FACT SHEET FOR NPDES PERMIT WA-002465-1
SEATTLE-TACOMA INTERNATIONAL AIRPORT

SUMMARY

This fact sheet is a companion document to National Pollutant Discharge Elimination System (NPDES) Permit No. WA-002465-1. This permit is issued to the Port of Seattle to allow the discharge of treated industrial wastewater to Puget Sound and stormwater to Miller Creek, Des Moines Creek, and the City of SeaTac storm sewer from the Seattle-Tacoma International Airport. This fact sheet establishes the basis for effluent limitations and other requirements which are included in the permit.

GENERAL INFORMATION

Applicant:	Port of Seattle	
Facility Name and Address:	Seattle-Tacoma International Airport Seattle, Washington	
Type of Facility:	Major international airport serving the Pacific Northwest, providing facilities for tenants engaged in aircraft maintenance, fueling, servicing, and repair.	
SIC Code:	4582	
Water Body ID Number:	Puget Sound	WA-PS-0270
	Des Moines Creek	WA-09-2000
	Miller Creek	WA-09-2005
	City of SeaTac Storm Sewer (no Water Body ID Number), tributary to Gillian Creek (no Water Body ID Number), and the Green River (Water Body ID Number WA-09-1020)	

Discharge Locations:

(i) Puget Sound

Outfall 001	Latitude: 47° 24' 07" N Longitude: 122° 20' 07" W

(ii) Des Moines Creek

Outfall 002 (SDE4)	Latitude: 47° 26' 13" N Longitude: 122° 17' 38" W
Outfall 003 (SDS1)	Latitude: 47° 26' 00" N Longitude: 122° 18' 01" W
Outfall 004 (SDS2)	Latitude: 47° 25' 50" N Longitude: 122° 18' 42" W
Outfall 005 (SDS3)	Latitude: 47° 25' 58" N Longitude: 122° 18' 30" W
Outfall 009 (SDS4)	Latitude: 47° 25' 33" N Longitude: 122° 18' 15" W
Outfall 010 (SDW3)	Latitude: 47° 26' 09" N Longitude: 122° 18' 53" W
Outfall 014 (Subbasin B)	Latitude: 47° 26' 07" N Longitude: 122° 18' 48" W
Outfall 015 (Subbasin D)	Latitude: 47° 26' 06" N Longitude: 122° 18' 46" W

(iii) Miller Creek

Outfall 006 (SDN1)	Latitude: 47° 27' 56" N Longitude: 122° 18' 09" W
Outfall 007 (SDN2)	Latitude: 47° 28' 00" N Longitude: 122° 18' 28" W
Outfall 008 (SDN3)	Latitude: 47° 27' 59" N Longitude: 122° 18' 45" W
Outfall 011 (SDN4)	Latitude: 47° 28' 00" N Longitude: 122° 18' 38" W

(iv) City of Sea-Tac Storm Sewer

Outfall 012 (Engineering Yard)	Latitude: 47° 27' 34" N Longitude: 122° 17' 50" W
Outfall 013 (Taxi Yard)	Latitude: 47° 27' 37" N Longitude: 122° 17' 43" W

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INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES) system of permits, which is administered by the Environmental Protection Agency (EPA). EPA has delegated responsibility to administer the NPDES permit program to the State of Washington on the basis of Chapter 90.48 RCW, which defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

Regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. for public review. Details on the Public Notice procedures are contained in Appendix A of the fact sheet. Definitions for both the permit and fact sheet are contained in Appendix B of the fact sheet.

The draft permit and fact sheet were reviewed by the Permittee. Errors and omissions identified in this review were corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the permit file and parties that submit comments will receive a copy of the Department's response, final permit and fact sheet. The fact sheet will be revised to reflect the final permit. Comments and the resultant changes to the permit and fact sheet will be summarized in the Responsiveness Summary.

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

Seattle-Tacoma (Sea-Tac) International Airport is a major airport that serves the Pacific Northwest. The airport opened in 1944 and is owned and operated by the Port of Seattle. Sea-Tac Airport is situated entirely within the City of SeaTac and occupies more than 2,500 acres of land (Figure 1). The Port provides facilities for tenants engaged in passenger and cargo air transportation. In addition to the main terminal, which has four concourses, there are two satellite terminals providing a total of 73 loading gates. Industrial activities at the airport include aircraft and ground vehicle maintenance, fueling, washing, deicing/anti-icing, and miscellaneous airport related activities. This NPDES permit addresses industrial wastewater and stormwater discharges from airport operations within the property boundary and the acquisition boundary shown on Figure 2.

Stormwater drainage at Sea-Tac Airport is separated into two different collection systems:

- The Industrial Wastewater System (IWS) collects industrial wastewater from the terminal and air cargo areas, hangers, and maintenance areas. Industrial wastewater is water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater, non-contact cooling water, or stormwater associated with industrial activity. Industrial wastewater may result from any process or activity of industry, manufacture, trade or business, and includes, but is not limited to: water used for industrial processes such as pipe integrity pressure testing and vehicle and aircraft wash water; stormwater contaminated with fuel, oil, fire foam, cleaning agents and aircraft deicing/anti-icing agents; contaminated construction dewatering waters; excess water from ground water well construction and monitoring; and leachate from solid waste facilities. Industrial wastewater does not include stormwater runoff that contains deicing/anti-icing agents that shear or drip from aircraft in the storm drainage system.

- The Storm Drainage System (SDS) collects stormwater runoff from the runways, taxiways, building roofs, and public roads.

Industrial Wastewater System (IWS)

The IWS collects industrial wastewater from two drainage basins: the North Service Basin and the South Service Basin. The IWS North Service Basin includes portions of the airport area between Taxiways A and B and Air Cargo Road, as well as the Weyerhauser area on the west side of the airfield. The North Service Basin accounts for approximately 147 acres of the 297-acre IWS contributing area. The IWS South Service Basin includes portions of airport areas east of Runway 16L-34R, west of International Boulevard, north of South 188th Street, and south of the North Satellite. The South Service Basin accounts for approximately 150 acres of the IWS contributing area. Figure 2: Drainage Basins shows the IWS service area.

The IWS conveyance system collects and transports industrial wastewater to the IWS treatment plant. The conveyance system includes 21.4 miles of piping, 510 manholes and catchbasins, two below grade vaults in the parking garage, and six pump stations. Two of the pump stations are associated with the parking garage, one is owned and operated by United Airlines in their fuel farm north of the garage, one is owned and operated by the Olympic Pipeline Company in the Olympic Tank Farm, and two have been installed to transfer contaminated stormwater from the storm drainage system to the IWS. Three additional pump stations have been built to divert snow melt water from snow storage areas to the IWS.

The existing IWS conveyance piping was originally designed for the 10-year, 24-hour storm event, consistent with the stormwater regulations in effect at that time. Currently, storm drainage systems are designed for the 25-year, 24-hour storm event. Computer modeling of the conveyance system determined that portions of the system may be overloaded during 25-year, 24-hour storm events. Overloading may cause local ponding in the area of manhole tops during the storm event. As result of this analysis, the Port installed five water-tight manhole covers to prevent flooding in areas that would pose a safety problem or may overflow to the SDS.

The Industrial Wastewater Treatment Plant (IWTP) was originally designed and constructed in 1963/1964 for the purpose of capturing and treating fuel spills. In the last 30 years, its capacity has been enlarged and it now consists of three lagoons and a Dissolved Air Flotation (DAF) plant

containing six DAF units. The IWTP is located at the southwest end of the airport, just west of the tunnel under the west airport runway.

The three IWTP lagoons receive the flow from the IWS conveyance system. The purpose of the lagoons is to store flows in excess of treatment capacity. The three lagoons have a combined storage volume of 25.1 million gallons at the maximum normal operating water depth and 29.5 million gallons at the extreme maximum overflow water depth. Lagoon 1 was completed in 1965 and holds approximately 1.6 million gallons at the maximum normal operating water depth. Lagoon 2 was constructed in 1972 and has a capacity of approximately 3.3 million gallons at the maximum normal operating water depth. Lagoon 1 was cleaned and lined with a polyethylene liner in 1996. Lagoon 2 was cleaned and lined in 1997. Lagoon 3 was constructed in 1979, holds approximately 20.2 million gallons at the maximum normal operating water depth, and is unlined. A schedule for liner installation in Lagoon 3 will be included in the IWS Engineering Report (Special Condition S4).

A continuous rainfall model using National Oceanic and Atmospheric Administration (NOAA) data from 1974 to 1994 showed that the existing lagoon volume is sufficient to prevent an overflow when the IWTP treatment rate is 4 million gallons per day (mgd), assuming that the contributing area stays as it is. The addition of two new DAF units has increased the IWTP treatment capacity to 3.5 mgd at the normal design flow rate, with a peak flow rate treatment capacity of 6.9 mgd.

Lagoons 1 and 2 are located just north of the IWTP, while Lagoon 3 is located southeast, across South 188th Street. Drainage from the North Service Basin normally flows into Lagoon 2, while drainage from the South Service Basin flows into Lagoon 1. An interconnection pipeline allows diversion of either service basin to either lagoon. Flow may also be diverted to Lagoon 3 by adjusting a valve. Lagoons 1 and 2 supply the IWTP by gravity flow. Two valves located in the Lagoon 1 and Lagoon 2 outlet structures, respectively, control the discharges from these lagoons into the IWTP. A pump station next to Lagoon 3 transfers water from Lagoon 3 to the IWTP influent pipeline. Oil and other petroleum products skimmed off the surface of the lagoons are stored in a tank and removed by an authorized recycler for reclamation.

The IWTP generally operates after periods of significant rainfall. Even during winter months, operation may be intermittent depending on weather conditions. At temperatures below 35 °F, the efficiency of the plant declines significantly. The drop in treatment efficiency at low temperatures is caused by a reduction of the chemical reaction rate in the coagulation process.

The IWTP treatment process consists of adding coagulation chemicals to the influent wastewater in a rapid mix chamber, gently mixing the chemicals in a flocculation tank to encapsulate suspended solids and oil droplets, and removing the floc and other oil particles in the DAF units. Air bubbles released into the wastewater in the DAF units attach to the suspended solids and colloidal oil particles, which then float to the surface. This floating material is scraped to a scum beach on one end of the DAF unit for removal. The removed material flows out of the IWTP building in a floor trench to a separation sump at the east side of the IWTP building. Oil is pumped to a nearby oil storage tank and removed by a recycler for reclamation of usable oil. The remaining material is pumped to two large Baker Tanks and is removed for disposal at a licensed treatment, storage, and disposal facility.

