineration of these odorous gases in the lime kiln has been demonstrated to work with good success so that process has been set as the standard.

The limits on particulate emissions contained in sub-section 2 are aimed at relieving reduced visibility problems caused by discharge of particulates from all air pollution sources. Methods for controlling particulates are well established. Electrostatic precipitators can be designed for almost any desired efficiency, although costs increase sharply at the very high efficiencies. It is believed that essentially all Oregon Kraft mills would have to install new or additional particulate control equipment to consistently meet the standard of 4#/ton of Kraft pulp production. This requirement is to be met by 1975 to coincide with any major modifications that might be necessary to meet the 1975 TRS standard.

Sub-Section 3 sets forth a time limit and procedure for each mill to develop, submit and obtain approval of a detailed program and time schedule for complying with the emission limits of these regulations.

Sub-Section 4 provides for review and re-hearing of these standards by not later than July 1973 to consider revisions of the standards as may be indicated by operating experience with the new recovery furnaces and the extensive monitoring data that will have been accumulated by then.

Section V provides for stricter emission standards, if necessary, for new mills or substantial expansions of existing mills or for mills in recognized problem areas. This is to ensure "highest and best practicable control" at every construction or re-construction opportunity and to prevent overloading an area of restricted dispersion by continued expansion of a single mill or by several mills located in the same area.

Section VI requires that plans and specifications and the projected effects on air quality shall be submitted to the Sanitary Authority and approval obtained before starting construction of a new Kraft mill or expansion of an existing Kraft mill.

Section VII requires monitoring and reporting of emissions from the principal sources of odorous gases and particulates in accordance with an approved program to show compliance or non-compliance with the standards and to provide a sound basis for revising standards if necessary.

Section VIII provides for "special studies" to be made at all mills to determine contributions to air pollution by sources other than the recovery furnace, smelt tank, digester and lime kiln.

Section IX merely points out that these standards are in addition to existing air pollution standards pertaining to plume opacity, particle fallout and suspended particulates, already applicable to Kraft mills.

TO : MEMBERS OF THE STATE SANITARY AUTHORITY

John D. Mosser, Chairman
B. A. McPhillips, Member
Storrs Waterman, Member
E. C. Harms, Jr., Member
Herman Meierjurgen, Member

FROM : AIR QUALITY CONTROL STAFF

DATE : March 27, 1969

SUBJECT: PROPOSED REGULATIONS FOR KRAFT MILLS

The proposed kraft mill regulations were drawn up in conjunction with a series of conferences with representatives of the kraft industry in Oregon and Washington. The conferences explored control, measuring, and monitoring techniques, definitions of terms, and ambient sampling methods. The goals of the proposed regulations are:

1. Maximize the application of existing knowledge, consistent with feasibility.

2. Develop emission monitoring programs so that mills will correlate emissions and process variables, be able to detect upsets and resulting increased emissions as they occur, assess sources, and to make it possible for the Sanitary Authority to correlate winds, emissions, and complaints, and to check on the progress of control programs.

3. Ensure uniformity of sampling and monitoring programs.

4. Stimulate studies and development of control techniques for sources which have not been studied in the past (the sources referred to as "other sources" in the regulation).

The following is an outline discussion of the sections of the proposed regulations.

Part I - Definitions:

The definitions include some terms, or special usages of terms, which were developed in the course of the conferences. These include:

1. Continual Monitoring. Truly continuous monitoring is not necessary, because emission rates don't change quickly. Frequent sampling is equally as informative, and this definition allows one instrument to monitor one or more sources, taking five or ten minute samples from each source in sequence.

2. Other Sources. These are emission points known, qualitatively, to be sources of odorous gas. The quantities are not known.

3. Non-condensibles. A variety of types of equipment and practices are used in the mills, using direct and indirect contact condensers and different liquids as condensing media. The gases which are or are not condensed, and the degree to which they condense, will vary from mill to mill and at different sources within the same mill. Therefore, listing the specific gases which are

to be considered, or defining non-condensibles in terms of specific boiling point temperatures ("all gases which condense below X degrees," for example) would be complex and inflexible to an extent not justified by increased regulatory control. The definition chosen for these regulations will cover the gases of interest.

4. TRS. The sulfur in hydrogen sulfide and organic sulfides is in a reduced state (has a valence of minus two). In one method, all the reduced sulfur is measured alike, no matter what compound it is in originally. All of these compounds contribute to odor, so that expressing them all in terms of Total Reduced Sulfur is sufficient to describe the problem as well as to describe the efficiency of control methods.

The other definitions are self-explanatory, and conform to the Oregon-Washington Air Quality Committee glossary.

Part II, Statement of Policy, and Part III, Highest and Best Treatment.

The statement of policy gives the overall goals of the regulations and the program. It focuses on getting the best treatment whereas the limits expressed in the body of the regulations are the minimum acceptable. It is also a statement to the people of Oregon, that this regulation will not result in an odorless mill. Finally, it sets out the goal using monitoring information for setting limits on sources which are not well understood at present as well as revising the limits already set in this regulation as technology allows.

Part IV, Emission Limitations, Sections 1 and 2.

The limits in the regulation are primarily on recovery furnace stack emissions for both odor and particulate matter, and on lime kiln and smelt tank particulate emissions. These are the sources that have received sufficient study so that limits can be set.

To meet the standards for reduced sulfur, the mills will have to reduce their emissions of TRS by an average of approximately 70 percent, or, excluding two mills that already meet the standard, a reduction of about 86 percent will be needed. The range is 0 to 91%.

Particulate emissions from recovery furnaces will have to be reduced an average of 55 percent, a range of 0 to 87%. Lime kiln emissions will have to be reduced an average of 22 percent. These figures are tabulated below:

	Reduced Sulfur Emissions*		Particulate Emissions			
			Recovery Furnace		Lime Kiln	
Mill	Present TRS, ppm	Reduction for Std. (%)	Present lbs/ton	Reduction Needed (%)	Present lbs/ton	Reduction Needed (%)
A	12-35	0	4.91	18	2.28	56
B	450	84	No Data		No Data	
C	294	76	15-25	44-84	1.63	39
D**	763	91	22.8	83	0.4	0
	580	88	38.6	87	0.41-1.33	0-25
E**	50	0	5.7-25.2	30-84		
	30	0	2.4-9.1	0-56	0.30-0.55	0

* Reduction in terms of lb. TRS per ton of pulp are essentially the same as those expressed in terms of ppm.

** Two recovery systems and furnaces.

One mill, which is not included above, recently completed an expansion. Emission data were submitted from pre-examination tests, and therefore are not representative of present conditions, especially because the expansion included the installation of air pollution abatement equipment.

All of the mills in Oregon have black liquor oxidation, which is the principal method for reducing TRS emissions from recovery furnaces. The difference between mills "A" and "E" and the other mills is in the efficiencies of the systems. In order to get the reductions necessary, the other mills will have to either add equipment or improve the efficiency of existing equipment. Industry people have expressed a belief that installing sufficient facilities will enable mills to meet the 70 ppm limit. By properly manipulating process variables, they should be able to reduce their emissions roughly by half again, with the same facilities.

Meeting the 70 ppm will reduce the areas in which odors are noticed, and should reduce the intensity of odors close to the mills.

The next level of emission, 0.5 lb/T or 17.5 ppm is close to the minimum reported for kraft mills run for periods up to 24 hours on practically a research basis. Achieving this level on a routine basis would require nearly perfect operation and maintenance. There is some feeling in industry that for many existing mills, it is an unattainable level. For this reason, a hearing is provided in the regulations for July 1973, to assess the state of the art and progress under these regulations to determine what should be a reasonable level. Presumably, a new limit could be either higher or lower than that of the 0.5 lb/T proposed. That limit was suggested in this regulation so that if major replacement of equipment were needed to meet the 70 ppm (for example, a new recovery furnace), the new facilities would be designed to meet the more stringent future limit rather than merely meet the limit set now. In all probability to meet the 1975 limit would require major modification and purchase of new equipment with large capital outlay.

The "limit" on non-condensibles is actually a performance specification, set on treatment of non-condensibles based on experience. Incineration in a lime kiln has been shown to work with good success, so that that process has been set as a standard.

The limits on particulate emissions are intended to relieve visibility problems. Control of particulates is fairly straightforward. Electrostatic precipitators can be designed for nearly any desired efficiency, although costs increase rapidly at high efficiencies and maintaining efficiency in routine operation is a difficult problem.

Section 3. The compliance schedule period of 180 days allows time for fairly extensive planning for mills that may require additional control or new production equipment.

Section 4. The public hearings set for July 1973 are intended to review the results of meeting the first emission limits set, and to consider revising existing limits and adopting more restrictive limits.

Part V, More Restrictive Emission Limits, Part VI, Plans and Specifications.

More restrictive emission limits and submission of plans and specifications may be required for new mills, or for expansions of existing facilities. These provisions are intended to prevent worsening of existing problems or over-loading an area of restricted dispersion. The possibility of having two separate mills in one area, where either one would be tolerable but, even if both met these limits, two of them would not be tolerable, was envisioned. Also, it is intended to include machinery for having adequate studies and surveys made before the plants are constructed or expanded.

Part VII, Monitoring and Reporting.

