

Sand and Gravel Stormwater Pollution Prevention Plan

Third Runway Project Borrow Areas 3 and 4 Seattle-Tacoma International Airport



August 2001

Parametrix, Inc.

Port of Seattle November 1, 2001
On Site Borrow Areas Memo
Reference No. 18

1278

AR 051103

**SEATTLE-TACOMA INTERNATIONAL AIRPORT
THIRD RUNWAY PROJECT
BORROW AREAS 3 AND 4**

**SAND AND GRAVEL
STORMWATER POLLUTION PREVENTION PLAN**

Prepared for

PORT OF SEATTLE
Seattle-Tacoma International Airport
P.O. Box 68727
Seattle, WA 98168

Prepared by

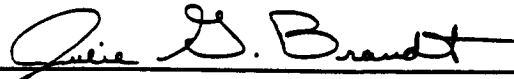
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August 2001
556-2912-001-01 (90)

AR 051104

CERTIFICATE OF APPROVAL

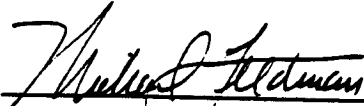
The technical material and data contained in this document were prepared under the supervision and direction of the undersigned.



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Port of Seattle

*Borrow Areas 3 and 4 Stormwater Pollution Prevention Plan
Port of Seattle Third Runway Project*

*August 8, 2001
556-2912-001 (90)
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AR 051105

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1. PURPOSE OF STORMWATER POLLUTION PREVENTION PLAN

Stormwater discharges have been identified as a significant source of pollution in waters of the United States. To address this problem, the Clean Water Act Amendments of 1987 required the U.S. Environmental Protection Agency (EPA) to publish regulations to control stormwater discharges under the National Pollution Discharge Elimination System (NPDES) program. The State of Washington has NPDES authority delegated by EPA, administered through the Washington Department of Ecology (Ecology).

On June 25, 1999, Ecology issued a revised NPDES and State Waste Discharge sand and gravel general permit (Permit). The Permit became effective on August 6, 1999, and will expire on August 6, 2004. All facilities that meet the criteria contained in the Permit must submit an application in order to be covered by the Permit. The Permit provides coverage to approved applicants for discharges of process water, stormwater, and mine dewatering water associated with sand and gravel operations, including stockpiles of mined materials. The Permit authorizes wastewater discharges to waters of the State of Washington subject to the Permit conditions.

The Port of Seattle (Port) has developed plans to excavate sand and gravel-like fill materials from Borrow Areas 3 and 4 to be used in the construction of a third runway at the Seattle-Tacoma International Airport. The Port has applied for coverage under the Permit for the third runway project Borrow Areas 3 and 4. Conditions of the Permit require that a Stormwater Pollution Prevention Plan (SWPPP) be prepared and implemented. The objectives of this SWPPP are:

- Provide for compliance with Special Condition 9 of the Permit, as well as other pertinent General and Special Permit conditions.
- Control Type 3 stormwater¹ as follows: implement Best Management Practices (BMPs), document locations of structures and drainages, provide personnel training, and implement inspection procedures.
- Prevent the addition of process water or mine dewatering water into Type 3 stormwater.
- Verify that non-stormwater discharges do not enter the stormwater treatment system.
- Implement best management practices (BMPs) to control stormwater and minimize soil erosion on site.
- Prevent violations of surface water quality, groundwater quality, or sediment management standards.

¹ Type 3 stormwater is stormwater from (1) industrial plant yards; (2) immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; (3) material handling sites; (4) sites used for the storage and maintenance of material handling equipment; (5) sites used for residual treatment, storage, or disposal; (6) shipping and receiving areas; (7) storage areas for raw materials or intermediate and finished products at active sites; or (8) areas where industrial activity has taken place in the past and significant materials remain and are exposed to stormwater.

- Eliminate the discharges of unpermitted process wastewater, domestic wastewater, and illicit discharges to stormwater drainage systems and surface waters of the state.

The SWPPP will not be submitted to Ecology unless requested. The SWPPP, inspection reports, and all other reports required by Permit Section S9 will be retained for at least 3 years after the date of Borrow Areas 3 and 4 closure. During Borrow Areas 3 and 4 operations, the SWPPP and BMP inspection reports will be kept on-site.

Whenever a self-inspection reveals that the description of pollutant sources or the BMPs specified in the SWPPP is inadequate, due to the actual or potential discharge of a significant amount of any pollutant, the SWPPP will be modified as appropriate. The Port will provide for implementation of any modifications to the SWPPP in a timely manner.

2. PROJECT OVERVIEW

2.1 SITE INFORMATION

Site information is summarized in Table 2-1.

Table 2-1. Site information.

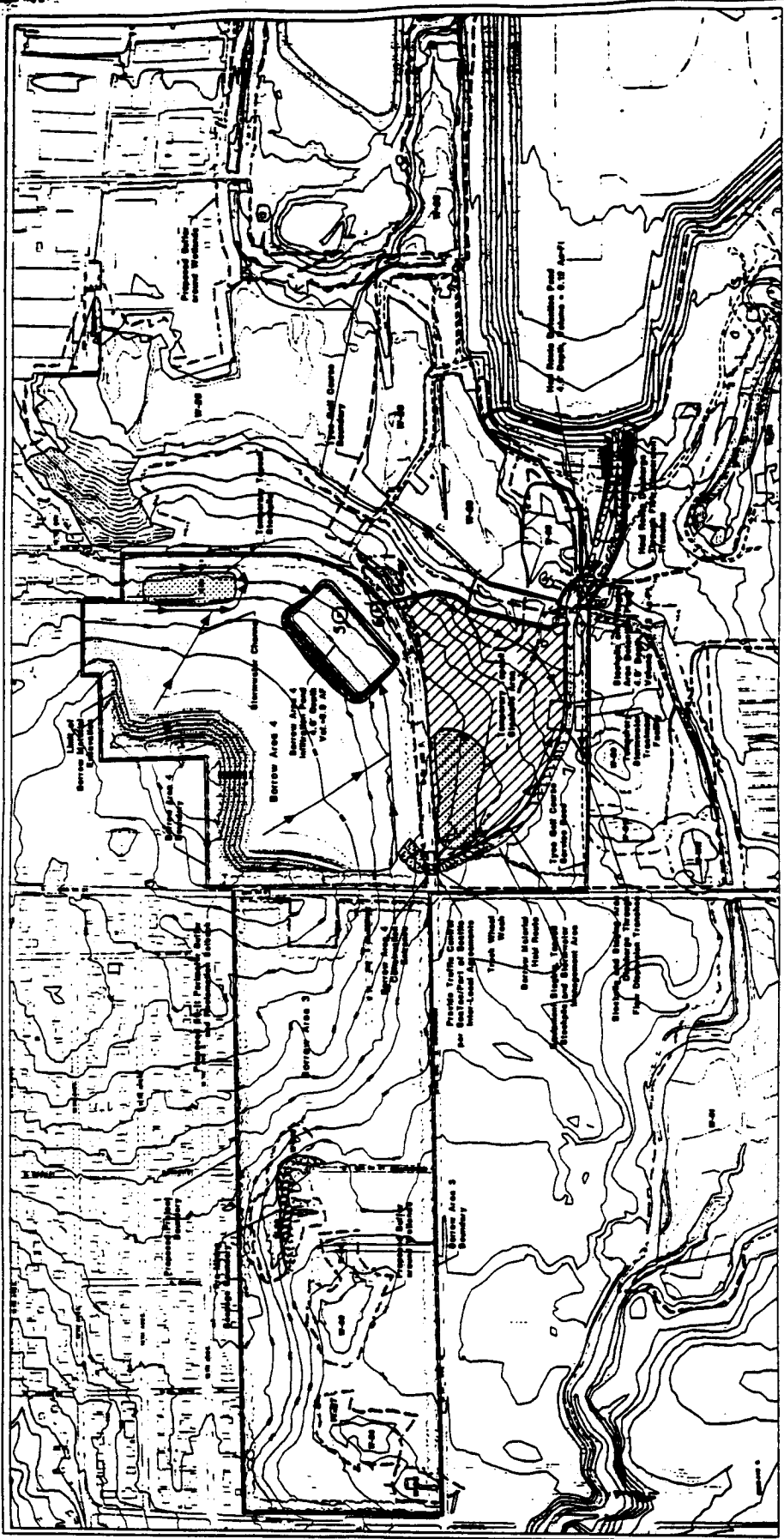
Project:	Port of Seattle Third Runway Project Borrow Areas 3 and 4
Contact:	Dave Walsh
Title:	Construction Manager
Work Phone:	(206) 431-4973
Emergency Phone:	(206) 786-0591
Location:	Between South 188 th Street and South 208 th Street, primarily west of 18 th Avenue South, SeaTac, Washington
Anticipated Operating Schedule:	Year-round, 24 hours per day, 7 days per week
Number of on-site employees:	Maximum of 12
Site Activities:	Borrow pit excavation, material stockpile and transfer, site reclamation
NPDES Permit No.:	WAG-50-_____

2.2 SITE DESCRIPTION

The Port Master Plan Update project involves construction of a third runway at the Seattle Tacoma International Airport to alleviate air travel congestion during inclement weather conditions. The third runway project requires construction of an earth-fill embankment, supplied by on-site (borrow) and off-site (import) material sources. Borrow Areas 3 and 4 are located on Port property in SeaTac, Washington, between South 188th Street and South 208th Street, primarily west of 18th Avenue South. Borrow Areas 3 and 4 will supply approximately 2.3 million cubic yards of fill material for the third runway embankment. The Borrow Area 3 and 4 excavation project will include Borrow Areas 3 and 4, staging and haul areas within upland areas of the former Tyee golf course, and a haul route. The haul route will border the south and west perimeter of the airfield operations area and terminate at the embankment construction site.

2.3 ACTIVITIES

Excavation will be limited to the dry summer months, roughly mid-May to early October, due to the moisture-sensitive nature of the Borrow Area 3 and 4 fill material. The excavation is expected to span a period of 2 years, with each area to be reclaimed and vegetated at the end of each construction season. Initial excavation will begin in Borrow Area 4, followed by Borrow Area 3 during the second season. The phasing of site operations has been summarized on Figures 1 through 4.



Project and Location:
 Year of Construction:
 Project Number:
 Drawing Title, Number and Scale:
 Date:

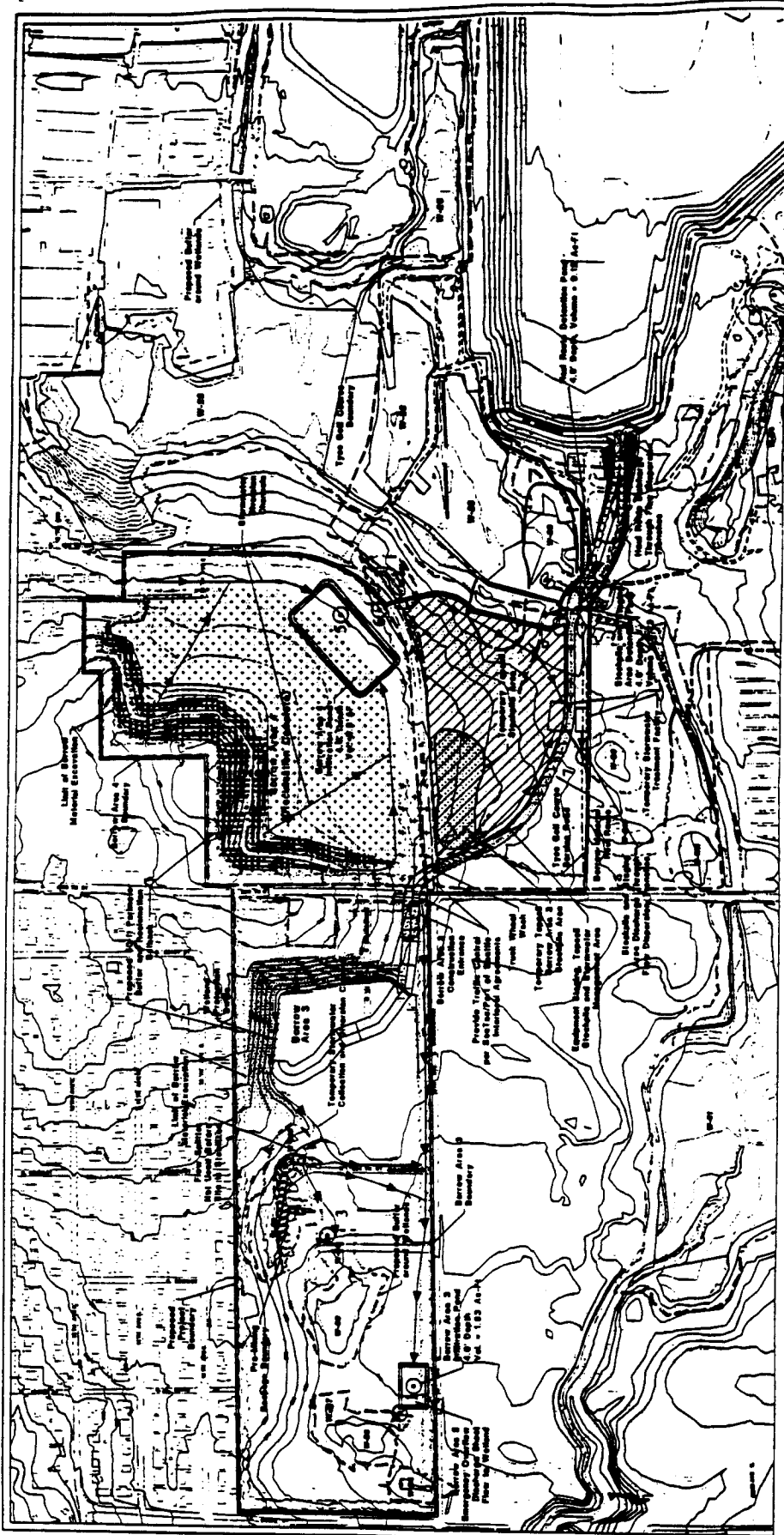
BEA-TAC THIRD RUNWAY BORROW AREAS 3 AND 4
YEAR 1: CONCEPTUAL MID-YEAR
EXCAVATION PLAN AND STORMWATER CONTROL

HARTCROWSER
 ENGINEERS
 1000 ...
 ...

NO.	REVISION	DATE	BY	CHKD.
1	ISSUED FOR PERMIT	...	...	...
2	...	...	...	...
3	...	...	...	...

TABLE 1: CONCEPTUAL MID-YEAR EXCAVATION PLAN
 This table provides a summary of the excavation volumes and stormwater control structures for the proposed project. The data is based on the conceptual design and is subject to change as the design progresses.

The excavation volumes are estimated based on the topographic data and the proposed borrow areas. The stormwater control structures are designed to manage the runoff from the excavation areas and prevent erosion and sedimentation.



