Water Resources Consulting L.L.C.
Peter Willing, Ph.D.

February 16, 2001

U.S. Army Corps of Engineers
Regulatory Branch
P.O. Box 3755
Seattle, Washington 98124-2255
ATTENTION: Jonathan Freedman

Washington State Department of Ecology
3190 160th Ave. S.E.
Bellevue, Washington 98008-5452
ATTENTION: Ann Kenny

RE: Department of the Army Section 404 Permit Application, SeaTac Airport
Reference: 1996-4-02325

Dear Mr. Freedman and Ms. Kenny,

The following review of water quality and water management aspects of the plan for SeaTac Airport comes to you at the request of the Airport Communities Coalition. I base my statements on 30 years of experience in reviewing major projects for water quality and water quantity impacts. My resume summarizes this experience and is attached.

I have referred to the following documents in the course of this review:

- Comprehensive Stormwater Management Plan, Master Plan Update Improvements, Seattle Tacoma International Airport. Prepared for the Port of Seattle by Parametrix, Inc. December 2000; previous versions of August 2000 and November 1999.
- Annual Stormwater Monitoring Report for Seattle Tacoma International Airport, July 1, 1999 - June 30, 2000. September 28, 2000.
- Seattle Tacoma Airport Master Plan Update Low Streamflow Analysis. Earth Tech, Inc., December 2000.
- NPDES Permit No. WA-002465-1, dated January 25, 1999, and its appurtenant Fact Sheet.
- National Pollutant Discharge Elimination System Discharge Monitoring Reports for SeaTac Airport, Port of Seattle, Permit no. WA-002465-1. 1998-2000.
- Des Moines Creek Basin Plan, November 1997
- King County Surface Water Design Manual, September 1998

The following section is a summary of my analysis:

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Exhibit 350
Date 2/15/02
Witness Willing
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Since the August 2000 version of the Stormwater Plan, there has been a disturbing lack of improvement in the features of the airport plan that bear on water quality. These features will greatly diminish water quality in the streams and aquifers surrounding the SeaTac area. There is no basis for Clean Water Act Section 401 certification or Section 404 approval. I will summarize the broad issues before proceeding to detailed comments.

- The Port of Seattle's plan for stormwater management is to divert flow from the stormwater system to the industrial waste system. This in effect diverts it from the Des Moines and Miller Creek basins, through the Renton treatment plant discharge, to Puget Sound. This hydrologic re-definition of the SeaTac area watersheds has the effect of concentrating a modestly reduced pollutant load into a greatly reduced annual runoff volume. By intercepting recharge, it has the potential to aggravate water quality problems in streams that are already heavily degraded. It also violates Governor Locke's certification of June 30, 1997 to the Secretary of Transportation, that "The Port of Seattle will design and construct the third runway such that the project will not cause changes in the location of the hydrologic divide between Miller and Des Moines Creeks in a manner that alters the average instream flow of either creek."

- A consistent direction in the Plan is the disposal of water-borne pollutants to biofiltration swales and filter strips. This approach anticipates permanent shallow soil disposal for long-lived pollutants. The harmful consequences of this decision have not been addressed in the Plan.

- The Low Streamflow Analysis reports a variety of modeling simulations. Estimates of low flow behavior were based on statistical analysis of the results of a model simulation. They were not based on actual flows, and thus they are an abstraction from reality. There are doubts about the applicability of the model calibration to actual low flow conditions. These results are used to develop low flow targets for stream systems that have been degraded by generations of man-made interference.

- The fate and transport of contaminants in SeaTac soils is an inescapable complication of any new construction at the airport. There is an acknowledged 50-year accumulation of contaminants, and proposed airport expansion activities will disturb and mobilize them. Instead of making systematic provisions for dealing with them. the Port appears to be counting on an ad hoc response when it can no longer be avoided.

- Existing Best Management Practices for stormwater at the airport have not been working, based on measured water quality parameters, partly because they were not designed for the water treatment problem at hand. Yet the Port of Seattle plans to install more facilities that,

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like the existing ones, come from the King County Basic Water Quality Menu. The plans will result in perpetuation of water quality violations. The Port offers no assurance that water quality violations will not continue and increase as a result of the proposed project.