The treated water in the DAF units flows over an outlet weir. Effluent from all of the DAF units then combines and flows to an effluent manhole, then into an effluent pipeline. An effluent pH control system adds sodium hydroxide to the effluent manhole. A sump situated inside the manhole pumps a small stream of water from the manhole back to a pH analyzer. If the pH is below the set point, the analyzer signals the sodium hydroxide addition pump to turn on. If the pH is above the set point, the analyzer signals the pump to turn off.

The IWS effluent flows through an 18-inch trunk line which eventually joins the Midway Sewer District's 30-inch effluent trunk line and discharges through a diffuser into Puget Sound (Outfall 001). The discharge occurs 1,400 feet from shore at a depth of 178 feet. Figure 3 shows the IWS effluent trunk and marine outfall location.

The Midway Sewer District and the Port of Seattle entered into a new 30-year agreement in February, 1995, for the joint use of the Midway Sewer District outfall. This agreement set forth the terms of the treated water discharge as follows:

> "Under the terms of the agreement, the Port will cease to discharge effluent into the Airport Trunk Line in excess of 2,500 gpm, whenever the combined flow from the Port and Midway exceeds ninety percent (90%) of the present outfall capacity of twelve thousand five hundred (12,500) gpm. Should Midway increase the outfall capacity, the figure of 2,500 gpm may be increased, subject to the Port contributing to the project cost in direct proportion to the additional capacity requested."

The IWTP interim effluent flow limitation is based on the DAF's design surface loading rate. The existing treatment capacity of the IWTP is 2,400 gallons per minute (gpm), or 3.5 million gallons per day (mgd), at the design treatment rate of 2 gpm per square foot (gpm/sf) of DAF surface area. The design peak flow rate of 4 gpm/sf allows a peak discharge rate of 4,800 gpm (6.9 mgd). The maximum flow that can be accepted by the 18-inch trunk line is 4,900 gpm (7.1 mgd).

The previous permit required the Port of Seattle to submit an engineering report to determine what level of industrial wastewater treatment should be provided to satisfy the requirement of All Known, Available, and Reasonable Methods of Prevention and Treatment (AKART). This report was submitted to the Department in December, 1995. The report identified several immediate improvement needs to the IWS collection and treatment system. These projects were separated from the larger AKART Engineering Report and were performed either as maintenance or were approved through the engineering report approval process. These improvement projects are listed in Table 1.

Table 1: Interim IWS Improvements

Project Description	Completion Date
Clean sediment from Lagoon 1 and install synthetic liner.	10/96
Install new oil skimmer for Lagoon 1.	12/95
Install new electric valves and associated telemetry for managing lagoon influent.	8/96
Improve effluent pH mixing and monitoring.	12/96
Install new DAF influent meters, rehabilitate influent control valves, and install new instrumentation.	12/96
Clean sediment from Lagoon 2 and install synthetic liner.	9/97
Install 2 new 250-sq. ft. DAF units, plus associated valves and piping.	12/97
Improve drainage on the south side of the IWTP building to ensure any sump overflows do not enter the storm sewer.	12/97
Install a new influent sampler.	12/97
Install a new effluent pH adjustment system, including NaOH storage tank, metering pump, piping, and controls.	12/95
Upgrade Lagoon 3 pump station to include 2 new pumps and a standby generator.	In progress, estimated 2/98
Modify the lagoon conveyance system to increase the transfer capacity between the lagoons.	In progress, estimated 2/98

The AKART Engineering Report has not been approved by the Department. One issue yet to be determined is the appropriate method to treat the deicers and plane wash water that are discharged to the IWS. The Port performed a pilot program during the winter of 1996/1997 to investigate the feasibility of collecting spent deicing fluid at the gates using vacuum sweeper trucks. The pilot program showed that ground recovery collected less than 40% of the glycol generated in dry weather conditions and was significantly less effective in wet weather conditions. Several other options are under consideration.

The draft permit requires the Port of Seattle to submit an updated AKART Engineering Report within one month of the issuance date of the permit. The Department will use the report to determine AKART for the industrial wastewater discharge. The AKART decision will be then be used to develop final effluent limitations which will be incorporated into the permit through a major permit modification. The permit modification will be subject to public notice.

Deicing/Anti-icing

Aircraft deicing and anti-icing is mandated by the Federal Aviation Authority (FAA) to ensure public safety. Deicing means removing ice from the surface of aircraft, airfield, or runway. Anti-icing means measures taken to prevent ice accumulation on the surface of the aircraft, airfield, or runway. Deicing and anti-icing are normally conducted during freezing conditions, although MD-80s require more frequent deicing. Deicing may be conducted at a gate, on a cargo ramp, or occasionally at airline hanger complexes. All aircraft deicing must occur within the

IWS collection area. Once a plane has been deiced or coated with an anti-icing fluid, the plane must take off within a specific amount of time or the chemicals must be reapplied.

The application of aircraft deicers is under the control of the individual airlines. Companies that provide deicing/anti-icing services for themselves include Alaska Airlines, American Airlines, America West, Delta, Horizon Air, Northwest, TWA, United, and US Airways. In addition, deicing/anti-icing services are provided by ATS, Aviation West Airline Services, Dynair and Slattery Airline Services.

Ethylene glycol-based and propylene glycol-based deicing/anti-icing fluids are the only chemicals the FAA authorizes for aircraft deicing or anti-icing at this time. The amount of deicing/anti-icing fluid applied per plane is variable, based upon the size and type of aircraft, temperature of the aircraft, temperature of the fuel, outside temperature, humidity, length of time the plane has been on the ground, location of the aircraft, and the type and characteristics of the precipitation, frost, or ice. Table 2 summarizes the deicing/anti-icing fluid usage (as undiluted product) reported by the Port during the previous permit cycle.

Table 2: Annual Deicing/Anti-icing Fluid Usage (Gallons)

Year	Ethylene	Propylene	Total
4/94 - 3/95	68,435	44,593	113,028
4/95 - 3/96	73,235	94,829	168,064
4/96 - 3/97	101,826	206,936	308,762

Hazardous wastes are regulated in Washington State by the Department's Hazardous Waste and Toxics Reduction Program through chapter 173-303 WAC, the Dangerous Waste Regulations. The Department has determined that wastes containing more than ten percent ethylene glycol book-designate as state-only dangerous waste (DW) under WAC 173-303-100(5)(b). While that determination was made in the context of evaluating the toxicity of waste ethylene glycol-based automobile and truck antifreeze, it may be sufficiently broad to apply to aircraft deicing fluids as well. Wastes containing propylene or diethylene glycol are not included in the state-only waste designation. In September, 1995 the Port of Seattle applied for certification of the waste aircraft deicing fluids generated at Sea-Tac Airport under WAC 173-303-075. The application included static acute fish and acute oral rat bioassays in accordance with the requirements of WAC 173-303-110(3)(b). Based on the results of the bioassays, the Department certified that waste aircraft deicing fluids containing ethylene glycol generated at Sea-Tac Airport are not dangerous wastes on October 20, 1995.

Deicing fluids are highly biodegradable and when released into surface water will exert Biochemical Oxygen Demand (BOD). Measuring the BOD of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is used by bacteria as food. BOD is used to estimate the potential reduction of dissolved oxygen in a receiving water after an effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. The primary source of BOD in the industrial wastewater is aircraft deicing/anti-icing fluids (glycols), although plane and vehicle wash water also exert BOD. The IWS final effluent limitations include BOD, which will effectively limit the discharge of deicing/anti-icing fluids.

Potassium acetate and calcium magnesium acetate (CMA) are used to deice and anti-ice the runways, taxiways, and roadways at the airport. Sand is also used on the roadways and may be used on the runways and ramps under extreme circumstances. The use of glycols on the runways and taxiways was terminated in 1992 and the use of urea was terminated in 1996. Deicing chemicals applied to runways and taxiways discharge to the SDS. The Port used 61,750 gallons of potassium acetate and 4,400 pounds of calcium magnesium acetate at the airport between April 1, 1996 and March 31, 1997. The Port has implemented a program to minimize chemical usage for airfield deicing.

Non-Contact Cooling Water

The Heating/Ventilation/Air Conditioning (HVAC) system for the terminal buildings uses cooling towers, located in the parking garage, to cool the water used in the system. The water circulation system is "closed loop", meaning that the water is recirculated through the cooling towers and is not discharged continuously. Emergency overflow and underflow drain lines which were connected to the storm drain system when the previous permit was issued were connected to the Midway Sewer District sanitary sewer in August, 1995. Water is discharged through the drain lines only when a cooling tower is emptied for maintenance. Each tower is cleaned once every other year and generates approximately 50,000 gallons of non-contact cooling water.

Stormwater

The stormwater drainage system (SDS) consists of pipes, manholes, and catch basins that collect surface water runoff from twelve drainage basins totaling approximately 841 acres (Figure 2). The four northernmost basins (SDN-1, SDN-2, SDN-3, and SDN-4) drain to Miller Creek through Lake Reba and the Miller Creek Regional Detention Facility. Stormwater flows up to the peak flow rate of the 6-month, 24-hour storm event are diverted to the IWS from the majority of basin SDN-2. The other eight basins (SDE-4, SDS-1, SDS-2, SDS-3, SDS-4, SDW-3, Subbasin B and Subbasin D) drain to Des Moines Creek. The drainage from all of these basins except basin SDS-4 receive detention in either Tyee Pond or the Northwest Ponds. The Port's Engineering Yard and the Taxi Yard drain to the City of Sea-Tac's storm drain system, which discharges to Gillian Creek, a tributary of the Green River. Both Miller Creek and Des Moines Creek flow into Puget Sound southwest of Sea-Tac Airport.