The monitoring provisions require monitoring or sampling the sources for which limits have been set, and also reporting of the collected data. The intent is to show compliance with the limits, or progress toward meeting them. Each mill is required to submit a program for review within sixty days, to order the necessary instruments within thirty days of approval of the program, and to place the equipment in effective operation within 90 days of receipt. The timing was set up this way, rather than specify monitoring within a certain time or by a certain date because of difficulties in getting prompt delivery after placing an order.

The reporting section specifies enough data submission to show compliance and amount of time in excess of limits. The "other pertinent data" mentioned could include process or efficiency data sufficient to evaluate internal procedures, or the effects of adjusting process variables.

Part VIII, Special Studies.

The "special studies" are intended to promote study of sources about which very little is known, especially the other sources mentioned in the definitions. The second special study, on SO_2, is intended to generate data in anticipation of setting SO_2 regulations in the future, and to determine whether they are enough to cause a problem.

Part IX, Other Limitations.

This section clarifies that limits established under this regulation are in addition to existing air pollution limits (plume opacity, fallout, suspended particulate limits) applicable to kraft mill effluents.

This, then, is the background of these regulations. They are based on present state of the art, which is concentrated on recovery furnace stack emission control. The success of these regulations in alleviating kraft mill problems will depend to no small extent on cooperation of the mills.

Industry people know their industry and its sources. These regulations set a base for studies, a minimum level for emissions, and a direction for further studies. Progress in implementing those studies, converting their results into practicable control programs, can be hastened by the industry. The regulations have been drawn around what the agencies consider necessary and what industry considers possible.

APPENDIX TO EXPLANATION OF KRAFT MILL REGULATIONS

THE KRAFT PULP MILL RECOVERY PROCESS AND EMISSION CONTROL

THE PROCESS:

Basically, the black liquor recovery cycle and its major points of emission are as follows:

1. Pulp and black liquor (spent cooking liquor, containing about half the solids originally in the chips and some of the sodium sulfide (Na_2S) originally in the white cooking liquor) are released from the digester into a blow tank. Gases and steam from this tank are condensed in a "hot-water accumulator," except for gases with a boiling point too low to condense. These non-condensibles (hydrogen sulfide, mercaptans and other organic sulfides, some organic non-sulfur compounds which are also odorous) have been vented to the atmosphere in the past.
2. The pulp is washed, and the wash water, now called weak black liquor, is processed to recover the cooking chemicals. The weak black liquor contains about 16% organic solids and from about 6 to 14 grams per liter (about 1%) sodium sulfide.
3. The black liquor is evaporated to about 50-55% solids in multiple-effect, indirect-contact, steam-heated evaporators. These will have a number of stages, or effects, operating at a slight vacuum which is maintained by ejectors or condensers. The non-condensible gases from the condensers are like those from the hot-water accumulator.
4. For mills currently in production, the black liquor is evaporated to about 60% solids in a direct-contact evaporator, where black liquor and flue gas are contacted. No matter what type of device is used, the purpose is to get maximum surface area for exchange of heat from flue gases to black liquor and evaporate water from the black liquor to flue gas. Carbon dioxide also transfers readily from flue gas to black liquor, forming hydrogen sulfide by reaction with sodium sulfide in the black liquor, and also helps to liberate mercaptans and organic sulfide.
5. The liquor is sprayed into a recovery furnace and burned. The furnace has two zones, below the spray nozzles deficient in oxygen, and above

the nozzles where there should be an excess of oxygen. In the lower zone, the inorganic cooking chemicals are reduced to sodium sulfide and sodium carbonate, in the form of a molten smelt. This smelt is drawn off, dissolved and slaked with lime, to regenerate cooking liquor.

In the upper zone, the organic constituents are oxidized to carbon dioxide, water, and sulfur dioxide (although ideally all the sulfur is in the smelt as sodium sulfide). In furnaces adequately sized for their loads, with adequate air supplies, the emissions of hydrogen sulfide and mercaptans have been held to around 5 parts per million basis for up to 24 hours, but only on a test, or research basis, not in regular operation. The recovery furnace is also a source of "saltcake" (sodium sulfate) emission.

6. The smelt is dissolved in a tank which is vented to allow release of considerable amount of steam, some particulate, and enough sodium hydroxide to make the condensed vapor highly alkaline. It is also possible to evolve hydrogen sulfide. The dissolved smelt, after slaking, is clarified. A calcium carbonate sludge settles out and the resulting solution, as white liquor, is returned to the digester.
7. The lime sludge is washed to remove sodium salts, and then calcined in a kiln to recover calcium oxide from the carbonate. The kiln is a quasi-counterflow device, in that the carbonate is introduced at the cold end and flows toward the fired, hot end. If there is sodium sulfide in the carbonate sludge, it can react with carbon dioxide to form hydrogen sulfide much as in the direct-contact evaporator. This is especially a problem in the modern, long kilns, in which the cool end is cooler than in the short kilns built on the order of a decade ago. The kilns can also emit calcium oxide and sodium sulfate as particulate.

PARTICULATE CONTROLS:

The control of particulate emissions from recovery furnace operations is fairly straightforward. The most important emission, saltcake from the recovery furnace, is generally controlled with an electrostatic precipitator, either alone or followed by an after-scrubber. One mill in Oregon uses only scrubbers. The efficiency of a precipitator roughly depends on the voltage

used, the uniformity and the linear velocity of gas flow through. Automatic voltage controls have been developed to maintain uniform efficiency. It is common for precipitators to operate at 97+%, and new installations are designed for 99+%. The emissions presently range in the tenth of a grain per cubic foot. The proposed regulations are intended to get the emissions down to approximately 0.1 grains per cubic foot (values will vary as a result of pulping and firing practices, and also from stacks which combine sources).

Particulate emissions from lime kilns have been controlled by sprayed-baffle scrubbers to the extent that existing lime fallout standards are uniformly met.

Dissolving tank emissions, which can be a source of both solid and liquid particulate emissions, are generally controlled successfully with demisters (essentially wetted baffles, sometimes using a metal fiber pad) or scrubbers.

ODOR CONTROLS:

The recovery furnace stack has been considered to be the major emission point of odors, so that the bulk of the studies done on kraft odors have been concerned with that source. There are two sources of odors in recovery furnace effluents, the furnaces themselves and the direct contact evaporators.

Studies on the furnaces have indicated that they are highly dependent on their secondary (oxidizing zone) air supply. As with any incineration device, there must be sufficient air present for complete combustion, with turbulence for mixing air and fuel and enough retention time in the furnace for combustion to be complete. Industry people in Oregon believe that all furnaces in the state have enough air, and that any furnace emissions are overwhelmed by emissions from direct contact evaporators.

Black liquor oxidation was developed to prevent the evolution of hydrogen sulfide from the direct contact evaporator. The goal of the process is to convert most, if not all, sodium sulfide (Na_2S) to sodium thiosulfate ($Na_2S_2O_3$) in the black liquor before it contacts the flue gases. The sulfur in sodium thiosulfate remains stable and does not convert to NaS or organic sulfides in the contact evaporator. The methods which have been developed are all based on mixing air with black liquor either before or after multiple effect evaporation. The means include packed towers, air-sparged reactors (in which air is bubbled into a tank of liquor, either with or without mechanical agitation), porous-plate contactors (in which liquor flows over a deck of

porous carbon or punched steel plates, with air forced through the deck from below). Much of the study on these systems has been concerned with mechanical problems, in handling the foam that is formed, and with maintenance and construction features. The efficiencies, or residual levels of Na_2S, needed to insure no emissions have not been described sufficiently so that a realistic standard can be established. Apparently, a residual concentration of 0.5 to 1 gram per liter of Na_2S in the strong black liquor is sufficient for a significant reduction, but at present that level can only be regarded as an estimate. Techniques of reaching that level on a routine basis are still being worked out, as is a reliable correlation between residual concentrations and emission rates. It has been found that there is some reversion of $Na_2S_2O_3$ back to Na_2S in the multiple effect evaporators.

Digester blow and relief gases have been recognized as an important source themselves. Batch digesters must be relieved of excess pressure at various times during a cook, and both batch and continuous digesters evolve gases when the cooked pulp is blown from them. These gases are condensed, somewhat, in "hot water accumulators", but certain of them have boiling points too low to be condensed in the equipment used. The non-condensible fraction, quite odorous, is handled usually by incineration in a lime kiln or absorption in black liquor in black liquor oxidation towers. Both of these techniques appear to be successful. Non condensible gases from multiple effect evaporators are treated the same way.

Studies have been made on the kinetics of odor formation in digesters, studying the influence of cooking liquor composition, digester pressure and temperature on time for cooking to given pulp properties and amounts of odorous gases produced. None of the results of these studies have been applied to our knowledge.

Lime kilns, while successful in treating non-condensible gases, can evolve hydrogen sulfide. Recognition of the problem has come about recently, as soon as the newer kilns have been studied. No solution has been proposed, indeed, the magnitude of the problem has not been fully established. One of the goals of the monitoring provisions of the proposed regulations is to promote efforts in this direction.

Some efforts have been made in treating odorous gases with chlorine. Theoretically, it is possible to produce relatively odorless gases, but only after

the formation of much more odorous intermediates. This type of control would be practiced at kraft mills where pulp was bleached. There are two such mills in Oregon, neither of which uses chlorine or chlorine compounds for odor control.

There is a provision for studying sulfur dioxide emissions in the regulations. Sulfur dioxide is not as offensive as an equivalent concentration of reduced sulfur gases, but it is felt that studies should be commenced in anticipation of general SO_2 standards to come in the future.