Existing stormwater discharges from SeaTac Airport continue to exceed the Washington State Water Quality Standards on a regular basis. These discharges are routed to Class AA streams that are on the 303(d) list of impaired waters. The streams themselves do not meet the state water quality standards, and many of the beneficial uses they should support have been compromised. There is no doubt that the state water quality standards are being violated. The stormwater plan relies on measures that will result in continuing future violations. Therefore the December 2000 version of the Stormwater Management Plan fails to constitute reasonable assurance that water quality standards will be met.

The above points are further explained below in comments on specific sections of the Stormwater Management Plan and accompanying documents.

Stormwater Management Plan

Volume I, page 1-2 describes a "specific objective" as follows:

> Enhance stream low flows by ceasing the exercise of existing surface water rights (obtained by the Port through property acquisitions) on Miller Creek, supporting and participating in the Des Moines Creek Basin Committee's flow-augmentation project on Des Moines Creek, incorporating infiltration into stormwater detention facilities where feasible, and if necessary, supplementing low flow with stored stormwater.

The promises in this section deserve to be examined one at a time. Three out of four of the promises appear to be uncertain or exaggerated. Relinquishment of water rights in Miller Creek turns out to be a net loss of water if it is balanced against termination of water imports into the basin. The Des Moines Creek Basin Plan was developed to deal with past ills, and does not pretend to have the resources or intent to mitigate Port watershed damage in the future. Further, no source of water has been obtained for this project. All of the conceptual sources that the Port has proposed have fatal flaws, which will be discussed in a later section.

Page 2-7 section 2.2.1 (in language unchanged from the August version) reports in narrative form an optimistic and idealized view of stormwater quality at the Port:

> Source controls and treatment facilities are implemented throughout STIA for all activities. This infrastructure is continually updated via an adaptive management process by which (1) BMP's are implemented, (2) monitoring and inspections demonstrate BMP effectiveness, (3) BMP improvements are made when necessary, and (4) follow-up sampling demonstrates that the improvements are effective. . . .

This description greatly exceeds the actual experience, which is a record of permit violations, unmet water quality criteria, and 303(d) listings for SeaTac area streams. In the face of this situation, section 2.2.2 (p. 2-6) says "ongoing water quality monitoring may indicate the need for future water quality BMP's."

Page 2-7, Section 2.2.2.2 recites a variety of facilities from the King County Basic Water Quality menu that will be used to manage the quality of water running off airport properties. The Plan does not mention the loading rates, ultimate fates, and mass balance relationships for major pollutants. They are all treated as if they just go away. The filter strip section on page 2-8 talks about "removal of metals and organic compounds is also significant, as these pollutants typically bind to trapped particles and/or the organic material in the soil and vegetation." In fact, filter strips are not very effective at removing anything but sediment. King County pointed this out in its review of the last (September 2000) version of the plan, but it remains unchanged. King County made it clear that if the SeaTac plans had been processed under the Large Site Drainage Review, the Port would be expected to produce BMP's with performance standards specific to the proposed conditions and contaminants. The consequence of the Port's stormwater management strategy is a high level of contamination in the surface soils. At anticipated rates of input, many pollutants such as metals, organics, and petroleum products will build up to substantial amounts. The dissolved air floatation sludge resulting from the industrial wastewater treatment process is classified as a hazardous waste, but the same materials in the stormwater system are simply disposed to land. Re-mobilization in relatively large slugs by heavy rains has not been assessed.

Page 4-13 says that 68% of the existing airport area that generates pollution is treated by facilities that are up to modern design standards. This leaves 32% that is not so treated, under existing conditions. These percentages do not agree with the accompanying table (4-6), which does not total treated and untreated acreages. If it did, it would show 55% treated and 45% not fully treated.

Page 4-15, Section 4.5.1.2, Subbasin PGIS Areas, informs us that "for the purposes of this initial assessment, roof tops were assumed to be non-PGIS [non-pollution-generating impervious surface]." Other documents make it plain that these surfaces do produce pollutants. Appendix T shows building roof surfaces that add up to approximately 5.2 acres of bare metal roof (an increase of one acre since the August estimate), plus a substantial area that has not been inventoried. These areas are mostly in subbasin SDN1, which has shown numerous permit violations for zinc, copper, and lead. The Annual Stormwater Monitoring Report that was completed in September 2000 says that Whole Effluent Testing (WET) led to zinc from two metal roofs as a suspected toxicant.

