

**Date:** February 24, 2026

**To:** FILE

**Through:** Kevin Parrett, Northwest Region Cleanup Program Manager  
Jeff Schatz, Lead Worker

**From:** Sarah Miller, Project Manager  
Rebecca Digiustino, Project Peer

**Subject:** Malarkey Roofing, ECSI # 0690; Staff Memorandum in Support of Proposed Source Control Determination

This document presents the basis for the Oregon Department of Environmental Quality's (DEQ's) recommended stormwater Source Control Decision for Malarkey Roofing, in Portland, Oregon. As summarized in this memo, the on-Site stormwater treatment system successfully decreases stormwater concentrations and potential contaminant migration to Columbia Slough sediment. This memo does not address historical releases of hazardous substances to the Columbia Slough from the Site and potential upland exposure pathways at the Site.

The proposed source control decision meets the requirements of Oregon Administrative Rules and Chapter 340 Division 122, Sections 010 to 0140; and ORS 465.200 through 465.455. The proposal is based on information documented in the administrative record for this Site. A copy of the administrative record index is presented at the end of this report.

## 1. BACKGROUND

### Site location.

The Site's location is shown on Figure 1 and can be described as follows:

- Address: 3131 North Columbia Boulevard, Portland, Multnomah County, Oregon
- Latitude 45.5911 ° North, Longitude 122.7001° West
- Three Tax Lots:
  - Tax lot 400, Township 01 North, Range 01 East, Section 9
  - Tax lot 100, Township 01 North, Range 01 East, Section 4CC
  - Tax lot 200, Township 01 North, Range 01 East, Section 4CC

### Site setting.

The Site is comprised of three tax lots, totaling approximately 30.4 acres, within a heavily industrialized area of Portland. The Site is zoned as Industrial General Use land/Warehouse General/Miscellaneous and has operated as an asphaltic-based roofing shingles production facility since 1956. The Site is developed with 18 buildings (depicted on Figure 2 as Buildings A through R). Buildings A and B are used as office spaces and buildings C through P and R are

used for manufacturing, maintenance, and storage operations. The Site is owned by Herbert Malarkey Roofing Company and is currently occupied by Malarkey Roofing Products.

The Site is bordered to the north by the Columbia Slough; to the west by vacant land and the former York Recycling Site (ECSI #6114); to the south by North Frontage Road followed by a Union Pacific Railroad (UPRR) spur and then North Columbia Boulevard; and to the east by AirGas-NorPac (ECSI #3528) and Copart, an automotive storage lot for online auction. A municipal sewage line runs along the western portion of the Site and a municipal stormwater sewer runs through the center of the Site and terminates at the City of Portland Stormwater Outfall Number 59 (OF59), which discharges into the Columbia Slough.

### **Physical setting.**

The lower Columbia Slough is adjacent to Malarkey Roofing on the north. The manufacturing area of the Site is relatively flat with elevation changes ranging from 15 to 20 feet due to historical placement of fill. The northern undeveloped portions of the Site are approximately 3 to 5 feet above grade of the manufacturing area.

According to the U.S. Department of Agriculture's Soil Conservation Service State Soil Geographic Database, the dominant soil type in the general area is Sauvie-Rafton-Urban land complex. Sauvie-Rafton-Urban land complex soils are characterized as poorly drained with moderately high hydraulic conductivity. Based on Site subsurface investigations, subsurface materials generally consist of fill (silt) to about 2 to 15 feet below ground surface (bgs) and fine-grained silt and/or clay to at least 30 feet bgs.

Groundwater is typically encountered in the coarse-grained Troutdale formation between 24 to 35 feet bgs. Historical groundwater level data collected from 1999 through 2007 shows the groundwater gradient to the south and southwest, away from the Columbia Slough.

Stormwater discharge at the Site consists of three industrial drainage areas and one non-industrial drainage area. The drainage basins, associated stormwater conveyance system, and stormwater treatment are detailed in Section 4. There is an undeveloped, vegetated area in the northern section of the Site that is not subject to industrial activities. Stormwater in this area infiltrates directly into the ground or sheet flows to the Columbia Slough.

### **Site history.**

By the 1940s the property was developed for agricultural use. During the construction of the Malarkey Roofing facilities in 1956, several areas around the northern property boundary were filled and graded with undocumented fill for buildings. Site investigations indicate the fill material was primarily concrete, brick, and masonry demolition rubble. Additionally, a non-municipal solid waste landfill (DEQ Solid Waste Permit #1360) existed near the northern property line.

The Site was initially developed with a main office building, paper mill, two settling ponds, a roofing assembly facility, several shops, a boiler building, storage facilities, and warehouses. The paper mill involved a pulping operation using recycled paper to manufacture roofing felt. No bleaching was reportedly performed as part of the paper mill activities; however, soda ash was

used in the paper mill process and disposed of in the settling ponds. The settling ponds and paper mill were shut down in 1983, and the paper mill was decommissioned in 1988.

Since 1956, a glass mill, saturator, extruder, and several storage facilities were added to the facility. The adjacent property was purchased in 1984 to expand facility operations. Previous operations on the adjacent property prior to Malarkey's acquisition included brass, aluminum, and lead smelting and transformer and capacitor salvage. In December 1988, Malarkey Roofing entered into a consent order (Consent Order No. ECSR-NWR-88-05) with DEQ to delineate and address releases of hazardous substances from the Malarkey Roofing facility.

### **Previous Investigations.**

A total of about 3,020 cubic yards of lead-contaminated soil was removed from the southern portion of the Site and the northwestern portion of the Site (north of the former Central Brass and Aluminum and Northwest Cast Metal Products, Inc. warehouses) in 1990. This work was performed with DEQ oversight under a 1988 Consent Order and only focused on tax lot 1N1E04CC 100, which Malarkey acquired at the time.

Shallow groundwater monitoring wells were installed at the Site in the late 1980s to monitor the non-municipal solid waste landfill on Site. Following closure of the landfill in 2008, water levels were monitored monthly for two years and demonstrated that groundwater consistently flows to the south-southwest, away from the Columbia Slough. Figure 3 depicts the groundwater elevation contours for December 2009 as an example of the general groundwater gradient observed at the Site.

In 2009, DEQ collected a sediment sample near OF59, which contained concentrations of several metals that were above ecological risk-based concentrations and Lower Slough baseline concentrations. Additionally, the sample collected from near the outfall appeared to contain material similar to roofing granules and/or sand. DEQ requested Malarkey Roofing conduct a stormwater source control evaluation (SCE). Table 1 presents select 2009 Lower Columbia Slough Sediment concentrations at OF59.

Table 1: Columbia Slough Outfall #59 Sediment Concentrations

Compound	Outfall #59 Concentration	Lower Slough Average/Baseline Concentration	Columbia Slough Background
Cadmium	0.68	1	0.63
Chromium	481	44	76
Copper	130	38	34
Lead	32.7	41	79
Nickel	255	20	47
Zinc	303	244	180

Notes:

Concentrations are reported in milligrams per kilogram (mg/kg).

In June and November 2012, stormwater sampling events were conducted as part of the SCE. Detected concentrations of several pollutants (copper, lead, zinc, and cadmium) were above the non-Portland Harbor stormwater screening level values (SLVs), but when the data are compared to the Portland Harbor stormwater rank-ordered charts, the contaminant concentrations were

within range of what would be expected from industrial sites in Portland. Chromium and nickel were detected in the 2012 stormwater samples but were at concentrations less than the respective non-Portland Harbor stormwater SLVs. Table 2 presents the 2012 stormwater discharge concentrations from the Site's drainage basins that exceeded their non-Portland Harbor stormwater SLVs.