The stormwater basins, corresponding outfalls, size of the drainage basin, and the industrial activities in each drainage basin are listed in Table 3. Non-industrial activities in the drainage basins, such as rooftops, employee parking lots, and roadways, are not listed in the table. For example, basin SDE-4 includes drainage from International Boulevard and the parking garage, SDS-1 includes mostly rooftops, SDS-2 includes drainage from 16th Ave. South and S. 188th Street, SDS-3 includes drainage from S. 188th Street, and SDN-1 includes drainage from Air Cargo Road and rooftops. Construction is also considered an industrial activity. Construction activities planned over the permit term have not been included in Table 3 but will occur in several of the drainage basins.

Table 3: Basin Characteristics for the Stormwater Drainage System

Stormwater Drainage Basin	Outfall	Area (acres)	Industrial Activities
SDE-4	002	112	Pilot Air Freight Emery Air Freight Airport Drayage Company Alaska Air Cargo United Airlines Cargo Airborne Freight Postal Freight Delta Cargo Main Terminal (Concourses A and D)
SDS-1	003	6	Taxiway
SDS-2	004	5	Staging of Construction Materials
SDS-3	005	424	Runway Taxiway
SDS-4	009	57	Runway Taxiway
SDW-3	010	24	Abandoned Runway
Subbasin B	014	40	Fill stockpile
Subbasin D	015	35	IWS Lagoons, IWTP
SDN-1	006	14	Airport access road
SDN-2	007	36	North Cargo Service Area Taxiway (most of this area is pumped to the IWS)
SDN-3	008	60	Runway Taxiway
SDN-4	011	26	Runway Taxiway
Engineering Yard	012	<1	Storage
Taxi Yard	013	<1	Taxi parking

The Port of Seattle implemented a Stormwater Pollution Prevention Plan (SWPPP) during the previous permit cycle. The SWPPP implementation included many operational and capital improvements to prevent the discharge of contaminants to the SDS. Table 4 summarizes the Best Management Practices (BMPs) that were implemented between June, 1994 and July, 1997.

During the past year, the Port of Seattle completed five capital improvement projects that diverted drainage from the SDS to the IWS at a cost of more than $450,000. Three aircraft service areas were completely eliminated from drainage basins SDS-1 and SDE-4. Another aircraft cargo/service area was connected to a pump station designed to collect up to the peak flow rate from the 6-month, 24-hour storm event. In addition, the Port's maintenance shop yard drainage was re-routed to the IWS.

During and subsequent to snow events of approximately four inches or more, the snow in the terminal areas is moved to an accumulation area. Some of this snow may be contaminated by deicing/anti-icing fluids. The Port has developed snow storage facilities that drain to the IWS.

Table 4: SWPPP BMP Implementation

ACTIVITY	BMP
Universal BMPs	SWPPP Implementation Monitor Inspections Pollution Prevention Team Signing catch basins (dump no waste)
Aircraft Servicing	Restricted to IWS areas Tenant education on Port policy Store glycols in IWS area Connect problem SDS areas to IWS
Airfield Anti-Icing	Termination of glycol and urea use Surface sensor system Sweep storage areas Evaluate alternative chemicals Store chemicals in IWS area
Roadway Deicing	Evaluate alternative chemicals
Spill Control	Implement Spill Plan Tenant Spill Control Plans
Construction Sites	Erosion control BMPs Restrictions on equipment servicing Secondary containment
Bare Ground Surfaces In Non-Construction Areas	Erosion control BMPs in contractor staging areas Erosion control of temporary soil piles Clarification of responsibility for BMPs in contractor staging areas BMPs for remediated pile in SDS-2 BMPs for clear zone roads
Vehicle Washing And Maintenance	Terminate activity in SDS areas Place signs in key locations Inspections Regularly clean sumps in Taxi Yard Sweep Taxi Yard and control litter
Landscape Management	Use environmentally benign chemicals Restrict use near waterways Proper cleaning/disposal Apply during dry periods Incorporate BMPs in specifications
Airfield Maintenance	Sweep pavement Clean catch basin sumps regularly Proper storage and disposal of sediments Store hazardous wastes in IWS area
Port Maintenance Shop Yard	Secondary containment Used fluids under cover Connect shop yard to IWS
Temporary Storage Of Surplus And Used Materials	No liquid storage in westside yard Engineer yard: Lock gate during offhours Signing on surplus storage Designated control person
Tenant Activities In SDS Areas	Sweep around dumpster area No storage of used fluids No outside maintenance of vehicles Inspect catch basin grates Clean loading dock as needed

PERMIT STATUS

The previous permit for Sea-Tac Airport was issued on June 30, 1994. The permit was modified several times during the three year permit cycle:

- On September 12, 1994, footnote *e* in Special Condition S3C.1 was clarified. This was a minor modification.
- On November 10, 1994, a minor modification added an effluent limit and an additional monitoring requirement for the non-contact cooling water discharge.
- On February 8, 1995, the flow limit for the discharge from the IWS (Outfall 001) was changed to reflect a new discharge agreement with the Midway Sewer District in accordance with Special Conditions S1.A and S2.A.
- On September 11, 1995, Special Condition S3.A.C.3 was modified to remove the Doug Fox Service Area outfall, due to the termination of industrial activity in the area. This was a minor modification.
- On August 22, 1996, a major modification to the permit was issued that added three additional outfalls, eliminated non-contact cooling water discharge, and modified the testing and reporting requirements.
- On September 10, 1996, the permit was modified to clarify the language in Special Condition S16. This was a minor modification.

An application for permit renewal was submitted to the Department on December 30, 1996 and accepted by the Department on May 19, 1997.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

Industrial wastewater effluent (Outfall 001) violations reported on the Discharge Monitoring Reports (DMRs) during the previous permit cycle are summarized in Table 5. The previous permit contained interim effluent limitations for the IWS discharge for flow, pH, oil and grease, and total suspended solids. The Port had trouble meeting these effluent limits until a consultant was hired to assist in designing improvements to the IWTP. The consultant worked on the system between January, 1995 and September, 1995. During this period, the Port's consultant performed a Treatability Study and performance evaluation on the IWTP, which was approved by the Department in November, 1995. Between September, 1995, and November, 1996, the Port reported eight minor effluent violations. These violations were usually caused by circumstances beyond the control of the Port, such as cold weather in the winter or algae blooms in the summer. The Port took immediate action to identify the cause and to prevent reoccurrence in response to each of these violations. The performance of the IWTP has improved greatly due to the IWTP performance evaluation and the improvements outlined in Table 1 above. The Port has been in compliance with the interim effluent limitations at Outfall 001 since November, 1996.

Table 5: Reported Effluent Violations

DATE	OUTFALL	PARAMETER	UNIT	TYPE	VALUE	LIMIT
Sep-94	001	Oil & Grease	mg/L	avg	25.3	8
Sep-94	001	Oil & Grease	mg/L	max	76	15
Oct-94	001	Flow	gpm	max	2916	2500
Oct-94	001	Oil & Grease	mg/L	avg	10.5	8
Nov-94	001	Oil & Grease	mg/L	avg	10.5	8
Nov-94	001	Oil & Grease	mg/L	max	18	15
Dec-94	001	Oil & Grease	mg/L	avg	11.7	8
Dec-94	001	Oil & Grease	mg/L	max	28	15
Jan-95	001	Oil & Grease	mg/L	avg	21	8
Jan-95	001	Oil & Grease	mg/L	max	33	15
Feb-95	001	Oil & Grease	mg/L	avg	21.7	8
Feb-95	001	Oil & Grease	mg/L	max	47	15
Feb-95	001	Total Suspended Solids	mg/L	avg	22.93	21
Feb-95	001	Total Suspended Solids	mg/L	max	46	33
Apr-95	001	Total Suspended Solids	mg/L	avg	48	21
Apr-95	001	Total Suspended Solids	mg/L	max	96	33
May-95	001	Oil & Grease	mg/L	avg	11.5	8
May-95	001	Oil & Grease	mg/L	max	16	15
May-95	001	Total Suspended Solids	mg/L	avg	35	21
May-95	001	Total Suspended Solids	mg/L	max	52	33
Jun-95	001	Total Suspended Solids	mg/L	avg	59	21
Jun-95	001	Total Suspended Solids	mg/L	max	100	33
Jul-95	001	Total Suspended Solids	mg/L	max	34	33
Aug-95	001	Oil & Grease	mg/L	avg	17.6	8
Aug-95	001	Oil & Grease	mg/L	max	46	15
Aug-95	001	Total Suspended Solids	mg/L	avg	30.6	21
Aug-95	001	Total Suspended Solids	mg/L	max	68	33
Dec-95	001	Oil & Grease	mg/L	max	23	15
Jan-96	001	Oil & Grease	mg/L	max	16	15
Jan-96	001	Total Suspended Solids	mg/L	max	38	33
Apr-96	001	pH	S.U.	min	5.95	6.0
Jul-96	001	Total Suspended Solids	mg/L	avg	37	21
Jul-96	001	Total Suspended Solids	mg/L	max	37	33
Oct-96	001	pH	S.U.	min	4.98	6.0
Nov-96	001	Total Suspended Solids	mg/L	max	44	33

Other reported incidents of noncompliance include the following:

- On August 16, 1995, about 135 gallons of an undefined petroleum product were discovered in a stormwater detention structure at Outfall 015. Immediate measures were taken by the Port to remove the accumulation of product and to prevent product release. An investigation into the source of the product determined that the product came from an IWS lagoon during normal IWS operations via an emergency overflow pipe. The product reached the overflow pipe due to the failure of both parts of a two-part IWS safety system. One of the safety mechanisms designed to prevent such an overflow failed during the time the second overflow prevention mechanism was off-line for maintenance. Procedural and equipment modifications have been implemented by the Port to prevent a reoccurrence of this type of release.

- On October 11, 1995, a bypass of IWTP influent occurred for approximately 20 minutes, between 1:40 and 2:00 am, at the lagoon diversion manhole. This bypass was caused by the failure of the treatment plant operator to manually open the valve to Lagoon 3 in a timely manner. The discharge flowed across the perimeter road, into a ditch that runs between the perimeter road and S. 188th Street, and then to Des Moines Creek via the Northwest Ponds detention system. The overflow occurred late in the storm event. Monitoring of the bypass in accordance with the Spill Prevention, Control, and Countermeasure Plan (SPCC) did not show elevated levels of petroleum hydrocarbons in Des Moines Creek.