The state of the art, then, is a matter of somewhat thorough studies on a few specific sources. There has not been enough monitoring to correlate effects of process variables with emissions, and as pointed out in this discussion practice has not produced all the results promised by theory.

PROPOSED RULES AND REGULATIONS
FOR KRAFT PULP MILLS IN OREGON

OREGON STATE SANITARY AUTHORITY
Air Quality Control

I. Definitions: As used in these regulations, unless otherwise required by context:

1. Continual Monitoring - means sampling and analysis, in a continuous or timed sequence, using techniques which will adequately reflect actual emission levels or concentrations on a continuous basis.
2. Emission - means a release into the outdoor atmosphere of air contaminants.
3. Kraft Mill or Mill - means any industrial operation which uses, for a cooking liquor, an alkaline sulfide solution containing sodium hydroxide and sodium sulfide in its pulping process.
4. Particulate Matter - means a small, discrete mass of solid or liquid matter.
5. Recovery Furnace Stack - means the stack from which the products of combustion are emitted to the ambient air from the recovery furnace.
6. Other Sources - means sources of odorous sulfur emissions in a kraft mill, including but not limited to, vents from lime kilns, knotters, brown stock pulp washers, multiple-effect evaporators, digesters, blow tanks, smelt tanks, blow heat accumulators, black liquor storage tanks, black liquor oxidation systems, tall oil recovery operations, and any operation connected with the treatment of condensate liquids within the mill or any vent which is shown to be a significant contribution of odorous gases.
7. Total Reduced Sulfur (TRS) - means hydrogen sulfide, mercaptans, dimethyl sulfide, dimethyl disulfide, and any other organic sulfides present.
8. Non-condensibles - means gases and vapors from the digestion and evaporation processes of a mill that are not condensed with the equipment used in said processes.

II. Statement of Policy:

Recent technological developments have enhanced the degree of malodorous emission control possible for the kraft pulping process. While recog-

nizing that complete malodorous and particulate emission control is not presently possible, consistent with the meteorological and geographical conditions in Oregon, it is hereby declared to be the policy of the Oregon State Sanitary Authority to:

1. Require, in accordance with a specific program and time table for each operating mill, the highest and best practicable treatment and control of atmospheric emissions from kraft mills through the utilization of technically feasible equipment, devices and procedures.
2. Require effective monitoring and reporting of emissions and reporting of other data pertinent to air quality or emissions. The Oregon State Sanitary Authority will use these data in conjunction with ambient air data and observation of conditions in the surrounding area to develop and revise emission and ambient air standards, and to determine compliance therewith.
3. Encourage and assist the kraft pulping industry to conduct a research and technological development program designed to progressively reduce kraft mill emissions, in accordance with a definite program, including specified objectives and time schedules.
4. Establish standards deemed to be technically feasible and reasonably attainable, with the intent of revising the standards as new information and better technology are developed.

III. Highest and Best Practicable Treatment and Control Required:

Notwithstanding the specific emission limits set forth in Section IV of these regulations, the highest and best practicable treatment and control currently available shall in every case be provided to maintain the lowest possible emission of air contaminants.

IV. Emission Limitations:

The following emission limits are based upon average daily emissions.

1. Emission of TRS

   (a) The emission of TRS from a recovery furnace stack shall not exceed 2 pounds of sulfur per ton of air-dried kraft pulp or 70 ppm expressed as H_2S on a dry gas basis, whichever is the more restrictive.

(b) No later than July 1, 1975, the emission of TRS from the recovery furnace stack shall not exceed 0.5 pound of sulfur per ton of air-dried kraft pulp or 17.5 ppm, expressed as H_2S on a dry gas basis, whichever is the more restrictive, or such other limit of TRS that proves to be reasonably attainable utilizing the latest in design of recovery furnace equipment, controls and procedures.

(c) No later than July 1, 1972, the emission of non-condensibles from digesters and multiple-effect evaporators shall be treated to reduce the emission of TRS equal to the reduction achieved by thermal oxidation in a lime kiln.

2. Emission of Particulate Matter

(a) No later than July 1, 1975, the emissions of particulate matter from the recovery furnace stack shall not exceed 4 pounds per ton of air-dried kraft pulp.

(b) No later than July 1, 1975, the emission of particulate matter from lime kilns shall not exceed 1 pound per ton of air-dried kraft pulp.

(c) No later than July 1, 1972, the emission of particulate matter from the smelt tank shall not exceed ½ pound per ton of air-dried kraft pulp.

3. Compliance Schedules

Within 180 days of the effective date of these regulations, each mill shall submit to the Oregon State Sanitary Authority a proposed schedule, including means, methods and a detailed time table, for complying with the emission limits of ~~this section~~ these regulations. After receipt of said proposed schedule, the Oregon State Sanitary Authority, will establish, in cooperation with mill representatives, an approved compliance schedule for each mill within the time limitations established by ~~this section~~ these regulations.

4. Public Hearing

A public hearing shall be held by the Oregon State Sanitary Authority not later than July, 1973 to review current technology and the adequacy of the emission limits established by ~~this section~~ these regulations and to adopt any revisions that may be necessary.

V. More Restrictive Emission Limits:

The Sanitary Authority may establish more restrictive emission limits and compliance schedules for new mills or for established mills that desire to expand or alter existing facilities, or are located in recognized problem areas.

VI. Plans and Specifications:

Prior to the construction of new kraft mills, or expansion of production or modification of facilities significantly affecting emissions at existing kraft mills, complete and detailed engineering plans and specifications for air pollution control devices and facilities and such other data as may be required to evaluate projected emissions and potential effects on air quality shall be submitted to the Oregon State Sanitary Authority for approval.

VII. Monitoring and Reporting:

1. Each mill shall develop and submit a detailed monitoring program, and order and install sampling and monitoring equipment within the following time schedule:
   (a) Within 60 days after the effective date of these regulations, each mill shall submit a detailed monitoring program for approval by the Oregon State Sanitary Authority.
   (b) Within 30 days after the monitoring program has been approved in writing by the Oregon State Sanitary Authority, sampling and monitoring equipment shall be ordered.
   (c) Within 90 days after delivery of the equipment, each mill shall place said equipment in effective operation in accordance with its approved monitoring program.
2. Each mill shall install equipment for the continual monitoring of TRS in accordance with the following:
   (a) The monitoring equipment shall be capable of determining compliance with the emission limits established by these regulations, and shall be capable of continual sampling and recording of the average concentrations of TRS contaminants during a time interval not greater than 30 minutes.
   (b) The sources monitored shall include, but are not limited to, the recovery furnace stacks and the lime kiln stacks.

3. Each mill shall sample the recovery furnace, lime kiln, and smelt tank for particulate emissions on a regularly scheduled basis in accordance with its approved monitoring program.
4. Unless otherwise authorized by the Oregon State Sanitary Authority, data shall be reported by each mill at the end of each calendar month as follows:
   (a) Daily average emission of TRS gases expressed in parts per million of H_2S on a dry gas basis for each source included in the approved monitoring program.
   (b) The number of hours each day the TRS gases from the recovery furnace stack exceeds 70 ppm and maximum concentration measured each day.
   (c) Emission of TRS gases in pounds of sulfur per equivalent air-dried ton of pulp processed in the kraft cycle on a monthly basis for each source included in the approved monitoring program.
   (d) Emission of particulates in pounds per equivalent air-dried ton of pulp produced in the kraft cycle based upon the sampling conducted in accordance with the approved monitoring program.
   (e) Average daily equivalent kraft pulp production in air-dried tons.
   (f) Other emission data as specified in the approved monitoring program.
5. Each kraft mill shall furnish, upon request of the Oregon State Sanitary Authority, such other pertinent data as the Authority may require to evaluate the mill's emission control program. Each mill shall immediately report abnormal mill operations which result in increased emissions of air contaminants.

VIII. Special Studies:

Special studies, having prior approval of the Oregon State Sanitary Authority, shall be conducted at each mill, and the results submitted to the Oregon State Sanitary Authority by July 1971. The studies shall cover the following areas:

A. Evaluation of the emissions of TRS from all other sources within the mill.
B. Evaluation of the emissions of sulfur dioxide from all sources within the mill, including but not necessarily limited to, recovery furnaces, lime kilns and power boilers.

IX. Other Established Air Quality Limitations:

The emission limits established by these regulations are in addition to visible emissions and other ambient air standards, established or to be established by the Sanitary Authority unless otherwise provided by rule or regulation.

Office Memorandum • OREGON STATE BOARD OF HEALTH

To : Sanitary Authority Members Date: March 21, 1969

From : Ely J. Weathersbee

Subject: Proposed Kraft Mill Air Quality Regulations

The following materials relative to proposed Kraft mill Air Quality Standards are enclosed for your information:

1) Proposed rules and regulations

2) Staff comments regarding the proposed regulations

3) Industry comments regarding the proposed regulations (Don Benson's letter of 3/19/69)

4) Explanation of Kraft mill recovery process and emission control

I believe this information is self-explanatory. One item needing additional comment is that the Oregon State Sanitary Authority staff has not agreed to limit Article IV.3 of the regulations to the 1972 deadlines as stated in Mr. Benson's letter. It is our understanding that the Washington Water Pollution Control Commission agreed to so limit this section. Our staff is of the opinion that the mills should consider the longer range standards in their implementation plan to the extent that this is possible.

We will attempt to answer any questions you might have at the executive session in the morning of March 27.

