

**Table 4-1, Rev. 1**

## Stormwater Improvement Actions, Best Management Practices, and Source Control Measures

Northwest Pipe Company, Portland, Oregon

Map ID corresponding to location noted on Figure 4-2	Year of Action	Description of Action
<b>Stormwater Improvement Actions and BMPs Initiated Prior to Source Control Measure Implementation</b>		
No map ID	Initiated in 1985, and ongoing action	Provide appropriate plant personnel training on implementation of the Stormwater Pollution Control Plan to improve compliance with the plan and protect stormwater quality.
Map ID 1	1987	Stormwater drain line rerouted around western side of the Cement Mortar Lining (CML) Process area.
No map ID	1989	Removed the used oil AST, lubricants, and cutting oils, from the southeast area, and relocated them near the Maintenance Shop.
No map ID	1989	Conducted focused soil removal in 1989 in response to site characterization findings (See Figure 3-1 and Table 3-1).
Map ID 2	1991	Modified stormwater catch basins to reduce sediment transport.
No map ID	Initiated in 1993, and ongoing action	Conduct monthly inspections under the Stormwater Pollution Control Plan. Inspections include, but are not limited to, storm drain catch basin filters, fuel tanks, forklifts, covered waste dumpsters, and general plant operations
Map ID 3	1995	Decommissioned an unused sump near a Beall-era Wash Pad, in the southwest area of the property.
Map ID 4	1997	Upgraded fuel systems by installing secondary containment around the diesel and gasoline storage tanks.
No map ID	2000	Replaced older forklifts with more efficient, cleaner running units. The new forklifts are maintained under a maintenance contract with an outside activity, reducing likelihood of oil leaks.
Map ID 5	2001	Re-routed storm drainage away from failed offsite storm line on adjacent property and installed pump station to effectively direct pooled water from the southern area to Outfall 18/WR-123. Eliminated historical Sample Port #1.
No map ID	Initiated in 2002, and ongoing action	Install and periodically replace catch basin filters to reduce the potential for suspended solids or oil and grease to enter the stormwater system.
No map ID	Initiated in 2002, and ongoing action	Periodically jet-clean stormwater lines to remove settled solids, if any, in system.
Map ID 6	2002	Installed Closed Loop Recycle Water System at the CML area, including five underground vaults and an open top settling basin, thereby disconnecting stormwater discharge in the CML area from the Site stormwater system.
Map ID 7	2002	Removed septic tank system for the Lining and Coating Building restroom; installed sanitary sewer line to connect to existing City sanitary line. Following this action, all Site sanitary discharge is connected to the City.
Map ID 4	2002	Replaced older, single wall gasoline storage tank with a double-walled fuel tank with built-in secondary containment.

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No map ID	2002-2007	Redesigned equipment that previously required non-contact cooling water discharge, eliminating the need for 100-J NPDES permit (2002-2005). Terminated 100-J permit in 2007.
Map ID 8	2002-2008	Closed catch basins that had been brought under cover as the Main Production Building roof expanded.
Map ID 9	2002 and 2011	Relocated or installed sampling test ports for NPDES stormwater compliance monitoring to improve representativeness of sampling. Replaced both test ports with manholes in 2011.
No map ID	2002	Relocated used oil AST, lubricants, and cutting oils to roofed areas inside the Main Production Building and installed secondary containment for the lube/oil storage area.
Map ID 10	2004	Re-routed roof drains in the southwest area of the Main Production Building to the existing storm system instead of to the southwest pump vault.
Map ID 11	2004	Installed a diversion drain to prevent water from entering Bay 1.
Map ID 12	2004	Increased asphalt curbing to prevent stormwater from entering Bay 3.
Map ID 13	2004	Added asphalt around the Cement Spinner, to ensure process water remains in the CML Closed Loop Recycle Water System at the CML area.
Map ID 14	2004	Discovered and abandoned old shipyard-era drain line between the Main Production Building and Bay 9.
Map ID 15	2005	Enclosed cement batch plant mixing system to reduce dust generation.
No map ID	Initiated in 2005, and ongoing action	Sweep facility roads weekly to reduce potential for entrainment in stormwater.
No map ID	2006	Terminated the use of any coatings that contained zinc, to reduce zinc in stormwater discharge.
Map ID 16	2006	Replaced sand blast baghouse unit at the Lining and Coating Building, with an improved particulate filter system.
Map ID 17	2007	Replaced internal diameter (ID) pipe abrasive blaster equipment and paint application system. Upgrades included higher efficiency dust collectors on the abrasive blast system and improved paint fume removal. Improvements reduced incidental overspray on the paint application system.
Map ID 18	2008	Discovered and decommissioned a Shipyard-era septic tank and drain field near the Old Shipping Office
Map ID 19	2008	Sealed three catch basins: two located between Bay 6 and Bay 9, and one located inside Bay 9.
No map ID	2008	Discontinued the use and application of coal tar enamel coating (American Water Works Association Standard C203). Removed related equipment and material.