- On November 30, 1995, the sump in the United Airlines tank farm was flooded by runoff from a heavy rain event when the sump pump failed, causing the runoff to discharge to Des Moines Creek. The pump was replaced the next morning. In the winter of 1996-1997, United Airlines redesigned and reconstructed the drainage system and sump/pump facilities. These upgrades should ensure that similar events do not occur.

- On December 3, 1995, between 6:00 p.m. and 9:20 p.m. heavy rains caused a bypass to occur at the lagoon diversion manhole. This bypass occurred when the treatment plant operator failed to monitor the rising water level in Lagoon 1 and to manually open the valve to Lagoon 3 in a timely manner. The Port sampled the bypass in accordance with the SPCC. The monitoring data did not find elevated petroleum hydrocarbon levels in Des Moines Creek.

The following two unintentional bypass events, caused by very large storm events, were beyond the control of the Port:

- On February 8, 1996, a bypass occurred from the lagoon diversion manhole when the influent flow rate was greater than the capacity of the storm sewer pipe to Lagoon 3, causing the manhole lid to lift off even though it was weighted down with a concrete block. As soon as the bypass was discovered, the some of the flow was diverted to Lagoons 2 and 3. The bypass occurred late in a very large storm event (5.10 inches of rainfall over 72 hours) and lasted less than 1.25 hours. Inspection of the ditches did not detect petroleum hydrocarbons. Immediately afterward, the Port bolted the manhole shut to prevent this incident from recurring.

- During a large, 7-day storm (16 inches of snow and 5.1 inches of rain) there were two releases of stormwater from the bottom of Lagoon 3. The first release occurred on December 30, 1996, and the second occurred on January 1, 1997. The bypasses occurred when the operation of the IWTP was reduced to lower the discharge flow rate in accordance with the discharge agreement with the Midway Sewer District for Outfall 001. Samples taken in accordance with the SPCC detected no petroleum hydrocarbons, but a slug of elevated BOD and glycols was detected.

The Department issued a Notice of Violation for the first two lagoon bypass events on January 3, 1996. In response to these events, the Port of Seattle increased the IWTP staffing and proceeded with several improvement projects. The manual valves on the inlet to Lagoons 1 and 2 were replaced with electric operators. A telemetry system was installed to monitor the wastewater levels in the lagoons and the IWTP. Additional wastewater storage capacity was provided when Lagoon 1 was cleaned and lined. A project to increase the capacity of the pipe from the diversion manhole to Lagoon 3 is currently under construction.

A warning letter was issued to the Port for two construction-related incidents of turbid water discharge in 1996:

- On July 29, 1996, a contractor hit a six-inch irrigation line at the North Fuel Rack construction project, causing fill material to be washed into Des Moines Creek. Much of the turbid water puddled along Air Cargo Road and was swept up by Port's vactor trucks. The turbid water that washed down the storm drain was held in the Tyee Pond (an instream detention pond) and allowed to settle for 16 hours. Some turbid water was discharged when the Tyee Pond control gate was opened to return the flow to the mainstream of Des Moines Creek.
- On July 30, 1996, a turbid discharge to Des Moines Creek occurred due to washing of the haul road at the South Safety Area construction project. Immediate action was taken to prevent this discharge, including using a street sweeper to clean the road, minimizing street washing, covering all drain inlets, and detaining the street wash water in a ditch and sediment pond prior to discharge to the creek.

INDUSTRIAL WASTEWATER AND STORMWATER CHARACTERIZATION

The following characterization is summarized from the discharge monitoring reports and additional sampling data provided by the Port. Table 6 characterizes the IWTP effluent (Outfall 001) between September, 1995, and March, 1997, which represents the effluent quality after the treatment system's performance was optimized. Annual priority pollutant scans showed very low concentrations of a few constituents. Copper, lead, and zinc were the only priority pollutant metals that were detected. Table 7 summarizes the stormwater data for all of the stormwater outfalls (Outfalls 002 through 015). The average values contained in Table 6 assume the detection limit for those data that were below detection, therefore the true average is less than the table value. Median values are presented in Table 7 because they more accurately characterize stormwater trends. "Median" is a statistical concept that shows the middle value in a series of numbers, above and below which lie an equal number of values.

Table 6: Industrial Wastewater Effluent Characterization

Parameter	Average Concentration	Concentration Range
Monthly Flow Rate	1167 gpm	---
pH	6.6 std. units	5.0 - 7.5 std. units
Oil & Grease	6.1 mg/L	5.0 - 23.0 mg/L
TSS	13.5 mg/L	1.0 - 38.0 mg/L
BOD (inhib)	98 mg/L	1.4 - 830 mg/L
BOD (noninhib)	104 mg/L	2.0 - 830 mg/L
Ammonia	0.08 mg/L	0.02 - 0.82 mg/L
Ethylene Glycol	153 mg/L	2.5 - 4,800 mg/L
Propylene Glycol	251 mg/L	2.5 - 8,700 mg/L
Benzene	4.3 µg/L	None Detected - 25 µg/L
Toluene	13.5 µg/L	0.01 - 62 µg/L
Ethylbenzene	3.4 µg/L	0.01 - 16 µg/L
Total Xylenes	27.9 µg/L	0.03 - 142 µg/L
WTPH - D	3.7 mg/L	1.0 - 10.0 mg/L
Phenols	0.05 mg/L	0.04 - 0.09 mg/L
Total Recoverable Copper	0.035 mg/L	None Detected - 0.087 mg/L
Total Recoverable Lead	0.015 mg/L	None Detected - 0.058 mg/L
Total Recoverable Zinc	0.104 mg/L	None Detected - 0.21 mg/L

Table 7: Stormwater Discharge Characterization

Parameter	Median Concentration	Concentration Range
pH	6.9 Std. Units	4.4 - 8.1 Std. Units
Oil and Grease	1.4 mg/L	none detected - 21 mg/L
TSS	15 mg/L	1.3 - 480 mg/L
Turbidity	8.9 NTU	0.7 - 310 NTU
Fecal Coliform	36 #/100 mL	1 – 30,000 #/100 mL
BOD_5	6.4 mg/L	2 - 194 mg/L
Total Ammonia	0.05 mg/L as N	none detected - 5.0 mg/L as N
Total Glycols	5 mg/L	none detected - 3,635 mg/L
Surfactants	0.06 mg/L	none detected - 1.5 mg/L
WTPH - D	0.5 mg/L	none detected - 10 mg/L
Total Recoverable Copper	0.030 mg/L	0.003 - 0.388 mg/L
Total Recoverable Lead	0.005 mg/L	0.0003 - 0.104 mg/L
Total Recoverable Zinc	0.072 mg/L	0.003 - 1.030 mg/L

A detailed analysis of the stormwater data by outfall and parameter is located in the Annual Stormwater Monitoring Report for Seattle-Tacoma International Airport, available for review at the Department of Ecology's Northwest Regional Office and at the Burien Public Library. Conclusions from the annual reports include that overall, Sea-Tac Airport stormwater quality is cleaner than regionally comparable data. The runoff from the terminal and landside outfalls is typically more contaminated than the runoff from the airfield (taxiway and runway) outfalls. Several public roadways drain to the landside and terminal outfalls, and consequently, bias the stormwater results for metals, petroleum hydrocarbons, and other vehicle-based pollutants. Stormwater water quality has improved as a result of the Port's SWPPP actions in the Taxi Yard and terminal (Outfall 002) drainage basins. A study of runway and taxiway deicing pollutant runoff showed that more than 90% of deicing-related pollutants are washed off of the runways and taxiways by 1.3 inches of rain, less than amount of rainfall generated from the 6-month, 24-hour storm event.

Fecal coliform have been found in the stormwater discharges from the airport. Because domestic wastewater from the airport is discharged to the sanitary sewer, it assumed that high levels of fecal coliform found in stormwater grab samples are from wild animal sources. In a few circumstances, fecal coliform have been traced to dumpsters, which were then removed from the SDS. King County Surface Water Management (SWM) initiated a fecal coliform source tracing effort using ribosomal RNA typing to identify the source of the fecal contamination. The RNA procedure matches the RNA of the sampled coliforms with those from known sources. For the samples collected at South 200th Street, below the Tyee Golf Course, 10 percent of the strains matched human/septage sources, 10 percent matched avian sources, 20 percent matched dog sources, and 50% were unmatched. This sample point includes drainage from the golf course, other commercial areas, roadways, the Northwest Ponds and Bow Lake as well as the airport.

PROPOSED PERMIT LIMITATIONS

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations are based upon the treatment methods available to treat specific pollutants. Technology-based limitations are set by regulation or developed on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992). The more stringent of these two limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based on information collected over the term of the previous permit. The effluent constituents were evaluated on a technology- and water quality-basis and the limits necessary to meet the rules and regulations of the State of Washington were determined and included in this permit. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department. Compliance with the effluent limitations and other conditions in this permit constitutes compliance with the Federal Water Pollution Control Act, also known as the Clean Water Act (33 U.S.C. § 1251, et seq.) and the Washington Water Pollution Control Act (RCW 90.48).

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Technology-based limitations are set by regulation in the Federal effluent guidelines or on a case-by-case basis using Best Professional Judgment (BPJ) when no effluent guidelines exist for an industrial category. Technology-based limits represent the best treatment a facility can install with the economic means of the industry as a whole (in the case of effluent guidelines) or of the specific industrial facility being permitted (in the case of BPJ).

This permit requires the Permittee to finalize an engineering study to determine the treatment methodologies that will satisfy the requirement for All Known, Available, and Reasonable Methods of Prevention and Treatment. The Permittee will be allowed to discharge treated industrial wastewater to Puget Sound subject to interim and final effluent limitations. The interim limitations will be replaced by the final limitations when the new or improved industrial wastewater treatment system is completed. If the discharge of IWS effluent to Puget Sound is eliminated and replaced with a discharge to the sanitary sewer, then this NPDES permit will be modified to remove the effluent limitations for Outfall 001 and pretreatment effluent limitations will be established to protect the wastewater treatment plant accepting the discharge. These permit changes will be through a major modification with public notice.

INTERIM LIMITATIONS

Interim limitations have been established to regulate the Permittee's industrial wastewater discharge prior to completion of a new or improved industrial wastewater treatment system.