Page 4-15, Section 4.5.1.3, BMP Inventory, says that "Bioswales were conservatively assumed to be trapezoidal, 6-ft-wide at the base, 2-inch-deep flow (regularly mowed), with 3:1 side slopes." One would expect a Stormwater Management Plan to have more than assumptions about the geometry of existing bioswales, especially as there are only four of them shown. They total 0.53 acres, which are supposed to serve 99 acres of future PGIS. This ratio is hardly plausible, particularly if the characteristics of the swales are all assumed. The Plan lacks a specific inventory of dimensions, treatment capacity, and performance levels for the anticipated waste stream. Without it, we have no assurance that the waste stream is being treated at all.

Page 4-15, Section 4.5.2. SDS Water Quality, claims that

> overall, the data show that the concentration of various constituents in STIA stormwater are generally less than those in runoff from other residential, urban, and industrial areas in the region. For example, the median concentrations for STIA constituents are lower than those in urban stormwater , with the exception of total

> recoverable copper. These data provide evidence for the efficacy of BMP's that have been implemented by the Port . . .

This set of claims is misleading on three counts: 1) it deflects attention from the fact that there has been a consistent history of permit violations and an unsatisfactory track record for existing BMP's; 2) it is of no relevance in assessing water quality impacts how the airport compares itself to the region; 3) a median of reported values is a meaningless indicator of water quality performance.

Table 4-8 (page 4-17) has been changed from the August version only by showing lower "median" values for SeaTac. It purports to back up the claim that SeaTac runoff is better than other developed areas in the region. However the metal values do not show any accompanying hardness values, in the absence of which they cannot be compared. Furthermore, they are "median" values for subbasin SDS3, which has contributed part of a long history of violating state water quality criteria for metals. The Port's Annual Stormwater Monitoring Reports have showed these violations in the past, but the most recent one for July 1999 through June 2000 attempts to hide the fact more securely than the previous ones. Instead of showing hardness data that corresponds with the metal sampling sources, it substitutes an across-the-board hardness value of 56 mg/l which purportedly is the median of seven samples collected in 1999 – data for which are not shown. Using a median value is a deception anyway, because it hides the violations in a pool of lower values. Besides, 56 mg/l is higher than any hardness values the Port has reported before: the median of 12 values reported in the last Monitoring Report is 14 mg/l. Under the State Water Quality Standards, even if one accepted the invalid notion of the 14 mg/l median, all of the five values shown in Appendix B are in violation, by up to 9 times the chronic toxicity standard for copper, and 7 times for lead. The effect of this distorted and selective use of the data is to make it look as though the metals analyses comply with the water quality standards, when in fact they do not.

On p. 4-18 (unchanged since August), the Port mentions only one specific discharge point, SDS1, for which "copper and zinc concentrations have dropped significantly," but shows no data to back up the claim. The Port does not mention the other outfalls in the stormwater system, which have not had a clean record. A far more useful way to portray the relevant information would be a tabulation of outfalls, with a water quality summary of each, and the state water quality standards for comparison. This would let the reviewer see what the situation is, where the problems are, and what needs to be done about them.

Page 4-18, Section 4.5.2.1, Metals and Hydrocarbons, offers a summary of water quality results based on relative statistics:

> Concentrations of these pollutants in STIA runoff are typically lower . . . more than 95% . . . were below levels found in urban runoff from other sources . . . 36% of the samples collected since March 1998 have had TPH concentrations less than the detectable limit . . . 75% of the lead, copper, and zinc . . . were below the median from comparable regional urban data.

There is little information in this summary. Average and median values are meaningless, because they say nothing about total mass loading or extreme concentrations; the argument is like the driver of an automobile claiming to drive the speed limit more often than other drivers.

Page 4-18, Section 4.5.2.2, Fecal Coliforms: the last two versions of the stormwater plan reported bacterial identification studies, but changed the conclusion. This section has been re-written to say that sanitary sewage is not the source of fecal contamination. The new evidence is not presented, nor are its contradictory conclusions explained, nor is a new candidate fecal source identified. If the Port has developed scientific data with sound methods, it should report the results so they can be evaluated. The substantial methodological limitations of bacterial source tracking techniques are reviewed in Sargeant (1999). The reviewer is forced to assess this section as an indefensible exercise calculated to shift responsibility for bacterial contamination away from the Port.

Page 4-18, Section 4.5.2.3, Suspended Solids: The median values of Total Suspended Solids tell us nothing. The important number to notice is the water quality criterion, which for AA waters is 5 NTU or 10% over background. Without the background levels, the suspended solids information is no more than empty statistics.