Part of Single Property Use (Borrow Areas 2 and 4,
 Part of Lot 10)
 Proposed Project Perimeter Boundary
 Setback with 30' Lot Buffer
 Proposed Area
 Proposed Area
 Proposed Area
 Proposed Area
 Proposed Area

BEA-74C THIRD RUNWAY BORROW AREAS 2 AND 4
 YEAR 2: CONCEPTUAL MID-YEAR EXCAVATION PLAN

NO.	DATE	DESCRIPTION
1	1/15/02	PRELIMINARY EXCAVATION PLAN
2	2/15/02	REVISIONS TO PRELIMINARY EXCAVATION PLAN
3	3/15/02	CONCEPTUAL EXCAVATION PLAN
4	4/15/02	CONCEPTUAL EXCAVATION PLAN
5	5/15/02	CONCEPTUAL EXCAVATION PLAN
6	6/15/02	CONCEPTUAL EXCAVATION PLAN
7	7/15/02	CONCEPTUAL EXCAVATION PLAN
8	8/15/02	CONCEPTUAL EXCAVATION PLAN
9	9/15/02	CONCEPTUAL EXCAVATION PLAN
10	10/15/02	CONCEPTUAL EXCAVATION PLAN
11	11/15/02	CONCEPTUAL EXCAVATION PLAN
12	12/15/02	CONCEPTUAL EXCAVATION PLAN

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YEAR 2: CONCEPTUAL MID-YEAR EXCAVATION PLAN
 This plan shows the proposed excavation areas for Year 2 of the project. The excavation areas are shown in hatched areas. The plan also shows the proposed project perimeter boundary and the proposed project perimeter boundary with a 30-foot lot buffer. The plan also shows the proposed project perimeter boundary with a 30-foot lot buffer. The plan also shows the proposed project perimeter boundary with a 30-foot lot buffer.

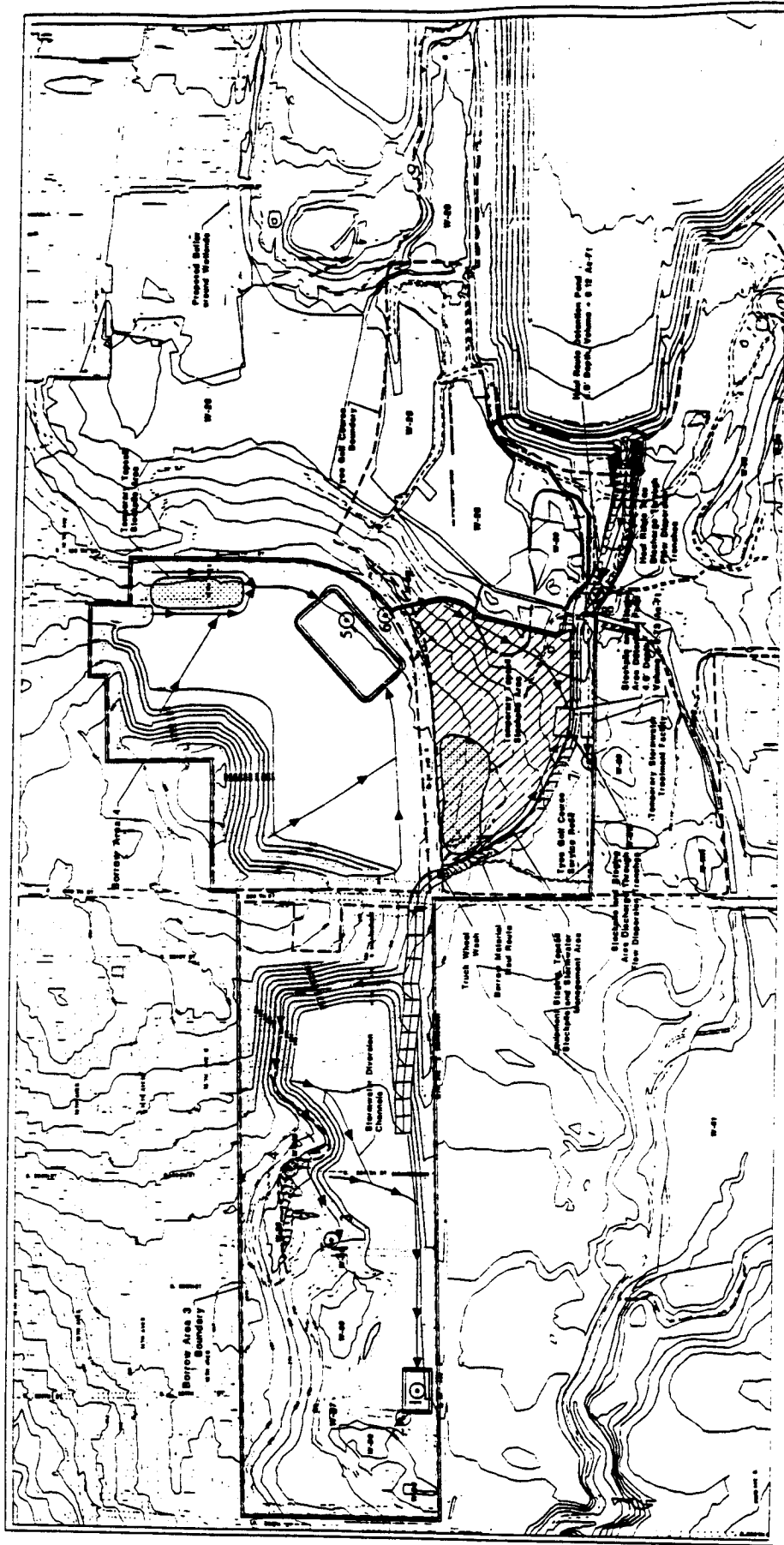
Initially, the Port will clear the Borrow Areas and harvest any salvageable timber in accordance with applicable permits. Remaining vegetation will be removed or managed in on-site compost piles. No open burning will occur. Topsoil will then be salvaged and stockpiled on-site as indicated on Figures 1 through 5. A detailed discussion of timber and topsoil management is contained in Section 3.2.3 of this SWPPP. Temporary erosion and sediment control (TESC) measures, discussed in Section 3.2.2, will be implemented before excavation begins, as indicated on Figure 1. In Borrow Area 3, a drainage swale will be constructed to intercept groundwater seepage from the excavated slope face on the north and west sides of the site. The swale will conduct flow southward to Wetland 29. See Figures 3 and 4.

Fill material will be retrieved by a series of benched cuts to the ultimate elevations indicated on Figure 4. Excavated materials larger than 6 inches will be pre-screened as part of the excavation and haul truck loading activities. No washing activities will be used as the fill materials have been designated suitable for applying directly as embankment construction fill. Temporary surge piles will be used in each borrow area to equalize daily truck loading activities. Thirty-ton highway haul trucks and trailers will then transport fill materials along a dedicated haul road within Port property. As shown on Figure 1, the truck haul route will originate at Borrow Areas 3 and 4, will traverse the former Tyee golf course, and then connect to existing airfield perimeter roads. The perimeter roads then cross the South 188th Street bridge onto the dedicated airfield service route.

Mobile fueling will take place on Borrow Areas 3 and 4 for on-site excavation and reclamation equipment only. Haul trucks and other vehicles will be fueled off-site. In addition, on-site vehicle and equipment maintenance will be limited to emergency events only, with regular vehicle and equipment maintenance occurring off-site. General locations of all on-site activities have been summarized on Figure 5.

Reclamation will begin as soon as borrow material extraction activities have advanced sufficiently to prevent reclamation from interfering with active mining. Reclamation is expected to begin at approximately the mid-year point in the extraction schedule, starting with recontouring of the upper portions of the high wall slopes. All surfaces will eventually be recontoured to provide a positive drainage surface of at least 1.5 percent. Topsoil will be redistributed from on-site stockpiles, followed by surface amendments, composted materials, and fertilization, as necessary. Stormwater control features installed during site construction will be modified or abandoned as appropriate during or after reclamation. Borrow Area 4 will be fully regraded and revegetated at the end of the first construction season, while full reclamation of Borrow Area 3 and all haul routes within the Borrow Areas and the former Tyee Golf course will be completed at the end of the second year.

In order to assure the stability of all regraded slopes and the viability of all revegetated areas, reclaimed surface disturbances within the permit boundary will be monitored for a minimum of 2 years following completion of scheduled reclamation. Monitoring locations will be established and monitored for soil conditions, erosion and sediment control, succession rates for replanted or reseeded species, and the general value to wildlife and other dependent uses that are compatible with future land-use activities.



SEA-PAC THIRD RUNWAY BORROW AREAS 3 AND 4
 STORMWATER POLLUTION PREVENTION PLAN ACTIVITY MAP
 BORROW AREAS 3 AND 4
 NPDES SAND AND GRAVEL GENERAL PERMIT

Scale: 1" = 100' (Horizontal)
 1" = 20' (Vertical)

North Arrow

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Map of Santa Property and Borrow Areas 3 and 4
 Project Name: Santa Property and Borrow Areas 3 and 4
 Project No.: 20110001
 Revision: 1
 Date: 08/27/10

Rev.	Description	Date
1	Initial Issue	08/27/10
2	Revised to include NPDES permit requirements	09/01/10
3	Revised to include stormwater prevention plan requirements	09/01/10
4	Revised to include borrow area boundaries	09/01/10
5	Revised to include stormwater treatment facility	09/01/10
6	Revised to include borrow area boundaries	09/01/10
7	Revised to include stormwater treatment facility	09/01/10
8	Revised to include borrow area boundaries	09/01/10
9	Revised to include stormwater treatment facility	09/01/10
10	Revised to include borrow area boundaries	09/01/10
11	Revised to include stormwater treatment facility	09/01/10
12	Revised to include borrow area boundaries	09/01/10
13	Revised to include stormwater treatment facility	09/01/10
14	Revised to include borrow area boundaries	09/01/10
15	Revised to include stormwater treatment facility	09/01/10
16	Revised to include borrow area boundaries	09/01/10
17	Revised to include stormwater treatment facility	09/01/10
18	Revised to include borrow area boundaries	09/01/10
19	Revised to include stormwater treatment facility	09/01/10
20	Revised to include borrow area boundaries	09/01/10

- STORMWATER PREVENTION PLAN ACTIVITY LIST**
- 1) Installation of SWS equipment and permits
 - 2) Land clearing, site preparation and site grading
 - 3) Grading and site preparation
 - 4) Installation of stormwater prevention measures
 - 5) Installation of stormwater treatment facility
 - 6) Installation of stormwater treatment facility
 - 7) Installation of stormwater treatment facility
 - 8) Installation of stormwater treatment facility
 - 9) Installation of stormwater treatment facility
 - 10) Installation of stormwater treatment facility
 - 11) Installation of stormwater treatment facility
 - 12) Installation of stormwater treatment facility
 - 13) Installation of stormwater treatment facility
 - 14) Installation of stormwater treatment facility
 - 15) Installation of stormwater treatment facility
 - 16) Installation of stormwater treatment facility
 - 17) Installation of stormwater treatment facility
 - 18) Installation of stormwater treatment facility
 - 19) Installation of stormwater treatment facility
 - 20) Installation of stormwater treatment facility

- BORROW AREAS 3 AND 4**
- 1) Installation of SWS equipment and permits
 - 2) Land clearing, site preparation and site grading
 - 3) Grading and site preparation
 - 4) Installation of stormwater prevention measures
 - 5) Installation of stormwater treatment facility
 - 6) Installation of stormwater treatment facility
 - 7) Installation of stormwater treatment facility
 - 8) Installation of stormwater treatment facility
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 - 12) Installation of stormwater treatment facility
 - 13) Installation of stormwater treatment facility
 - 14) Installation of stormwater treatment facility
 - 15) Installation of stormwater treatment facility
 - 16) Installation of stormwater treatment facility
 - 17) Installation of stormwater treatment facility
 - 18) Installation of stormwater treatment facility
 - 19) Installation of stormwater treatment facility
 - 20) Installation of stormwater treatment facility

2.4 DRAINAGE

Borrow Areas 3 and 4 lie within the Des Moines Creek watershed, where stormwater generally drains to the east. In Borrow Area 3, stormwater appears to infiltrate on site, or pool in low wetland areas to the southeast. Most stormwater runoff from Borrow Area 4 flows northeast into roadside ditches along South 196th Street and 18th Avenue South.

Stormwater management on each Borrow Area will include construction of temporary stormwater collection and diversion channels, which will convey runoff to an on-site infiltration pond. On the temporary staging and stockpile area, collection and diversion channels will be constructed to convey runoff to an on-site water treatment facility. Stormwater from the temporary staging and stockpile area will be treated before being discharged to surface water. Surface water and groundwater discharge monitoring locations for the Borrow Area 3 and 4 infiltration ponds have been identified on Figure 5 and are discussed in detail in Section 5 of this SWPPP. In addition, the discharge locations will be monitored according to the schedule outlined in Section 5 of this SWPPP.

Excavation in Borrow Area 3 is expected to intercept a relatively flat-lying perched zone of shallow groundwater along parts of the western and northern excavation slopes. The Port will collect this seepage in a grass-lined swale and convey it to augment existing surface water and shallow groundwater discharging to Wetland 29 (see Figure 3). To maintain proper water supply to Wetland 29, a flow control weir and diversion structure will be installed in the swale just upstream of Wetland B10 and Wetland 29. Any excess water above that needed to sustain the wetlands will be diverted to the stormwater management system. On both Borrow Areas, excavations have been designed to avoid direct impacts to wetlands to the extent practicable.

2.5 INVENTORY OF MATERIALS

The materials inventory list below is used to identify all materials on site and assess their potential for contributing contaminants to stormwater runoff. The materials listed are used, stored, produced, or disposed at the site.

Table 2-2. Inventory of materials.

Material	Location	Potential contact with stormwater?	Controls
Buried and surficial demolition debris	Embedded underground in Borrow Area excavation area	Yes	Immediate off-site disposal; or BMP S1.60 for Outside Storage or Transfer of Solid Raw Materials, By-Products or Finished Products. See Appendix A.
Trees and root masses, logged intact or mulched	Throughout site	Yes	BMP S1.60 for Outside Storage or Transfer of Solid Raw Materials, By-Products or Finished Products, and BMP S1.93 for Landscaping. See Appendix A
Diesel fuel	Mobile fueling locations	Yes	BMP S1.50 for Container Storage of Liquids, Food Wastes or Dangerous Wastes. See Appendix A.
Oil and hydraulic fluid	Emergency maintenance locations	Yes	BMP S1.50 for Container Storage of Liquids, Food Wastes or Dangerous Wastes. See Appendix A.
Flocculent	Wheel wash	Yes	BMP S1.50 for Container Storage of Liquids, Food Wastes or Dangerous Wastes. See Appendix A.

3. BEST MANAGEMENT PRACTICES

As noted in Section 1 of this SWPPP, whenever a self-inspection reveals that the description of pollutant sources or the BMPs specified are inadequate, the SWPPP will be modified as appropriate. BMPs will be selected from the latest version of the *Stormwater Management Manual for the Puget Sound Basin* (Ecology 1992) or an equivalent manual. All BMP modifications will be documented, and the records will be retained as part of the SWPPP for a minimum of 3 years.

3.1 OPERATIONAL BMPs

3.1.1 Pollution Prevention Team

The pollution prevention team is responsible for implementing, enforcing, maintaining, and revising the SWPPP. The pollution prevention team will meet quarterly to discuss BMPs, spill prevention, control, and countermeasures, and any necessary updates to the SWPPP. Table 3-1 lists the Port's team for overall management of Borrow Areas 3 and 4.