Table 2: 2012 Stormwater Discharge Concentrations

	Date	Cadmium		Copper		Lead		Zinc		TSS
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	
Drainage Area 1	Jun-12	0.381	<0.100	22.5	10.7	1.95	0.160	180	65.3	11.0
	Nov-12	<0.100	<0.100	12.2	8.30	0.527	<0.100	73.7	49.0	8.00
Drainage Area 3	Jun-12	<0.100	<0.100	42.2	13.5	0.479	<0.100	90.8	37.8	<5.00
	Nov-12	<0.100	<0.100	25.7	15.2	0.291	<0.100	58.9	34.9	8.00
Drainage Area 4	Jun-12	<0.100	<0.100	12.8	5.65	1.91	0.106	183	97.6	9.00
	Nov-12	<0.100	<0.100	6.72	4.51	0.486	<0.100	94.2	68.9	<5.00
Drainage Area 6	Jun-12	<0.100	<0.100	23.8	8.26	0.969	0.130	450	93.6	<5.00
	Nov-12	<0.100	<0.100	14.5	10.7	0.569	0.153	291	305	6.00
Non-Portland Harbor SLV	--	0.094	0.094	2.74	2.74	0.54	0.54	36.5	36.5	NE

Notes:

- Metals concentrations are reported in micrograms per liter (µg/L).
- Total suspended solids (TSS) concentrations are reported in milligrams per liter (mg/L).
- Concentrations greater than the respective Non-Portland Harbor SLV are highlighted in blue.
- NE = A Non-Portland Harbor SLV has not been established for TSS.
- <MRL = Analyte concentration was less than the listed method reporting limit (MRL).

As shown in Table 2, stormwater from Drainage Areas 1, 3, 4 and 5 contained concentrations of metals exceeding the respective stormwater SLVs for non-Portland Harbor sites.

In May 2013, DEQ requested an estimate of the average annual stormwater volumes at the Site. The estimated annual runoff volume was calculated using rain gauge data, the Site drainage basins, and runoff coefficients. DEQ evaluated the estimated annual runoff calculations and concluded that stormwater discharge from the facility continued to be a source of metals to the Columbia Slough. As a result, additional source control work was completed at the Site as described in Section 4.

## 2. BENEFICIAL LAND AND WATER USE DETERMINATIONS

### Land use.

The Site has operated as an asphaltic-based roofing shingles production facility since 1956. The current and reasonably anticipated future land use at the Site is industrial.

### **Groundwater use.**

The Site and surrounding area are predominantly supplied with potable water by the City of Portland (COP) municipal water system, which will likely continue in the future. Shallow groundwater is not used as a drinking water source and local beneficial use of deeper groundwater (in Troutdale formation) is industrial only. Nearby deep groundwater wells include a 260-foot well (MULT136427) installed at the Airgas property and a 363-foot well (MULT954) installed at the Malarkey Roofing property. Malarkey Roofing pumps non-contact cooling water from the well and discharges the water to the Slough, consistent with a National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit number 100-J.

### **Surface water use.**

The Columbia Slough is adjacent to the Site on the north. Current surface water uses of the Columbia Slough include recreation (e.g., paddling, hiking, and/or biking), and fishing. The Columbia Slough and associated wetlands also provide groundwater recharge and habitat for fish and wildlife. It is not anticipated that surface water use will change in the future.

## **3. RISK EVALUATION**

### **Conceptual Site model.**

DEQ's 2009 Lower Columbia Slough Sediment study documented elevated concentrations of metals in sediment in the vicinity of the City of Portland OF59. Stormwater from the Site historically discharged to this area and likely contributed to the contaminants detected in the sediment. Stormwater concentrations of cadmium, copper, nickel, and zinc exceeded the DEQ SLVs based on impacts to aquatic life, bioaccumulation based on fish consumption and background concentrations.

Shallow groundwater from the Site may discharge to the Columbia Slough, although groundwater elevation measurements near the closed on-Site landfill demonstrate shallow groundwater generally moves to south southwest, away from the Columbia Slough. Contaminants detected in shallow groundwater are not expected to pose a threat to aquatic receptors based on the concentrations detected.

### **Human health & Ecological risk.**

Stormwater discharging from the Site to the Columbia Slough exceeded fresh water ecological screening level values for the following contaminants of concern (COCs): cadmium, copper, lead, and zinc. Screening level values are based on impacts to aquatic life, bioaccumulation based on fish consumption and background concentrations.

## **4. INVESTIGATION AND CLEANUP WORK**

Stormwater discharge at the Site was evaluated to delineate drainage basins and associated stormwater flow pathways. The drainage basins and stormwater conveyance system configuration have changed over time. Malarkey connected a portion of the Site's stormwater system to the City's system by 1982 with the 1990 *Remedial Investigation and Feasibility Studies for Herbert Malarkey Roofing Company* and 1991 addendum identifying a western and eastern outfall, as shown on Figure 4. One outfall was located along N Endicot Ave and

continued due north at the end of the avenue to enter the Slough. A second storm line ran to the east border of the property and then ran due north until it reached the Slough.

By 1997, the Site's stormwater conveyance system was reconfigured as shown on Figure 5. Throughout the 2000s, the stormwater system was reconfigured, and the Site was repaved and drainage basins recontoured, resulting in the configuration shown on Figure 6.

In November 2013, Malarkey Roofing performed a clean-out of the Site stormwater system, which consists of approximately 5,400 feet of pipe and 60 catch basins. The clean-out removed approximately 7.75 tons of material.

In 2014, Malarkey performed a Columbia Slough bank reconnaissance and decommissioned a 'steel pipe' that was presumed to be the former western outfall described in Figure 4. Several attempts were made to find the eastern outfall along the bank, but no structures were found. Based on records documenting connection to the City system by 1982, DEQ presumes the eastern outfall was possibly routed to the settling ponds and is no longer functional.

By 2017, source control measures completed at the Site included:

- Regrading the northern unpaved area for surface water management.
- Installation of a concrete containment area to temporarily store spent granules before they are removed from Site.
- Plumbing upgrades.
- Installation of a chain-link fence to restrict activity in unpaved areas.
- Installation of a stormwater vault (A1-V-01) near the concrete granule containment to allow for settling and separation of solids before conveying stormwater to the vegetated surface ditch.
- Filter inserts in Site catch basins.

Malarkey Roofing implemented three additional rounds of stormwater sampling for copper, lead, zinc, and total suspended solids (TSS) to support the SCE in 2017.

In December 2019, as a part of its NPDES Industrial Stormwater Discharge Permit Number 1200-Z, Malarkey Roofing submitted a Tier II Report and Stormwater Pollution Control Plan Addendum proposing the installation of a multistage stormwater treatment system.

In 2021, Malarkey installed a multistage stormwater treatment system to reduce total metals and other pollutants in stormwater discharging from the Site. The system was designed to operate at a flow rate of 800 gallons per minute and includes three 20,000-gallon detention and sedimentation tanks, four sand filters, and two adsorptive media filters.

The current configuration<sup>1</sup> consists of three industrial drainage areas and one non-industrial drainage area (Figure 2):

- Drainage Area 1: stormwater flows via a network of gravity piping to manhole MH-A where it is combined with runoff from Drainage Areas 3 and 4 and conveyed to pump

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<sup>1</sup> Over time, the facility has been repaved and recontoured resulting in the incorporation of historical Drainage Areas 2 and 5 into the current configuration of Drainage Areas 1 and 3.

station PS-1. The stormwater is then conveyed via pump station PS-1 to the stormwater treatment system before being discharged to the City’s combined sewer and OF59.