Flow -- The flow limitation is set at 4800 gallons per minute (gpm). This limit is based on the design peak loading rate for the DAF units in the IWTP. The discharge flow rate shall also not exceed the discharge rate specified in the Midway Sewer District discharge agreement (flow shall not exceed 2,500 gpm whenever the combined flow from the IWS and Midway Sewer District exceeds 90% of the outfall's present capacity of 12,500 gpm).

pH -- The pH interim effluent limitation was set using Best Professional Judgment (BPJ) based on Best Conventional Pollutant Control Technology (BCT) effluent guidelines for stormwater in the Petroleum Refining Point Source Category (40 CFR Part 419). Although the Petroleum Refining category does not apply to this facility, the treatment technology used for industrial wastewater treatment at Sea-Tac Airport is the same as was used to develop the BCT limits for stormwater runoff in this category. Also, the character of the industrial wastewater from the airport is similar to the stormwater from a petroleum refinery.

The interim limit for pH is set at within the range of 6.0 to 9.0 standard units.

Oil and Grease -- The oil and grease interim effluent limitation was set using BPJ based on BCT effluent guidelines for stormwater in the Petroleum Refining Point Source Category (40 CFR Part 419). The interim limit for oil and grease is set at a daily average of 8 mg/L and a daily maximum of 15 mg/L. Although the Petroleum Refining category does not apply to this facility, the treatment technology used for industrial wastewater treatment at Sea-Tac Airport is the same as was used to develop the BCT limits for stormwater runoff in this category. Also, the character of the industrial wastewater from the airport is similar to the stormwater from a petroleum refinery.

This effluent limit is based on the traditional oil and grease method (EPA 413.1/Standard Methods 5520B). Oil and grease is a method-defined analyte. It is defined as anything that is recovered as a substance soluble in the solvent, Freon, that is used for the extraction. It includes sulfur compounds, certain organic dyes, and chlorophyll. It has traditionally been used to measure constituents that may negatively influence biological wastewater treatment systems. EPA has proposed a substitute method for oil and grease due to the phasing-out of Freon. The new method, EPA Method 1664, uses hexane for the solvent extraction instead of Freon. EPA tests show that, on average, there should not be a large difference in results between hexane and Freon and that a direct substitution is possible, although any given wastewater may be different and only a side-by-side comparison will tell. This permit requires side-by-side testing of Method 413.1 and 1664 for one year or until Method 413.1 is no longer available, which ever occurs first. The Department will use the data from the two tests to determine if the methods are comparable for the IWTP effluent. If there is a statistical difference between the two methods' results, new interim effluent limitations for oil and grease Method 1664 will be determined by the Department. Any change to the interim effluent limitations for oil and grease will be made through a permit modification subject to public notice.

Total Suspended Solids -- The total suspended solids interim effluent limitation was set using BPJ based on BCT effluent guidelines for stormwater in the Petroleum Refining Point Source Category (40 CFR Part 419). The interim limit for total suspended solids is set at a daily average of 21 mg/L and a daily maximum of 33 mg/L. Although the Petroleum Refining category does not apply to this facility, the treatment technology used for industrial wastewater treatment at Sea-Tac Airport is the same as was used to develop the BCT limits for stormwater runoff in this category. Also, the character of the industrial wastewater from the airport is similar to the stormwater from a petroleum refinery.

FINAL LIMITATIONS

The final effluent limitations will be effective upon completion of construction and start up of the new or improved treatment system constructed as a result of the IWS AKART Engineering Report (Special Condition S4). Technology-based effluent limitations for flow, oil and grease, TSS, and BOD_5 will be determined by the Department upon completion of the Engineering Report required in Special Condition S4. Technology-based limitations will be based on the determination of All Known, Available, and Reasonable Methods of Treatment (AKART). Total ammonia, PAHs, BTEX, total recoverable phenolics and priority pollutant metals have been removed from the list of final effluent limit parameters because monitoring data has shown that these parameters are not present at levels of concern in the IWTP effluent.

The following Final Effluent Limitations have been determined for the IWS discharge:

Flow -- The flow limitation for IWS effluent is set at 2500 gpm whenever the combined flow from the IWS and Midway Sewer District exceeds ninety percent of the outfall's present capacity of 12,500 gpm. This limit is based on the Permittee's allocation of Outfall 001's capacity agreed on with the Midway Sewer District. If the Permittee's allocation is changed through a new agreement with the Midway Sewer District, this limit will be set at the new allocation. This limit may be replaced with an AKART technology-based flow limit if it is more stringent.

pH -- The final limit for pH is set at within the range of 6.0 to 9.0 standard units. This limitation is based on the determination of AKART to be neutralization for pH adjustment.

Other -- Discharge of non-contact cooling water to waters of the state is prohibited. Discharge of industrial wastewater to storm drains is prohibited. Stormwater associated with industrial activity and construction activity may be discharged to the storm drainage system in accordance with the terms and conditions of this permit. Overflows of untreated industrial wastewater from the IWS collection systems or lagoons due to stormwater flows in excess of the design criteria are authorized bypasses. All known, available, and reasonable methods to prevent the unintentional release of industrial wastewater to ground water shall be applied. Discharge of stormwater to ground water is permitted

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Surface water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin wide total maximum daily loading study (TMDL).

NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The U.S. EPA has promulgated 91 numeric water quality criteria for the protection of human health that are applicable to Washington State (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

ANTIDEGRADATION

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural

conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the ambient conditions of a receiving water are of higher quality than the criteria assigned, the ambient conditions shall constitute the water quality criteria. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The Department has reviewed ambient water quality monitoring results gathered by the Port in the Stormwater Receiving Environment Monitoring Report (June 1997) and data included in the Des Moines Creek Basin Plan (November 1997). From the available data, the ambient water quality generally does not meet the Class AA water quality criteria given in Chapter 173-201A WAC for copper (Miller Creek and Des Moines Creek), temperature and fecal coliform (Des Moines Creek). Des Moines Creek is listed on the Department's 1996 303(d) list for fecal coliform. The Department will use the Class AA water quality criteria for Des Moines Creek and Miller Creek in the proposed permit. The discharges authorized by this proposed permit should not cause further degradation which would interfere with or become injurious to existing beneficial uses.

The Department has reviewed existing records and is unable to determine if the ambient water quality of Puget Sound in the vicinity of Outfall 001 is either higher or lower than the Class AA water quality criteria; therefore, the Department will use the Class AA criteria for this water body in the proposed permit.

CRITICAL CONDITIONS

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

MIXING ZONES

The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving AKART and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

DESCRIPTION OF THE RECEIVING WATER

Puget Sound is designated as a Class AA receiving water in the vicinity of Sea-Tac International Airport's industrial wastewater outfall. Miller Creek and Des Moines Creek are designated as a Class AA receiving waters because they are tributary to a Class AA receiving water. Potential characteristic uses of Class AA waters include the following:

water supply (domestic, industrial, agricultural); stock watering; fish migration; fish and shellfish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Puget Sound

The United States Environmental Protection Agency (EPA) named Puget Sound an estuary of national significance in 1988. Its waters support international commerce, commercial and recreational fisheries, shellfish beds and a variety of wildlife habitat. Recreational opportunities abound. A growing population and increased urban development have impacted Puget Sound. A number of government agencies, non-profit environmental organizations and citizen groups are dedicated to protecting and cleaning up the Sound.

The Midway Sewer District outfall (Sea-Tac Airport's Outfall 001) enters Puget Sound approximately 400 feet north of the Des Moines Marina and extends approximately 1,700 feet to a depth of 165 feet mean lower low water (MLLW).

Miller Creek

Miller Creek, a perennial watercourse that drains to Puget Sound, has headwaters originating at Arbor, Burien, and Tub Lakes (See Figure 4). Sea-Tac Airport contributes drainage to the creek through the Miller Creek Regional Detention Facility (Lake Reba). Walker Creek, a tributary to Miller Creek, begins in the wetlands west of the airport. The Miller Creek watershed encompasses an area of about 8.1 square miles (5,200 acres). The Airport covers about 0.4 square miles (5 percent) of the Miller Creek watershed. Approximately 136 acres (or 2.6 percent of the Miller Creek watershed) of Airport property drains through four stormwater outfalls included in this permit (Outfalls 006, 007, 008, and 011). Miller Creek's watershed includes portions of Normandy Park and Burien. Approximately 62 percent of the land use in the Miller Creek Basin is residential, 14 percent is commercial (non-airport), 5 percent is airport, and the remainder is open (parks, cemeteries or forest/wetlands).

The Miller Creek watershed is located on a plateau lying between Puget Sound and the Duwamish Valley. Miller Creek flows off the plateau, through a ravine, toward the southwest. Materials along the sides of the ravine are of glacial origin, primarily non-cohesive, erodible, sandy till. Underlying these units is a glacio-lacustrine clay. The clay is significantly more erosion resistant then the non-cohesive materials on the walls of the ravine. Bank erosion and landsliding occurs along this ravine, which terminates in an alluvial valley that begins downstream of First Avenue South.

Urbanization has increased flood peaks and volumes along Miller Creek. The increase runoff has been attributed to increases in mass wasting, bank erosion, bed scour, sedimentation, degradation of fish habitat and water quality, and flooding along the stream. Detention of stormwater runoff is the primary recommended mitigation action. The Lake Reba Detention Facility was constructed by the Port in 1973. The Miller Creek Regional Detention Facility (which includes Lake Reba) and the 1st Ave. South Regional Detention Facility were constructed by King County in 1992 as partial mitigation of increased flows attributed to watershed development.

Des Moines Creek

The Des Moines Creek watershed covers 5.8 square miles (3,712 acres) near the center of the Seattle-Tacoma metropolitan area, including portions of King County and the Cities of Des Moines, Normandy Park, and SeaTac (see Figure 5). Des Moines Creek is approximately 3.5 miles long and flows into Puget Sound at Des Moines Creek Beach Park. The creek originates on a low gradient plateau and descends steeply though a ravine shortly before it empties into Puget Sound.

The watershed contains two major tributaries (East Fork and West Fork) and two major water bodies (Bow Lake and the Northwest Ponds). The East Fork and the West Fork converge on the Tyee Golf Course. The East Fork flows out of Bow Lake, for the first half mile through a series of subsurface pipes, to where it surfaces at approximately 26th Avenue South. An instream stormwater detention facility, the Tyee Pond, was constructed in the east tributary on the golf course in 1989. The West Fork flows out of the Northwest Ponds complex located at the western edge of the Tyee Golf Course. The stormwater runoff from the south end of the airport receives detention in either Tyee Pond or the Northwest Ponds, except for Outfall 009 (SDS-4).