Table 3-1. Pollution prevention team.

Name: <u>Dave Walsh</u>	Phone: <u>(206) 431-4973</u>	Affiliation: <u>CH2MHill</u>
Responsibilities: Construction Manager. Oversee maintenance, revision, and implementation of SWPPP. Ensure that sediment control and hazardous material control monitoring takes place, certify compliance with SWPPP and Permit, and keep all records.		
Name: <u>Sarah Olson</u>	Phone: <u>(206) 248-7137</u>	Affiliation: <u>Port of Seattle</u>
Responsibilities: Designated SWPPP inspector. Ensure that BMPs are in place and functioning as designed. Respond to sediment control and spill containment directives from the Port. Inspect BMPs weekly and following storms. Identify necessary changes to BMPs.		
Name: <u>David Jenkins</u>	Phone: <u>(206) 423-1509</u>	Affiliation: <u>Port of Seattle</u>
Responsibilities: Port of Seattle Engineering Department Erosion Control/Stormwater Engineer. Engineering operations point of contact.		
Name: <u>Tom Hubbard</u>	Phone: <u>(206) 248-7135</u>	Affiliation: <u>Port of Seattle</u>
Responsibilities: Port of Seattle Stormwater Program Manager. NPDES point of contact.		
Name: <u>Ken Ludwa</u>	Phone: <u>(206) 822-8880</u>	Affiliation: <u>Parametrix, Inc.</u>
Responsibilities: Oversee construction stormwater monitoring.		

3.1.2 Good Housekeeping

The following good housekeeping procedures will be implemented:

- Promptly contain, clean up, and dispose of solid and liquid pollutant leaks and spills (including oils, solvents, fuels, and dust) from manufacturing operations on any exposed soil, vegetation, or paved area according to the spill prevention, control, and countermeasure guidelines described in Section 3.2.5 of this SWPPP.

- Sweep paved material handling and storage areas regularly as needed, for the collection and disposal of dust and debris that could contaminate stormwater. Do not hose down pollutants from any area to the ground, storm drain, conveyance ditch, or receiving water unless necessary for air quality control purposes and unless the pollutants are conveyed to a treatment system approved by the local jurisdiction.
- Clean oils, debris, sludge, etc. from all BMP systems (including catch basins, settling/detention basins, oil/water separators, boomed areas, and conveyance systems) regularly to prevent the contamination of stormwater.
- Promptly repair or replace all substantially cracked or otherwise damaged paved secondary containment, high-intensity parking, and any other drainage areas that are subjected to pollutant material leaks or spills.
- Promptly repair or replace all leaking connections, pipes, hoses, valves, etc. which can contaminate stormwater.
- Promptly repair any deterioration threatening the structural integrity of the stormwater facilities. This includes replacement of clean-out gates, catch basin lids, and rock in emergency spillways.
- Ensure that storm sewer capacities are not exceeded and that heavy sediment discharges to the sewer system are prevented.

3.1.3 Preventative Maintenance

The following preventative maintenance procedures will be implemented:

- Prevent the discharge of unpermitted liquid or solid wastes, process wastewater (including truck wash water), and sewage to ground or surface water, or to storm drains which discharge to surface water, or to the ground.
- Cover and contain materials, equipment, waste, and compost piles that could cause contamination of stormwater.
- Conduct all cleaning of oily parts, steam cleaning, or pressure washing of equipment or containers inside a building or on an impervious contained area.
- Cover and contain soils contaminated with pollutants, particularly toxic compounds such as pesticides, oils and greases, and metals.
- Do not pave over contaminated soil unless it has been determined that groundwater has not been and will not be contaminated by the soil.
- Construct impervious areas that are compatible with the materials handled. Portland cement concrete, asphalt, or equivalent material may be considered.

- Use drip pans to collect leaks and spills from industrial/commercial equipment (such as log stackers, industrial parts, trucks and other vehicles) stored outside.
- For the storage of liquids, use containers (such as steel and plastic drums) that are rigid and durable, corrosion-resistant to the weather and fluid content, non-absorbent, watertight, rodent-proof, and equipped with a sealed cover.
- For the temporary storage of mixed solid and liquid wastes, use dumpsters, garbage cans, drums, and comparable containers that are durable, corrosion-resistant, non-absorbent, non-leaking, and equipped with either a solid cover or screen cover. If covered with a screen, the container must be stored under a lean-to or equivalent structure.
- Where exposed to stormwater, use containers, piping, tubing, pumps, fittings, and valves that are appropriate for their intended use and for the contained liquid.

3.1.4 Employee Training

All Port employees responsible for conducting inspections of Borrow Areas 3 and 4 will be trained in:

- Good housekeeping and preventive maintenance procedures outlined in Section 3.1.2 of this SWPPP.
- Source control BMPs outlined in Section 3.2 of this SWPPP.
- Spill prevention, control, and countermeasures outlined in Section 3.2.5 of this SWPPP.

In addition, the Port will ensure that all employees (including contractor employees and subcontractors) who have access to Borrow Areas 3 and 4 are trained in:

- Identifying pollutant sources and pollutants.
- Understanding pollutant control measures and spill response procedures outlined in Section 3.2.5 and the Spill Prevention, Control, and Countermeasures Plan (SPCCP) located in Appendix B.
- Understanding environmentally acceptable material handling practices – particularly those related to vehicle/equipment liquids such as fuels, and vehicle/equipment cleaning.

3.2 SOURCE CONTROL BMPs

3.2.1 General Source Control BMPs

The following selected source control BMPs, taken from Ecology's Stormwater Management Manual for the Puget Sound – Final Draft, revised January 2001, shall be implemented:

- BMP S1.11 for Mobile Fueling of Vehicles and Heavy Equipment

- BMP S1.20 for Vehicle/Equipment/Building Structure Washing and Steam Cleaning
- BMP S1.21 for Vehicle and Equipment Maintenance and Repair
- BMP S1.22 for Vehicle and Equipment Parking and Storage
- BMP S1.30 for Liquid or Solid Material Loading and Unloading Areas
- BMP S1.50 for Container Storage of Liquids, Food Wastes or Dangerous Wastes
- BMP S1.60 for Outside Storage or Transfer of Solid Raw Materials, By-Products, or Finished Products
- BMP S1.80 for Spill Emergencies
- BMP S1.90 for Integrated Pest Management and Lawn/Vegetation Management
- BMP S1.91 for Maintenance of Roadside Ditches
- BMP S1.93 for Landscaping
- BMP S2.00 for Maintenance of Stormwater Drainage and Treatment Systems
- BMP S2.51 for Control of Dust From Disturbed Land Areas and Unpaved Roadways and Parking Lots
- BMP S2.60 for Erosion Control and Sedimentation

Descriptions of the selected BMPs are contained in Appendix A.

3.2.2 Erosion and Sediment Control

Erosion and sediment control facilities, including stormwater diversion swales and infiltration ponds, will be constructed before disturbing excavation areas of Borrow Areas 3 and 4. Excavation practices that will prevent erosion, including back-sloped benches and contoured bench drainage, will be implemented. Runoff from all material stockpiles will be controlled (through the use of berms, hay bales, silt fences, etc.) to limit sediment transport. Hydroseeding and permanent reclamation of excavated areas will be implemented as early as possible during the operating schedule, as outlined in Section 2.3.

The Port will ensure the implementation of the erosion and sediment control BMPs outlined in this SWPPP. All contractors using Borrow Areas 3 and 4 must develop and submit to the Port a Contractor's Erosion and Sediment Control Plan (CESP) per Section 02270 (Temporary Erosion and Sediment Control) of their contract documents. The CESP outlines the measures they must take for slope control, stormwater runoff management, and stormwater pollution prevention. All contractor CESP non-compliance issues will be handled through the contract in force during contractor use of Borrow Areas 3 and 4.

3.2.3 Topsoil Management

Topsoil in Borrow Areas 3 and 4 will be salvaged for use during reclamation activities where possible. Soil sampling has identified slightly elevated levels of arsenic in the topsoil of Borrow Area 4 related to windblown particulates from the former Asarco smelter in Tacoma. Surface deposition of windblown arsenic originating from the former Asarco smelter is a regional issue and the impacts expected at Borrow Area 4 are similar to those experienced by other undeveloped sites in the vicinity. Sampling in Borrow Area 3 indicates arsenic concentrations comparable to natural background levels.

Initial operations at each of Borrow Area will begin with removal of the topsoil layer. The topsoil will then be stored in bermed stockpiles within the permitted area for use during the concurrent and final reclamation stages. However, any topsoil unsuitable for reuse may be transported off-site for disposal. Stockpiles of topsoil from Borrow Area 4 will be covered at all times. Following excavation of the underlying embankment fill material, the stockpiled topsoil will be replaced in the Borrow Area from which it originated. Specifically, any topsoil that originated from Borrow Area 4 will be replaced in Borrow Area 4 only.

Trees in Borrow Area 4 will be harvested for commercial lumber sale, while the root masses will be unearthed and retained for on-site use or transported off-site for disposal. To the extent practical, dirt will be removed from the root masses prior to any mulching or off-site transport. Trees in Borrow Area 3 will be salvaged with root masses intact, where possible, or logged, and then transported off-site for commercial sale or use in other Port projects. Root masses from Borrow Area 3 that are not salvaged with the trees may also be retained for on-site use.

3.2.4 Control of Hazardous Materials

The Port will ensure the implementation of the hazardous materials management BMPs outlined in this SWPPP. All contractors using Borrow Areas 3 and 4 must develop and submit to the Port a Hazardous Materials Management Plan (HMMP) per Section 01631 (Hazardous Materials Management Planning and Execution) of their contract documents. The HMMP outlines the measures they must take for spill prevention, control, and countermeasures.

All contractor HMMP non-compliance issues will be handled through the contract in force during contractor use of Borrow Areas 3 and 4.

3.2.5 Spill Prevention, Control, and Countermeasures Plan

The Borrow Areas 3 and 4 SPCCP is located in Appendix B. The Borrow Areas 3 and 4 pollution prevention team will be trained in the implementation of the SPCCP and will meet quarterly to discuss spill control procedures. The Port will provide a spill kit to be retained on site.

All spills will be documented on the SeaTac International Airport Spill Report form located in Appendix B. In addition, the Port will retain as part of the SWPPP all reports on spills of oil or hazardous substances in greater than Reportable Quantities (Code of Federal Regulations Title 40 Parts 302.4 and 117) for a period of 3 years. Hazardous substances include, but are not limited to, oil, gasoline, or diesel fuel that causes a violation of the State of Washington's Water Quality

Standards; causes a film, surface sheen, or discoloration in the waters of the State or adjoining shorelines; or causes a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

3.3 TREATMENT BMPs

As discussed in Section 2.4 of the SWPPP, management of surface water runoff generated on each Borrow Area will include construction of temporary stormwater collection and diversion channels, which will convey runoff to an on-site infiltration pond. On the temporary staging and stockpile area, collection and diversion channels will be constructed to convey runoff to an on-site water treatment facility. Stormwater from the temporary staging and stockpile area will be treated before being discharged to surface water. Surface water and groundwater discharge monitoring locations for the Borrow Area 3 and 4 infiltration ponds have been identified on Figure 5 and are discussed in detail in Section 5 of this SWPPP. In addition, the discharge locations will be monitored according to the schedule outlined in Section 5 of this SWPPP.

3.4 INNOVATIVE BMPs

As discussed in Section 2.4 of this SWPPP, excavation in Borrow Area 3 is expected to intercept a relatively flat-lying perched zone of shallow groundwater along parts of the western and northern excavation slopes. The Port will collect this seepage in a grass-lined swale and convey it to augment existing surface water and shallow groundwater discharging to Wetland 29 (see Figure 3). To maintain proper water supply to Wetland 29, a flow control weir and diversion structure will be installed in the swale just upstream of Wetland B10 and Wetland 29. Any excess water above that needed to sustain the wetlands will be diverted to the stormwater management system. On both Borrow Areas, excavations have been designed to avoid direct impacts to wetlands to the extent practicable.

4. INSPECTIONS AND RECORDKEEPING

4.1 DRY SEASON INSPECTION

During the dry season (May 1 – September 30), the Port site inspector will perform at least one site inspection, after at least 7 consecutive days of no precipitation, as follows:

- Verify that BMPs are implemented and adequate.
- Confirm that no unpermitted non-stormwater discharges occur (e.g., domestic wastewater, contact cooling water, or process wastewater). If a discharge related directly or indirectly to process water is discovered, the Port will notify Ecology and eliminate the discharge within 10 days.

4.2 WET SEASON INSPECTION

During the wet season (October 1 – April 30), the Port site inspector will perform at least one site inspection. The inspection will be conducted during a rain event of at least 0.50 inches in 24 hours and at a period during the rain event in which runoff from the site is being produced. The inspector will evaluate the following:

- Monitor for the presence of turbidity, floating materials, suspended solids, surface sheen, discoloration, and odor in the stormwater discharges. If turbid runoff, off-site sedimentation, and/or a surface sheen are occurring, the inspector and engineer will work with the contractor to implement appropriate BMPs until the turbid discharge, sedimentation, and/or surface sheen ceases.
- Verify that the description of potential pollutant sources required under this permit is accurate.
- Verify that the site maps have been updated or otherwise modified to reflect current conditions.

4.3 INSPECTION REPORTS

A report on each inspection will be prepared and retained as part of the SWPPP. The report will summarize the scope of the inspection, the personnel conducting the inspection, the date(s) of the inspection, major observations relating to the implementation of the SWPPP, and any actions taken. Each report will be signed by the designated SWPPP signatory and will certify that the discharge of stormwater has been investigated for the presence of non-stormwater discharge.

5. DISCHARGE MONITORING

5.1 MONITORING REQUIREMENTS

The Port will monitor all authorized discharges to surface water and groundwater according to the Stormwater Monitoring Plan contained in Appendix C and the schedule outlined in Table 4-1.

Table 4-1. Discharge monitoring information.

Discharge Location	Category	Monitoring Parameter	Units	Minimum Sampling Frequency	Sample Type	Discharge Limit	
						Average Monthly ^a	Maximum Daily ^b
Surface Water	Process and dewatering water	TSS	mg/l	Quarterly	Grab	40	80
	Process, dewatering, and stormwater	Turbidity	NTU	Twice monthly ^c	Grab	50	50
		pH	-	Monthly	Measurement	6.0 - 9.0	
		Temperature	°F	Weekly ^d	Measurement	None	
Ground-water	Process Water	pH	-	Monthly	Grab	6.5 - 8.5	
	Stormwater	pH	-	Quarterly	Grab	6.5 - 8.5	

- a The average monthly effluent limitation is defined as the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
- b The maximum daily effluent limitation is defined as the highest allowable daily discharge.
- c There must be at least 24 hours between sampling.
- d During the months of July, August, and September.

The Port will monitor all authorized discharges of process water, mine dewatering water, and stormwater that discharge to surface water, including any sources that discharge to a storm sewer that discharges to surface water. In addition, the Port will provide representative sampling of all discharges to groundwater. Representative sampling includes all discharges of process water and mine dewatering water to unlined ponds, infiltration trenches, or land.