- Drainage Area 3: stormwater flows to a concrete sediment and oil-trapping vault and then conveyed to pump station PS-3. Stormwater is pumped to manhole MH-A where it is combined with runoff from Drainage Areas 1 and 4 and conveyed to pump station PS-1. The stormwater is then conveyed via pump station PS-1 to the stormwater treatment system before being discharged to the City’s combined sewer and OF59.
- Drainage Area 4: stormwater flows to a concrete sediment and oil-trapping vault and then conveyed to pump station PS-4. Stormwater is pumped to manhole MH-A where it is combined with runoff from Drainage Areas 1 and 3 and conveyed to pump station PS-1. The stormwater is then conveyed via pump station PS-1 to the stormwater treatment system before being discharged to the City’s combined sewer and OF59.
- Drainage Area 6 (non-industrial): stormwater is filtered via a CONTECH StormFilter before discharging to OF59.

After installation of the treatment system, stormwater samples were collected in 2021 and 2022 to evaluate the effectiveness of the source control measure.

## 5. RESULTS DISCUSSION

Stormwater samples representative of the stormwater treatment system effluent were collected from manhole MH-B (monitoring point MP-001). This location is representative of the Site’s stormwater discharges to OF59 and ultimately the Columbia Slough. Stormwater samples were collected on November 23, 2021; December 9, 2021; January 6, 2022; May 5, 2022; and November 4, 2022. Due to the filter fabric inserts in the on-Site catch basins, significant amounts of sediment do not collect in the sumps or pretreatment vault. Therefore, catch basin sediment samples could not be collected. The analytical results from the 2021 and 2022 post-source control measures stormwater sampling are summarized on Table 3.

Table 3: 2021 and 2022 Stormwater Discharge Concentrations

Date	Copper		Lead		Zinc		TSS
	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
11/23/2021	2.24	0.59	0.336	<0.100	3.64	4.35	<10.0
12/9/2021	8.53	4.09	0.873	0.15	12.2	7.14	<10.0
1/6/2022	3.53	<0.500	0.21	<0.100	9.83	<2.00	<10.0
5/5/2022	10.70	7.30	0.41	0.23	11.6	7.23	<10.0
11/4/2022	8.41	4.29	0.40	<0.100	12.2	3.43	<10.0
Non-Portland Harbor SLV	2.74	2.74	0.54	0.54	36.5	36.5	NE
Knee of Curve*	50	50	25	25	500	500	50

Notes:

Metal concentrations (copper, lead, and zinc) are reported in micrograms per liter (µg/L).

Total suspended solids (TSS) concentrations are reported in milligrams per liter (mg/L).

Concentrations greater than the respective non-Portland Harbor SLV are highlighted in blue.

NE = A Non-Portland Harbor SLV has not been established for TSS.

<MRL = Analyte concentration was less than the listed method reporting limit (MRL).

\*Approximate concentration representing the knee of curve for each analyte.

During the 2021 and 2022 stormwater sampling events, copper and lead concentrations exceeded the respective non-Portland Harbor SLVs in one or more samples; however, the copper and lead concentrations were below the DEQ rank-ordered knee of curve stormwater contaminant concentration charts (Figure 7b and 7c). Additionally, TSS was below reporting limits and the concentrations of the select metals analyzed are less than the analytical results from the 2012 stormwater sampling event, suggesting the stormwater treatment system is successfully decreasing COCs concentrations.

## 6. PUBLIC COMMENT

DEQ is seeking public comments on this proposed source control decision. DEQ's notice of the proposed source control decision will be published on March 1, 2026, in the Secretary of State's Bulletin and the Oregonian and will also be sent to the Columbia Slough gov-delivery email system. DEQ will consider all public comments received by March 31, 2026, before making a final decision regarding this source control decision. Written comments can be submitted by email to [sarah.miller@deq.oregon.gov](mailto:sarah.miller@deq.oregon.gov), or by mail to:

Oregon Department of Environmental Quality  
Attn: Sarah Miller, NWR Cleanup Program  
700 NE Multnomah Street, Suite 600  
Portland, OR 97232

## 7. RECOMMENDATION

The stormwater treatment system successfully reduces concentrations of COCs and potential contaminant migration to Columbia Slough sediment. The Site operates under an NPDES Industrial Stormwater Discharge Permit Number 1200-Z. The permit requires an updated Stormwater Pollution Control Plan (SWPCP) be maintained on Site. Investigations at the closed landfill demonstrated consistent groundwater flow to the south and southwest, away from the Columbia Slough. The landfill is subject to DEQ Solid Waste Closed Landfill Permit #1360. A source control determination for the Site's contribution to the Columbia Slough is recommended for the Site.

This recommendation addresses current groundwater and stormwater source control only and does not address:

- Historical releases to the Columbia Slough: Malarkey Roofing activities at this Site historically contributed to sediment contamination in the Columbia Slough via stormwater discharge at Outfall #59. Additional work is needed to investigate and fully delineate the potentially impacted areas near Outfall #59 and two historical outfalls to the Columbia Slough. Malarkey Roofing could enter into an agreement with DEQ to address sediment within the Columbia Slough impacted by historical releases from the Site.
- Upland exposure pathways: Earlier cleanup efforts in the early 1990s focused on known contamination at tax lot 100. While other DEQ programs are active on the Site, DEQ Cleanup program has not fully assessed the Site for potential upland exposure pathways.

A Source Control Determination will be recorded in DEQ's Your DEQ Online (YDO) database (ECSI # 0690) upon approval.

## **8. ADMINISTRATIVE RECORD**

DEQ Consent Order No. ECSR-NWR-88-05. Signed December 23, 1988.

DEQ. Guidance for Evaluating Stormwater Pathway at an Upland Site. Updated October 2010.

DEQ. Voluntary Letter Agreement for Stormwater Assessment. June 23, 2011.

Hart Crowser, Inc. Addendum to Remedial Investigation and Feasibility Studies for Herbert Malarkey Roofing Company. March 1, 1991.

Maul Foster Alongi. Stormwater Source Control Evaluation. December 9, 2011.

Maul Foster Alongi. Stormwater System Cleaning. March 28, 2014.

Maul Foster Alongi. Stormwater Source Control Evaluation. Revised April 19, 2024.

Riedel Environmental Services, Inc. Remedial Investigation and Feasibility Studies for Herbert Malarkey Roofing Company. May 7, 1990.

## **9. ATTACHMENTS**

Figure 1: Site Location

Figure 2: Drainage Areas and Stormwater System

Figure 3: Estimated Groundwater Elevation Contours, December 16, 2009

Figure 4: Physical Features of the Malarkey Site (as of March 1991)

Figure 5: Drainage Areas and Storm Sewer Collection System (1997)

Figure 6: Former Drainage Areas and Stormwater System (2011)

Figure 7a: TSS (mg/L) in Stormwater at Portland Harbor Heavy Industrial Sites

Figure 7b: Copper ( $\mu\text{g/L}$ ) in Stormwater at Portland Harbor Heavy Industrial Sites

Figure 7c: Lead ( $\mu\text{g/L}$ ) in Stormwater at Portland Harbor Heavy Industrial Sites

Figure 7d: Zinc ( $\mu\text{g/L}$ ) in Stormwater at Portland Harbor Heavy Industrial Sites



**Notes**  
 U.S. Geological Survey 7.5-minute topographic quadrangle (2020): Portland.  
 Township 1 north, range 1 east, sections 4 and 9.