Page 4-20, Section 4.5.3, IWS [industrial waste system] Treatment Performance, announces that according to data from Port Discharge Monitoring Reports, effluent water quality limitations have been met since November 1996. The DMR's bias the picture however, because they show results from composite samples taken on a routine schedule, and do not show higher values that would be collected during storm events – when IWS overflows would be likely to happen. The analysis purporting to show zero overflow events in a 50 year period depends on continuous full capacity operation of the wastewater pumping system during winter (King County comments on September Stormwater Plan, 2000, p. 2). Nor does the plan say anything about the violation record shown in the Discharge Monitoring Reports for the stormwater outfalls that drain to local streams.

Frequency of IWS overflow to the stormwater system is a major determinant of water quality in receiving streams. Runoff from a large land area has been diverted to the IWS. Overflow frequency is a function of treatment capacity and storage. The storage capacity has apparently been increased from 47 to 72 million gallons, but at the expense of 11.5 acres of open water within 2,500' of both runways 34L and 34R, and mostly within the runway protection zone of 34L (Kennedy/Jenks, Industrial Wastewater Lagoon 3 Expansion Project, drawing STIA 0009-G-2; approved for construction by Ecology, 7/24/2000). (Because the Port has furnished few design details, the 11.5 acre number has to be derived from a stage-storage relationship based on the plans.) This feature cannot be reconciled with FAA Advisory Circular 150/5200-33, which has a siting criterion that no waste water settling ponds will be created within 10,000' of a jet aircraft runway.

The Stormwater Management Plan has several sections that refer to flow augmentation. Comments on these sections will be found in a separate part of these comments that is reserved for that subject.

Page 7-3 announces that "water quality for the third runway drainage is expected to be similar to that measured in subbasin SDS3 in recent years." This news is not reassuring, in light of the fact that the Port's Discharge Monitoring Reports for 1998-2000 show that this discharge has a sustained record of violation of the copper and zinc water quality standards.

Page 7-4 describes proposed expansion of the south aviation support area (SASA). Of 93 acres of new impervious surface, 58 will be diverted out of the basin to the industrial wastewater system; 35 acres will be routed to Des Moines Creek either directly or through biofiltration swales. Although there are numerous references to a new detention pond, including a size of 33.4 acre-feet on page

6-5 and Figure 6.1, there are no detailed plans in any of the Appendices (such as D or H) where one would expect to find them. A footnote on p. 7-4 discloses only the cryptic information that "SASA stormwater runoff may be discharged directly to Des Moines Creek after treatment. The SASA pond will then be designed . . ." in the future. For the present, there appears to be no detention pond at all for 98 acres of new impervious surface in this basin. With over half of this acreage draining to the IWS, these changes will bring about a massive hydrological redirection of the basin, in violation of Governor Locke's certification. Essentially 8 bioswales are expected to replace the varied wetland functional values of the existing land cover, which consists largely of mature vegetation (NHC, 2001).

Page 7-10 reports that retrofitting over 80 acres in subbasins SDS3 and SDE4 with conventional treatment BMP's will be impracticable. These are two of the subbasins that have reported discharge permit violations for metals in the last two years. It appears that the Port plan is to continue to discharge flows that violate the water quality criteria into the stormwater system as before, and passively hope for new BMP ideas to emerge. The same approach is anticipated for the Terminal drives. These proposals are not an adequate basis for section 401 certification.

The retrofitting section lists as treatment BMP's "routing of rooftop runoff through a Basic Water Quality Menu treatment BMP." Sedimentation will do nothing whatsoever to treat the runoff, which has dissolved metals but few suspended solids. This deficiency was carefully explained by King County (2000, p. 16) after the last version of the stormwater plan. No change has resulted. Without proper provision for the pollutant load of stormwater runoff, 401 approval must be denied.

Flow Augmentation for Des Moines Creek

The Port of Seattle's inability to propose a reliable and convincing water source for flow augmentation in Des Moines Creek was one of four reasons why the Port was forced to withdraw its application for a 401 permit in 1998 (see letter from T. Luster to E. Leavitz [sic] , September 25, 1998). The Port has not yet made up its mind how it plans to meet this obligation, much less "resolved" the issue beyond the narrow semantic terms of the facilitated negotiations in late 2000. The complete lack of certainty of outcomes for Des Moines Creek is underscored by the following chronology:

- Implementation Plan for the Des Moines Creek Flow Augmentation Facility, July 25, 2000. The "preferred option" in this version of the plan was to use water from a port-owned well.