MAILING ADDRESS:
P. O. BOX 231
PORTLAND, OREGON 97207

TELEPHONE:
AREA CODE 503
226-2161

STATE OF OREGON
OREGON STATE SANITARY AUTHORITY
A DIVISION OF THE OREGON STATE BOARD OF HEALTH
STATE OFFICE BUILDING
1400 S. W. 5TH AVENUE
PORTLAND, OREGON 97201

March 19, 1969

Kenneth H. Spies
Secretary and Chief Engineer
State Sanitary Authority
1400 S. W. 5th Avenue
Portland, Oregon

Dear Mr. Spies:

In reference to the proposed regulations for kraft mills prepared for a public hearing on March 27, 1969, before the Oregon State Sanitary Authority, the staff has received and has prepared additions and changes to clarify the intent of specific sections of the regulations.

It is recommended that the enclosed changes dated March 18, 1969, be given consideration by the Oregon State Sanitary Authority.

Very truly yours,

H M Patterson

H. M. Patterson, Chief
Air Quality Control

HMP:ms

cc: Arnold Silver
E. J. Weathersbee

KRAFT MILL REGULATIONS

Amend the following sections:

I. Page 1, I Definitions, Item, 4 Particulate Matter

The definition now reads as follows:

Particulate Matter - means a small, discrete mass of solid or liquid matter.

It is recommended that the definition be changed so as to exclude uncombined water, (ie. steam or water vapor), from the emission limitations in Section 2. Emission of Particulate Matter on Page 3.

The new definition would read as follows (new portion underlined).

4. Particulate Matter - means a small, discrete mass of solid or liquid matter, but not including uncombined water.

II. Page 1, I Definitions

Add a definition for parts per million, ppm.

9. Parts per million, ppm - means parts of a contaminant per million parts of [redacted] by volume (0.0001 percent by volume).

III. Page 2, Section III, Highest and Best Practicable Treatment and Control Required: The section now reads as follows:

Notwithstanding the specific emission limits set forth in Section IV of these regulations, the highest and best practicable treatment and control currently available shall in every case be provided in order to maintain the lowest possible emission of air contaminants.

It has been recommended that the following wording be adopted to clarify the intent.

Notwithstanding the specific emission limits set forth in Section IV of these regulations, in order to maintain the lowest possible emission of air contaminants, the highest and best practicable treatment and control currently available shall in every case be provided.

IV. Pages 2 and 3, Section IV, Emission Limitations: - 1. (a) (b) - 2. (a) (b) (c)

It is recommended that "equivalent" be added to clarify the meaning (new word underlined).

1. Emission of TRS

(a) The emission of TRS from a recovery furnace stack shall not exceed 2 pounds of sulfur per ton of equivalent air-dried kraft pulp or

70 ppm expressed as H_2S on a dry gas basis, whichever is the more restrictive.

(b) No later than July 1, 1975, the emission of TRS from the recovery furnace stack shall not exceed 0.5 pound of sulfur per ton of equivalent air-dried kraft pulp or 17.5 ppm, expressed as H_2S on a dry gas basis, whichever is the more restrictive, or such other limit of TRS that proves to be reasonably attainable utilizing the latest in design of recovery furnace equipment, controls and procedures.

(c) No change.

2. Emission of Particulate Matter

(a) No later than July 1, 1975, the emissions of particulate matter from the recovery furnace stack shall not exceed 4 pounds per ton of equivalent air-dried kraft pulp.

(b) No later than July 1, 1975, the emission of particulate matter from lime kilns shall not exceed 1 pound per ton of equivalent air-dried kraft pulp.

(c) No later than July 1, 1972, the emission of particulate matter from the smelt tank shall not exceed ½ pound per ton of equivalent air-dried kraft pulp.

V. Page 4, Section V, More Restrictive Emission Limits

It has been recommended that the words "in a manner significantly affecting emissions" be added to clarify the intent of the regulations. The section would read: (New words underlined)

The Sanitary Authority (will) may establish more restrictive emission limits and compliance schedules for new mills or for established mills that desire to expand or alter, in a manner significantly affecting emissions, existing facilities, or are located in recognized problem areas.

VI. Page 4, Section VII, Monitoring and Reporting: - 2. (a)

It is recommended that the bracketed [ ] words be deleted to clarify intent.

2. Each mill shall install equipment for the continual monitoring of TRS in accordance with the following:

(a) The monitoring equipment shall be capable of determining compliance with the emission limits established by these regulations, and shall be capable of continual sampling and recording of [the average] concentrations of TRS contaminants during a time interval not greater than 30 minutes.

(b) No change.

Executive Secretary: DONALD J. BENSON

NORTHWEST PULP AND PAPER ASSOCIATION

2633 Eastlake Avenue East
Seattle, Wn. 98102 • EA 5-3277

March 19, 1969

Kenneth Spies, Secretary and Chief Engineer
Oregon State Sanitary Authority
P. O. Box 231
Portland, Oregon

Dear Mr. Spies:

This letter is submitted with regard to the proposed rules and regulations relating to kraft mills that will be considered by the Authority at a public hearing on March 27, 1969.

These comments were developed by an industry technical committee comprised of recognized experts on kraft mill air protection in the Pacific Northwest. The discussion is intended to be limited solely to the technical aspects of the proposed rules and regulations.

We have carefully studied the proposed rules and regulations and have assessed their potential impact on the kraft industry in this state. We find that the requirements envisioned are the most stringent and demanding of any imposed on this industry in the United States or Canada.

We have been advised that the following amendments will be made prior to adoption:

Article I.4	Add "exclusive of uncombined water".
Articles IV.1 (a) and IV.1 (b)	Will include the words "sulfur per equivalent ton of pulp".
Not Correct Article IV.3	This section shall apply only to 1972 deadlines.
Article V	Delete "or alter" or define alter "as construction that would result in an increase in emissions".
Article VII.2 (a)	Delete "average".

We endorse these proposed amendments.

As an industry technical committee we submit the following additional comments and recommendations for your favorable consideration.

It is premature to establish the emission limits proposed in Article IV.1 (b) and IV.2 (a) without sufficient information available upon which to establish realistic 1975 standards. Such information will be available for the first time as a result of the monitoring program contained in the proposed rules and regulations.

It is submitted that the hearing required to be held by July 1973 will provide an appropriate forum to analyze the data generated and assess the improvement in community environmental conditions. That hearing will provide a basis upon which to establish realistic emission limits for 1975. If, after weighing these considerations, the Authority still feels it is committed to establishing 1975 standards at this time, we would make this statement:

> "After an analysis of the available information, it is the judgment of the technical committee that the proposed emission standard IV.1 (b) should be changed to 35 ppm or 1.0 pounds per ton of pulp produced and IV.2 (a) be revised to a more realistic limit of 8 pounds per ton of pulp."

We must express our concern at the prospect of unwarranted obsolescence of modern equipment installed in the past few years that would result from the adoption of arbitrary emission requirements. This could involve several million dollars per unit, requiring major engineering and corporate fiscal considerations. We submit that such drastic measures should not be required without a well documented need, as the differences between our recommended 1975 limit and those set forth in the proposed regulations are small when compared to present kraft mill emissions.

Referring now to Article III of the proposed regulations which pertains to the "highest and best practical treatment", we call to your attention a contradiction in terms between "best practicable" and "lowest possible" in the article as proposed. We must object to the inclusion of Article III in its entirety in that it is not quantitative and furthermore is redundant in that it merely restates objectives adequately covered elsewhere in the proposed rules and regulations, for example Articles II, V and VI.

The intensive monitoring and special study program, in conjunction with the identification of community needs, will stimulate the development of necessary improved technology. We are confident the achievement of the program envisioned in the proposed rules and regulations amended per our recommendations will substantially improve environmental control in the kraft industry.

The initial emission limits proposed represent a major, in many cases 5 to 10 fold, reduction in reduced sulfur emission by the industry. The result will be a significant contribution to this State's environmental control program and will represent a very large investment by the industry in the future of Oregon.

Thank you for your consideration of these recommendations. If there are any questions, please do not hesitate to contact us.

Respectfully submitted,

Donald J. Benson

Donald J. Benson, Secretary
Kraft Mill Air Standards Technical Committee

DJB tl

PRESENTATION AT A PUBLIC HEARING ON THE PROPOSED RULES AND REGULATIONS FOR KRAFT PULP MILLS IN OREGON IN ROOM 36, STATE OFFICE BUILDING 1400 S. W. FIFTH AVENUE, PORTLAND, OREGON

March 27, 1969
1:30 p.m.

By
Allan Mick, Engineer
Representing
Mid-Willamette Valley
Air Pollution Authority

PARTICIPATING COUNTIES:
BENTON
LINN
MARION
POLK
YAMHILL

MID-WILLAMETTE VALLEY AIR POLLUTION AUTHORITY

2585 State Street - Salem, Oregon 97301
Telephone 581-1715

March 27, 1969

Oregon State Sanitary Authority
1400 S. W. 5th Avenue
Portland, Oregon 97201

Re: Kraft Pulp Mill
Regulations

Gentlemen:

Mr. Chairman, members of the Oregon State Sanitary Authority:

My name is Allan Mick and I am an Engineer representing the Mid-Willamette Valley Air Pollution Authority. The Authority has two Kraft process pulp mills in the regional area, and its Salem office receives many queries, complaints and comments from local residents concerning air pollution problems of these plants. Although jurisdiction of this industry has been retained by the O.S.S.A., Mid-Willamette, because of its interest in the total Valley air resource, deems it appropriate to submit comments on the "Proposed Rules and Regulations for the Kraft Pulp Mills in Oregon".