All locations in the active site where water collects will be monitored visually for oil sheen. When water is present, monitoring should be each day of operation for most locations on-site and never less than monthly. If a sheen is present, cleanup procedures will be implemented in accordance with Section 3.2.5 and Appendix B of this SWPPP.

5.2 LOCATION AND IDENTIFICATION OF SAMPLING POINTS

Monitoring locations include, but are not limited to, the points listed in Table 4-2 and shown on Figure 5.

Table 4-2. Discharge monitoring locations.

Type	No.	Name	Description	
Regular monitoring point (discharge expected on routine basis)	1	Borrow Area 3 Infiltration Basin	Collection location of stormwater runoff from Borrow Area 3. Representative groundwater sampling point.	
	3	Borrow Area 3 Wetland Protection Swale to Wetland B9 and Wetland 30	Collection location of groundwater seepage from Borrow Area 3 excavation. Discharge to Wetland B9. Surface water sampling point.	
	4	Borrow Area 3 Wetland Protection Swale to Wetland 29	Collection location of groundwater seepage from Borrow Area 3 excavation. Discharge to Wetland 29. Surface water sampling point.	
	5	Borrow Area 4 Infiltration Basin	Collection location of stormwater runoff from Borrow Area 4. Representative groundwater sampling point.	
	7	Stockpile and Staging Area Detention Pond	Collection and treatment location of stormwater runoff from staging and stockpile area. Discharge to flow dispersion trenches near Wetland G9. Surface water sampling point.	
	8	Haul Route Detention Pond	Collection location of stormwater runoff from Borrow Area 3. Non-turbid discharge to flow dispersion trenches near Des Moines Creek. Turbid water pumped to treatment at stockpile and staging area detention pond. Surface water sampling point.	
	Emergency overflow point (discharge expected only during intense rainfall events)	2	Borrow Area 3 Emergency Overflow	Emergency overflow for infiltration basin. Discharge to sheet flow to Wetland B6. Surface water sampling point.
	6	Borrow Area 4 Emergency Overflow	Emergency overflow for infiltration basin. Discharge to City of SeaTac storm drainage system. Surface water sampling point.	

5.3 REPORTING REQUIREMENTS

Discharge Monitoring Report forms will be submitted to Ecology quarterly for all active sites whether or not the facility was discharging. If there was no discharge or if the facility was not operating during a given monitoring period, the form will be submitted as required with the words "no discharge" entered in place of the monitoring results. Reports will be received by Ecology on or by January 15 (for the period of October, November, and December), April 15 (for the period of January, February, and March), July 15 (for the period of April, May, and June), and October 15 (for the period of July, August, and September).

APPENDIX A
SELECTED SOURCE CONTROL BEST MANAGEMENT PRACTICES

BMP S1.11 for Mobile Fueling of Vehicles and Heavy Equipment

Description of Pollutant Sources: Mobile fueling, also known as fleet fueling, wet fueling, or wet hosing, is the practice of filling fuel tanks of vehicles by tank trucks that are driven to the yards or sites where the vehicles to be fueled are located. Mobile fueling is only conducted using diesel fuel, as mobile fueling of gasoline is prohibited. Diesel fuel is considered as a Class II Combustible Liquid, whereas gasoline is considered as a Flammable Liquid.

Note that some local fire departments may have restrictions on mobile fueling practices.

Historically mobile fueling has been conducted for off-road vehicles that are operated for extended periods of time in remote areas and for vehicles that are not typically operated on roads including at construction sites, logging operations, and farms. Mobile fueling of on-road vehicles is also conducted commercially in the State of WA.

Pollutant Control Approach: Proper training of the fueling operator, and the use of spill/drip control and reliable fuel transfer equipment with backup shutoff valving are typically needed.

Applicable Operational BMPs:

- Ensure that all mobile fueling operations are approved by the local fire department and comply with local and Washington State fire codes.
- In fueling locations that are in close proximity to sensitive aquifers, designated wetlands, wetland buffers, or other Waters of the State, approval by local jurisdictions is necessary to ensure compliance with additional local requirements.
- Ensure the compliance with all 49 CFR 178 requirements for DOT 406 cargo tanker. Documentation from a DOT Registered Inspector shall be proof of compliance.
- Ensure the presence of the driver/operator at the fuel transfer location during fuel transfer and ensure that the following procedures are implemented at the fuel transfer locations:
 - Locating the point of fueling at least 25 feet from the nearest storm drain or inside an impervious containment with a volumetric holding capacity equal to or greater than 110% of the fueling tank volume, or covering the storm drain to ensure no inflow of spilled or leaked fuel. (Storm drains that convey the inflow to a spill control separator approved by the local jurisdiction and the fire dept. need not be covered.) Potential spill/leak conveyance surfaces must be impervious and in good repair.

- Placement of a drip pan, or an absorbent pad under each fueling location prior to and during all dispensing operations. The pan must be liquid tight and the absorbent pad must have a capacity of 5 gallons. Spills retained in the drip pan or the pad need not be reported
- The handling and operation of fuel transfer hoses and nozzle, drip pan(s), and absorbent pads as needed to prevent spills/leaks of fuel from reaching the ground, storm drains, and receiving waters.
- Not extending the fueling hoses across a trafficable lane without fluorescent traffic cones, or equivalent devices, conspicuously placed so that all traffic is blocked from crossing the fuel hose.
- Removing the fill nozzle and cessation of filling when the automatic shut-off valve engages.
- Not "topping off" the fuel receiving equipment
- Provide the driver/operator of the fueling vehicle with:
 - Adequate flashlights or other mobile lighting to view fill openings with poor accessibility. Consult with local fire department for additional lighting requirements.
 - Two-way communication with his/her home base.
- Train the driver/operator annually in spill control measures and emergency procedures.
- Ensure that the local fire department (911) and the appropriate regional office of the Department of Ecology are immediately notified in the event of any spill not immediately retained by spill pans and absorbent pads.
- Maintain a minimum of the following spill clean-up materials in all fueling vehicles, that are readily available for use:
 - Non-water absorbents capable of absorbing 15 gallons of diesel fuel;
 - A storm drain plug or cover kit;
 - A non-water absorbent containment boom of a minimum 10 feet in length with a 12-gallon absorbent capacity.
 - A non-metallic shovel
 - Two five-gallon buckets with lids
- Use automatic shutoff nozzles for dispensing the fuel. Replace automatic shut-off nozzles as recommended by the manufacturer.

- **Maintain and replace equipment on fueling vehicles, particularly hoses and nozzles, at established intervals to prevent failures.**

Applicable Structural Source Control BMPs: Include the following fuel transfer site components:

- **Automatic fuel transfer shut-off nozzles.**
- **An adequate lighting system at the filling point.**

**BMP S1.20 for
Vehicle/Equipment/
Building Structure
Washing and Steam
Cleaning**

Description of Pollutant Sources: Vehicles, aircraft, vessels, transportation equipment, industrial equipment, and large buildings and structures may be commercially cleaned with low or high pressure water or steam. This includes frequent "charity" car washes at gas stations and commercial parking lots. The cleaning can include hand washing, scrubbing, sanding, etc. Washwater from cleaning activities can contain oil and grease, suspended solids, heavy metals, soluble organics, soaps, and detergents that can contaminate stormwater.

Pollutant Control Approach: The preferred approach is to cover and/or contain the cleaning activity, or conduct the activity inside a building, to separate the uncontaminated stormwater from the pollutant sources. Washwater must be conveyed to a sanitary sewer after approval by the local sewer authority, temporarily stored before proper disposal, or recycled, with no discharge to the ground, to a storm drain, or to surface water. Washwater may be discharged to the ground after proper treatment in accordance with *Ecology guidance WQ-R-95-56, "Vehicle and Equipment Washwater Discharges"*, June 1995. The quality of any discharge to the ground after proper treatment must comply with Ecology's Ground Water Quality Standards, Chapter 173-200 WAC. Discharge of washwater to surface water or to a storm drain after on-site treatment is not allowed without a NPDES permit from the local Ecology Regional Office.

Applicable Operational BMPs:

- Do not change oil in the wash area.

Applicable Structural Source Control BMPs: Conduct vehicle/equipment washing in one of the following locations:

- At a commercial washing facility in which the washing occurs in an enclosure and drains to the sanitary sewer, or
- In a building constructed specifically for washing of vehicles and equipment which drains to a sanitary sewer.

Conduct outside washing operation in a designated wash area with the following features:

- In a paved area, preferably with Portland cement concrete or a surface with at least equivalent imperviousness to fuels and solvents, and constructed as a spill containment pad to prevent the run-on of stormwater from adjacent areas. Slope the spill containment area so that washwater is collected in a containment pad drain system with perimeter drains, trench

Note that the purpose of the valve is to convey only washwater and contaminated stormwater to a treatment system.

drains or catchment drains. Size the containment pad to extend out a minimum of four feet on all sides of the vehicles and/or equipment being washed.

- Convey the washwater to a sump, or other catchment, and then to a sanitary sewer (if allowed by the local Sewer Authority), or other treatment (see Volume V for treatment options), or recycle system. A NPDES permit may be required for any washwater discharge to a storm drain or receiving water after treatment. Contact the Ecology regional office, or local jurisdiction for treatment requirements.
- The containment sump must have a positive control valve for spill control, live containment volume, and overflow with oil/water separation. Size the minimum live storage volume for the 6-month, 24-hour storm for the drainage area of the containment pad.
- The positive control valve in the discharge pipe should be closed when washing is not occurring, thereby preventing the entry of uncontaminated stormwater into the pretreatment/treatment system. The stormwater can then drain into the conveyance/discharge system outside of the wash pad (essentially bypasses the washwater treatment/conveyance system). Post signs to inform people of the operation and purpose of the valve. Clean the concrete pad thoroughly until there is no foam or visible sheen in the washwater prior to closing the positive control valve and allowing uncontaminated stormwater to overflow and drain off the pad.
- Collect the washwater from building structures and convey it to appropriate treatment such as a sanitary sewer system if it contains oils, soaps, or detergents, where feasible. If the washwater does not contain oils, soaps, or detergents then it could drain to soils that have sufficient natural attenuation capacity for dust and sediment.

Recommended Additional BMPs:

- The wash area should be well marked at gas stations, multi-family residences and any other business where non-employees wash vehicles.
- For uncovered wash pads the positive control valve may be manually operated but a pneumatic or electric valve system is preferable. The valve may be on a timer circuit where it is opened upon completion of a wash cycle. The timer

would then close the valve after the sump or separator is drained.

- Use phosphate-free biodegradable detergents when practicable.
- Consider recycling the washwater.

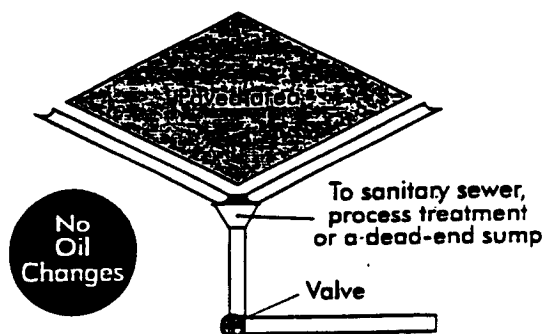


Figure 4.2 Uncovered Wash Area

- Because soluble/emulsifiable detergents can be used in the wash medium the selection of soaps and detergents and treatment BMPs should be considered carefully. Oil/water separators are ineffective in removing emulsified or water soluble detergents.

Exceptions

- At gas stations or commercial parking lots, where it is not possible to discharge the washwater to a sanitary sewer, a temporary plug or "sump kit" can be used at the storm drain to collect the washwater for off-site disposal such as to a nearby sanitary sewer.
- New and used car dealerships may wash vehicles in the parking stalls as long as a temporary plug "sump kit" system is used to collect the washwater for disposal as stated above, or an approved treatment system for the washwater is in place.
- If soaps, detergents, and/or other chemical cleaners are not used in washing trucks at industrial sites the washwater must be conveyed to a catch basin and an oil/water separator, or equivalent treatment BMP prior to discharge to a storm drain.

**BMP S1.21 for Vehicle
and Equipment
Maintenance and
Repair**

Description of Pollutant Sources: Pollutant sources include parts/vehicle cleaning, spills/leaks of fuel and other liquids, replacement of liquids, outdoor storage of batteries/liquids/parts, and vehicle parking.

Pollutant Control Approach: Control of leaks and spills of fluids using good housekeeping and cover and containment BMPs.

Applicable Operational BMPs:

- Inspect incoming vehicles, parts, and equipment stored temporarily outside, for leaks.
- Use drip pans or containers under parts or vehicles that drip or that are likely to drip liquids, such as during dismantling of liquid containing parts or removal or transfer of liquids.
- Consider storing damaged vehicles inside until all liquids are removed. Remove liquids from vehicles retired for scrap.
- Remove batteries and liquids from vehicles and equipment in designated areas designed to prevent stormwater contamination. Store cracked batteries in a covered non-leaking secondary containment system.
- Empty oil and fuel filters before disposal. Provide for proper disposal of oil and fuel.
- Do not pour/convey washwater, liquid waste, or other pollutant into storm drains or to surface water. Check with the local sanitary sewer authority for approval to convey to a sanitary sewer.
- Do not connect maintenance and repair shop floor drains to storm drains or to surface water. To allow for snowmelt during the winter a drainage trench with a sump for particulate collection can be installed and used only for draining the snowmelt and not for discharging any vehicular or shop pollutants.

Applicable Structural Source Control BMPs:

- Conduct all maintenance and repair of vehicles and equipment in a building, or other covered impervious containment area that is sloped to prevent run-on of uncontaminated stormwater and runoff of contaminated stormwater.

- The maintenance of refrigeration engines in refrigerated trailers may be conducted in the parking area with due caution to avoid the release of engine or refrigeration fluids.
- Park large mobile equipment, such as log stackers, in a designated contained area.

For additional applicable BMPs refer to BMP S1.10-Fueling Stations, BMP S1.20-Vehicle/Equipment Washing and Steam Cleaning, BMP S1.30-Loading and Unloading Liquid Materials, BMP S1.40-Liquid Storage in Above-ground Tanks, BMP S1.50-Container Storage of Liquids, Food Wastes, or Dangerous Wastes, BMP S1.60-Outside Storage of Raw Materials, By-Products, or Finished products, BMP S1.80-Emergency Spill Cleanup Plans, and S2.10-Locating Illicit Connections to Storm Drains, and other BMPs provided in this chapter.

Note that a treatment BMP is applicable for contaminated stormwater.

Applicable Treatment BMPs: Convey contaminated stormwater runoff from vehicle staging and maintenance areas subjected to drips/leaks of pollutant liquids to a sanitary sewer, if allowed by the local sewer authority, an API or CP oil and water separator (*See Volume V*), applicable filter, or other equivalent oil treatment system.

Recommended Additional Operational BMPs:

- Clean parts with aqueous detergent based solutions or non-chlorinated solvents such as kerosene or high flash mineral spirits, and/or use wire brushing or sand blasting whenever practicable. Avoid using toxic liquid cleaners such as methylene chloride, 1,1,1-trichloroethane, trichloroethylene or similar chlorinated solvents. Choose cleaning agents that can be recycled.
- Inspect all BMPs regularly, particularly after a significant storm. Identify and correct deficiencies to ensure that the BMPs are functioning as intended.
- Avoid hosing down work areas. Use dry methods for cleaning leaked fluids.
- Recycle greases, used oil, oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic fluids, transmission fluids, and engine oils (*see Appendix C*).
- Do not mix dissimilar or incompatible waste liquids stored for recycling.