- Revised Implementation Plan for the Des Moines Creek Flow Augmentation Facility, August 18, 2000. This version of the plan maintained the preference for the well source, but also discussed Seattle water.

- Flow Augmentation Update, email from Keith Smith to Tom Luster, September 6, 2000. This revision stated that "the primary source is water from Seattle Public Utilities."

- Des Moines Creek Flow Augmentation Preliminary Design." written by Kennedy/Jenks Consultants for the Port of Seattle, dated September 2000. This version says that water from SPU is "currently the preferred source" of flow augmentation water.

- The Port's Stormwater Management Plan of December 2000 says the water will come from the existing Port-owned well on the Tyee Golf Course.

- The Low Streamflow Analysis of December 2000 says that the Port proposes to construct additional stormwater storage facilities that would hold stormwater for later use in augmenting dry season low stream flows.

- The Port and Ecology appear to have agreed that there will be "no Separate Flow Augmentation Plan" for Des Moines Creek or any other creek; but that other documents produced for public comment will describe the facilities, monitoring, and operation (SeaTac Airport Third Runway 401 Permit Negotiations, Meeting Notes Summary; January 3, 2001). No such documents or description has emerged, however.

- The port is still "investigating other sources of water in the basin" (Dennis Ossenkop memorandum dated January 10, 2001 to Nancy Brennan-Dubbs; Response to USFWS Questions)

The existing documents are all incomplete, conflicting, inconsistent, and make it clear that no reliance can be placed on the Port of Seattle's handling of this important problem.

In the December 2000 Stormwater plan, p. 6-10. the "preferred plan" has reverted to the old Highline Water District well #1. The plan to use the well conflicts with information on p. 1-2, and in the Low Streamflow Analysis, which says (p. 15-20) that seasonal carry-over stormwater storage will be used for flow augmentation in Des Moines Creek. The Port of Seattle appears to be using whichever source suits the argument of the moment, hoping that several partial inconsistent plans will add up to one acceptable plan.

Page 6-11 of the Stormwater plan offers some details about how Des Moines Creek flows will be augmented according to monitoring instrumentation at the gauge at 200th St. This gauge is King County 11F, which has no rating curve. The weir is wide, so that a large variation in flows is represented by a very small increment of gauge height, leading to an insensitive control on the pump. The Port is proposing a delicately balanced feedback system to protect the flow in Des Moines Creek. As described, it will not work: it will fail to turn off and on at the right times. The proposed 19°C set point for temperature control is 3° above the water quality criterion. Reasonable assurance has to be based on a workable plan.

The December 2000 Stormwater plan, Page 7-21. Section 7.7.5, promises that the Port will "work with" the Des Moines Creek Basin Committee to implement the flow augmentation project. Mitigation for the third runway construction is a sole responsibility of the Port, and should not be confused with the purpose of the Committee's Basin Plan. The Committee Plan was developed to identify and remediate long-standing existing water quality problems, not to take on the new burdens on the Creek that the Port proposes.

All of the three major flow augmentation schemes that have been floated by the Port have serious defects that disqualify them as a contribution to the "reasonable assurance" the Port is required to provide. I will treat them one at a time.

Existing well on the Tyee Golf Course:

The Port came to an agreement with the Highline Water District about the former Highline well #1, on the golf course. This well was not used at all for a period of years, and then was used without benefit of a water right for many more years. It is highly unlikely there is a valid water right for the well. The administrative process to determine whether there is or not has not proceeded beyond the preliminary stages.

This well was not legally constructed under state law, the water right for it has probably expired, and it is not capable of making any contribution to reasonable assurance that the flow augmentation plan will work. The well exploits three different aquifers in a common casing, in contravention of state guidance on protecting upper aquifer zones. The revised flow augmentation proposal of August 18, 2000 contains several pages from an unidentified document with pages numbered 34 and 37, and some King County drawings. Page 34, 2nd para under "Assessment of Existing Well" has a description of well #1. There are several errors in this paragraph. It equates perforations with screens. They are not the same. "The second [set of perforations], between 190 and 243 feet, has an aquitard that makes it a confined aquifer." While there may be a large degree of confinement in this horizon, it is hardly an absolute – there is unquestionably some degree of vertical leakage. The discussion neglects to discuss the third set of perforations that are described on the well log, between 511' and 541', and it does not show on Figure 13.