The Mid-Willamette Authority supports the proposed Rules. However, it requests that the Sanitary Authority review the following recommendations for possible incorporation into the Rules if adopted.

Section I, Definitions

This section should include the following definition:

Air Dry Weight equals 110% of bone dry weight

General Discussion on Sections II, III, IV, V, VII, Relating to Emission Limitations and Process Monitoring. Mid-Willamette believes that there has been enough information published to establish a definite link between recovery furnace "overloads" and TRS emissions. It is common knowledge throughout the Kraft industry that the level of malodorous emissions increases when recovery furnaces are operated well beyond their nameplate capacity. Weyerhaeuser Company ran tests (Thoen) with a modified Barton Titrator on a 350 ton/day B & W recovery furnace to determine what relationship exists between Total Reduced Sulfur (TRS) emissions and total solids fired into the boiler. Thoen found that emissions in the flue gas before the direct contact evaporator resulted in 2.05 ppm TRS when the boiler was operated at 128% of design. However, at 187% of furnace design, losses increased to 242 ppm TRS. Other data cited in the attached report substantiate these relationships

Recommendations: The existing evidence indicates the best solution in reducing TRS emissions appears to be in limiting recovery boilers to 120-130% of nameplate design. Mid-Willamette Valley Air Pollution Authority recommends that Sections II, III, IV-1 (a), (b) and IV-3 reflect this "overloading" of recovery boilers and further that the routine monitoring and reporting of the loading of total solids to the recovery boiler with supporting data be incorporated into Section VII to be correlated with TRS emission data taken before the direct contact evaporators.

Direct Contact Evaporators. The direct contact evaporator can emit to the stack TRS at levels greater than 1,000 ppm if the black liquor oxidation system fails to function. A highly effective system is essential to prevent the flue gas from stripping malodorous gases from the black liquor at the direct contact evaporator. The oxidation towers have been known to be undependable and are easily by passed.

Recommendations. Mid-Willamette Valley Air Pollution Authority recommends that the operation of the oxidation towers be continuously monitored and a malfunction or shut down considered an upset condition and reported to D.S.S.A. Due to the inherent potential for odor problems, MWV-APA recommends that serious consideration be given to prohibiting direct contact of flue gas with the black liquor.

Section IV - 2, (a) and (b) Particulate Matter

The proposed standard in this section would result in emissions considerably higher than those allowed in "typical Process Weight Rate Standards". MWV-APA is considering adopting such a standard in the future. The question arises that if a Regional Authority adopted a typical process weight emission standard similar to the standard the State applied to the hot mix asphalt plants, would the Kraft plants be required to meet the same process weight standard, irregardless of size, the same as other industries.

Section IV - 4 Public Hearing.

Mid-Willamette's attorney questions whether this paragraph is necessary at all (see attached letter). However, if the Sanitary Authority feels a date is necessary, MWV-APA suggests the date be moved up to July, 1971. This would allow the Kraft mills enough time to procure and install the sampling equipment and provide the O.S.S.A. with requested data over a one year's period. After a review of the data and current technology, O.S.S.A. could adopt any revisions necessary and still provide the Kraft industry time to engineer, budget, procure, and install modifications required and very possibly the 1975 date with new standards can be moved up significantly.

Thank you for your time and attention.

Sincerely yours,

MICHAEL D. ROACH, Director

Allan Mick
Engineer

AM:ks
Attachment

CECIL H. QUESSETH
ATTORNEY AT LAW
466 STATE STREET
SALEM, OREGON 97301
TELEPHONE 585 2666

March 24, 1969

Mr. Michael D. Roach
Director, Mid-Willamette Valley
Air Pollution Authority
2585 State Street
Salem, Oregon 97301

Re: Proposed rules & regulations
for kraft pulp mills

Dear Mike:

At your request I have reviewed the proposed rules and regulations for kraft pulp mills of the State Sanitary Authority upon which a public hearing is scheduled for 1:30 P.M. March 27, 1969.

My comments pertain principally to the form and content from a legal standpoint rather than their sufficienty from an engineering standpoint, since you can better advise on the latter point.

At the outset, it is well to be reminded that upon establishment of our regional Authority the State Sanitary Authority retained jurisdiction in the region over various sources including pulp and paper mills (Spies letter of October 10, 1967). This power of retention of sources exists under ORS 449.910. Under ORS 449.855 it is provided however, that "the regional authority shall enforce rules, regulations and orders of the Sanitary Authority insofar as it is required to do so by the Sanitary Authority."

Accordingly, the proposed regulations presumably apply to "all" kraft mills in Oregon including those located within the boundaries of regional air pollution control authorities. If it is the intention of the State Sanitary Authority upon adoption of the kraft mill regulations to impose enforcement of such regulations upon the regional authorities it might be appropriate to have some language in the regulations spelling out this delegation of authority. This is not a mandatory provision but simply a suggestion.

In paragraph 4, page 3, reference is made to a public hearing to be held by the Sanitary Authority not later than July 1973, to review the matter and possibly adopt revisions. I question whether this paragraph is necessary at all since as a practical

matter the Sanitary Authority can always review such matters and if revision of standards and regulations are necessary a prior public hearing must be held in accordance with ORS 449.790.

On page 5, paragraph 5, I wonder about the use of the word "abnormal" operations in referring to the reporting of mill operations. Possibly this is just a play on words but I assume they are referring to the type of "upset conditions" set out in our rule 12-025. I suggest that maybe the word "abnormal" might be clarified.

On page 5, paragraph VIII, reference is made to "special studies". I question whether or not this is actually a necessary provision since there are other provisions in the regulations requiring submission of compliance schedules and the development and submission of a detailed monitoring program. Possibly I don't fully understand this additional requirement for such "special studies" and for this reason I question whether it is entirely essential.

The only other comment I have is that it is usually desirable to have a proposed effective date of regulations or standards. The Sanitary Authority must not only follow the provisions of ORS 449.790 but also the Administrative Procedures Act. Under the latter statute the effective date of rules shall not be sooner than ten days subsequent to publication in the Secretary of State's bulletin, unless the agency finds an emergency exists: ORS 183.350.

The foregoing are simply suggestions for whatever use you wish to make of them and use your discretion whether or not any such suggestions should be transmitted to the Oregon State Sanitary Authority.

Sincerely yours,

Cecil H. Quesseth

CECIL H. QUESSETH
Consulting Attorney
Mid-Willamette Valley
Air Pollution Authority

CHQ/mm

MID-WILLAMETTE VALLEY AIR POLLUTION AUTHORITY

INTEROFFICE MEMORANDUM

TO: Michael D. Roach, Director

FROM: Allan Mick, Engineer

DATE: March 24, 1969

SUBJECT: Proposed Rules and Regulations for Kraft Pulp Mills in Oregon

I have reviewed the proposed rules and regulations for the Kraft Pulp Industry, and I wish to make the following comments:

SECTION I, DEFINITIONS

To include the following definition:

Air Dry Pulp equals 110% of bone dry.

SECTION IV, EMISSION LIMITATIONS

The emission of TRS and particulate matter from the recovery area will be measured at the stack, thus allowing the mills to select their own control methods and devices. The regulatory agencies are ultimately concerned in reducing the overall mill emissions to tolerable levels. However, I'm not entirely convinced that O.S.S.A. should allow the pulp industry to be the sole judge in what can be accomplished, how it will be accomplished, and when it will be accomplished.

To define the whole problem, first let us break it down into its components, and then evaluate them individually.

1. Recovery Boiler
2. Oxidation Tower
3. Direct Contact Evaporator
4. Electrostatic Precipitator
5. Water Scrubber
6. Multiple Effect Evaporators will be discussed later.

Recovery Boiler. The black liquor which is sprayed into the recovery furnace is made up of chemicals which have been used to dissolve the lignin from the pulp and 35 to 40% water. Very little is known of the chemical tie-up of the lignin with the sodium hydroxide. More is known of the physical properties of the liquid as it enters the furnace. Temperature, pressure, per cent solids, flow rate are all monitored. Temperature affects the viscosity of the black liquor. Changes in line pressure and viscosity also changes the flow rate and the nozzle spray pattern. The black liquor is normally maintained at 60-65% solids; if the solids content decreases below design limitations, dangerous boiler "blackouts" can occur. Many methods are currently available to measure the total solids which are fired in the boiler. One of the mills with which I am familiar dilutes the black liquor 1:1 with water before specific gravity and temperature readings are taken.