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Map ID corresponding to location noted on Figure 4-2	Year of Action	Description of Action
<b>Source Control Measures, BMPs, and Additional Improvement Actions 2009 - 2018</b>		
Map ID 2	2008	Stormwater drain opening on center drain was raised 3 feet allowing maintenance access, but no surface drainage.
No map ID	Initiated in 2008, and ongoing action	Developed and stationed spill response kits throughout the plant Site.
No map ID	2009	Cleaned and painted 6.7 acres of the Main Production Building's galvanized roof to reduce zinc in roof runoff by more than 90 percent and zinc in overall site runoff by 79 percent.
Map ID 20	2009	Increased capacity of the Closed Loop Recycle Water System with supplemental storage for the CML area.
No map ID	2009	Constructed curbing around all outdoor transformer areas.
Map ID 21	2009	Decommissioned an unused blind sump located in the Paper Shed.
Map ID 22	2009	Abandoned historical southern portion of a drain line near the CML area at the nearest catch basin. Catch basin currently in operation, draining towards the northwest treatment system.
No map ID	2009	Reorganized operations to allow cement-mortar rebound and recycle sandblast media to be stored under roof, isolating the material from Site stormwater system.
No map ID	2011	Relocated wastes and recycling collection hoppers for scrap steel that may have come into contact with cutting lubricants indoors. Only scrap wood and clean scrap steel is collected outside.
No Map ID	2011	Completed video survey of stormwater system, which identified unknown lines and line blockages. (See Figure 6-1)
Map ID 23	2011	Completed comprehensive stormwater improvements based on video survey and Site observations (including the next six rows of actions). Installed six new clean-out manholes in the east side stormwater piping, to access stormwater pipes for cleaning.
Map ID 24	2011	Installed one new catch basin on the west side of the railroad tracks to improve accessibility.
Map ID 25	2011	Installed three new catch basins on the eastern-most stormwater line near the Paint Shed to improve drainage.
Map ID 26	2011	Installed one new stormwater catch basin and diversion drain to improve drainage in the north end of the property, near the Steam Bay.
Map ID 27	2011	Uncovered and began using a catch basin located near the east end of historical Bay 11, thereby improving drainage.
Map ID 28	2011	Installed a diversion drain to prevent water from entering Bay 9.

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<b>Source Control Measures, BMPs, and Additional Improvement Actions 2009 - 2018</b>		
Map ID 29	2011	Redirected historical Sample Point 5 to Sample Point 3 by installing a cross over pipe, reducing three discharge points to two discharge points. Abandoned pipes associated with discharge to Sample Point 5.
No map ID	2011-2012	Excavated and removed two hot spot areas to address potential risk to Site workers posed by PAHs and PCBs in surface soil. In addition, installed concrete eco-blocks (2 feet square in cross section and 6 feet long) to minimize soil sloughing from off-site raised roadway onto the Site.
Map ID 30	Initiated in 2011, and ongoing action	Installed, and continue to operate and maintain, two above-ground stormwater treatment systems, one for each stormwater line leaving the site, to reduce suspended solids and associated concentrations of metals and hydrophobic organic constituents in stormwater.
No map ID	Initiated in 2011, and ongoing action	Modeled Site stormwater discharge, regraded, and completed a major soil capping remedial action (paved approximately 4 acres of previously unpaved area). Pavement inspections and repaving continue on a regular basis. (See Figure 6-2)
Map ID 31	2011	Installed an additional manhole for cleanout on a segment of the stormwater line with a previously unknown configuration.
Map ID 32	2011-2012	Excavated and found a catch basin approximately 18 inches below ground. Raised and returned the catch basin to service. Monitored inlet pipe coming from offsite for flow. No off-site flow observed entering the feature since discovery, so no modifications were made to offsite features.
Map ID 33	2012	Sealed and abandoned a drywell, including a round vault and a square vault, west of the steam tunnels. These features were associated with the Shipbuilding era and were discovered during the paving project.
Map ID 34	2012	Added two manholes and uncovered one manhole on an existing stormwater line in the northeastern-most portion of the stormwater system.
Map ID 4	2012	Constructed an isolated drainage zone around the fueling area adjacent to the two above ground fuel tanks, which directs captured stormwater to the City of Portland sanitary system via an oil-water separator.
Map ID 35	2015	Replaced two catch basins on the western side of the property to improve settling of total suspended solids in the stormwater system.
Map ID 36	2018	Installed drain at rail crossing at north fence to prevent any stormwater from flowing offsite. This drain includes a submersible pump, that pumps collected water directly into the stormwater treatment vault for treatment.
Map ID 37	2021	Installed two underground planters on the east side of the Shop Office which tie into the stormwater system.
Map ID 38	2021	Three trench drains were added that tie into the stormwater system. One trench drain has been installed on the west end of Bay 5 where a new exit cart travels. Two other trench drains were installed on the east end of Bay 5 and Bay 6 along the cart travel path.