**BMP S1.22 for
Vehicle and
Equipment Parking
and Storage**

Description of Pollutant Sources: Public and commercial parking lots such as retail store, fleet vehicle (including rent-a-car lots and car dealerships), equipment sale and rental parking lots, and parking lot driveways, can be sources of toxic hydrocarbons and other organic compounds, oils and greases, metals, and suspended solids caused by the parked vehicles.

Pollutant Control Approach: If the parking lot is a high-use site as defined below, provide appropriate oil removal equipment for the contaminated stormwater runoff.

Applicable Operational BMPs:

- If washing of a parking lot is conducted, discharge the washwater to a sanitary sewer, if allowed by the local sewer authority, or other approved treatment system, or collect it for off-site disposal.
- Do not hose down the area to a storm drain or to a receiving water.

Recommended Additional Operational BMPs: Sweep parking lots, storage areas, and driveways, regularly to collect dirt, waste, and debris. Consider using high-efficiency vacuum filter street sweepers (see BMP S2.20), as they appear to provide superior removal of the finer dirt particles.

Applicable Treatment BMPs: An oil removal system such as an API or CP oil and water separator, catch basin filter, or equivalent BMP, approved by the local jurisdiction, is applicable for parking lots meeting the threshold vehicle traffic intensity level of a *high-use site*.

Vehicle High-Use Sites

Description of Pollutant Sources: Establishments subject to a vehicle high-use intensity have been determined to be significant sources of oil contamination of stormwater. Examples of potential high use areas (4, 5, and 6) include customer parking lots at fast food stores, grocery stores, taverns, restaurants, large shopping malls, discount warehouse stores, quick-lube shops, and banks. In a survey by King County (12) levels of vehicular traffic were related to oil pollutant discharge levels. High-use site thresholds were then established based on the generation of a significant amount of oil contamination of stormwater. A *high-use site* is defined as having at least 5000 square feet of total impervious surface at a commercial or industrial establishment and has one of the following characteristics:

- Is subject to an expected average daily vehicle traffic (ADT) count equal to or greater than 100 vehicles per 1000 square feet of gross building area, or
- Is subject to petroleum product storage and transfer in excess of 1500 gallons per year, not including routine delivered heating oil, or,
- Is subject to use, storage, or maintenance of a fleet of 25 or more diesel vehicles that are over 10 tons gross weight (trucks, buses, trains, heavy equipment, etc.), or

Applicable Treatment BMP: At new or redevelopment areas/ facilities with high-use parking lots, and intersections install appropriate oil treatment BMPs (*See Volume V*).

**BMP S1.30 for Liquid
or Solid Material
Loading and
Unloading Areas**

Description of Pollutant Sources: Loading/unloading of liquid and solid materials at industrial and commercial facilities are typically conducted at shipping and receiving, outside storage, fueling areas, etc. Materials transferred can include products, raw materials, intermediate products, waste materials, fuels, scrap metals, etc. Leaks and spills of fuels, oils, powders, organics, heavy metals, salts, acids, alkalis, etc. during transfer are potential causes of stormwater contamination. Spills from hydraulic line breaks are a common problem at loading docks.

Pollutant Control Approach:

- Cover and contain the loading/ unloading area where necessary to prevent run-on of stormwater and runoff of contaminated stormwater.
- To the maximum extent practicable, use a perimeter drain system, which leads to treatment.

Applicable Operational BMPs:

At All Loading/ Unloading Areas: A significant amount of debris can accumulate at outside, uncovered loading/unloading areas. Sweep these surfaces frequently to remove material that could otherwise be washed off by stormwater. An area may be covered for a period of time by containers, logs, or other material. Also sweep up areas that are cleared.

At Tanker Truck and Rail Transfer Areas to Above/below-ground Storage Tanks:

- To minimize the risk of accidental spillage, prepare an "Operations Plan" that describes procedures for loading/unloading. Train the employees, especially fork lift operators, in its execution and post it or otherwise have it readily available to employees.
- Report spills of reportable quantities to Ecology (refer to section 2.2 for telephone nos. of Ecology Regional Offices)
- Prepare and implement an Emergency Spill Cleanup Plan for the facility (BMP S1.80) which includes the following BMPs:
 - Ensure the clean up of liquid/solid spills in the loading/ unloading area immediately, if a significant spill occurs, and, upon completion of the loading/unloading activity, or, at the end of the working day.
 - Retain and maintain an appropriate oil spill cleanup kit on-site for rapid cleanup of material spills. (See BMP S1.80).

- Ensure that an employee trained in spill containment and cleanup is present during loading/unloading.

At Rail Transfer Areas to Above/below-ground Storage Tanks:
Install a drip pan system as illustrated (see Figure 4.3) within the rails to collect spills/leaks from tank cars and hose connections, hose reels, and filler nozzles.

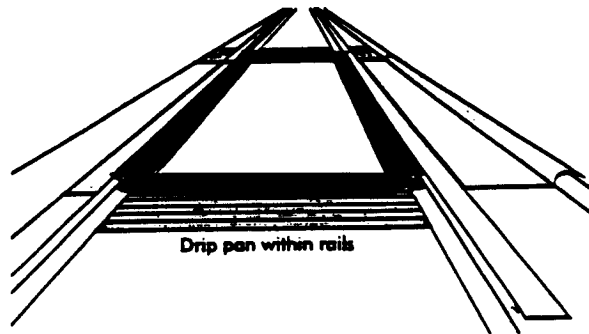


Figure 4.3 Drip Pan Within Rails

Loading/unloading from/to Marine Vessels: Facilities and procedures for the loading or unloading of petroleum products must comply with Coast Guard requirements specified in Appendix D-R.5.

Transfer of Small Quantities from Tanks and Containers: Refer to BMP S1.40-Liquid Storage in Above-ground Tanks, and S1.50-Container Storage of Liquids, Food Wastes, or Dangerous Wastes, for requirements on the transfer of small quantities from tanks and containers, respectively.

Applicable Structural Source Control BMPs:

At All Loading/ Unloading Areas:

- Consistent with Uniform Fire Code requirements (Appendix D-R.2) and to the extent practicable, conduct unloading or loading of solids and liquids in a manufacturing building, under a roof, or lean-to, or other appropriate cover.
- Berm, dike, and/or slope the loading/unloading area to prevent run-on of stormwater and to prevent the runoff or loss of any spilled material from the area.
- Large loading areas frequently are not curbed along the shoreline. As a result, stormwater passes directly off the paved

surface into surface water. Place curbs along the edge, or slope the edge such that the stormwater can flow to an internal storm drain system that leads to an approved treatment BMP.

- Pave and slope loading/unloading areas to prevent the pooling of water. The use of catch basins and drain lines within the interior of the paved area must be minimized as they will frequently be covered by material, or they should be placed in designated "alleyways" that are not covered by material, containers or equipment.
- Place drip pans, or other appropriate temporary containment device, at locations where leaks or spills may occur such as hose connections, hose reels and filler nozzles. Drip pans shall always be used when making and breaking connections (see Figure 4.4). Check loading/unloading equipment such as valves, pumps, flanges, and connections regularly for leaks and repair as needed.

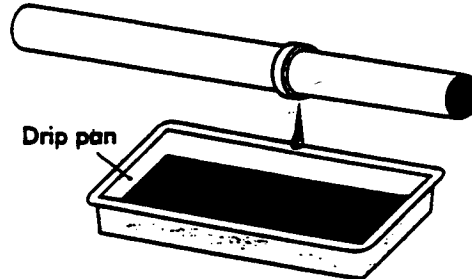


Figure 4.4 Drip Pan

Recommended Structural Source Control BMP: For the transfer of pollutant liquids in areas which cannot contain a catastrophic spill, install an automatic shutoff system in case of unanticipated off-loading interruption (e.g. coupling breaks, hose ruptures, overfills, etc.).

At Loading and Unloading Docks:

- Install/maintain overhangs, or door skirts that enclose the trailer end (see Figures 4.5 and 4.6) to prevent contact with rainwater.
- Design the loading/unloading area with berms, sloping, etc. to prevent the run-on of stormwater.
- Retain on-site the necessary materials for rapid cleanup of spills.

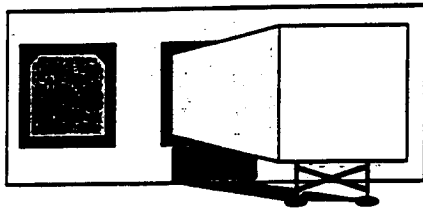


Figure 4.5 Loading Dock with Door Skirt

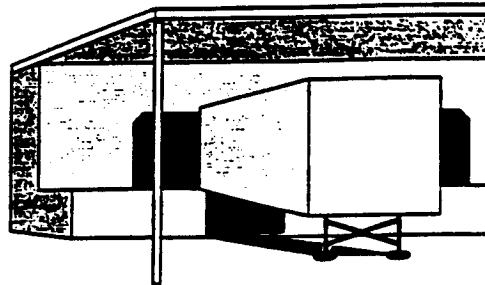


Figure 4.6 Loading Dock with Overhang

At Tanker Truck Transfer Areas to Above/Below-Ground Storage Tanks:

- Pave the area on which the transfer takes place. If any transferred liquid, such as gasoline, is reactive with asphalt pave the area with Portland cement concrete.
- Slope, berm, or dike the transfer area to a dead-end sump, spill containment sump, a spill control (SC) oil/water separator, or other spill control device. The minimum spill retention time should be 15 minutes at the greater flow rate of the highest fuel dispenser nozzle through-put rate, or the peak flow rate of the 6-month, 24 hour storm event over the surface of the containment pad, whichever is greater. The volume of the spill containment sump should be a minimum of 50 gallons with an adequate grit sedimentation volume.

**BMP S1.50 for
Container Storage of
Liquids, Food Wastes
or Dangerous Wastes**

Description of Pollutant Sources: Steel and plastic drums with volumetric capacities of 55 gallons or less are typically used at industrial facilities for container storage of liquids and powders. The BMPs specified below apply to container(s) located outside a building used for temporary storage of accumulated food wastes, vegetable or animal grease, used oil, liquid feedstock or cleaning chemical, or Dangerous Wastes (liquid or solid) unless the business is permitted by Ecology to store the wastes (*Appendix D-R.4*). Leaks and spills of pollutant materials during handling and storage are the primary sources of pollutants. Oil and grease, acid/alkali pH, BOD, COD are potential pollutant constituents.

Pollutant Control Approach: Store containers in impervious containment under a roof or other appropriate cover, or in a building. For roll-containers (for example, dumpsters) that are picked up directly by the collection truck, a filet can be placed on both sides of the curb to facilitate moving the dumpster. If a storage area is to be used on-site for less than 30 days, a portable temporary secondary system like that shown in Figure 4.9 can be used in lieu of a permanent system as described above.

Applicable Operational BMPs:

- Place tight-fitting lids on all containers.
- Place drip pans beneath all mounted container taps and at all potential drip and spill locations during filling and unloading of containers.
- Check containers daily for leaks/spills. Replace containers and replace and tighten bungs in drums as needed.
- Businesses accumulating Dangerous Wastes that do not contain free liquids need only to store these wastes in a sloped designated area with the containers elevated or otherwise protected from storm water run-on.
- Drums stored in an area where unauthorized persons may gain access must be secured in a manner that prevents accidental spillage, pilferage or any unauthorized use (*see Figure 4.8*).

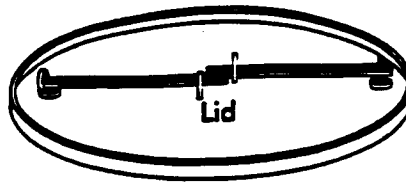


Figure 4.8 Locking System for Drum Lid

- If the material is a Dangerous Waste, the business owner must comply with any additional Ecology requirements as specified in Appendix D-R.3.
- Storage of reactive, ignitable, or flammable liquids must comply with the Uniform Fire Code (*Appendix D-R.2*).
- Inspect, clean and maintain all source control and treatment BMPs regularly to ensure that they achieve their intended efficiency. Inspect for corrosion, structural failure, spills, leaks, overfills, and failure of piping systems.
- Cover dumpsters, or keep them under cover such as a lean-to, to prevent the entry of stormwater. Replace or repair leaking garbage dumpsters.
- Drain dumpsters and/or dumpster pads to sanitary sewer. Keep dumpster lids closed. Install waterproof liners.

Applicable Structural Source Control BMPs:

- Keep containers with Dangerous Waste, food waste, or other potential pollutant liquids inside a building unless this is impracticable due to site constraints or Uniform Fire Code requirements.

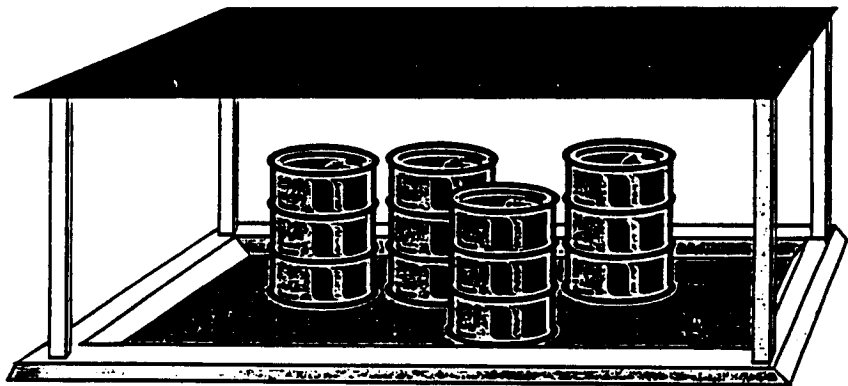


Figure 4.9 Covered and Bermed Containment Area

- Store containers in a designated area, which is covered, bermed or diked, paved and impervious in order to contain leaks and spills (see Figure 4.9). The secondary containment shall be sloped to drain into a dead-end sump for the collection of leaks and small spills.
- For liquid wastes, surround the containers with a dike as illustrated in Figure 4.9. The dike must be of sufficient height to provide a volume of either 10% of the total enclosed container volume or 110% of the volume contained in the largest container, whichever is greater, or, if a single container, 110% of the volume of that container.
- Where material is temporarily stored in drums, a containment system can be used as illustrated, in lieu of the above system (see Figure 4.10).

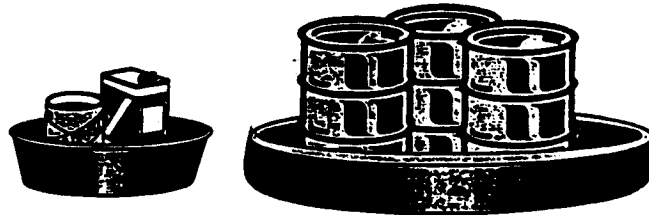


Figure 4.10 Secondary Containment System

- Place containers mounted for direct removal of a liquid chemical for use by employees inside a containment area as described above. Use a drip pan during liquid transfer (see Figure 4.11).