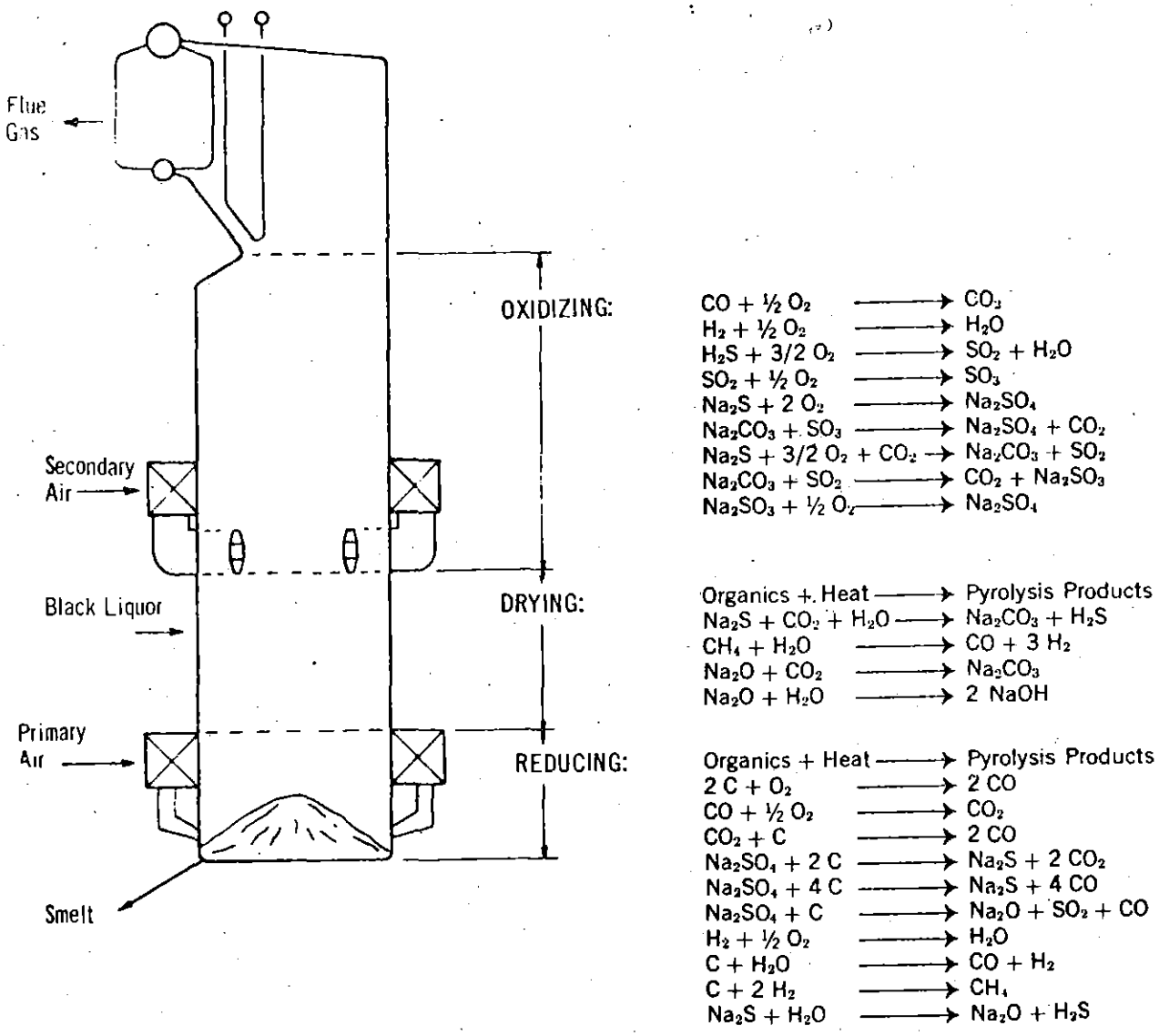


Fig. 1 Typical C-E recovery unit showing chemical reactions and where they occur[2]

A reference chart is used to determine the percent solids to plus or minus 2% with a yearly statistical average of better than 1/2% accuracy. The fireman continuously moniters a nuclear density meter to be assured that the solids level does not suddenly drop. This meter in itself does not give total solids but its reading is noted when the solids test is made and although the calibration may change, it is a useful tool in furnace operation.

Kraft furnaces are rated in tons of total pulp production where 3,000 pounds of solids are burned for each ton of pulp produced, therefore, an 800 ton mill will burn 2,400,000 pounds of solids each day. Many mills have increased their capacity to nearly 200% and often the Recovery Furnace becomes the bottleneck to any further increase in production rates. It is common knowledge in the Kraft Industry that the level of malodorous emissions increases from these "overworked" boilers. Chemical sulphidity becomes more difficult to maintain, and these increased sulphur losses must be replaced to maintain pulp quality. The Kraft mills candidly solve this problem by purchasing elemental sulphur and feeding it into the chemical stream in as many ways as there are plants. Sulphur has been added at the digesters, mixed in the black liquor, added at the causticizer, pumped in molten form to the smelt bed, tossed by 100 pound sack into the furnace and high sulphidity refinery waste has been pumped into the smelt tank.

Low sulphidities are not entirely caused by sulphur losses, but also by the mill's ability to recover more of the sodium. Thoen, of the Weyerhauser Company, ran tests[1] on a 350 ton/day B and W recovery furnace to determine if there actually is a relationship between TRS emissions and boiler firing rates. He found that TRS in the flue gas before the direct contact evaporator was only 2.05 ppm when the boiler was being operated at 128% of design. However, when the same furnace was pushed to 187% of design capacity, TRS losses increased to 242 ppm.

Table I. Emissions from 450 Ton Kraft Plant Recovery Furnace[3]

Design Capacity	SO_2	H_2S	RSH	RSR	RSSR
127%	16.8	0.11	ND	ND	ND
182%	31.6	151	65.2	22.0	4.0

SO_2 - Sulfur dioxide
H_2S - Hydrogen Sulfide
RSH - Methyl Mercaptan
RSR - Dimethyl Sulfide
RSSR - Dimethyl Disulfide

Supporting data is supplied by Harding and Landing[2] and others.[5,6] On tests run on an 800 ton/day recovery furnace, Thoen found that at 116% design load, H_2S emission was held below 3ppb and SO_2 did not exceed 0.08 ppm.

Table II.[3] - Extended Operation at Optimum Conditions*
(24 Hr. Test-Load = 116% Design)

	ppm v/v				
Periodic Samples	SO_2	H_2S	RSH	RSR	RSSR
1	0.04	0	0	0	0
2	0.07	0	0	0	0
3	0.04	0	0	0	0
4	0.01	0	0	0	0
5	0.08	0	0	0	0

*35% secondary air at 180 ft/sec coarse black liquor spray.

The odor threshold of H_2S and RSH is 1 ppb and 10 ppb for RSR and RSSR.[2] Present technology offers no economic means of reducing TRS

emissions to these levels. In light of the existing evidence, the best solution appears to be in limiting the operation of recovery boilers to 120-130% of nameplate design. If a tall stack could provide at least 2,000 dilutions between stack discharge and ground level, a recovery furnace would be odor free if the flue gas is at a maximum 2 ppm TRS concentration.

In addition to better control of emissions of malodorous gases, there are these economic advantages:

1. Chemical recovery of Na and S.
2. Increased steam production.
3. Prolonged boiler life.

Recommendations: Recovery Furnaces. Additional data is needed to confirm the apparent exponential increase of TRS emission from overloaded furnaces. As continuous stack monitoring equipment becomes available, information in the following areas will be invaluable.

1. Total solids to recovery boiler
2. Black liquor temperature and pressure
3. Nozzel size and type
4. Excess oxygen
5. TRS emissions, SO_2, before d.c. evaporator
6. Percent O_2, CO_2, CO.
7. Furnace and Flue gas temperatures

Upon evaluation of this data, it may be necessary to consider limiting solids burned in the recovery boiler.

DIRECT CONTACT EVAPORATORS AND OXIDATION TOWERS

When TRS emissions are being discussed in the air evaporator and oxidation tower areas, we must consider them as part of the same unit. A highly efficient oxidation system is mandatory to prevent the flue gas from stripping malodorous gases from the d.c. evaporator. The oxidation towers are not the most dependable piece of equipment and when they malfunction, can easily be by-passed with the consequent result that unoxidized black liquor in the d.c. evaporator produces high TRS emissions. Thoen's tests show the effect of BL oxidation on furnace and cascade evaporator emissions.

Table IV. Effect of Black Liquor Oxidation on Furnace and Cascade Emissions.

	ppm v/v			
	H_2S	RSH	RSR	RSSR
Oxidized Liquor				
Before Cascade	0	0	0	0
After Cascade	4.16	0.74	0.68	0
Unoxidized Liquor				
Before Cascade	0	0	0	0
After Cascade	72.4	3.45	0	2.28

Note: 0 indicates concentration less than detection limits of analytical equipment.

The degree of black liquor oxidation apparently has no effect on flue gas quality.[2,4]

Recommendations: Direct Contact Evaporators and Oxidation Towers.

In the future a shutdown of an oxidation tower should be treated as a mill upset condition and reported to the O.S.S.A. We further recommend that serious consideration be given to prohibiting direct contact of flue gas with black liquor.

NON-CONDENSABLE GASES

The non-condensables from the digesters and the multiple effect evaporators are highly concentrated and appear in relatively small volumes. Inexpensive methods have been developed to burn digester blow gases in a lime kiln[4] as well as scrubbing the gases from multiple effect evaporator emissions.[4] Despite these plus other developments, apparently few mills have installed controls on these emissions.

SECTION IV - 2, (a) and (b)

A 450 ton Kraft Pulp Plant in the Northwest has demonstrated that in 1967 its particulate losses were[9] little more than 2 lbs/ADT (0.065 grains per ft^3 dry gas or 31 lbs/hr). The flue gas for this plant passes through a direct contact evaporator, a 80% efficiency electrostatic precipitator and a Venturi Scrubber and was sampled by conductivity of sodium ions after collection in an impinger train. O.S.S.A. uses the following factors for comparison: 2 lbs particulate/ADT = 0.05 grains/SCF. The question arises that if a Regional Authority

adopted a typical Process Weight Emission standard similar to the standard on Hotmix Asphalt plants adopted by the State, would the Kraft plant be required to meet process weight standard irregardless of size.