**Data Source**  
 Property boundary obtained from Multnomah County.

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**Legend**

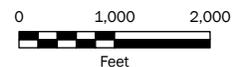
 Site Boundary

**Key Map**



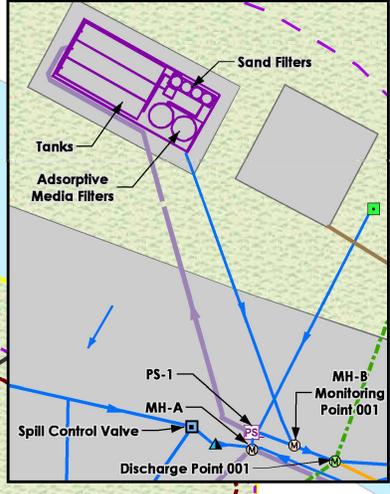
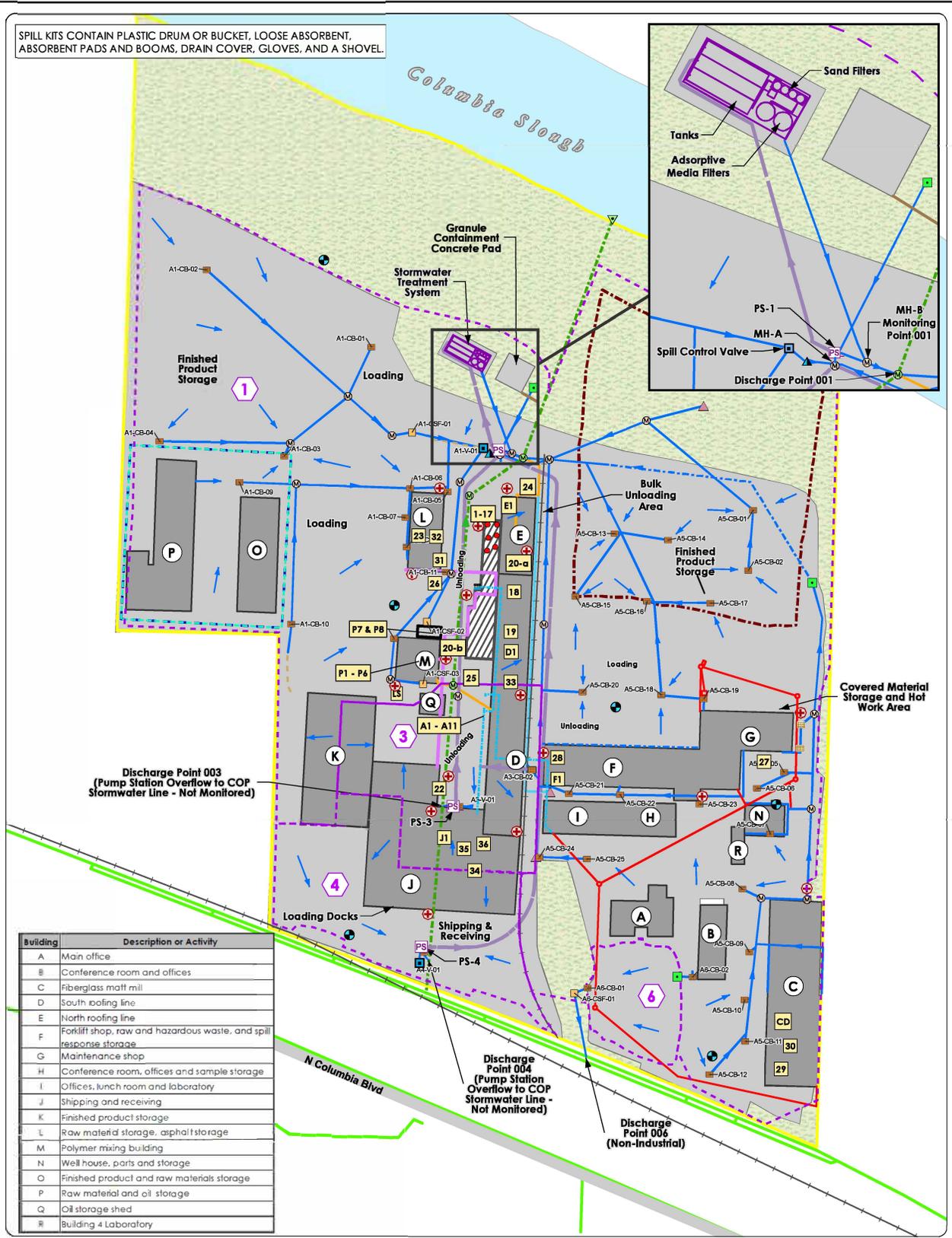
**Figure 1  
 Site Location**

Herbert Malarkey  
 Roofing Company  
 Portland, OR



SPILL KITS CONTAIN PLASTIC DRUM OR BUCKET, LOOSE ABSORBENT, ABSORBENT PADS AND BOOMS, DRAIN COVER, GLOVES, AND A SHOVEL.

Date: X:\1318\01\_Malheur\Drawings\DWG\1318\_01\_010\_002.mxd; User: SCS; Drawn: Azma and Stormwater System  
 Sheet: 1318\_01\_010\_002.mxd  
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 Title: 1318\_01\_010\_002.mxd  
 Author: Maul Foster Alongi  
 Date: 10/10/2014  
 Project: 1318\_01\_010\_002.mxd  
 Title: 1318\_01\_010\_002.mxd  
 Author: Maul Foster Alongi  
 Date: 10/10/2014



Building	Description or Activity
A	Main office
B	Conference room and offices
C	Fiberglass matt mill
D	South roofing line
E	North roofing line
F	Forklift shop, raw and hazardous waste, and spill response storage
G	Maintenance shop
H	Conference room, offices and sample storage
I	Offices, lunch room and laboratory
J	Shipping and receiving
K	Finished product storage
L	Raw material storage, asphalt storage
M	Polymer mixing building
N	Well house, parts and storage
O	Finished product and raw materials storage
P	Raw material and oil storage
Q	Oil storage shed
R	Building 4 Laboratory