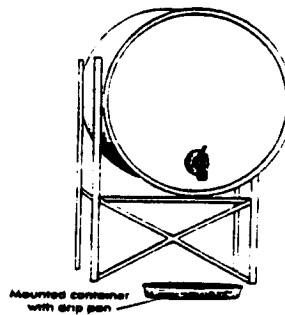


Figure 4.11 Mounted Container with Drip Pan

Note that a treatment BMP is applicable for contaminated stormwater from drum storage areas.

Applicable Treatment BMP:

- For contaminated stormwater in the containment area, connect the sump outlet to a sanitary sewer, if approved by the local Sewer Authority, or to appropriate treatment such as an API or CP oil/water separator, catch basin filter or other appropriate system (see Volume V). Equip the sump outlet with a normally closed valve to prevent the release of spilled or leaked liquids, especially flammables (compliance with Fire Codes), and dangerous liquids. This valve may be opened only for the conveyance of contaminated stormwater to treatment.
- Another option for discharge of contaminated stormwater is to pump it from a dead-end sump or catchment to a tank truck or other appropriate vehicle for off-site treatment and/or disposal.

**BMP S1.60 for
Outside Storage or
Transfer of Solid Raw
Materials,
By-Products or
Finished Products**

Description of Pollutant Sources: Solid raw materials, by-products, or products such as gravel, sand, salts, topsoil, compost, logs, sawdust, wood chips, lumber and other building materials, concrete, and metal products sometimes are typically stored outside in large piles, stacks, etc. at commercial or industrial establishments. Contact of outside bulk materials with stormwater can cause leachate, and erosion of the stored materials. Contaminants include TSS, BOD, organics, and dissolved salts (sodium, calcium, and magnesium chloride, etc).

Pollutant Control Approach: Provide impervious containment with berms, dikes, etc. and/or cover to prevent run-on, discharge of leachate pollutant(s) and TSS.

Applicable Operational BMP: Do not hose down the contained stockpile area to a storm drain or a conveyance to a storm drain or to a receiving water.

Applicable Structural Source Control BMP Options: Choose one or more of the source control BMP options listed below for stockpiles greater than 5 cubic yards of erodible or water soluble materials such as soil, road deicing salts, compost, unwashed sand and gravel, sawdust, etc. Also included are outside storage areas for solid materials such as logs, bark, lumber, metal products, etc.

- Store in a building or paved and bermed covered area as shown in Figure 4.12, or;

Note that a treatment BMP is applicable for contaminated stormwater from uncovered stockpiles greater than five (5) cubic yards.

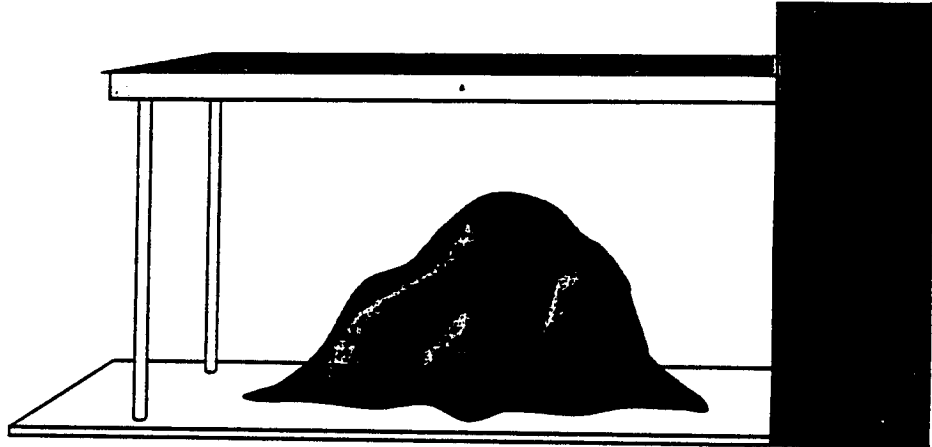


Figure 4.12 Covered Storage Area for Bulk Solids

- Place temporary plastic sheeting (polyethylene, polypropylene, hypalon, or equivalent) over the material as illustrated (see Figure 4.13), or,

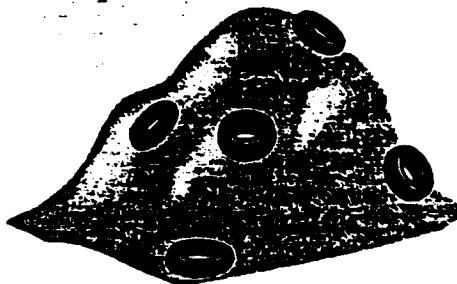


Figure 4.13 Material Covered with Plastic Sheeting

- Pave the area and install a stormwater drainage system. Place curbing or berming along the perimeter of the area to prevent the run-on of uncontaminated stormwater and to collect and convey runoff to treatment. Slope the paved area in a manner that minimizes the contact between stormwater (e.g., pooling) and leachable materials in compost, logs, bark, wood chips, etc.
- For large stockpiles that cannot be covered, implement containment practices at the perimeter of the site and at any catch basins as needed to prevent erosion and discharge of the stockpiled material offsite or to a storm drain. Ensure that contaminated stormwater is not discharged directly to catch basins without conveying through a treatment BMP.

Applicable Treatment BMP: Convey contaminated stormwater from the stockpile area to a wet pond, wet vault, settling basin, media filter, or other appropriate treatment system depending on the contamination (see *Volume V, Runoff Control*, or guidance document for log yards, Publication #95-53).

Recommended Additional Operational BMPs:

- Maintain drainage areas in and around storage of solid materials with a minimum slope of 1.5 percent to prevent pooling and minimize leachate formation. Areas should be sloped to drain stormwater to the perimeter where it can be collected, or to internal drainage "alleyways" where material is not stockpiled.

- Sweep paved storage areas at least monthly for collection and disposal of loose solid materials.
- If and when feasible, collect and recycle water-soluble materials (leachates) to the stockpile.
- Stock cleanup materials, such as brooms, dustpans, and vacuum sweepers near the storage area.

BMP S1.80 for Spill Emergencies

Description of Pollutant Sources: Owners or operators of facilities engaged in drilling, producing, gathering, storing, processing, transferring, distributing, refining or consuming oil and/or oil products are required by Federal Law to have a Spill Prevention and Control Plan if the storage capacity of the facility, which is not buried, is 1,320 gallons or more of oil, or any single container with a capacity in excess of 660 gallons and which, due to their location, could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR Part 110, into or upon the navigable waters of the United States or adjoining shorelines {40 CFR 112.1 (b)}. Onshore and offshore facilities, which, due to their location, could not reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines are exempt from these regulations {40 CFR 112.1(1)(i)}. Owners of businesses that produce Dangerous Wastes are also required by State Law to have a spill control plan. These businesses should refer to *Appendix D-R.6*. The federal definition of oil is oil of any kind or any form, including, but not limited to petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

Pollutant Control Approach: Maintain, update, and implement an oil spill prevention/cleanup plan.

Applicable Operational BMPs: The businesses and public agencies identified in Appendix A that are required to prepare and implement an Emergency Spill Cleanup Plan shall implement the following:

- Prepare an Emergency Spill Control Plan (SCP), which includes:
 - A description of the facility including the owner's name and address.
 - The nature of the activity at the facility.
 - The general types of chemicals used or stored at the facility,
 - A site plan showing the location of storage areas for chemicals, the locations of storm drains, the areas draining to them, and the location and description of any devices to stop spills from leaving the site such as positive control valves.
 - Cleanup procedures.
 - Notification procedures to be used in the event of a spill, such as notifying key personnel. Agencies such as

Ecology, local fire department, Washington State Patrol, and the local Sewer Authority, shall be notified.

- The name of the designated person with overall spill cleanup and notification responsibility.
- Train key personnel in the implementation of the Emergency SCP. Prepare a summary of the plan and post it at appropriate points in the building, identifying the spill cleanup coordinators, location of cleanup kits, and phone numbers of regulatory agencies to be contacted in the event of a spill.
- Update the SCP regularly.
- Immediately notify Ecology and the local Sewer Authority if a spill may reach sanitary or storm sewers, ground water, or surface water, in accordance with federal and Ecology spill reporting requirements.
- Immediately clean up spills. Do not use emulsifiers for cleanup unless an appropriate disposal method for the resulting oily wastewater is implemented. Absorbent material shall not be washed down the floor drain or storm sewer.
- Locate emergency spill containment and cleanup kit(s) in high potential spill areas. The contents of the kit shall be appropriate for the type and quantities of chemical liquids stored at the facility.

Recommended Additional Operational BMP: The spill kit should include appropriately lined drums, absorbent pads, and granular or powdered materials for neutralizing acids or alkaline liquids. In fueling areas: absorbent should be packaged in small bags for easy use and small drums should be available for storage of absorbent and/or used absorbent. Spill kits should be deployed in a manner that allows rapid access and use by employees.

**BMP S1.90 for
Integrated Pest¹
Management and
Lawn/Vegetation
Management**

Description of Pollutant Sources: For certain land areas and operations control of objectionable weeds, insects, mold, bacteria and other pests with chemical pesticides is practiced. Examples include weed control on golf course lawns, access roads, utility corridors and during landscaping; sapstain and insect control on lumber and logs; rooftop moss removal; killing nuisance rodents; and fungicide application to patio decks. Toxic pesticides such as pentachlorophenol, carbamates, and organometallics can be released to the environment by leaching and dripping from treated parts, container leaks, product misuse, and outside storage of pesticide contaminated materials and equipment. Poor management of the vegetation and poor application of pesticides or fertilizers can cause stormwater contamination.

Pollutant Control Approach: Use pesticides only as a last resort. If pesticides/herbicides are used they must be carefully applied in accordance with label instructions on U.S. Environmental Protection Agency (EPA) registered materials. Implement the Integrated Pest Management Plan (IPM). Maintain appropriate vegetation where practicable to control erosion and the discharge of stormwater pollutants. Adjust the soil properties of the subject site to grow desired plant species, where feasible.

**Integrated Pest
Management**

Integrated Pest Management (IPM) is a natural, long-term, ecologically based systems approach to controlling pest populations. This system uses techniques either to reduce pest populations or maintain them at levels below those causing economic injury, or to so manipulate the populations that they are prevented from causing injury. The goals of IPM are to encourage optimal selective pesticide² use (away from prophylactic, broad spectrum use), and to maximize natural controls to minimize the environmental side effects. (28, 29)

Applicable Operational BMPs for the Use of Pesticides:

- Implement a pesticide-use plan and include at a minimum: a list of selected pesticides and their specific uses; brands, formulations, application methods and quantities to be used; equipment use and maintenance procedures; safety, storage, and disposal methods; and monitoring, record keeping, and

¹ Pest is defined to mean any agent, whether insect, fungus, bacteria, or vegetation that causes damage or as in the case of weeds, is in the wrong place at the wrong time.

² The term pesticide includes those chemicals commonly known as pesticides, rodenticides, fungicides, nematocides and herbicides.

public notice procedures. All procedures shall conform to the requirements of Chapter 17.21 RCW and Chapter 16-228 WAC (*Appendix D-R.7*).

- Choose the least toxic pesticide available that is capable of reducing the infestation to acceptable levels. The pesticide should readily degrade in the environment and/or have properties that strongly bind it to the soil. Any pest control used should be conducted at the life stage when the pest is most vulnerable. For example, if it is necessary to use a Bacillus thuringiensis ^(S) application to control tent caterpillars, it must be applied before the caterpillars cocoon or it will be ineffective. Any method used should be site-specific and not used wholesale over a wide area.
- Apply the pesticide according to label directions. Pesticides shall be mixed, and equipment cleaned, in an area where accidental spills will not enter surface or ground waters, and will not contaminate the soil.
- Store pesticides in enclosed areas or in covered impervious containment. Ensure that contaminated stormwater or spills/leaks of pesticides are not discharged to storm drains.
- Clean up any spilled pesticides and ensure that the waste materials are kept in designated covered and contained areas.
- Sweep paved storage areas that drain to a storm system at least monthly. Do not hose down the paved areas to a storm drain or conveyance ditch. Store and maintain appropriate spill cleanup materials in a location known to all near the storage area.
- The pesticide application equipment must be capable of immediate shutoff in the event of an emergency.
- Do not spray pesticides within 100 feet of open waters including wetlands, ponds, and streams, sloughs and any drainage ditch or channel that leads to open water except when approved by Ecology and other applicable agencies. All sensitive areas including wells, creeks and wetlands must be flagged prior to spraying.
- As required by the local government or by Ecology, complete public posting of the area to be sprayed prior to the application.
- Do not spray apply during weather conditions specified in applicable local and state regulations.

Recommended Additional Operational BMPs:

- Consider alternatives to the use of pesticides such as covering or harvesting weeds, substitute vegetative growth, and manual weed control/moss removal⁽³¹⁾
- Consider the use of soil amendments such as compost (32) that are known to control certain common diseases in plants, such as Pythium root rot, ashy stem blight, and parasitic nematodes. There are four possible mechanisms for disease control by compost addition (USEPA publication 530-F-9-044): successful competition for nutrients by, antibiotic production, and successful predation against pathogens by beneficial microorganism; and activation of disease-resistant genes in plants by composts. Installing an amended soil/landscape system can preserve both the plant system and the soil system more effectively. This type of system provides a soil/landscape system with adequate depth, permeability, and organic matter to sustain itself and continue working as an effective stormwater infiltration and a sustainable nutrient cycle.
- Once a pesticide is applied, its effectiveness should be evaluated for possible improvement.⁽³⁰⁾
- Records should be kept showing the applicability and inapplicability of the pesticides considered.
- An annual evaluation procedure should be developed including a review of the effectiveness of pesticide applications, impact on buffers and sensitive areas (including potable wells), public concerns, and recent toxicological information on pesticides used/proposed for use. If individual or public potable wells are located in the proximity of commercial pesticide applications contact the regional Ecology hydrogeologist to determine if additional pesticide application control measures are necessary.
- Rinseate from equipment cleaning and/or triple-rinsing of pesticide containers should be used as product or recycled into product.
- The application equipment used should be capable of immediate shutoff in the event of an emergency.

Note the recommended consideration for pesticide applications in the proximity of individual and public potable wells.

For more information, contact the WSU Extension Home-Assist Program, (253) 445-4556, or Bio-Integral Resource Center (BIRC), P.O. Box 7414, Berkeley, CA.94707, or the Washington Department of Ecology to obtain "Hazardous Waste Pesticides" (publication #89-41); and/or EPA to obtain a publication entitled "Suspended, Canceled and Restricted Pesticides" which lists all restricted pesticides and the specific uses that are allowed.