SECTION IV - 2 (c)

Dissolving tank vent losses from a 450 T/day Kraft mill averaged 0.15 pounds per ADT. The vent gases were passed through a packed tower and scrubbed with weak wash. The cost of such an installation is minimal.

SECTION IV - 4

Public hearing date should be moved up to July 1, 1971. This will allow ample time to review mill data and yet have enough time to select possible new standards which the pulp mills can meet by the 1975 deadline.

The above information is offered for your review and comment.

Allan Mick

Allan Mick, Engineer

AM/ks

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2. Hochmuth, F. W. "An Odor Control System for Chemical Recovery Units", Combustion Engineering, Inc. (Sept., 1968)
3. Thoen, G. N. "The Effect of Combustion Variables on the Release of Odorous Sulfur Compounds from a Kraft Recovery Unit", Tappi (Feb., 1968)
4. Hendrickson, Dr. E. R. "Atmospheric Emissions from Sulfate Pulping", USPHS (April, 1966).
5. Blosser, R. O. "Factors Affecting Gaseous Sulfur Emissions in the Kraft Recovery Furnace Complex", National Council for Air and Stream Improvement (1969).
6. Murry, F. E. "The Emission of Hydrogen Sulphide from Kraft Recovery Furnaces", B. C. Research Council, Vancouver, B. C. (1967).
7. Clement, J. L. "Kraft Recovery Boiler Design for Odor Control", Paper Trade Journal, (Sept., 1968).

NOTICE OF HEARING
OREGON STATE SANITARY AUTHORITY

NOTICE IS HEREBY GIVEN that the Oregon State Sanitary Authority is considering the adoption of certain rules and regulations relating to kraft pulp mills to be made a part of Oregon Administrative Rules, Chapter 334.

Copies of the proposed rules and regulations may be obtained upon request from the Secretary, Oregon State Sanitary Authority, State Office Building, 1400 S.W. Fifth Avenue, Portland, Oregon, or by telephone at 226-2161, extension 230.

Any person desiring to submit any written views or data on this matter may do so by forwarding them to the Secretary, Oregon State Sanitary Authority, 1400 S.W. Fifth Avenue, Portland, Oregon, 97201, before 12:00 o'clock noon, March 27, 1969, or may appear and be heard orally or submit any additional written data or views between the hours of 1:30 o'clock p.m. and 5:00 o'clock p.m. on the aforesaid day in Room 36, State Office Building, 1400 S.W. Fifth Avenue, Portland, Oregon.

Kenneth H. Spies, Secretary
Oregon State Sanitary Authority

PROPOSED RULES AND REGULATIONS
FOR KRAFT PULP MILLS IN OREGON

OREGON STATE SANITARY AUTHORITY
Air Quality Control

I. Definitions: As used in these regulations, unless otherwise required by context:

1. Continual Monitoring - means sampling and analysis, in a continuous or timed sequence, using techniques which will adequately reflect actual emission levels or concentrations on a continuous basis.
2. Emission - means a release into the outdoor atmosphere of air contaminants.
3. Kraft Mill or Mill - means any industrial operation which uses, for a cooking liquor, an alkaline sulfide solution containing sodium hydroxide and sodium sulfide in its pulping process.
4. Particulate Matter - means a small, discrete mass of solid or liquid matter, but not including uncombined water.
5. Recovery Furnace Stack - means the stack from which the products of combustion are emitted to the ambient air from the recovery furnace.
6. Other Sources - means sources of odorous sulfur emissions in a kraft mill, including but not limited to, vents from lime kilns, knotters, brown stock pulp washers, multiple-effect evaporators, digesters, blow tanks, smelt tanks, blow heat accumulators, black liquor storage tanks, black liquor oxidation systems, tall oil recovery operations, and any operation connected with the treatment of condensate liquids within the mill or any vent which is shown to be a significant contribution of odorous gases.
7. Total Reduced Sulfur (TRS) - means hydrogen sulfide, mercaptans, dimethyl sulfide, dimethyl disulfide, and any other organic sulfides present.
8. Non-condensibles - means gases and vapors from the digestion and evaporation processes of a mill that are not condensed with the equipment used in said processes.

II. Statement of Policy:

Recent technological developments have enhanced the degree of malodorous emission control possible for the kraft pulping process. While recog-

nizing that complete malodorous and particulate emission control is not presently possible, consistent with the meteorological and geographical conditions in Oregon, it is hereby declared to be the policy of the Oregon State Sanitary Authority to:

1. Require, in accordance with a specific program and time table for each operating mill, the highest and best practicable treatment and control of atmospheric emissions from kraft mills through the utilization of technically feasible equipment, devices and procedures.
2. Require effective monitoring and reporting of emissions and reporting of other data pertinent to air quality or emissions. The Oregon State Sanitary Authority will use these data in conjunction with ambient air data and observation of conditions in the surrounding area to develop and revise emission and ambient air standards, and to determine compliance therewith.
3. Encourage and assist the kraft pulping industry to conduct a research and technological development program designed to progressively reduce kraft mill emissions, in accordance with a definite program, including specified objectives and time schedules.
4. Establish standards deemed to be technically feasible and reasonably attainable, with the intent of revising the standards as new information and better technology are developed.

III. Highest and Best Practicable Treatment and Control Required:

Notwithstanding the specific emission limits set forth in Section IV of these regulations, the highest and best practicable treatment and control currently available shall in every case be provided to maintain the lowest possible emission of air contaminants.

IV. Emission Limitations:

The following emission limits are based upon average daily emissions.

1. Emission of TRS

   (a) The emission of TRS from a recovery furnace stack shall not exceed 2 pounds of sulfur per ton of air-dried kraft pulp or 70 ppm expressed as H_2S on a dry gas basis, whichever is the more restrictive.

(b) No later than July 1, 1975, the emission of TRS from the recovery furnace stack shall not exceed 0.5 pound of sulfur per ton of air-dried kraft pulp or 17.5 ppm, expressed as H_2S on a dry gas basis, whichever is the more restrictive, or such other limit of TRS that proves to be reasonably attainable utilizing the latest in design of recovery furnace equipment, controls and procedures.

(c) No later than July 1, 1972, the emission of non-condensibles from digesters and multiple-effect evaporators shall be treated to reduce the emission of TRS equal to the reduction achieved by thermal oxidation in a lime kiln.

2. Emission of Particulate Matter

(a) No later than July 1, 1975, the emissions of particulate matter from the recovery furnace stack shall not exceed 4 pounds per ton of air-dried kraft pulp.

(b) No later than July 1, 1975, the emission of particulate matter from lime kilns shall not exceed 1 pound per ton of air-dried kraft pulp.

(c) No later than July 1, 1972, the emission of particulate matter from the smelt tank shall not exceed ½ pound per ton of air-dried kraft pulp.

3. Compliance Schedules

Within 180 days of the effective date of these regulations, each mill shall submit to the Oregon State Sanitary Authority a proposed schedule, including means, methods and a detailed time table, for complying with the emission limits of this section. After receipt of said proposed schedule, the Oregon State Sanitary Authority, will establish, in cooperation with mill representatives, an approved compliance schedule for each mill within the time limitations established by this section.

4. Public Hearing

A public hearing shall be held by the Oregon State Sanitary Authority not later than July, 1973 to review current technology and the adequacy of the emission limits established by this section and to adopt any revisions that may be necessary.

V. More Restrictive Emission Limits:

The Sanitary Authority may establish more restrictive emission limits and compliance schedules for new mills or for established mills that desire to expand or alter existing facilities, or are located in recognized problem areas.

VI. Plans and Specifications:

Prior to the construction of new kraft mills, or expansion of production or modification of facilities significantly affecting emissions at existing kraft mills, complete and detailed engineering plans and specifications for air pollution control devices and facilities and such other data as may be required to evaluate projected emissions and potential effects on air quality shall be submitted to the Oregon State Sanitary Authority for approval.

VII. Monitoring and Reporting:

1. Each mill shall develop and submit a detailed monitoring program, and order and install sampling and monitoring equipment within the following time schedule:
   (a) Within 60 days after the effective date of these regulations, each mill shall submit a detailed monitoring program for approval by the Oregon State Sanitary Authority.
   (b) Within 30 days after the monitoring program has been approved in writing by the Oregon State Sanitary Authority, sampling and monitoring equipment shall be ordered.
   (c) Within 90 days after delivery of the equipment, each mill shall place said equipment in effective operation in accordance with its approved monitoring program.
2. Each mill shall install equipment for the continual monitoring of TRS in accordance with the following:
   (a) The monitoring equipment shall be capable of determining compliance with the emission limits established by these regulations, and shall be capable of continual sampling and recording of the average concentrations of TRS contaminants during a time interval not greater than 30 minutes.
   (b) The sources monitored shall include, but are not limited to, the recovery furnace stacks and the lime kiln stacks.