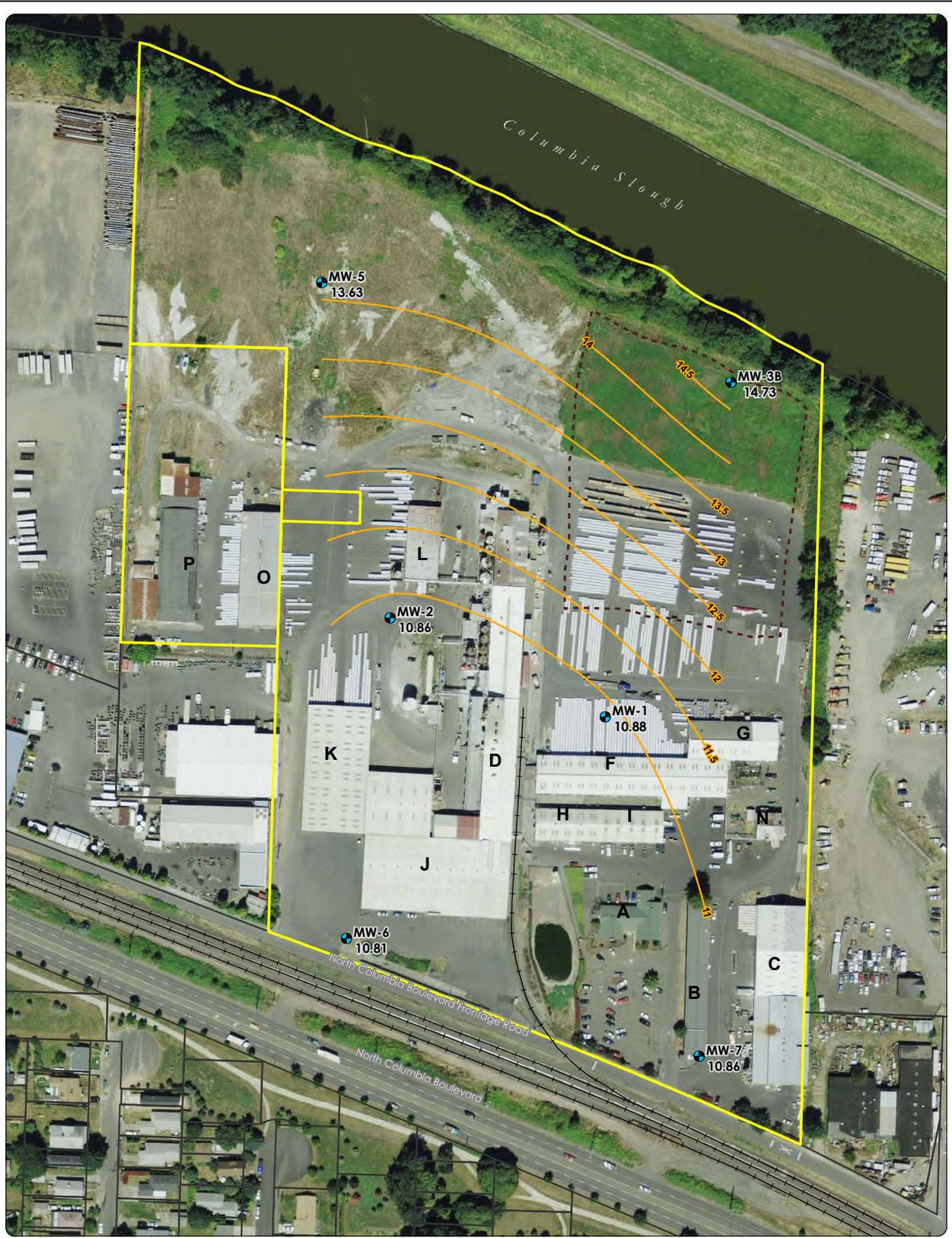
**Notes**  
 Locations of former features are approximate and were compiled from historical hard copy drawings and/or electronic drawing files provided to Maul Foster & Alongi, Inc. by Herbert Malarkey Roofing Company. Loading and unloading activities may be conducted on any of the paved surfaces shown above (except Area 6), City of Portland.

**Data Sources**  
 Tax lot data (2012) obtained from Metro Data Resource Center; City stormwater system data obtained from City Bureau of Environmental Services (2011).

- Legend**
- Groundwater Monitoring Well
  - Grated Culvert Inlet
  - Pump Station
  - City Outfall 59
  - City Manhole
  - Manhole
  - Catch Basin with Metal Frame Basket and Geotextile Insert
  - Catch Basin with Filter Fabric Insert
  - CONTECH Stormfilter
  - Oil/Water Separator
  - Ultrasonic and Visual Bird Repellent
  - Stormwater Vault
  - Pretreatment Vault
  - Spill Control Valve
  - Spill Kit
  - Stormwater Flow Direction
  - Roof Drain
  - Aboveground Piping
  - Ditch
  - Sanitary Sewer
  - City Combined Sewer (Approximate)
  - Storm Sewer
  - Storm Sewer (Approximate)
  - Storm Force Main
  - Non-Contact Cooling Water Line
  - Eco-block with Filter Sock
  - Former Smelter and Transformer Salvaging Company Boundary
  - Process Water
  - Railroad
  - Site Boundary
  - Tank Farm
  - Pervious Area
  - Secondary Containment Area
  - Historical Capped Landfill Boundary
  - Pavement
  - Building
  - Building Reference
  - Drainage Area
  - Drainage Area Name
  - Tank and Drum Locations from SWPCF Tables 1 and 2

**Figure 2**  
**Drainage Areas and Stormwater System**  
 Herbert Malarkey Roofing Company  
 Portland, Oregon

0 50 100  
 Feet



Source: Aerial photograph (2007) and tax lots (2008) obtained from Metro Data Resource Center

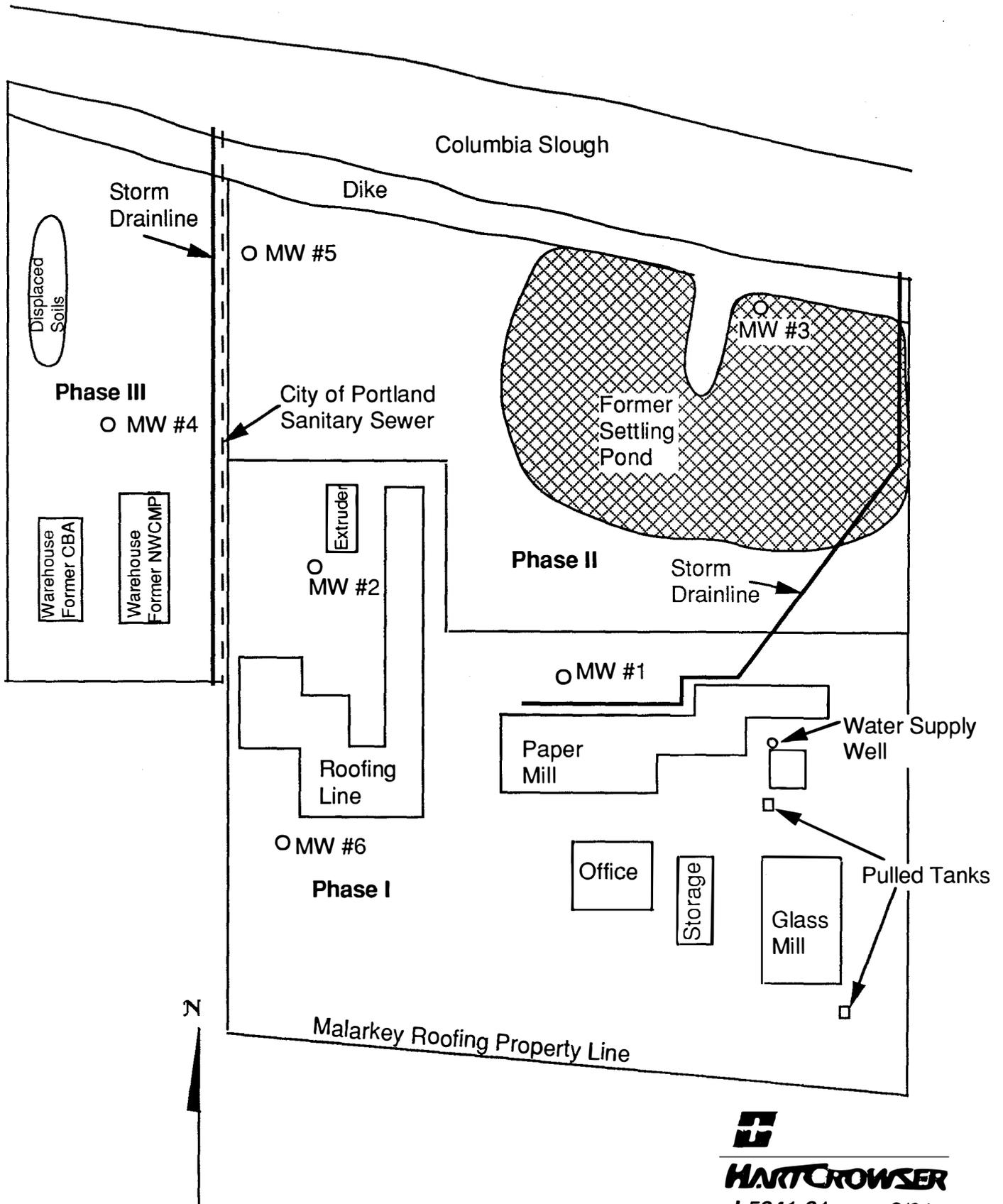
**Notes:**  
1. NAVD88 = North American Vertical Datum 1988.  
2. Water level contours were generated using the Tension Spline Interpolation method within ArcGIS 9.3.1 Spatial Analyst extension.