**Vegetation
Management**

Applicable Operational BMPs:

Vegetation Management:

- Use at least a four-inch (32) "topsoil" layer (King County recommends 8-13% organic matter content) to provide a sufficient vegetation growing medium. Amending existing landscapes and turf systems by increasing the percent organic matter and depth of topsoil can substantially improve the permeability of the soil, the disease and drought resistance of the vegetation, and reduce fertilizer demand. This reduces the demand for fertilizers, herbicides, and pesticides. Organic matter is the least water-soluble form of nutrients that can be added to the soil. Composted organic matter generally releases only between 2 and 10 percent of its total nitrogen annually, and this release corresponds closely to the plant growth cycle. If natural plant debris and mulch are returned to the soil, this system can continue recycling nutrients indefinitely.
- Select the appropriate turfgrass mixture for your climate and soil type. Certain tall fescues and rye grasses resist insect attack because the symbiotic endophytic fungi found naturally in their tissues repel or kill common leaf and stem-eating lawn insects. They do not, however, repel root-feeding lawn pests, and are toxic to ruminants such as cattle and sheep. The fungus causes no known adverse effects to the host plant or to humans. Endophytic grasses are commercially available and can be used in areas such as parks or golf courses where grazing does not occur. The local Cooperative Extension office can offer advice on which types of grass are best suited to the area and soil type. Use the following seeding and planting BMPs, or equivalent BMPs to obtain information on grass mixtures, temporary and permanent seeding procedures, maintenance of a recently planted area, and fertilizer application rates: Temporary Seeding, Mulching and Matting, Clear Plastic Covering, Permanent Seeding and Planting, and Sodding. (*See Volume II*)
- Selection of desired plant species can be made by adjusting the soil properties of the subject site. For example, a constructed wetland can be designed to resist the invasion of reed canary grass by layering specific strata of organic matters (e.g., compost forest product residuals) and creating a mildly acidic pH and carbon-rich soil medium. Consult a soil restoration specialist for site-specific conditions.
- Aerate lawns regularly in areas of heavy use where the soil tends to become compacted. Aeration should be conducted

while the grasses in the lawn are growing most vigorously. Remove layers of thatch greater than ¼" deep.

- Mowing is a stress-creating activity for turfgrass. When grass is mowed too short its productivity is decreased and there is less growth of roots and rhizomes. The turf becomes less tolerant of environmental stresses, more disease prone and more reliant on outside means such as pesticides, fertilizers and irrigation to remain healthy. Set the mowing height at the highest acceptable level and mow at times and intervals designed to minimize stress on the turf.

Irrigation:

- The depth from which a plant normally extracts water depends on the rooting depth of the plant. Appropriately irrigated lawn grasses normally root in the top 6 to 12 inches of soil; lawns irrigated on a daily basis often root only in the top 1 inch of soil. Improper irrigation can encourage pest problems, leach nutrients, and make a lawn completely dependent on artificial watering. The amount of water applied depends on the normal rooting depth of the turfgrass species used, the available water holding capacity of the soil and the efficiency of the irrigation system. Consult with either the local Soil Conservation office or Cooperative Extension office to help determine optimum irrigation practices.

Fertilizer Management:

- Turfgrass is most responsive to nitrogen fertilization, followed by potassium and phosphorus. Fertilization needs vary by site depending on plant, soil and climatic conditions. Evaluation of soil nutrient levels through regular testing ensures the best possible efficiency and economy of fertilization. For details on soils testing, contact the local Conservation District or Cooperative Extension Service.
- Fertilizers should be applied in amounts appropriate for the target vegetation and at the time of year that minimizes losses to surface and ground waters. Do not fertilize during a drought or when the soil is dry. Alternatively, do not apply fertilizers within three days prior to predicted rainfall. The longer the period between fertilizer application and either rainfall or irrigation, the less fertilizer runoff occurs. Use slow release fertilizers such as methylene urea, IDBU or resin coated fertilizers when appropriate, generally in the spring.
- Use of slow release fertilizers is especially important in areas with sandy or gravelly soils. Time the application to periods of maximum plant uptake. Fall application of fertilizer nitrogen

for the next growing season in cool moist climates should be discouraged.

- Properly trained persons should apply all fertilizers. At commercial or industrial facilities fertilizers should not be applied to grass swales, filter strips, or buffer areas which drain to sensitive water bodies unless approved by the local jurisdiction.

**BMP S1.91
Maintenance of
Roadside Ditches:**

Description of Pollutant Sources: Road debris can include TSS, oils, vegetative particles, and heavy metals as well as the erosion of soil from bare or thinly vegetated roadside surfaces can be sources of stormwater pollutants.

Pollutant Control Approach: Roadside ditches should be maintained to preserve the condition and capacity for which they were originally constructed, and to minimize bare or thinly vegetated ground surfaces. Maintenance practices should provide for erosion and sediment control (*Refer to previous BMP S1.90 and Volume II*).

Applicable Operational BMPs:

- Inspect roadside ditches regularly to identify sediment accumulations, localized erosion and other problems or as needed.
- Clean ditches on a regular basis, as needed. Ditches should be kept free of rubbish and debris.
- Vegetation in ditches often prevents erosion and cleanses runoff waters. Remove vegetation only when flow is blocked or excess sediments have accumulated. Conduct ditch maintenance (seeding, fertilizer application, harvesting) in late spring and/or early fall, where possible, to re-establish vegetative cover by the next wet season thereby minimizing erosion of the ditch as well as making the ditch effective as a biofilter.
- In the area between the edge of the pavement and the bottom of the ditch, commonly known as the "bare earth zone", use grass vegetation, wherever possible, if not from the edge of the pavement at least from the top of the slope of the ditch.
- Diversion ditches on top of cut slopes that are constructed to prevent slope erosion by intercepting surface drainage must be maintained to retain their diversion shape and capability.
- Ditch cleanings are not to be left on the roadway surfaces. Sweep dirt and debris remaining on the pavement at the completion of ditch cleaning operations.
- Examine culverts on a regular basis for scour or sedimentation at the inlet and outlet, and repair as necessary. Give priority to those culverts conveying perennial and/or salmon-bearing streams and culverts near streams in areas of high sediment load, such as those near subdivisions during construction.

Recommended Structural Source Control BMPs:

Install biofiltration swales (BMPT 8.10) and vegetated filter strips (BMP T8.20) wherever feasible and use engineered compost topsoils wherever necessary to maintain adequate vegetation (32). These systems can improve infiltration and stormwater pollutant control upstream of roadside ditches.

**BMP S1.93 for
Landscaping**

Description of Pollutant Sources: Landscaping can include grading; soil transfer; vegetation removal; pesticide, and fertilizer applications; and watering. Stormwater contaminants include toxic organic compounds, heavy metals, oils, total suspended solids, coliform bacteria, fertilizers, and pesticides.

Pollutant Control Approach: Control of fertilizer and pesticide applications, soil erosion, and site debris to prevent contamination of stormwater.

Applicable Operational BMPs:

- Install engineered soil/landscape systems (32) to improve the infiltration and regulation of stormwater in landscaped areas.
- Implement BMP S1.90 for maintaining vegetation, and application and handling of pesticides and fertilizers.
- Do not dispose of collected vegetation into waterways or storm drainage systems.

Recommended Additional Operational BMPs:

- Dispose of grass clippings, leaves, sticks, or other collected vegetation, by composting, if feasible.
- Use mulch or other erosion control measures when soils are exposed for more than one week during the dry season or two days during the rainy season.
- If oil or other chemicals are handled, store and maintain appropriate oil and chemical spill cleanup materials in readily accessible locations. Ensure that employees are familiar with proper spill cleanup procedures.
- Till fertilizers into the soil rather than dumping or broadcasting onto the surface. Determine the proper fertilizer application for the types of soil and vegetation encountered. A topsoil mix or composted organic material should be rototilled into the soil to create a transition layer that encourages deeper root systems and drought-resistant plants.
- Use manual and/or mechanical methods of vegetation removal rather than applying herbicides, where practical.

**BMP S1.93 for
Landscaping**

Description of Pollutant Sources: Landscaping can include grading; soil transfer; vegetation removal; pesticide, and fertilizer applications; and watering. Stormwater contaminants include toxic organic compounds, heavy metals, oils, total suspended solids, coliform bacteria, fertilizers, and pesticides.

Pollutant Control Approach: Control of fertilizer and pesticide applications, soil erosion, and site debris to prevent contamination of stormwater.

Applicable Operational BMPs:

- Install engineered soil/landscape systems (32) to improve the infiltration and regulation of stormwater in landscaped areas.
- Implement BMP S1.90 for maintaining vegetation, and application and handling of pesticides and fertilizers.
- Do not dispose of collected vegetation into waterways or storm drainage systems.

Recommended Additional Operational BMPs:

- Dispose of grass clippings, leaves, sticks, or other collected vegetation, by composting, if feasible.
- Use mulch or other erosion control measures when soils are exposed for more than one week during the dry season or two days during the rainy season.
- If oil or other chemicals are handled, store and maintain appropriate oil and chemical spill cleanup materials in readily accessible locations. Ensure that employees are familiar with proper spill cleanup procedures.
- Till fertilizers into the soil rather than dumping or broadcasting onto the surface. Determine the proper fertilizer application for the types of soil and vegetation encountered. A topsoil mix or composted organic material should be rototilled into the soil to create a transition layer that encourages deeper root systems and drought-resistant plants.
- Use manual and/or mechanical methods of vegetation removal rather than applying herbicides, where practical.

**BMP S2.00
Maintenance of
Stormwater Drainage
and Treatment
Systems**

Description of Pollutant Sources: Facilities include roadside catch basins on arterials and within residential areas, conveyance systems, detention facilities such as ponds and vaults, oil and water separators, biofilters, settling basins, infiltration systems, and all other types of stormwater treatment systems presented in Volume V. Roadside catch basins can remove from 5 to 15 percent of the pollutants present in stormwater. When catch basins are about 60 percent full of sediment, they cease removing sediments. Oil and grease, hydrocarbons, debris, heavy metals, sediments and contaminated water are found in catch basins, oil and water separators, settling basins, etc.

Pollutant Control Approach: Provide maintenance and cleaning of debris, sediments, and oil from stormwater collection, conveyance, and treatment systems to obtain proper operation.

Applicable Operational BMPs:

Maintain stormwater treatment facilities according to the O & M procedures presented in the Appendix of Volume V in addition to the following BMPs:

- Inspect and clean treatment BMPs, conveyance systems, and catch basins as needed, and determine whether improvements in O & M are needed.
- Promptly repair any deterioration threatening the structural integrity of the facilities. These include replacement of clean-out gates, catch basin lids, and rock in emergency spillways.
- Ensure that storm sewer capacities are not exceeded and that heavy sediment discharges to the sewer system are prevented.
- Regularly remove debris and sludge from BMPs used for peak-rate control, treatment, etc. and discharge to a sanitary sewer if approved by the sewer authority, or truck to a local or state government approved disposal site.
- Clean catch basins when the depth of deposits is equal to or greater than 1/3 the depth from the basin to the invert of the lowest pipe into or out of the basin unless the discharge from the catchbasin is conveyed to a treatment system operating at required pollutant removal levels. Clean woody debris in a catch basin as frequently as needed to ensure proper operation of the catchbasin.
- Post warning signs; "Dump No Waste - Drains to Ground Water," "Streams," "Lakes", or emboss on or adjacent to all storm drain inlets *where practical*.

Additional Applicable BMPs: Select additional applicable BMPs from this chapter depending on the pollutant sources and activities conducted at the facility including BMP S2.60-Erosion and Sediment and Control, S1.50-Container Storage of Liquids, S1.80-Emergency Spill Cleanup Plans, S2.10-Locating Illicit Connections to Storm Drains, and S2.20-Street Sweeping.

BMP S2.51 Control of Dust From Disturbed Land Areas and Unpaved Roadways and Parking Lots

Description of Pollutant Sources: Dust can cause air and water pollution problems particularly at demolition sites and in arid areas where reduced rainfall exposes soil particles to transport by air.

Pollutant Control Approach: Minimize dust generation and apply environmentally friendly and government approved dust suppressant chemicals, if necessary.

Applicable Operational BMPs:

- Sprinkle or wet down soil or dust with water as long as it does not result in a wastewater discharge .
- Use only local and/or state government approved dust suppressant chemicals such as those listed in Ecology publication 96-433.
- Avoid excessive and repeated applications of dust suppressant chemicals. Time the application of dust suppressants to avoid or minimize their wash-off by rainfall or human activity such as irrigation.
- Apply stormwater containment to prevent the conveyance of stormwater TSS into storm drains or receiving waters.
- The use of motor oil for dust control is prohibited. Care should be taken when using lignin derivatives and other high BOD chemicals in excavations or areas easily accessible to surface water or ground water.
- Consult with the Ecology Regional Office in your area on discharge permit requirements if the dust suppression process results in a waste water discharge to the ground, ground water, storm drain, or surface water.

Recommended Additional Operational BMPs for Roadways and Other Trafficked Areas:

- Consider limiting use of off-road recreational vehicles on dust generating land.
- Consider paving unpaved permanent roads and other trafficked areas at municipal, commercial, and industrial areas.
- Consider paving or stabilizing shoulders of paved roads with gravel, vegetation, or local government approved chemicals.
- Encourage use of alternate paved routes, if available.
- Vacuum or wet sweep fine dirt and skid control materials from paved roads soon after winter weather ends or when needed.

- Consider using traction sand that is pre-washed to reduce dust emissions.

Additional Recommended Operational BMPs for Dust Generating Areas:

- Prepare a dust control plan. Helpful references include: Control of Open Fugitive Dust Sources (EPA-450/3-88-088), and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004)
- Limit exposure of soil (dust source) as much as feasible.
- Stabilize dust-generating soil by growing and maintaining vegetation, mulching, topsoiling, and/or applying stone, sand, or gravel.
- Apply windbreaks in the soil such as trees, board fences, tarp curtains, bales of hay, etc.
- Cover dust-generating piles with wind-impervious fabric, or equivalent material.

**BMP S2.60 for
Erosion Control and
Sedimentation**

Description of Pollutant Sources: Industrial activities on soil areas; soil, waste and other material exposure; steep grading; etc. can be sources of erodible materials that can contaminate stormwater runoff.

Pollutant Control Approach: Limit the exposure of erodible soil, stabilize or cover erodible soil where necessary to prevent erosion, and/or provide treatment for stormwater contaminated with TSS caused by eroded soil.

Applicable BMPs:

Cover Practice Options:

- Vegetative cover such as grass, trees, shrubs, on erodible soil areas; or,
- Covering with mats such as clear plastic, jute, synthetic fiber; and/or,
- Preservation of natural vegetation including grass, trees, shrubs, and vines and/or,

Structural Practice Options:

Vegetative swale, dike, silt fence, check dam, riprap, gravel filter berm, sedimentation basin, and proper grading. *(For design information refer to Volume II, "Standards and Specifications for BMPs for Erosion and Sediment Control")*

APPENDIX B

SPILL PREVENTION, CONTROL, AND COUNTERMEASURES PLAN

AR 051168

SPILL PREVENTION, CONTROL, AND COUNTERMEASURES PLAN (SPCCP)

B.1 SITE INFORMATION

Site information is summarized in Table B-1.

Table B-1. Site information.

Project:	Port of Seattle Third Runway Project Borrow Areas 3 and 4
Contact:	Dave Walsh
Title:	Construction Manager
Work Phone:	(206) 431-4973
Emergency Phone:	(206) 786-0591
Location:	Between South 188 th Street and South 208 th Street, primarily west of 18 th Avenue South, SeaTac, Washington
Anticipated Operating Schedule:	Year-round, 24 hours per day, 7 days per week
Number of on-site employees:	Maximum of 12
Site Activities:	Borrow pit excavation, material stockpile and transfer, site reclamation
NPDES Permit No.:	WAG-50-_____

B.2 SPILLABLE MATERIALS AND LOCATION

The materials inventory list below is used to identify all materials on site and assess their potential for contributing contaminants to stormwater runoff. The materials listed are used, stored, produced, or disposed at the site.