3. Each mill shall sample the recovery furnace, lime kiln, and smelt tank for particulate emissions on a regularly scheduled basis in accordance with its approved monitoring program.
4. Unless otherwise authorized by the Oregon State Sanitary Authority, data shall be reported by each mill at the end of each calendar month as follows:
   (a) Daily average emission of TRS gases expressed in parts per million of H_2S on a dry gas basis for each source included in the approved monitoring program.
   (b) The number of hours each day the TRS gases from the recovery furnace stack exceeds 70 ppm and maximum concentration measured each day.
   (c) Emission of TRS gases in pounds of sulfur per equivalent air-dried ton of pulp processed in the kraft cycle on a monthly basis for each source included in the approved monitoring program.
   (d) Emission of particulates in pounds per equivalent air-dried ton of pulp produced in the kraft cycle based upon the sampling conducted in accordance with the approved monitoring program.
   (e) Average daily equivalent kraft pulp production in air-dried tons.
   (f) Other emission data as specified in the approved monitoring program.
5. Each kraft mill shall furnish, upon request of the Oregon State Sanitary Authority, such other pertinent data as the Authority may require to evaluate the mill's emission control program. Each mill shall immediately report abnormal mill operations which result in increased emissions of air contaminants.

VIII. Special Studies:

Special studies, having prior approval of the Oregon State Sanitary Authority, shall be conducted at each mill, and the results submitted to the Oregon State Sanitary Authority by July 1971. The studies shall cover the following areas:

A. Evaluation of the emissions of TRS from all other sources within the mill.
B. Evaluation of the emissions of sulfur dioxide from all sources within the mill, including but not necessarily limited to, recovery furnaces, lime kilns and power boilers.

IX. Other Established Air Quality Limitations:

The emission limits established by these regulations are in addition to visible emissions and other ambient air standards, established or to be established by the Sanitary Authority unless otherwise provided by rule or regulation.

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PROPOSED STANDARDS FOR KRAFT PULP MILLS IN OREGON

Submitted by

OREGON STATE SANITARY AUTHORITY

Air Quality Control

February 25, 1969

1. Definitions:

A. Continual Monitoring - shall mean sampling and analysis, in a continuous or timed sequence, using techniques which will adequately reflect actual emission level or concentration on a continuous basis.

B. Emission - means a release into the outdoor atmosphere of air contaminants.

C. Kraft Mill - shall mean any pulping process which uses, for a cooking liquor, an alkaline sulfide solution containing sodium hydroxide and sodium sulfide.

D. Particulate Matter - a small, discrete mass of solid or liquid matter. Concentrations are to be expressed as though they exist at standard conditions of temperature and pressure, 60°F and 29.92 inches of Hg absolute, on a dry basis.

E. Recovery Furnace Stack - the stack from which the products of combustion from the recovery furnace are emitted to the ambient air.

F. Other Sources - In a kraft mill "other sources" of odorous sulfur emissions shall be construed to include, but not be limited to, vents from lime kilns, knotters, brown stock pulp washers, multiple-effect evaporators, digesters, blow tanks, smelt tanks, blow heat accumulators, black liquor storage tanks, black liquor oxidation systems, tall oil recovery operations, and any operation connected with the treatment of condensate liquids within the mill or any vent which is shown to be a significant contribution of odorous gases.

G. Total Reduced Sulfur, (TRS) - means to include hydrogen sulfide, mercaptans, dimethyl sulfide, dimethyl disulfide, and any other organic sulfides present.

H. Non-condensibles - Gases and vapors from the digestion and evaporation processes that are not condensed with the equipment used in those processes.

2. Statement of Policy:

Recent technological developments have enhanced the degree of malodorous emission control possible for the kraft pulping process. While recognizing that complete malodorous and particulate emission control is not presently possible, consistent with the meteorological and geographical conditions in Oregon, it is hereby declared to be the policy of the Oregon State Sanitary Authority to:

A. Require, in accordance with a specific program and timetable for each operating mill, the highest and best practicable treatment and control of atmospheric pollutants emitted from kraft mills through the utilization of technically feasible equipment, devices and procedures.

B. Require effective monitoring and reporting of emissions and other pertinent data. The Oregon State Sanitary Authority will use these data in conjunction with ambient air data and observation of conditions in the surrounding area to develop and revise emission and ambient air standards, and to determine compliance therewith.

C. Encourage and assist the kraft pulping industry to conduct a research and technological development program designed to progressively reduce kraft mill emissions, in accordance with a definite program, including specified objectives and time schedules.

D. Establish standards deemed to be technically feasible and economically reasonable, with the intent of revising the standards as new information and better technology are developed.

3. Emission Limits:

All emission limits stated below are based on daily emissions. These limitations do not preclude the requirement to install the highest and best treatment currently available. Compliance schedules will be established by the State for each mill within the limitations of dates established below:

A. The emission of TRS from a recovery furnace stack shall not exceed 2 pounds of sulfur per ton of air-dried kraft pulp or 70 ppm expressed as H_2S on a dry gas basis, whichever is the more restrictive. A schedule of compliance with the above regulation shall be submitted by each mill for the approval of the Oregon State Sanitary Authority not later than 180 days after the effective date of this regulation. By not later

than July, 1975, the emission of TRS from the recovery furnace stack shall be further reduced so as not to exceed 0.5 pound of TRS per ton of air-dried kraft pulp or 17.5 ppm, expressed as H_2S on a dry gas basis, whichever is the more restrictive, or such other limit of TRS that proves to be reasonably attainable utilizing the latest in design of recovery furnace equipment, controls and procedures.

B. Non-condensibles from digesters and multiple-effect evaporators shall be treated to reduce emission of TRS equal to the reduction achieved by thermal oxidation in a lime kiln. All kraft mills shall be in compliance with this requirement by not later than July, 1972.

C. The emissions of particulate matter from the recovery furnace stack shall not exceed 4 pounds per ton of air-dried kraft pulp. In recognized problem areas, particulate emission limitations may be set lower by the Oregon State Sanitary Authority. All kraft mills shall be in compliance with this requirement by not later than July, 1975.

D. The emission of particulate matter to the atmosphere from the lime kiln shall not exceed 1 pound per ton of air-dried kraft pulp. All kraft mills shall be in compliance with this requirement by not later than July 1975.

E. The emission of particulate material to the atmosphere from the smelt tank shall not exceed 1/2 pound per ton of air-dried kraft pulp. All kraft mills shall be in compliance with this requirement by not later than July, 1972.

F. Kraft mills producing less than 200 air-dried tons of pulp per day shall be deemed to be in compliance if the emissions are not greater than the emissions allowed for a 200 ADT per day plant.

G. A schedule of compliance with sections 3-B, 3-C, 3-D, and 3-E shall be submitted by each mill for approval of the Oregon State Sanitary Authority not later than 180 days after the effective date of this regulation.

H. A public hearing shall be held not later than July, 1973 to review current technology and adequacy of the above standards and to make revisions as necessary.

I. The Oregon State Sanitary Authority may establish more restrictive emission limits for new mills or for mills expanding existing facilities. Data documenting projected emissions and changes in or effects upon air quality that would result from the construction or expansion must be submitted to the Oregon State Sanitary Authority, together with plans and specifications in accordance with section 4 (f).

4. Monitoring and Reporting:

A. Every kraft mill in the State shall install equipment for the continual monitoring of TRS.

1) The monitoring equipment shall be capable of determining compliance with these standards and shall be capable of continual sampling, recording and recording of the average concentrations of the above contaminants during a time interval not greater than 30 minutes.

2) The sources monitored shall include, but are not limited to, the recovery furnace stacks and the lime kiln stacks.

B. Each mill shall sample the recovery furnace, lime kiln, and smelt tank for particulate emissions on a regularly scheduled basis.

C. Each mill shall submit, within 60 days after effective date of this regulation, a detailed sampling program and time schedule for the approval by the Oregon State Sanitary Authority. The equipment shall be ordered within 30 days after the sampling program has been approved in writing by the Oregon State Sanitary Authority. The equipment shall be placed in effective operation in accordance with the approved program within 90 days after delivery.

D. Unless otherwise authorized by the Oregon State Sanitary Authority, data shall be reported by each mill at the end of each calendar month as follows:

1) Daily average emission of TRS gases expressed in parts per million of H_2S on a dry gas basis for each source included in the approved sampling programs.

2) Emission of TRS gases in pounds of sulfur per equivalent air-dried ton of pulp processed in the kraft cycle on a monthly basis for each source included in the approved sampling program.

3) Daily average emission of particulates in pounds per equivalent air-dried ton of pulp produced in the kraft cycle.
4) Average daily kraft pulp production in air-dried tons.
5) Other emission data as specified in the approved sampling program.

E. Each kraft mill shall furnish, upon request of the Oregon State Sanitary Authority, such other data as the Authority may require to evaluate the mill's emission control program. Each mill shall immediately report abnormal mill operations which result in increased emissions of air contaminants.

F. Prior to the construction of new kraft mills (or expansion of production or modification of facilities at existing kraft mills) complete and detailed engineering plans and specifications for air pollution control devices and facilities and such other data as may be required to evaluate potential air pollution effects shall be submitted to the Oregon State Sanitary Authority for approval.

5. Special Studies:

Special studies, having prior approval of the Oregon State Sanitary Authority, shall be conducted at each mill, and the results submitted to the Oregon State Sanitary Authority by July 1971. The studies shall cover the following areas:

A. Evaluation of the emissions of TRS from all other sources within the mill.

B. Evaluation of the emissions of sulfur dioxide from all sources within the mill, including but not necessarily limited to, the recovery furnace, lime kiln and power boiler.

6. Other Established Air Quality Limitations: The emission limits established under these sections are in addition to visible emissions and other ambient air standards, established or to be established by the Sanitary Authority unless otherwise provided by rule or regulation.