The Port would have us believe that 35' of screen on an 8" casing at a depth of 511' to 541' is out-producing a total of 141' of perforated 12" casing at much shallower depths. This is very difficult to believe: the longer, larger diameter, shallower open interval would produce most of the water. "The well is configured so that the lower aquifer contributes the most flow." This statement is patent wishful thinking. Well #2 is screened in the upper aquifer, above 130' depth. The Port thinks this is different from Well #1, which is perforated from 72' to 160'. The same logic should apply to both: "Withdrawal from this aquifer would probably have an impact on Des Moines Creek recharge."

The Port's Figure 13 has further discrepancies that do not agree with the well log. It shows a "lower aquitard" consisting of "clay" of indeterminate thickness below 245' depth. The well log shows "Sand, clay, gravel;" "Fine sand and clay;" for this part of the well. To interpret these descriptors, one must acknowledge the well driller's convention of listing the most abundant materials first in the lithologic characterization. The materials described do not constitute an "aquitard." The effect of this discrepancy is to understate the degree of hydraulic continuity between Des Moines Creek and the producing horizon proposed for an augmentation water source. In all likelihood, the aquifer discharges naturally to the creek, and if the Port pumps it into the creek it will not be augmenting anything. In January 2001 the Port suggested "packing off" the upper cased intervals of the well. Clearance for this concept would have to follow a laborious showing that it will work. Before any reliance can be made of this well, it must be subjected to a detailed hydrogeologic analysis, inspection, and testing; in the end it still may not work.

Water from Seattle Public Utilities:

Temperature improvements claimed for the Implementation Plan cannot be realized with water from the Seattle distribution system. The first iteration of an Implementation Plan (under cover letter from

Keith R. Smith to Tom Luster, July 25, 2000) proposed a temperature target of 16°C for Des Moines Creek flows. In fact 16°C is the water quality standard for Class AA streams. The revised plan does not mention the temperature criterion. Even with cool water, attaining a target temperature of 16°C could require more than 1 cfs of augmentation water. Seattle Public Utilities staff data show that Lake Youngs water sometimes reaches 20°C in September. When it does so, during the time when supplemental water is most needed, it will not be acceptable for flow augmentation.

The SPU scheme relies on technological inputs whose continuity cannot be assured. There is a fundamental weakness in a mitigation plan that depends on technological inputs, such as chemicals, electronic sensors, programmable controllers, and large horsepower pumps. This point has been raised by the Corps, in its comments: "We discourage the use of structures in a mitigation site that might need direct human interaction over long periods of time to operate." (Terzi and Freeman to J. Kelly, Parametrix, August 11, 2000). The point was made emphatically in the Battle Mountain Gold decision also (Pollution Control Hearings Board, 2000). The Port has assumed that an SPU augmentation water supply would be non-interruptible (p. 2, top paragraph), but negotiations for a water purchase agreement with the City of Seattle have been suspended.

Delivery of water from the Seattle Public Utilities distribution system would entail 4,500' of 6" or 8" diameter pipeline from the present end of the distribution system to Des Moines Creek. This is a major construction project, that will require at least a 10' construction path, probably more; a pipe buried as much as 4 feet, bedded in pea gravel, the trench to be backfilled with pit run gravel. Yet "No wetlands will be affected" is the Port's summary of effects of this project. The pipeline would have to be routed around wetland 28, which is 35 acres, is discontinuous, and surrounded by other non-jurisdictional wetlands.

The SPU water would have to be purged of drinking water conditioning chemicals. The Port of Seattle has clearly not done its homework on this score. Obviously chlorine has a high toxicity to fish and cannot be tolerated in an augmentation flow. WAC 173-201A-040, the Washington State water quality criteria, specifies a maximum of 19 µg/l maximum 1-hour concentration of chlorine in a 3-year period. Fluoride is also a problem: the City of Seattle follows standard practice in applying fluoride to its water supply system, at concentrations designed to achieve a concentration of 1 mg/l at the point of service (APHA-AWWA-WPCF, 1989). To achieve the target concentration at the customer's tap means that it has to be slightly higher in the distribution system. Fluoride is applied to Seattle's Highline wells at the wellhead. Fluoride at 1 mg/l has been shown to cause mortality and morbidity in salmonids and other aquatic organisms (Strand, 2000). Fluoride will have to be removed from the water used for flow enhancement, and the Port implementation plan is totally silent on the matter.

