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

July 3, 2001

U.S. Army Corps of Engineers
Regulatory Branch
P.O. Box 3755
Seattle, Washington 98124-2255
ATTENTION: Muffy Walker, Gail Terzi

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 Ms. Walker, Terzi, and Kenny:

Water Resources Consulting LLC has been engaged by the Airport Communities Coalition to provide technical analysis of water resource and water quality issues arising from the Port of Seattle's Master Plan Update projects at SeaTac Airport.

The attached document replies to the Port of Seattle's response to Water Resources Consulting comments on the December 2000 version of the Stormwater Management Plan and other contemporaneous documents.

The format of the attached response is: numbered Port comment in block text, followed by Water Resources Consulting answer to the immediately preceding comment, in italics.

Thank you for taking into account the enclosed views.

Sincerely,

Peter Willing, Ph.D.
Attachment

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Follow-up response to Port of Seattle Response to 401/404 Comments,
Seattle-Tacoma International Airport
Reference 1996-4-02325, April 30, 2001
by
Water Resources Consulting LLC
July 3, 2001

1. The Master Plan Update proposes to increase impervious area in the Des Moines, Miller, and Walker Creek basins by approximately 307 acres (see Table 4-1 in the *Comprehensive Stormwater Management Plan*) total for all three basins. This number does reflect the impervious area reduction in the Miller and Walker Creek basins that will result from the acquisition and demolition of houses in areas outsid. of the new Master Plan Update construction area. There is no diversion from the Storm Drain System to the Industrial Wastewater System in the Miller Creek basin (or in the Walker Creek basin) for the Master Plan Update. nor is diversion to the Industrial Wastewater System "the plan" for stormwater management at the airport. However, there was a diversion of surface runoff to the Industrial Wastewater System in the Miller Creek basin that has been implemented under the National Pollution Discharge Elimination System permit as a best management practice to reduce industrial stormwater discharge to Miller Creek. This diversion change is included in the *Comprehensive Stormwater Management Plan* because it occurred after the base year (1994). Approximately 78 percent of the new impervious areas will be directed to stormwater detention facilities or infiltration that flows to surface streams.

While the project changes the exact location of the hydrologic divide between Miller, Walker, and Des Moines creeks, the basin area of each subbasin affected does not change. See also response to Tom Luster's memorandum January 21, 2001, to State Senator Julia Patterson.

There is a contradiction between what the Port says here, and the Stormwater Management Plan, Table 4-4; which shows the diversion to IWS of 45 acres in the Miller Creek basin. The South Aviation Support Area will divert 58 acres of Des Moines Creek to the IWS (Stormwater Management Plan, p. 7-4). NHC (2001) puts the IWS diversion figure for Des Moines Creek at 111 acres. The area associated with the North Electric Service Upgrade will be diverted to the IWS, at the expense of flow to Gilliam Creek (Port of Seattle, 2001)

The Port claims to follow the Governor's water quality certification by arguing that the basin area of each subbasin does not change. In the first place, this is not what the Governor's certification specified (i.e 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"); and in the second, the Port has not shown that the admittedly changed basin boundaries are in any way hydrologically equivalent to the pre-existing drainage. The Port thus has no basis for saying that its reinterpretation of the Governor's language will provide reasonable assurance of meeting water quality standards.

The "reduction in impervious area" in the Miller and Walker Creek basins that will result from house demolition is highly speculative. The Port has not made any documented claims about the short-term or long-term hydrologic character of the land surface; obviously the best it could hope to be in the near term from an infiltration perspective is grass pasture, which will not result in a significant improvement over the single family homes and lawns that are being replaced Beyerlein, 1999). The Environmental Protection Agency (2001) raised this same concern.

2. **Biofiltration stormwater treatment best management practices (bioswales and filter strips) have been in use for at least 10 years in Washington. Biofiltration is specified in the King County and draft Ecology stormwater management manuals, both of which represent state-of-the-practice. The draft Ecology Manual specifies biofiltration for applications such as streets and highways (i.e., similar application to runways), specifically to target pollutants such as total suspended solids, oil and grease, and metals.**

Biofiltration swales and filter strips are not means of "disposal" as asserted in the comment. Furthermore, biofiltration swales and filter strips are standard best management practices (BMPs) recommended by the *King County Surface Water Design Manual* (1998) and the draft Ecology Manual as treatment for stormwater. Such BMPs take advantage of the binding capacity of soil particles and the organic and inorganic ligands in soils, to render the chemicals inert. These bound chemicals will either not be able to enter the biological compartment, or if they do, they will be unavailable to exert "harmful consequences".