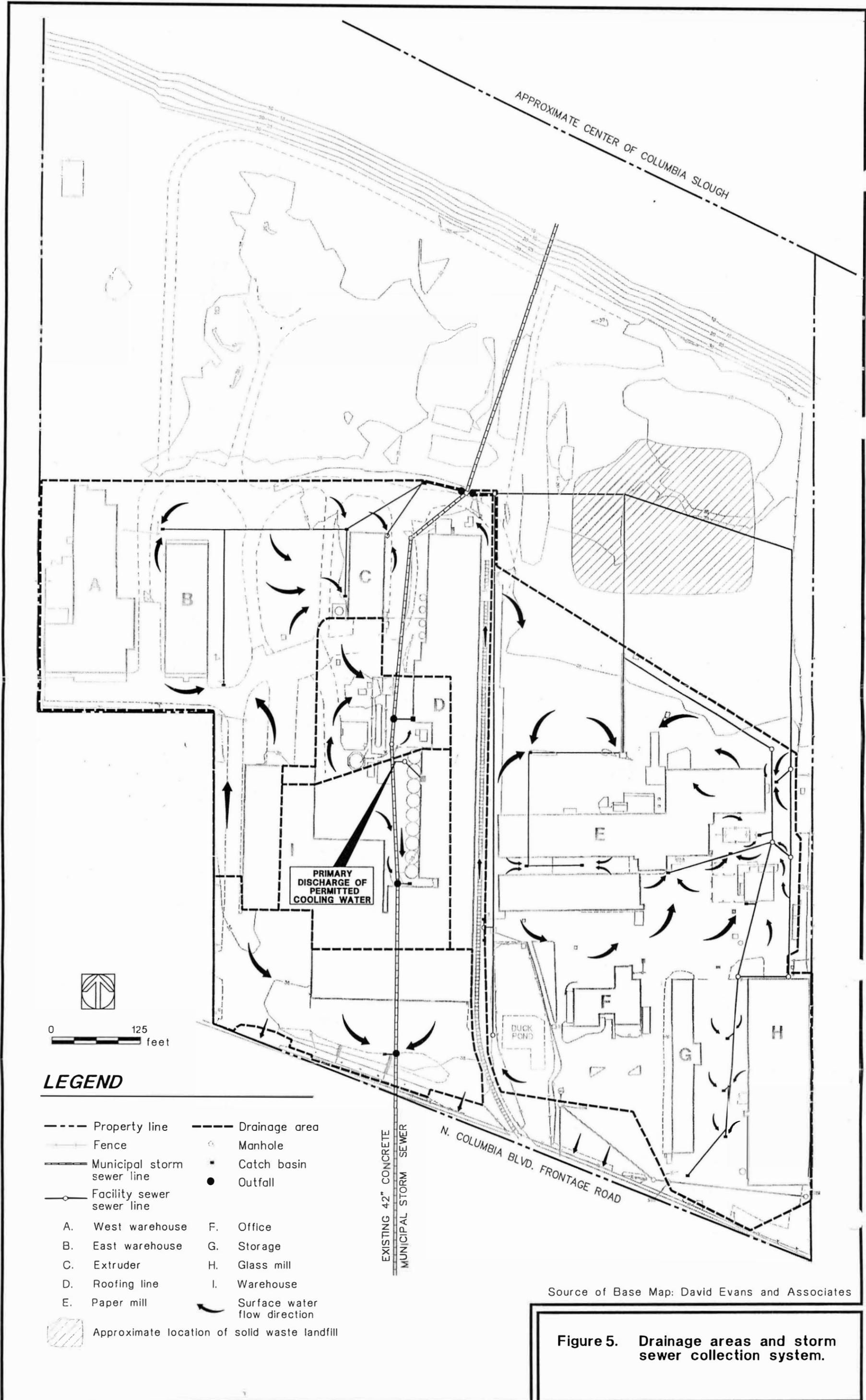
**Legend**

- MW-1 10.88 Monitoring Well Location and Groundwater Elevation in Feet NAVD88
- 13.5 Estimated Groundwater Elevation Contour in Feet NAVD88
- Railroad
- Landfill Perimeter
- Site Tax Lot Boundary
- Tax Lot Boundary
- Building Description

**Figure 3**  
**Estimated Groundwater Elevation Contours, December 16, 2009**  
Malarkey Roofing Company  
Portland, Oregon

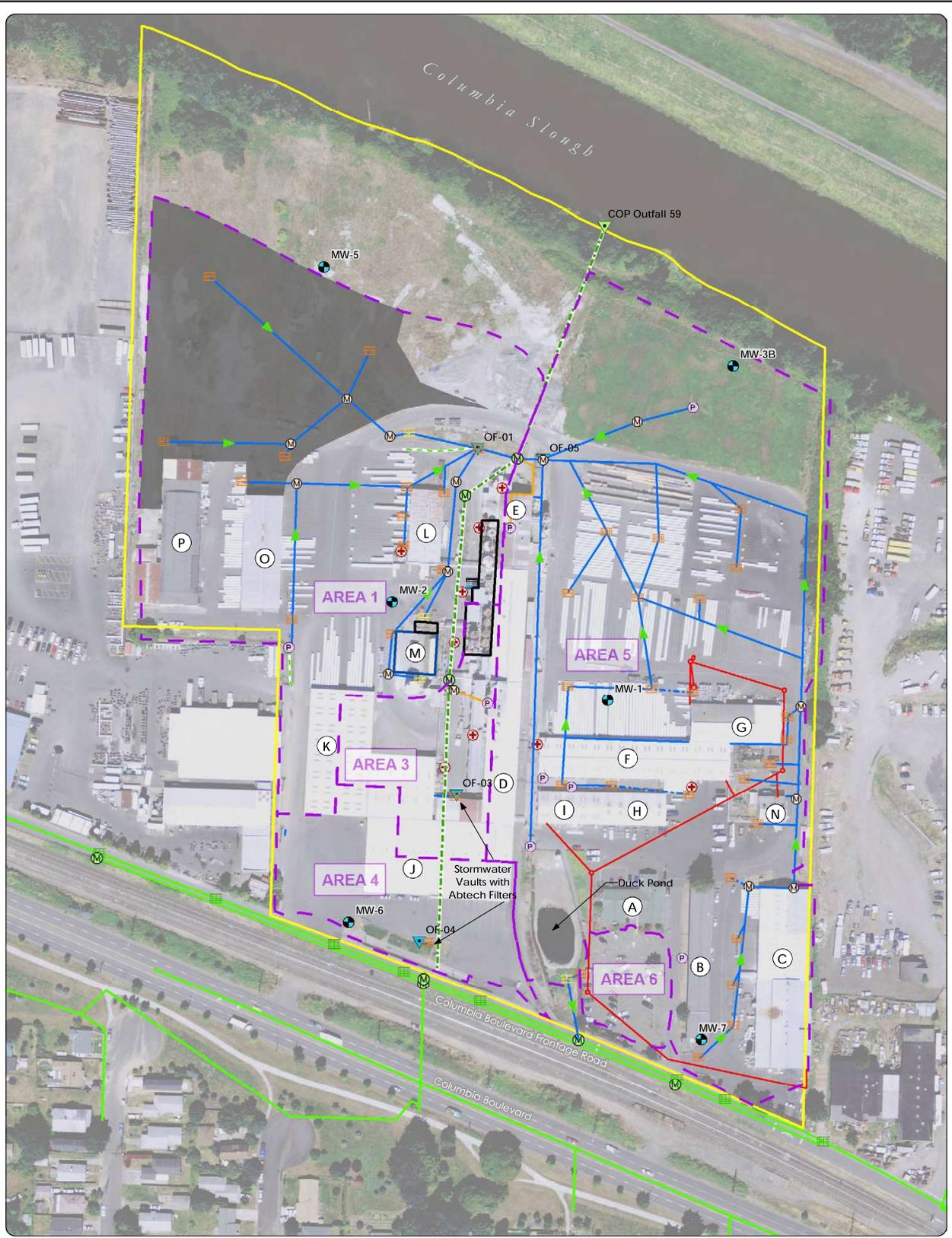
# Physical Features of the Malarkey Site (As of March 1991)