Carry-over storage of stormwater:

The Port's Low Streamflow Analysis of December 2000 proposes a heretofore unmentioned scheme to use carry-over stormwater storage to augment streamflows in Des Moines and Miller Creeks. The scheme is to capture and store 8.9 acre feet in the Miller Creek Basin and 7.1 acre-feet in the Des Moines Creek basin. The storage facilities will presumably have to consist of additional depth in underground vaults, because open ponds would attract birds. The December plans (Appendix D, figures C139, C150, C151) show 7.2 acre feet of carry over storage in two vaults in the Miller Creek basin, but there is no indication of where the remaining 1.7 acre-feet will be stored. The plans show 1.8 acre-feet in the SDS4 vault on Des Moines Creek, but do not account for the remaining 5.3 acre

feet of required storage in that basin. The drawings show a dead storage discharge line in the bottom of the vault. If built as shown, the first discharge to the receiving Class AA streams which would already be under stressed low flow conditions, would be an anoxic slug of accumulated silt and sediment carrying a year's worth of adsorbed pollutant load. Contrary to the facilitated arrangement with Ecology in December, there is not a word about operational procedures to make this approach to flow augmentation effective. Because this idea has never come up before, and because it has no design or operational details, one is forced to assume that the concept is an afterthought. It by no means has the strength to carry the burden of reasonable assurance.

The Stormwater Management Plan, p. 6-3, section 6.1.4, "Water quality of stormwater stored in vaults" is optimistic that stormwater stored for as much as six months will be of adequate quality to discharge to streams during low flow periods. No examples of successful installation or operation of such a scheme are offered. The scheme has not been developed to the point of design or operational specificity.

The Port has careened from one concept to another, encountering difficulties, and responding by thinking up another augmentation water source. None of them has been proven up, and none of them offers a reasonable assurance that water quality standards will be met in Des Moines Creek.

Low Streamflow Study

The Low Streamflow Analysis reports a variety of modeling simulations, and non-modeling tweaks to improve these simulations where the models are known to be inadequate. Estimates of low flow behavior were based on statistical analysis of the results of a model simulation; not based on actual flows; thus they are an abstraction from reality, and as such are speculative and uncertain. There are no estimated error bands or confidence limits on the analysis, that would show how far off it could be. There is a very short record of actual flows, and no indication of if, or how, they were used as a reasonableness check on the model-based results. These results are used to develop low flow targets for stream systems that have been degraded by generations of man-made interference.

The flow diagram that illustrates the HSPF model structure (Appendix D, Figure 3) shows an increase in Des Moines Creek effective impervious area between 1994 and 2006 of 198 acres. It also shows the basin increasing by 16 acres. These figures do not agree with the Stormwater Plan, which says that the Des Moines Creek basin will experience 128 acres of new impervious surface. Des Moines Creek's share of the 111 acres of new IWS tributary area is not specified. For Miller Creek, these two sources of information show a discrepancy of 27 acres of impervious surface and the Miller Creek basin loses 44 acres of overall tributary area. These discrepancies are sufficient to undermine any confidence in the predictions of effects on low flow behavior that will result from airport expansion.

The Low Streamflow Analysis claims that most of the runway runoff will infiltrate into neighboring grassed filter strips as "secondary recharge." No specific analysis of these filter strips or their infiltration capacity has been carried out since the last version of the Stormwater Plan. There is a danger that the infiltration capacity of the filter strips could be occupied by direct precipitation on the strips themselves, so the soil reaches saturation, and will accept no further infiltration from offsite; then the runoff from the runways will be forced to continue on the surface.

Fate and transport of contaminants in SeaTac soils

There is a 50-year history of spills and intentional land disposal of jet fuel, aviation gasoline, other petroleum wastes, and of a variety of other contaminants around the SeaTac Airport Operations and Maintenance Area (Agreed Order of May 25, 1999 pursuant to the Model Toxics Control Act ("MTCA," RCW 70.105D). Specific contaminants found on the airport site include numerous known sites with multiple dozens of compounds such as benzene-ethylene-toluene-xylene, heavy metals, volatile organics, and total petroleum hydrocarbon (TPH) species. Some of these materials have found their way into the local groundwater. Some are lying in wait below the surface, for the next subsurface construction job to expose them. Port contractors have identified the City of Seattle Highline wellfield; the Highline Water District; King County Water District 54; private drinking water wells; Des Moines Creek; and Miller Creek as "potential local receptors" of exposure to these materials (AESI, 2000b).