Most of the upper watershed is heavily urbanized. Sea-Tac Airport constitutes 27 percent of the watershed. Sea-Tac airport's NPDES-permitted drainage area covers 705 acres that drain to Des Moines Creek through eight outfalls (Outfalls 002, 003, 004, 005, 009, 010, 014, and 015). In addition to watershed development, the construction of a variety of structures (e.g., bridges, buildings, roads, pipelines, and culverts) on and adjacent to the creek has had a substantial effect on stream hydraulics.

Section 303(d) of the CWA requires states to develop a list of water body segments that are not expected to attain water quality standards after implementation of technology-based pollution controls. These controls include additional point source wastewater treatment as well as enforceable best management practices for impacts associated with nonpoint sources. The 303(d) list contains all those water bodies for which some additional management activities must be implemented. The 1996 303(d) list included Des Moines Creek for fecal coliform contamination. In the Cedar/Green Water Quality Management Area, which includes Des Moines Creek, 43 of the 54 303(d) listed water bodies are included in whole or in part due to fecal coliform contamination.

The CWA directs that a total maximum daily load (TMDL) be established for all waters on the 303(d) list. A TMDL is established to assure that the pollution load to a water body does not exceed its assimilative capacity. The Department has listed Des Moines Creek as a high priority waterbody for performing a TMDL. In all, there are thirteen high priority TMDL waterbodies in the Cedar/Green Water Quality Management Area. The implementation schedule for these TMDLs has not been established at this time.

Stormwater Receiving Environment Monitoring Report

The Stormwater Receiving Environment Monitoring Report (June 1997), prepared by the Port of Seattle, assessed the ambient levels of cadmium, copper, lead, nickel, and zinc in both Miller and Des Moines Creeks during storm events. The study found that concentrations of total recoverable copper in ambient waters both upstream and downstream of the stormwater discharges generally exceeded the water quality criteria, while concentrations of cadmium, lead,

nickel and zinc did not. In ambient waters downstream and upstream of the stormwater discharges to Miller Creek, dissolved cadmium and silver were not detected. Dissolved cadmium and lead were only occasionally detected in Des Moines Creek. Table 8 summarizes the metals data from the study.

The study looked at instream Whole Effluent Toxicity (WET) for Miller and Des Moines Creeks using Microtox bioassay testing. Overall, there was little toxicity in any of the samples collected at outfall, upstream, or downstream stations in Miller or Des Moines Creeks. Other topics included in the study were sediments, other sources of pollutants, vegetation management, and streambank erosion.

Documentation of studies conducted on these creeks is included in the reference section of this Fact Sheet and should be referred to for more detailed information.

Table 8: Range of Dissolved Metals Concentrations in Miller and Des Moines Creeks

	Miller Creek		Des Moines Creek		Acute Water Quality Criteria[a]	
Parameter	Upstream	Downstream	Upstream	Downstream	Miller	Des Moines
Cadmium (µg/L)	NA	NA	<0.2 - 0.22	<0.2 - 0.28	0.8	1.2
Copper (µg/L)	3.1 - 11.5	<0.5 - 7.8	0.85 - 8.72	1.0 - 15.2	4.3	6.4
Lead (µg/L)	<0.5 - 1.1	<0.5 - 0.96	0.53 - 0.61	<0.2 - 1.5	12.6	20.6
Nickel (µg/L)	1.4 - 4.5	1.1 - 4.2	0.94 - 1.9	0.97 - 2.8	408	590
Zinc (µg/L)	19.1 - 46.5	0.83 - 26	<0.5 - 33.6	<0.72 - 79	33.0	47.7

[a]Water quality criteria as dissolved metal (µg/L) at a hardness of 35.6 mg/L $CaCO_3$ for Des Moines Creek and 23 mg/l $CaCO_3$ for Miller Creek (the 10th percentile value measured in the background).

SURFACE WATER QUALITY CRITERIA

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for Class AA waters are summarized below:

Freshwater:

Fecal Coliforms	50 organisms/100 mL maximum geometric mean; not more than 10% of all samples obtained for calculating the geometric mean shall exceed 100 colonies/100 mL
Dissolved Oxygen	9.5 mg/L minimum
Temperature	16.0 °C maximum or 0.3 °C incremental increase above background
pH	6.5 to 8.5 standard units
Turbidity	Less than 5 NTU above background turbidity when the background turbidity is 50 NTU or less, or have more than a 10% increase in turbidity when the background turbidity is more than 50 NTU.
Toxics	No toxics in toxic amounts

Marine Water:

Fecal Coliforms	14 organisms/100 mL maximum geometric mean; not more than 10% of all samples obtained for calculating the geometric mean shall exceed 43 colonies/100 mL
Dissolved Oxygen	7.0 mg/L minimum
Temperature	13.0 °C maximum or 0.3 °C incremental increase above background
pH	7.0 to 8.5 standard units
Turbidity	Less than 5 NTU above background turbidity when the background turbidity is 50 NTU or less, or have more than a 10% increase in turbidity when the background turbidity is more than 50 NTU.
Toxics	No toxics in toxic amounts

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Industrial Wastewater

If pollutant concentrations in a proposed discharge exceed water quality criteria with technology-based controls that the Department has determined to be AKART, a mixing zone may be authorized in accordance with chapter 173-201A WAC. A mixing zone study was performed by the Port of Seattle to determine the amount of mixing available at Outfall 001. The study used the PLUMES model to determine the dilution available from the existing outfall configuration and several alternatives. The dilution factors for the existing outfall and the maximum allowable mixing zone in chapter 173-201A were determined to be 60 (acute) and 470 (chronic). These dilution factors will be recalculated if necessary when the AKART report is finalized to reflect

changes in the IWTP flow rate and/or the outfall configuration. The size of the mixing zone will be established through a major permit modification.

The impacts of dissolved oxygen deficiency and pH were considered as discussed below. No other water quality criteria pollutants are present in the IWTP discharge at levels of concern (see Table 6 above).

BOD_5--When the technology-based limitations are developed, the Department will determine if the amount of BOD loading relative to the amount of dilution occurring in the receiving water at critical conditions will potentially violate the water quality criteria for dissolved oxygen. If not, the technology-based limitation will be used to protect the dissolved oxygen criteria in the receiving water.

pH--Because of the high buffering capacity of marine water, compliance with the technology-based limits of 6 to 9 will assure compliance with the water quality standard for pH.

Stormwater

Fecal Coliform-- Fecal coliform are harmless bacteria that reside in the intestinal tracts of warm-blooded animals, including human beings. Fecal coliform are used to indicate the presence of pathogenic organisms from human waste. Pathogenic organisms may be discharged in human wastewater by human beings who are infected with disease or who are carriers of disease. Fecal coliform are used to indicate the presence of human pathogenic organisms because the identification of pathogenic organisms in water is both extremely time-consuming and difficult. If high fecal coliform counts are traced to wildlife population, then the fecal coliform are not indicating the presence of human pathogens, and therefore may not indicate a risk to human health.

The updated SWPPP required in Special Condition S12 is required to address fecal coliform in the stormwater discharges. The Port should perform additional testing to determine the source of fecal coliform for the updated SWPPP.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

In August, 1996, EPA issued an Interim Approach for Water Quality-Based Effluent Limitations in Stormwater Permits [Federal Register: August 26, 1996 (Volume 61, Number 166)]. This policy addressed issues related to the type of effluent limitations that are most appropriate for NPDES stormwater permits to provide for the attainment of water quality standards. The Policy seeks to fulfill the objectives of the 1996 - 1997 National Water Program Agenda for the Future, including reducing the threat of wet weather discharges to water quality, providing States and local governments with greater flexibility to solve wet weather problems. The policy was developed because of the variable nature of stormwater discharges and the typical lack of information on which to base numeric water quality-based effluent limitations.

The interim permitting approach uses best management practices (BMPs) in first-round stormwater permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards. The stormwater permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring, or a combination of monitoring procedures designed to gather necessary information.

Copper, lead, and zinc are present in Sea-Tac Airport's stormwater discharge. Table 9 compares the 95th percentile, 95 percent confidence level of the stormwater data for copper, lead, and zinc to the respective water quality criteria. This is a direct comparison of effluent data to the water quality criteria without a mixing zone. Some amount of mixing should be allowed given that the application of BMPs satisfies the requirement for AKART. Mixing zone analysis to determine dilution factors is a very complicated modeling problem for stormwater. Assuming no mixing zone, the stormwater discharges from Sea-Tac Airport show reasonable potential to violate the water quality criteria for copper, lead, and zinc.

The stormwater metals monitoring requirement is in the form of total recoverable. When the effluent monitoring data is compared with the water quality standards to determine reasonable potential to violate the criteria, a translator is used to convert the criteria from dissolved to total recoverable. The determination of the translator is discussed on page VI-5a of the Permit Writer's Manual (July 96).

Table 9: Reasonable Potential Analysis for Copper, Lead and Zinc in Stormwater

	Fresh Water Acute Water Quality Criteria[a]		All Outfalls
Parameter	Des Moines Creek	Miller Creek	95th Percentile Stormwater Data
Copper (µg/L)	6.7	4.4	115
Lead (µg/L)	21.9	12.6	44
Zinc (µg/L)	48.8	33.7	412

[a]Water quality criteria as total recoverable metal (µg/l) at a hardness of 35.6 mg/L $CaCO_3$ for Des Moines Creek and 23 mg/l $CaCO_3$ for Miller Creek (the 10th percentile value measured in the background). These criteria are based on EPA's criteria promulgated in FR Vol. 60, No. 86.

The Annual Stormwater Monitoring Report analyzed the metals data from the first two years of stormwater monitoring. This report noted that the copper, lead, and zinc concentrations from the four airfield (runways and taxiway) subbasins were typically lower than the terminal and landside data. This points to vehicle traffic as a probable source for these metals. When comparing median metals values to other regional data, copper was typically higher and lead and zinc were typically lower at Sea-Tac Airport. Table 10 compares the Sea-Tac Airport stormwater data with other regional data.