There is a substantial body of technical literature that does not support the blanket proposition that "Such BMPs take advantage of the binding capacity of soil particles and the organic and inorganic ligands in soils, to render the chemicals inert." On June 20, 2001, the Washington State Chapter of the American Public Works Association wrote comments on the draft Ecology Stormwater Manual as follows: ". . . substantial concern exists over the performance of some of the approved BMPs, particularly swales and filter strips. These BMPs do not perform consistently in the field. They need a substantial factor of safety. . ." (Derry et al., 2001)

Biofiltration swales are listed in the King County manual under the Basic Water Quality Menu, the goal of which is 80% removal of suspended solids rather than other contaminants such as metals. The King County Manual shows other management practices for other pollutants. The Port's choice of bioswales for runoff containing other pollutants means that the Port is inappropriately using them in a disposal mode, subjecting the temporarily detained pollutant load to the likelihood of resuspension and remobilization by future storm events.

In a review of 30 published monitoring reports on BMP effectiveness, Claytor et al. (1996) found that "Removal of soluble metals, however, was only 20 to 50% . . . many trace metals are primarily found in soluble forms (cadmium, copper and zinc), while others are mostly attached to sediment particles (iron and lead). Yousef et al. (1985) found that swales were not very effective at adsorbing soluble metal species. Adsorption requires that a metal be present in runoff as a positively charged cation that can be adsorbed to a negatively charged particle in the soil or organic layer. Metals, however, can be found in a complex number of ion species depending on the prevailing acidity (pH) of runoff. Some metals such as zinc readily adsorb to soil at pH levels typical of stormwater runoff of 6.5 to 8.0, but many others (aluminum, cadmium, copper, chromium and lead) show little tendency to adsorb to soils within this pH range. Consequently, the ability of swale soils to remove many soluble trace metals tends to be rather low."
Under a joint project between the American Society of Civil Engineers and the Environmental Protection Agency, an analysis of numerous studies of stormwater BMP effectiveness has been undertaken (EPA, 1999). The results do not show an unqualified endorsement for bioswales. They report low or even negative effective removal rates (remobilization) for many pollutant species, including metals. Some of

the observations of this study are relevant:

"In semi-arid climates, grass filter strips may need to be irrigated to maintain a dense stand of vegetation and to prevent export of unstabilized soil." SeaTac Airport may be considered a semi-arid climate for several months of the year. There is also a winter dormant period in most years when grass growth is inadequate to offer good filtration performance. Typical removal percentages for grassed swales and vegetated filter strips are 15-45%, and 30-65% respectively. Open channel vegetated systems show a very wide range of pollutant removal efficiency, including negative removals (i.e. more is detected going out than in)."If open channel systems are not properly maintained, significant export of sediments and associated pollutants such as metals and nutrients can occur from eroded soil."

To summarize the main point, reliance on inappropriate BMP's for treatment of the acknowledged pollutant stream in the SeaTac stormwater does not constitute reasonable assurance that water quality standards will be met.

3. Models are the best means available to predict the potential for changes to the system. Models calibrated to include low flows, such as those described in the *Comprehensive Stormwater Management Plan* (Appendix B), are based on actual flow data. It is an acceptable and appropriate approach to evaluate the predicted changes in low stream flow and mitigate potential changes. Low flow mitigation responds to predicted changes in the system and provides mitigation; existing impacts are beyond the purview of stormwater impacts caused by the Master Plan Update.

With regard to calibration, refer to Technical Appendix B, Volume 3, of the *Comprehensive Stormwater Management Plan.*

The Water Resources Consulting comment was not directed at modeling generally, but rather at the particular model implementation being used by the Port. The point remains that the estimates of impact on low flows from airport construction were based on statistical analysis of a modeling simulation, without actual low flows to calibrate to, which falls short of providing a reasonable assurance that remaining low flows will not be adversely affected. The Port's continuing effort to bring other models besides HSPF, specifically the SLICE model, to bear on this question indicates the Port's own level of confidence in its first round of low flow estimates.

4. The Port has successfully mitigated construction impacts at the Airport for the past three years. The *Comprehensive Stormwater Management Plan* describes the erosion and sedimentation controls that have successfully been used, and which will continue to control and contain sediment (see Section 7.7.6 and Appendix R). The Port is not aware of any evidence that Master Plan Update improvements would mobilize contaminants.

Several episodes undermine the Port's assurances that sediment control BMP's will work, or that violations will be handled responsibly:

- *The Port's Discharge Monitoring Report for February 2001 shows a discharge from outfall 013 (the taxi yard) of 660 mg/l of Total Suspended Solids. This is a composite sample, which reflects conditions considerably more favorable than worst case. Further, the monitoring data is so sporadic that it makes a very thin record. An absence of sampling cannot be construed as an absence of discharge violations.*

The Port was assessed over $10,000 in fines as a result of erosion problems at the North Employee Parking Lot in September and October 1997. The Port's statement that it has "successfully mitigated construction impacts at the Airport for the past three years" is artfully worded to exclude this massive and repeated failure of their best management practices.