Numerous major construction projects are both underway and proposed at the airport in areas that are known to contain contaminated soils above MTCA cleanup levels. One example is the Aircraft Hydrant Fueling System. Environmental review of this project consisted of a Declaration of Non-Significance and accompanying Environmental Checklist dated respectively October 6 and 5, 2000. This one project entails construction of approximately 7,000 lineal feet of pipeline, with as much as 350,000 cubic yards of excavation and corresponding backfill. The route transits an area of known soil contamination left over from the old Continental Airlines hydrant system (AESI, 2000b, figure 2). Other areas of contamination are not precisely known, and the first specific knowledge of them will come from a backhoe operator.

Trench backfill for the hydrant piping will most likely consist of coarse-grained gravelly material. Shallow infiltrated stormwater, and any contaminants in the shallow soils, will readily follow the outside of the pipe in the permeable backfill material. The backfill can also act as a french drain, enhancing recharge into the shallow groundwater. Current and future construction activities will create preferential pathways for contaminant transport around the SeaTac site. The groundwater flow directions in the shallow (Qva) aquifer in the AOMA vicinity are to the west and northwest, which would lead the contaminant pathways toward the headwaters of Miller and Walker Creeks (AESI 2000b, Figure 7; Stormwater Management Plan, Appendix Figure B1-3).

The Port has adopted two approaches to dealing with contaminated sediments. One is to abandon the materials in place and assume that if they don't go away on their own, at least they will not go anywhere else. The other is to spread them out and dilute them below clean-up action levels, as was done with petroleum contaminated soil from the Crawford Fuel Tank Parking Area Remediation Project. The material from that site was "landfarmed," i.e. mixed with clean surface soils, at the IWS Lagoon 3 site (letter from Kathy Bahnick, Port of Seattle, to Chung Yee, Department of Ecology, August 29, 2000).

Environmental evaluation of the fuel hydrant system was dismissed with a Declaration of Non-Significance. The major groundwater modeling study that was required under the Agreed Order, and which was intended to evaluate potential groundwater pollution from the operations area, is in suspension because the Port has not allocated the funding to complete it. For an airport expansion plan whose cost is now estimated at $6 billion, the lack of $60,000 for a groundwater study is hardly believable. Until the Port completes a comprehensive evaluation of contaminant fate and transport,

as it promised to do under the Agreed Order, there can be no assurance that transport of existing contaminants will not violate water quality standards or pose a threat of environmental harm to local receptors.

Conclusions

In order to approve the expansion plans at Sea Tac Airport, the State of Washington must certify that there is a reasonable assurance that the project will not result in violations of state water quality standards. In order to allow the project to proceed with the filling of jurisdictional wetlands, the Corps of Engineers must receive the State's certification, and it must establish independently that the project is in the public interest based on, among other considerations, the project's environmental impact. My intensive review of the Port of Seattle's case, which I have conducted over the last fifteen months, leads me to the conclusion that the project does not meet its burden of proof in either case.

Thank you for taking into account these thoughts on the adequacy of the Port of Seattle's application for Section 401 and 404 approvals for its proposed SeaTac developments.

Sincerely,

Peter Willing, Ph. D.
Enclosure

References:

AESI, 2000a. Hydrogeologic Study, Industrial Waste System Plant and Lagoons, Seattle-Tacoma International Airport. Project BV98112. June 21, 2000.

AESI, 2000b. Seattle-Tacoma International Airport Groundwater Study. Project Overview/Conceptual Fate & Transport Model Presentation, October 4, 2000.

APHA-AWWA-WPCF, 1989. Standard Methods for the Examination of Water and Waste Water. 17th ed.

King County Department of Natural Resources. Enclosure 2. Final Review Comments on SeaTac Stormwater Management Plan.

Northwest Hydraulic Consultants, 2001. Comments on stormwater, hydrology, and hydraulics aspects of proposed 3rd runway and related development actions at Seattle-Tacoma International Airport. Comment letter provided to Washington Department of Ecology and Corps of Engineers.

Sargeant, D. 1999. Fecal Contamination Source Identification Methods in Surface Water. Department of Ecology Report #99-345. 19 p.

Pollution Control Hearings Board, 2000. Okanogan Highlands Alliance et al. v. Ecology and Battle Mountain Gold Company. PCHB No. 99-019.