Table B-2. Inventory of materials.

Material	Location	Potential contact with stormwater?	Controls
Buried and surficial demolition debris	Embedded underground in Borrow Area excavation area	Yes	Immediate off-site disposal; or BMP S1.60 for Outside Storage or Transfer of Solid Raw Materials, By-Products or Finished Products. See Appendix A.
Trees and root masses, logged intact or mulched	Throughout site	Yes	BMP S1.60 for Outside Storage or Transfer of Solid Raw Materials, By-Products or Finished Products, and BMP S1.93 for Landscaping. See Appendix A.
Diesel fuel	Mobile fueling locations	Yes	BMP S1.50 for Container Storage of Liquids, Food Wastes or Dangerous Wastes. See Appendix A.
Oil and hydraulic fluid	Emergency maintenance locations	Yes	BMP S1.50 for Container Storage of Liquids, Food Wastes or Dangerous Wastes. See Appendix A.
Flocculent	Wheel wash	Yes	BMP S1.50 for Container Storage of Liquids, Food Wastes or Dangerous Wastes. See Appendix A.

B.3 SPILL PREVENTION

The following spill prevention procedures will be used:

- No vehicle maintenance other than emergency repair will be performed on the project site. No fresh or used engine fluids will be stored on the project site.
- Vehicle and equipment fueling will occur in a single designated location, within the construction staging area; this area will be located away from drainage courses, and inside secondary containment.
- Oil-absorbent pads and drip pans will be placed under vehicles being fueled and under parked vehicles.

B.4 SPILL KIT

A spill kit consisting of the following materials will be kept on site. Any spill kit materials used will be replaced within 2 days.

- 3 pairs of rubber gloves
- 3 pairs of protective goggles or glasses (or face shields)
- 1 set of spill response procedures (below)
- 12 oil-absorbent pads
- 1 roll of visqueen
- 2 rolls of duct tape for temporary patching of lines and tanks, etc.
- 5 gallons loose absorbent material (floor sweep, kitty litter, etc.)
- 2 permanent markers for labeling contaminated materials
- 24 heavy-duty garbage bags
- 10 copies of Spill Report Form (Form D2, attached)

B.5 SPILL RESPONSE PROCEDURES

The following spill response procedures will be used, in order:

1. **Hazard Assessment:** assess the source, extent, and quantity of the spill.
2. **Securement and Personal Protection:** if the spill cannot be safely and effectively controlled, then evacuate the area and immediately notify outside response services (go to step 5). If the spill can be safely and effectively controlled, secure the area and proceed immediately with spill control.
3. **Containment and Elimination of Source:** contain the spill with absorbent materials, floating booms, or a soil berm around the affected area. Eliminate the source of the spill by closing valves, sealing leaks, providing containment, or deactivating pumps.
4. **Cleanup:** when containment is complete, use absorbent and other materials to clean up the spill.
5. **Notification:** All notification will proceed according to the following protocols.

- If necessary, the contractor's ESC/Stormwater lead (or any employee if the ESC/Stormwater Lead is unavailable) should contact emergency agencies and/or spill response services:

Emergency Services (fire fighting and medical):
Port of Seattle Fire Department: 911

Spill Response Contractor (name and phone):

- For all spills, all contractor employees will notify the contractor's designated ESC/Stormwater Lead.

Contractor's ESC Lead (name and phone numbers for 24-hour contact):

- For all spills, the contractor's ESC/Stormwater Lead will notify the Port of Seattle Surface Water Manager.

Port of Seattle Surface Water Manager:
Tom Hubbard: (206) 248-7135

- The surface water manager will notify the appropriate local, state, and federal agencies.

For all spills that produce a surface sheen:
National Response Center Hotline: (800) 424-8802
Ecology: (425) 649-7276

Any release that may be a threat to human health or the environment:
Ecology Toxics Cleanup Program: (360) 407-7170

Any spill to water that cannot be contained:
Washington State Emergency Management Division: (800) 258-5990

6. **Removal and disposal of contaminated materials:** remove all contaminated soil and place on a plastic liner, cover with plastic, and remove off-site by the end of the workday. Properly dispose of contaminated soil at an approved disposal facility. Collect absorbent and other materials into a sealed, labeled container and properly dispose of at an approved disposal facility.
7. **Follow-up reporting:** fill out a Spill Report Form (a copy is provided at the end of this appendix) within 2 working days and submit it to Tom Hubbard, Port of Seattle Surface Water Manager.

B.6 SPCCP PROGRAM MANAGEMENT

All Port employees, including contractor employees and subcontractors, will be trained in spill prevention, control, and countermeasures, including spill source and receptor recognition, spill prevention techniques, spill response measures, and spill reporting protocol.

Should site conditions change, this SPCCP will be updated as necessary.

APPENDIX C
STORMWATER MONITORING PLAN

AR 051174

STORMWATER MONITORING PLAN

C.1 SITE INFORMATION

Site information and activities are summarized in Table C-1.

Table C-1. Site information.

Project:	Port of Seattle Third Runway Project Borrow Areas 3 and 4
Contact:	Dave Walsh
Title:	Construction Manager
Work Phone:	(206) 431-4973
Emergency Phone:	(206) 786-0591
Location:	Between South 188 th Street and South 208 th Street, primarily west of 18 th Avenue South, SeaTac, Washington
Anticipated Operating Schedule:	March through October, 24 hours per day, 7 days per week
Number of on-site employees:	Maximum of 12
Site Activities:	Borrow pit excavation, material stockpile and transfer, site reclamation
NPDES Permit No.:	WAG-50-_____

General locations of on-site activities have been summarized on Figure 5 of the SWPPP.

C.2 MONITORING REQUIREMENTS

The Port will monitor all authorized discharges to surface water and groundwater according to the schedule outlined in Table C-2.

Table C-2. Discharge monitoring information.

Discharge Location	Category	Monitoring Parameter	Units	Minimum Sampling Frequency	Sample Type	Discharge Limit	
						Average Monthly ^a	Maximum Daily ^b
Surface Water	Process and dewatering water	TSS	mg/l	Quarterly	Grab	40	80
	Process, dewatering, and stormwater	Turbidity	NTU	Twice monthly ^c	Grab	50	50
		pH	-	Monthly	Measurement	6.0-9.0	
		Temperature	°F	Weekly ^d	Measurement	None	
Ground-water	Process Water	pH	-	Monthly	Grab	6.5-8.5	
	Stormwater	pH	-	Quarterly	Grab	6.5-8.5	

- a The average monthly effluent limitation is defined as the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
- b The maximum daily effluent limitation is defined as the highest allowable daily discharge.
- c There must be at least 24 hours between sampling.
- d During the months of July, August, and September.

The Port will monitor all authorized discharges of process water, mine dewatering water, and stormwater that discharge to surface water, including any sources that discharge to a storm sewer that discharges to surface water. In addition, the Port will provide representative sampling of all discharges to groundwater. Representative sampling includes all discharges of process water and mine dewatering water to unlined ponds, infiltration trenches, or land.

All locations in the active site where water collects will be monitored visually for oil sheen. When water is present, monitoring should be each day of operation for most locations on-site and never less than monthly. If a sheen is present, cleanup procedures will be implemented in accordance with Section 3.2.5 and Appendix B of this SWPPP.

C.3 LOCATION AND IDENTIFICATION OF SAMPLING POINTS

Surface water and groundwater discharge monitoring locations for the Borrow Area 3 and 4 infiltration ponds have been identified in Table C-3 and on Figure 5.

Table C-3. Discharge monitoring locations.

Type	No.	Name	Description
Regular monitoring point (discharge expected on routine basis)	1	Borrow Area 3 Infiltration Basin	Collection location of stormwater runoff from Borrow Area 3. Representative groundwater sampling point.
	3	Borrow Area 3 Wetland Protection Swale to Wetland B9 and Wetland 30	Collection location of groundwater seepage from Borrow Area 3 excavation. Discharge to Wetland B9. Surface water sampling point.
	4	Borrow Area 3 Wetland Protection Swale to Wetland 29	Collection location of groundwater seepage from Borrow Area 3 excavation. Discharge to Wetland 29. Surface water sampling point.
	5	Borrow Area 4 Infiltration Basin	Collection location of stormwater runoff from Borrow Area 4. Representative groundwater sampling point.
	7	Stockpile and Staging Area Detention Pond	Collection and treatment location of stormwater runoff from staging and stockpile area. Discharge to flow dispersion trenches near Wetland G9. Surface water sampling point.
	8	Haul Route Detention Pond	Collection location of stormwater runoff from Borrow Area 3. Non-turbid discharge to flow dispersion trenches near Des Moines Creek. Turbid water pumped to treatment at stockpile and staging area detention pond. Surface water sampling point.
Emergency overflow point (discharge expected only during intense rainfall events)	2	Borrow Area 3 Emergency Overflow	Emergency overflow for infiltration basin. Discharge to sheet flow to Wetland B6. Surface water sampling point.
	6	Borrow Area 4 Emergency Overflow	Emergency overflow for infiltration basin. Discharge to City of SeaTac storm drainage system. Surface water sampling point.

C.4 STANDARD PROCEDURES FOR COLLECTING SAMPLES

Manual grab samples will be used, as outlined in the U.S. EPA NPDES Stormwater Sampling Guidance Document (EPA 83-B-92-001, July 1992). (See attached excerpt.)

C.5 REPORTING REQUIREMENTS

Discharge Monitoring Report forms will be submitted to Ecology quarterly for all active sites whether or not the facility was discharging. If there was no discharge or if the facility was not operating during a given monitoring period, the form will be submitted as required with the words "no discharge" entered in place of the monitoring results. Reports will be received by Ecology on or by January 15 (for the period of October, November, and December), April 15 (for the period of January, February, and March), July 15 (for the period of April, May, and June), and October 15 (for the period of July, August, and September).

C.6 MAINTENANCE OF MONITORING PLAN

The monitoring plan will be retained on-site, and will be updated as necessary to adequately represent facility changes. The plan will be reviewed annually, at minimum. The Port will train employees, including contractor employees and subcontractors, on what is included in the plan and how the site activities relate to monitoring requirements.

EXHIBIT 2-10 LOGISTICAL PROBLEMS OF STORM WATER SAMPLING	
Problem:	Arid/drought areas
Solution:	Submit a petition requesting a modification to the protocol if problems are anticipated and, if it is approved, submit the application without sampling data by the application due date with a certified explanation. Provide sampling data to the permitting authority as soon as possible.
Problem:	Adverse weather conditions such as freezing, flooding, winds, tornadoes, electrical storms, and gully washes
Solution:	Sample another, less hazardous event or submit a certified justification of why the event was not sampled. Provide sampling data to the permitting authority as soon as possible.
Problem:	False starts
Solution:	Discard the sample if the volume is inadequate. If the volume is adequate, submit the sampling data with a certified explanation that the sample is from a non-representative event. Continue to monitor weather conditions and attempt to resample as soon as possible.
Problem:	Stop/start rains
Solution:	Continue to sample in case the storm event turns out to be representative and adequate sample volumes are obtained. If sample volumes are inadequate, continue to monitor weather conditions and attempt to resample as soon as possible.

The grab samples taken during the first 30 minutes of a storm event will generally contain higher concentrations of pollutants, since they pick up pollutants that have accumulated on drainage surfaces since the last storm event.

Composite samples characterize the average quality of the entire storm water discharge. Flow-weighted composite samples provide for the most accurate determination of mass load. The flow-weighted composite sample must be taken for either the first 3 hours or for the entire discharge (if the event is less than 3 hours long). Additional information on how to collect grab and composite samples is presented in Sections 3.3 and 3.4, respectively.

Industrial applicants are required at a minimum to sample only one storm event. However, if samples from more than one storm are analyzed and the results are representative of the discharge, the data representing each event must be reported. The facility must provide a description of each storm event tested. The average of all values within the last year must be determined and the

Recording rain gauges provide a permanent record of rainfall, and they can be used to determine variations in rainfall intensity over time without making frequent observations during the storm. But recording gauges are more complicated mechanically than standard gauges, making them more costly, less durable, and more difficult to operate.

Although all gauges are subject to error, most errors can be minimized. To minimize errors, the gauge should be placed on a level surface that is not windswept and is away from trees or buildings that might interfere with the path of rainfall. When taking measurements, other factors contributing to error should also be considered: mistakes in reading the scale, dents in the collector rim (which changes the receiving area), measuring sticks that may retain some of the water, and water lost to evaporation. In the case of tipping bucket gauges, water may not be collected while the bucket is still tipping. The most common source of inaccuracy is changes in data that are attributable to wind. It is possible to assess wind errors by comparing measurements of gauges that are protected from the wind with those that are not.

3.3 GRAB SAMPLE COLLECTION

Section 3.1.2 discussed both the parameters that must be monitored by grab sample and the conditions under which grab sampling is required. This section explains how to collect grab samples. The entire sample is collected at an uninterrupted interval (i.e., grabbed at one time). A grab sample provides information on the characterization of storm water at a given time and may be collected either manually or automatically as discussed below.

3.3.1 HOW TO MANUALLY COLLECT GRAB SAMPLES

A manual grab is collected by inserting a container under or downcurrent of a discharge with the container opening facing upstream. Generally, simplified equipment and procedures can be used. In most cases, the sample container itself may be used to collect the sample. Less accessible outfalls may require the use of poles and buckets to collect grab samples. To ensure that manual grab samples are representative of the storm water discharged, the procedures set forth in Exhibit 3-17 should be followed.

EXHIBIT 3.17. RECOMMENDED OPERATING PROCEDURES FOR TAKING GRAB SAMPLES

- Label sample containers before sampling event
- Take a cooler with ice to the sampling point
- Take the grab from the horizontal and vertical center of the channel
- Avoid stirring up bottom sediments in the channel
- Hold the container so the opening faces upstream
- Avoid touching the inside of the container to prevent contamination
- Keep the sample free from uncharacteristic floating debris
- Transfer samples into proper containers (e.g., from bucket to sample container), however, fecal coliform, fecal streptococcus, phenols and O&G should remain in original containers
- If taking numerous grabs, keep the samples separate and labelled clearly
- Use safety precautions (see Chapter 6)

Specialized equipment and procedures may be needed, particularly in situations where storm water discharges are inaccessible or where certain parameters are monitored. For example:

- When sampling for O&G and VOCs, equipment that safely and securely houses O&G bottles or VOC vials should be used. This may be necessary because: (1) O&G will adhere to containers and thus should not be transferred from one container to another; and (2) excessive aeration during sampling may result in the partial escape of VOCs.
- Since facilities sometimes use sample bottles that already contain preservatives (as provided by contract laboratories), extreme care should be taken when filling them to avoid spills, splatters, or washout of the preservatives.

All equipment and containers that come into contact with the sample must be clean to avoid contamination. Additionally, sample collection equipment and container materials should be totally unreactive to prevent leaching of pollutants. Cleaning procedures are discussed in detail in Section 3.5.