Table 10: Comparison of Median Metals Concentrations in Regional Stormwater

Parameter	ACWA, 1997[a]	Highway Runoff[b]	Sea-Tac Airport[c]
Copper (µg/L)	9	43	30
Lead (µg/L)	10	466	5
Zinc (µg/L)	480	638	72
[a]Oregon NPDES Stormwater Monitoring Data Compiled by ACWA for Mixed Land Use.			
[b]Port of Seattle, 1996c. Highway runoff in 15 locations in Seattle with 57,000 ADT, 43 to 64 storm samples in 1980 - 1981.			
[c]Median of all stormwater outfall monitoring data between 6/94 and 5/97.			

An important consideration in regulating discharges of metals based on the water quality criteria is the form the metal takes in the receiving water. The water quality standards for copper, lead, and zinc are based on the metal in the dissolved form. These standards apply to the metal in the receiving water, not the discharge. As the effluent mixes with the receiving water, the chemical properties of the mixture will determine the fraction of the metal that is dissolved and the fraction of the metal that is in particulate form (typically adsorbed to surfaces of other compounds). Many different properties influence this dissolved to total recoverable metal ratio. Important factors include water temperature, pH, hardness (calcium carbonate concentration), concentrations of metal binding sites such as total suspended solids, particulate organic carbon, dissolved organic carbon, and acid volatile sulfides, as well as concentrations of other metals and organic compounds that compete with the metal ions for the biding sites. It is difficult to predict the result of such complex chemistry. The most straightforward approach is to analyze the mixture to determine the dissolved and total recoverable metal fractions.

The Stormwater Receiving Environment Monitoring Report (June 1997), prepared by the Port of Seattle, will be used to develop a partitioning coefficient for copper, lead, and zinc in Miller and Des Moines Creeks. These coefficients will be applied to the total recoverable copper, lead, and zinc stormwater effluent monitoring data to predict the dissolved concentration in the receiving water for comparison with the dissolved water quality criteria.

As stated above, the water quality criteria for copper, lead, and zinc are based on the metal in the dissolved form. Taking copper as an example, dissolved copper takes many forms, including the ionic form and numerous organic-inorganic complexes. The ionic form of copper is highly bioavailable, and therefore toxic to aquatic organisms at low concentrations, while complexed copper is basically nontoxic (Hall, 1997). The NPDES permitting process makes the assumption that all dissolved copper is present in the most toxic form, which may not be accurate because the ionic form is highly-reactive, readily forming nontoxic complexes. The dissolved metal analytical procedure is currently used to measure compliance with water quality standards in the receiving water because dissolved metal more closely approximates the bioavailable fraction of metal in the water column than does total recoverable metal.

Copper, lead, and zinc are present in all urban stormwater runoff. Research on stormwater treatment BMPs for metals is ongoing. This permit requires the SWPPP to be updated no later than November 30, 1998. The updated SWPPP will need to address the copper, lead, and zinc in the stormwater discharges from Sea-Tac Airport. This permit also includes an ongoing requirement for outfall monitoring and annual data analysis to determine the effectiveness of the SWPPP. Acute whole effluent toxicity testing will be required to help determine whether the discharge of metals in the stormwater has the potential to cause aquatic toxicity in the receiving water.

WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

The proposed permit requires whole effluent toxicity testing for both the IWTP effluent and stormwater. IWTP effluent will be characterized for both acute and chronic toxicity. Stormwater will be characterized for acute toxicity only, due to the intermittent nature of the discharge.

Special Conditions S8 and S9 delay the IWTP effluent characterization for WET until the completion and startup of the new or improved wastewater facility required in Special Condition S4. WAC 173-205-030(4) allows the Department to delay effluent characterization for WET for existing facilities that are under a compliance schedule in a permit to implement technology-based controls or to achieve compliance with surface water quality-based effluent limits.

If acute or chronic toxicity is measured during the IWTP effluent characterization at levels that, in accordance with WAC 173-205-050(2)(a), have a reasonable potential to cause receiving water toxicity, then the proposed permit will set a limit on the acute or chronic toxicity. The proposed permit will then require the Permittee to conduct WET testing in order to monitor for compliance with either an acute toxicity limit, a chronic toxicity limit, or both an acute and a chronic toxicity limit. The proposed permit also specifies the procedures the Permittee must use to come back into compliance if the limits are exceeded.

When the WET tests during effluent characterization indicate that no reasonable potential exists to cause receiving water toxicity, the Permittee will not be given WET limits and will only be required to retest the effluent prior to application for permit renewal in order to demonstrate that toxicity has not increased in the effluent.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC_{50}, EC_{50}, IC_{25}, etc. All accredited labs have been provided the most recent version of the Department of Ecology Publication # WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* which is referenced in the permit. Any Permittee interested in receiving a copy of this publication may call the Ecology Publications Distribution Center 360-407-7472 for a copy. The Department recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the applicant's discharges do not contain chemicals of concern based on existing data. The discharge will be re-evaluated for impacts to human health at the next permit reissuance.

SEDIMENT QUALITY

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The permittee conducted a sediment monitoring study at Outfall 001 during the previous permit cycle. Although the report detected some contaminants in the sediments, no substance exceeded its respective sediment quality standard or lowest apparent effects threshold value. The proposed permit requires the sediment testing to be repeated to confirm these results within three years of the permit issuance date.

GROUND WATER QUALITY LIMITATIONS

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect beneficial uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100). The conditions in the permit that regulate ground water are imposed pursuant to state law only and not as part of the NPDES Permit or the Federal Water Pollution Control Act, also known as the Clean Water Act (33 U.S.C § 1251, et seq.).

Industrial wastewater and stormwater are both discharged to surface water at Sea-Tac Airport, except for the discharge to ground water from the unlined Lagoon 3. This discharge will be eliminated when Lagoon 3 is lined. There are two systems that could potentially contaminate ground water through unintentional releases: (1) the IWS collection and treatment system, and (2) the underground fuel storage tanks (USTs) and fuel distribution systems.

The IWS collects fuel spills that occur occasionally during day-to-day operations at the airport. These spills are washed off of the pavement into the IWS collection system by the Fire Department. The spills are stored in the IWS lagoons until they are processed through the IWTP.

A potential release to ground water could occur if the IWS collection system and lagoons did not properly contain the fuel spills. The Port of Seattle has a maintenance program to routinely inspect, maintain, and upgrade the IWS collection system. Lagoons 1 and 2 are lined with a polyethylene liner that effectively contains the fuel spills. Lagoon 3 has not yet been lined, but will be lined in the next few years.

The proposed permit contains a requirement for a hydrogeological study to evaluate the potential for the Industrial Wastewater Facility to impact ground water. The study will include an assessment of the current condition of the hydrogeologic environment in the vicinity of the IWTP and lagoons.

The underground fuel storage and distribution systems at the airport have implemented applicable BMPs, including various methods of leak testing, to prevent releases. Depending on the nature of the individual system, several requirements of the federally-mandated UST regulations apply to the operations and closure of these systems. These regulations are implemented by the Department's Toxic Cleanup Program (TCP).

Ground water at Sea-Tac Airport has been unintentionally impacted in some locations in the past, primarily due to malfunctions of fuel systems. The fuel systems associated with these locations are no longer operational. The releases to ground water have been gasoline and, to a larger extent, Jet A fuel. The known, significant past releases have been investigated and contaminant impacts have been characterized. At some locations, additional characterization is being performed. The boundary of the impacts are known and typically there is localized contaminant migration in ground water from the original source areas. All such sites have been or are being remediated and/or monitored appropriately as required by the Model Toxic Control Act (MTCA).

As part of the ongoing MTCA program at Sea-Tac Airport, the Port of Seattle will be conducting an investigative study of the ground water via an agreed order with the TCP. The study will evaluate data from past releases of fuel and other documented releases, as well as data describing hydrogeological and associated conditions, to determine whether there is a significant risk that contamination from known and unknown sources in the airport's primary aircraft operations and maintenance area could unacceptably impact ground water, and in particular reach identified local receptors of concern. Another part of the agreed order will investigate and implement additional pollution prevention practices that could prevent future releases from the fueling facilities.

COMPARISON OF EFFLUENT LIMITS WITH THE PREVIOUS PERMIT

The interim effluent limits for flow has changed from 2,500 gpm (whenever the combined flow from the IWS and the Midway Sewer District exceeds ninety percent of Outfall 001's capacity of 12,500 gpm) to 4,800 gpm. The basis of the flow limitation in the previous permit was the discharge agreement between the Midway Sewer District and the Port of Seattle. This agreement effectively limited the flow only in large storm events, when the Midway Sewer District experienced high influent flow rates. The flow limitation in the proposed permit is based on the design peak loading rate for the DAF units in the IWTP. The discharge flow rate shall also not exceed the discharge rate specified in the Midway Sewer District discharge agreement.

Total ammonia; polynuclear aromatic hydrocarbons (PAHs); benzene, toluene, ethylbenzene, and xylenes (BTEX); total recoverable phenolics; and priority pollutant metals have been removed

from the final effluent limitation parameter list. IWTP effluent monitoring over the previous permit cycle has shown that these parameters are not present at levels of concern. Final effluent limitations for these parameters were not contained in the previous permit, but were listed as "To Be Determined".

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

LAB ACCREDITATION

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.*

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 273-220-210).

COMPLIANCE SCHEDULE

The Permittee is required in Special Condition S4 to submit an updated engineering report describing plant modifications and/or additional wastewater treatment necessary for the Department to determine AKART for the IWS effluent. The engineering report will include a schedule for project design, construction, and startup. The report is due within one month of the issuance date of the permit.

OPERATION AND MAINTENANCE

In accordance with state and federal regulations, the Permittee is required to take all reasonable steps to properly operate and maintain the treatment system (40 CFR 122.41(e)) and WAC 173-220-150 (1)(g). An Operation and Maintenance (O&M) Manual was submitted as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150). Special Condition S5.A requires the Permittee to review the O&M Manual at least annually and to confirm this review by letter to the Department.

SPILL PLAN

The Department has determined that the Permittee stores a quantity of chemicals that have the potential to cause water pollution if accidentally released. The Department has the authority to require the Permittee to develop best management plans to prevent this accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080.

The Permittee has developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the Permittee to update this plan and submit it to the Department.