Source of Base Map: David Evans and Associates

**Figure 5. Drainage areas and storm sewer collection system.**



Source: Aerial photograph (2007) and tax lot data (2008) obtained from Metro Data Resource Center; City stormwater system data obtained from City of Portland Bureau of Environmental Services (2011).

- Notes:**
- Locations of former features are approximate and were compiled from historical hard copy drawings and/or electronic drawing files provided to Maul Foster and Alongi, Inc. by Malarkey Roofing Company.
  - Loading and unloading activities may occur on any of the paved surfaces shown above (except Area 6).
  - COP = City of Portland.

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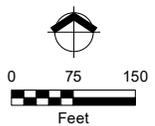
**Legend**

Catch Basin	Monitoring Well
Contech StormFilter	Spill Kit
COP Catch Basin	On-site Stormwater Line
COP Outfall	On-site Stormwater Line (Approximate)
COP Manhole	COP Stormwater Main (Approximate)
Manhole	Non-Contact Cooling Water Line
Pipe Inlet Drain	Sanitary Sewer Line
Oil Water Separator	COP Stormwater Line
Outfall	Stormwater Flow Direction
	Ditch

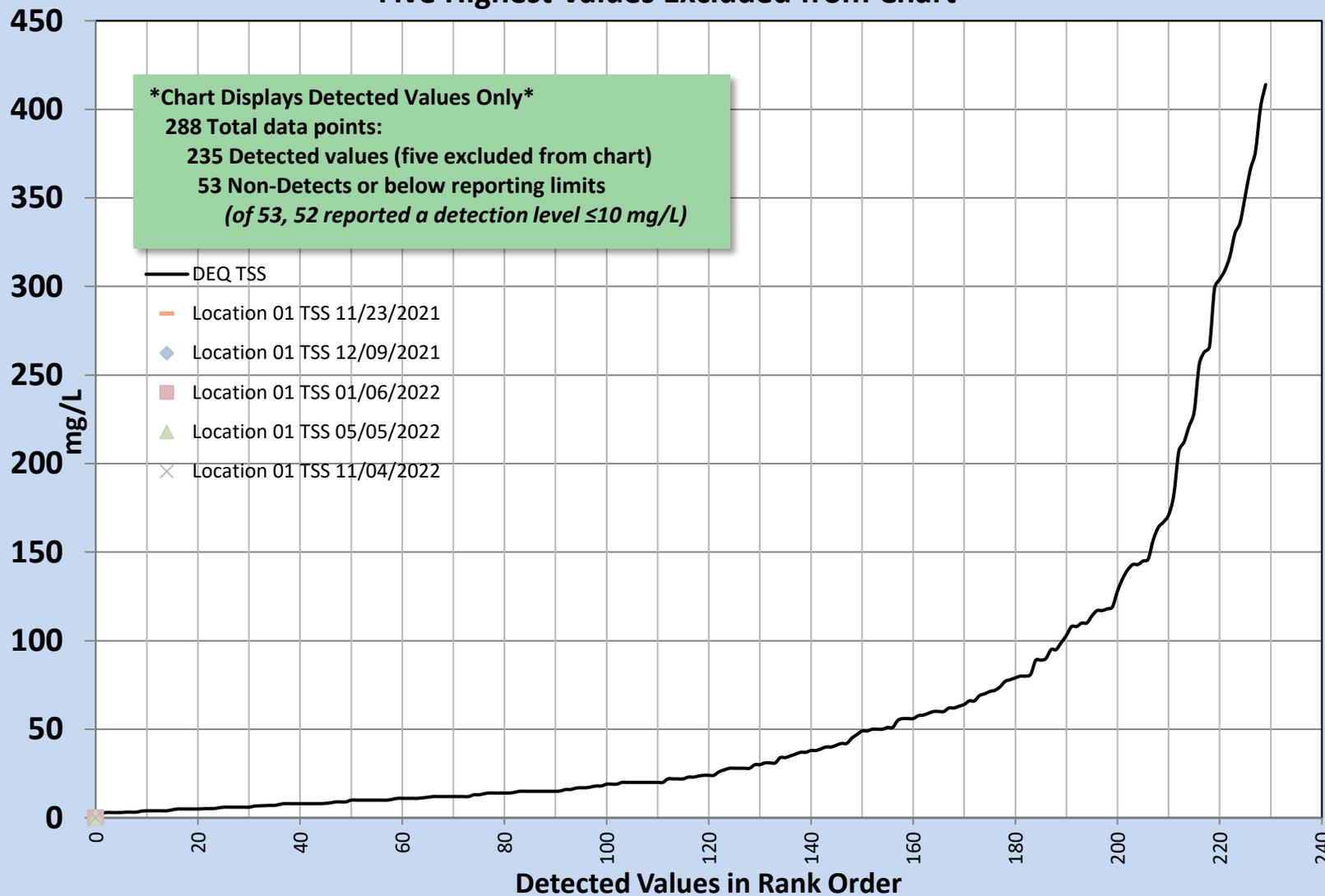
Recently Paved Surface	Drainage Area
Secondary Containment Area	Polymer Mixing Building
Site Boundary	Building Reference