STORMWATER POLLUTION PREVENTION PLAN FOR AIRPORT OPERATIONS

Special Condition S12 requires the Permittee to update the existing Stormwater Pollution Prevention Plan (SWPPP) at least twice during the term of the proposed permit. The first update is due by November 30, 1998. A primary objectives of the SWPPP for Airport Operations is to implement and maintain Best Management Practices (BMPs) to identify, reduce, eliminate, and/or prevent the discharge of stormwater pollutants to protect the water quality standards in the receiving water.

STORMWATER POLLUTION PREVENTION PLAN FOR CONSTRUCTION ACTIVITIES

Special Condition S13 requires a SWPPP for construction activity, including construction dewatering, to be prepared and implemented prior to the commencement of any construction activity that disturbs five or more acres of total land area. The main objective of a SWPPP for construction activities is to implement BMPs to minimize erosion and sediments from rainfall runoff at construction sites, and to identify, reduce, eliminate, or prevent the pollution of stormwater.

STORMWATER DRAINAGE REPORT

Special Condition S14 requires that the existing Stormwater Drainage Report be amended prior to any planned action that would adversely affect the hydrology in either Miller or Des Moines Creek.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual industrial NPDES permits issued by the Department.

Condition G1 requires responsible officials or their designated representatives to sign submittals to the Department. Condition G2 requires the Permittee to allow the Department to access the treatment system, production facility, and records related to the permit. Condition G3 specifies conditions for modifying, suspending or terminating the permit. Condition G4 requires the Permittee to apply to the Department prior to increasing or varying the discharge from the levels stated in the permit application. Condition G5 requires the Permittee to construct, modify, and operate the permitted facility in accordance with approved engineering documents. Condition G6 prohibits the Permittee from using the permit as a basis for violating any laws, statutes or regulations. Conditions G7 and G8 relate to permit renewal and transfer. Condition G9 requires the Permittee to control its production in order to maintain compliance with its permit.

Condition G10 prohibits the reintroduction of removed substances back into the effluent. Condition G11 states that the Department will modify or revoke and reissue the permit to conform to more stringent toxic effluent standards or prohibitions. Condition G12 incorporates by reference all other requirements of 40 CFR 122.41 and 122.42. Condition G13 notifies the Permittee that additional monitoring requirements may be established by the Department. Condition G14 requires the payment of permit fees. Condition G15 describes the penalties for violating permit conditions.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards for Surface Waters, Sediment Quality Standards, or Water Quality Standards for Ground Waters, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that this permit be issued for four and one-half years to correspond with the Cedar/Green Water Quality Management Area permit issuance cycle.

REFERENCES FOR TEXT AND APPENDICES

Cosmopolitan Engineering Group

1995. Effluent Mixing Zone Study, August, 1995.

1997. Effluent Mixing Zone Study, January, 1997.

Des Moines Creek Basin Committee. Draft Des Moines Creek Basin Plan, March, 1997.

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Hall, John C., William T. Hall, and Charles T. Simmons. "Water Quality Criteria for Copper," Water Environment Technology, June , 1997 (Vol. 9, No. 6, pp 45 - 49).

HDR Engineering, Inc.

1996. Port of Seattle, Sea-Tac International Airport Storm Drainage System Comprehensive Plan, December, 1996.

1997. Port of Seattle, Sea-Tac International Airport Storm Drainage System Comprehensive Plan, February, 1997.

Kennedy/Jenks Consultants

1995a. Port of Seattle Seattle-Tacoma International Airport. Industrial Waste System Wastewater Treatment Plant, Operation and Maintenance Manual, May, 1995.

1995b. TSS Treatability Test Report Seattle-Tacoma International Airport, November 1, 1995.

1995c. Port of Seattle Seattle-Tacoma International Airport. Industrial Waste System and Treatment Plant Final Engineering Report, December, 1995.

1997. Port of Seattle Seattle-Tacoma International Airport. Draft Evaluation of Glycol Recovery Vehicle Performance, May 6, 1997.

Port of Seattle

1994. Vehicle Washwater Report, December 31, 1994.

1995a. 1994/1995 Glycol Usage Report, April 27, 1995.

1995b. Spill Prevention Control and Countermeasure Plan, June, 1995.

1995c. Stormwater Pollution Prevention Plan, June 30, 1995.

1995d. Annual Stormwater Monitoring Summary Report, August 30, 1995.

1995e. Stormwater Pollution Prevention Plan, November 27, 1995.

1996a. Investigation of Occurrence of Petroleum Hydrocarbon Product in the Detention Structure at Storm Water Outfall SDS3-39A, Seattle-Tacoma International Airport, King County, Washington. January 16, 1996.

1996b. 1995/1996 Glycol Usage Report, May 17, 1996.

1996c. Annual Stormwater Monitoring Summary Report, November 18, 1996.

1997a. Procedure Manual for Stormwater Monitoring, March 7, 1997.

1997b. 1996/1997 Glycol Usage Report, April 30, 1997.

1997c. Stormwater Receiving Environment Monitoring Report for NPDES Permit No. WA-002465-1, June, 1997.

1997d. Annual Stormwater Monitoring Summary Report, September 29, 1997.

Sills and Blakeslee, 1991. The Environmental Impact of Deicers in Airport Stormwater Runoff. Presented at the conference, "Alternative Deicing Technologies and the Environment," March 25-26, 1991, Michigan State University, Lansing, Michigan.

Stevens, Thompson and Runyan, Inc., 1974. Final Report. Water Quality and Drainage Study: Seattle-Tacoma International Airport and Vicinity Master Planning Program for Port of Seattle and King County.

University of Washington, 1972. Miller Creek Watershed. UW Department of Landscape Architecture.

URS

1995. Sediment Baseline Final Report, July, 1995.

1996. Sediment Baseline Revised Final Report, September, 1996.

Washington State Department of Ecology.

1992. Stormwater Management Manual for the Puget Sound Basin. Publication Number 91-75.

1994. Permit Writer's Manual. Publication Number 92-109.

1996. Implementation Guidance for the Ground Water Quality Standards. Publication No. 96-02.

1997. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Publication No. WQ-0R-95-80.

1998. Watershed Approach to Water Quality Management Draft Needs Assessment for the Cedar/Green Water Quality Management Area. February, 1998.

FIGURES

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on 5/26/97 and 6/2/97 in the Seattle Times and the Highline Times to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on 10/10/97 in the Seattle Times South Edition and on 10/18/97 in the Highline Times to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Ave. S.E., Bellevue, WA 98008-5452

A Public Meeting will be held at the Burien Public Library on Monday, November 3, 1997 at 6:00 p.m. for the public to ask questions and find out more about the permit.

A Public Hearing will be held at the Burien Public Library on Monday, November 10, 1997, to receive oral and written testimony for the record. Hearings are open to all individuals and groups to state their views for the official record.

WHERE: Burien Public Library, 14700 - 6th Avenue SW, Burien, WA 98166

The Department will consider all comments received by December 10, 1997, in formulating a final determination to issue, revise, or deny the permit. Testimony and written comments submitted for the record will be addressed by Ecology in a responsiveness summary document. Only those comments which specifically address the proposed draft permit can be considered by Ecology at the Hearing, in the responsiveness summary, and in the development of the draft permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (425) 649-7276, or by writing to the address listed above.

This permit and fact sheet were written by Lisa Zinner, P.E.

APPENDIX B--DEFINITIONS

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of prevention and treatment".

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Anti-icing--Measure taken to prevent ice accumulation on the surface of the aircraft, airfield, or runway.

Average Monthly Discharge Limitation --The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Colloidal Particles--Small particles in the size range of 5 to 5,000 angstroms that do not settle out of suspension rapidly and are not readily filtered.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Deicing--Removing ice from the surface of aircraft, airfield, or runway.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Erosion--means the wearing away of the land surface by running water, wind ice, or other geological agents, including such processes as gravitational creep.

Erosion and Sediment Control BMPs--BMPs that are intended to prevent erosion and sedimentation, such as preserving natural vegetation, seeding, mulching and matting, plastic covering, filter fences, and sediment traps and ponds. Erosion and sediment control BMPs are synonymous with stabilization and structural BMPs

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial Wastewater--Industrial wastewater is water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater, non-contact cooling water, or stormwater associated with industrial activity. Industrial wastewater may result from any process or activity of industry, manufacture, trade or business, and includes, but is not limited to: water used for industrial processes such as pipe integrity pressure testing and vehicle and aircraft wash water; stormwater contaminated with fuel, oil, fire foam, cleaning agents and aircraft deicing/anti-icing agents; contaminated construction dewatering waters; excess water from ground water well construction and monitoring; and leachate from solid waste facilities. Industrial wastewater does not include stormwater runoff that contains deicing/anti-icing agents that shear or drip from aircraft in the storm drainage system.

Industrial Wastewater Facility--means all structures, equipment, or processes required to collect, carry away, treat, reclaim or dispose of industrial wastewater.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Significant Amount—means an amount of a pollutant in a discharge that is amenable to available and reasonable methods of prevention or treatment; or an amount of a pollutant that has a reasonable potential to cause a violation of surface or ground water quality or sediment management standards.

Site--means the land or water area where any "facility or activity" is physically located or conducted. The site of the Seattle-Tacoma International Airport is indicated in Figure 2.

Solid Waste-- all putrescible and nonputrescible solid and semisolid wastes, including but not limited to garbage, rubbish, ashes, industrial wastes, swill, demolition and construction wastes, abandoned vehicles or parts thereof, and discarded commodities. This includes all liquid, solid and semisolid materials which are not the product of private, public industrial, commercial mining and agricultural operations. Solid waste includes but is not limited to sludge from wastewater treatment plants and septage, from septic tanks, woodwaste, dangerous waste and problem wastes. Solid waste does not include industrial wastewater as defined in this permit.

Spill—means an unauthorized discharge of oil and hazardous substances into waters of the state. For the purposes of this permit, a spill also includes the accidental and unauthorized release of pollutants to state waters which may not be defined as oil or hazardous substances, such as, but not limited to, domestic sewage and industrial wastewater. An overflow of untreated industrial wastewater from the IWS collection systems or lagoons due to stormwater flows in excess of the design criteria is an authorized bypass, not a spill.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee, which includes, but is not limited to severe stormwater events, summer algae blooms, start ups or shut downs, cold weather operation (below 35 °F). An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.