**Figure 6**  
 Former Drainage Areas and Stormwater System  
 Malarkey Roofing Company  
 Portland, Oregon



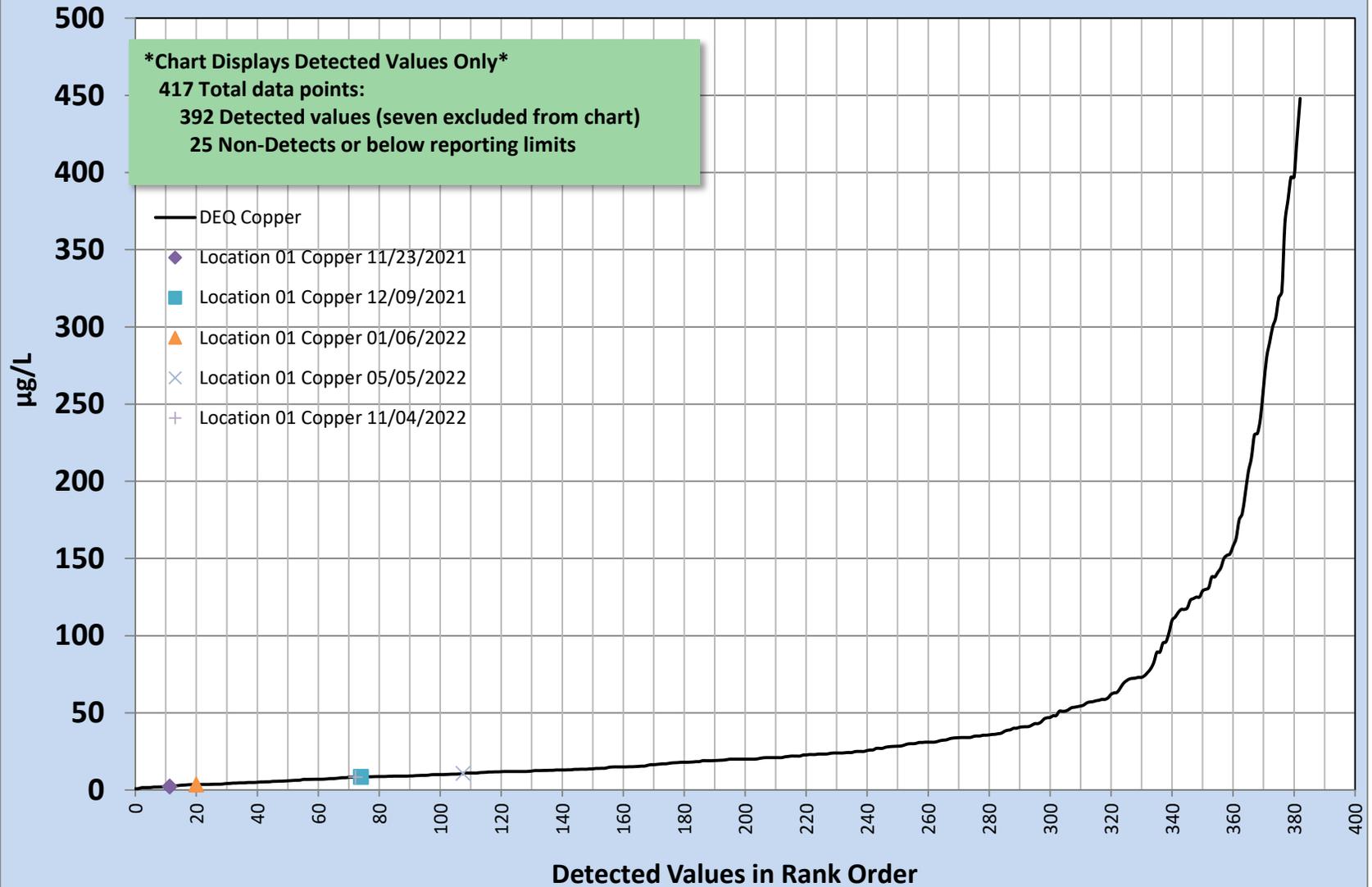
# Figure 7a: TSS (mg/L) in Stormwater at Portland Harbor Heavy Industrial Sites

Five Highest Values Excluded from Chart



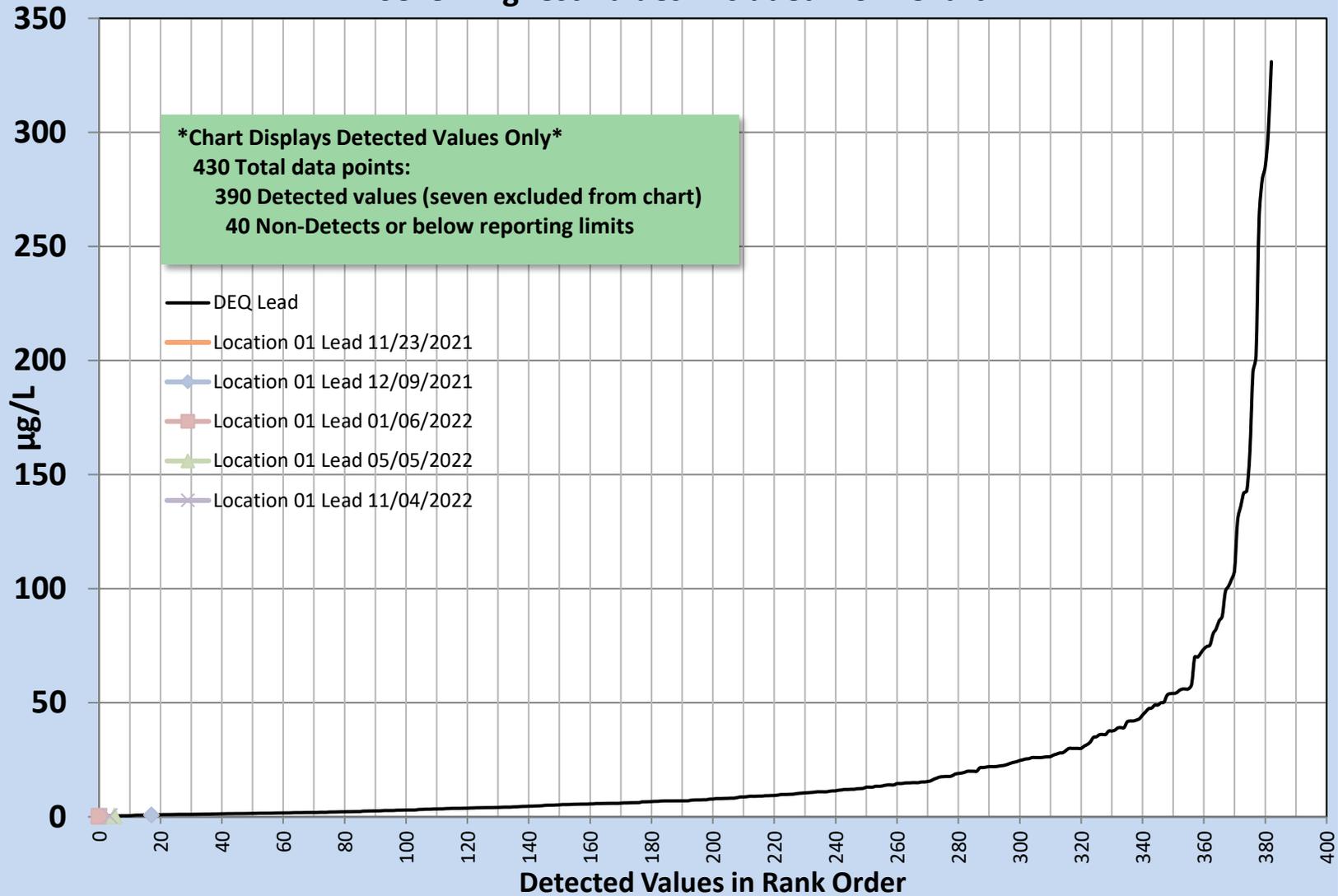
# Figure 7b: Copper ( $\mu\text{g/L}$ ) in Stormwater at Portland Harbor Heavy Industrial Sites

Seven Highest Values Excluded from Chart



# Figure 7c: Lead ( $\mu\text{g/L}$ ) in Stormwater at Portland Harbor Heavy Industrial Sites

Seven Highest Values Excluded from Chart



# Figure 7d: Zinc ( $\mu\text{g/L}$ ) in Stormwater at Portland Harbor Heavy Industrial Sites

12 Highest Values Excluded from Chart