The Port's handling of a violation of the Clean Fill Criteria associated with import of rock from the Black River Quarry is not reassuring. What did the Port do when it received notice of a sample contaminated with hydrocarbons above the MTCA Level A clean-up threshhold? It allowed the material to continue on its way to SeaTac. Then the Port waited for four months and more bad samples to stop further shipments from the quarry (Port of Seattle, 2001b) In light of this experience, the Port's proposal offers no reasonable assurance that MTCA procedures will be implemented in time to prevent dispersion of contaminants, with resulting effects on biological resources and beneficial uses. If the Port cannot properly manage the relatively modest current amounts of fill, there is little assurance that it will be able to handle the much larger quantities in prospect with third runway construction.

5. Washington State regulations state that "the primary means to be used for requiring compliance with the [water quality] standards shall be through *best management practices* (emphasis added) required in waste discharge permits, rules, orders, and directives issued by the department *for activities which generate stormwater pollution*" (emphasis added) (WAC 173-201A-160(3)(d).

The Port is in compliance with its National Pollution Discharge Elimination System (NPDES) permit, issued under §402 of the federal Clean Water Act and Washington State regulations, WAC 173-201A-160(3)(d). The Port's NPDES permit is the regulatory permit that assures "activities which generate stormwater" are in compliance with state water quality standards. This comment indicates a focus on "end of the pipe" measurements that have not had the benefit of dilution. However, the citation in the comment allows for dilution "after consideration of disposal site dilution and dispersion ...". The data obtained by the Port is "end of pipe" data. Such data does not demonstrate violation of water quality standards in the receiving water body. By employing best management practices prior to discharging its stormwater, the Port is using all known available and reasonable remediation treatment (AKART). Compliance with state water quality standards in such circumstances should be measured in the receiving waters using appropriate mixing zones and dilution within those waters. Moreover, the data is stormwater data, which cannot be used absent consideration of storm events to determine compliance with water quality standards.

The Port's response does not identify the source of its dilution and dispersion language. WAC 173-201A-100 (1) says "the allowable size and location of a mixing zone and the associated effluent limits shall be established in discharge permits, general permits, or orders, as appropriate." The intent of the regulation and the implementation practice is that the discharger demonstrate that AKART has been applied to all discharges, and that under the least favorable of discharge conditions such as low late summer flows when the discharge could equal or exceed the streamflow, beneficial uses in the receiving waters will be protected. These demonstrations are to result from a mixing zone analysis for each discharge. The Port has not told us where these terms have been established for the SeaTac stormwater outfalls. The only mention of a mixing zone in the NPDES permit applies to the IWS discharge, outfall 001.

The Low Streamflow Analysis circulated as a companion volume to the Stormwater Management Plan shows low flows for Miller, Walker, and Des Moines Creeks that will provide little if any mixing zone under typical low flow conditions. This means that the "first flush" of stormwater runoff in the next rainstorm will have severe water quality impacts on these streams.

The receiving waters of both Des Moines and Miller Creeks are already degraded below Class AA levels for copper. Discharges exceeding the water quality standards at the end of the pipe are making the problem worse, not better. WAC 173-201A-040 (1) says that "toxic substances shall not be introduced above natural background levels in waters of the state which have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent on those waters, or adversely affect public health . . ."

In compliance with its NPDES permit, the Port tested the toxicity of its stormwater discharges directly using whole effluent toxicity (WET) testing. These tests, conducted using sensitive aquatic organisms following Environmental Protection Agency protocols, have shown that undiluted stormwater (100 percent stormwater) from three of four tested outfalls is not toxic to aquatic life. Of particular note is the fact that stormwater from SDS3 drainage basin was not toxic. This 149-acre drainage basin is the largest at Airport and is representative of future taxiways and runways. For the outfall that reported levels outside the WET range, the Port has identified the source of the pollutant that caused toxicity – a metal roof. This problem can be fixed and the Port is taking steps to do so.

In addition to the WET testing, the Port has conducted a Water Effects Ratio (WER) bench screening analysis to estimate whether metals criteria should be adjusted for site-specific characteristics pursuant to WAC 173-201A-040(3), note dd, which authorizes such analysis. The result of this analysis showed that the stormwater would not exceed potential site-specific standards.

The WER analysis has not been made available for outside review. The Port has offered a highly selected quote from the regulations, and conclusions from its own studies that are not available on the record, to buttress its case. WAC 173-201A(040)(dd) says, "Metals criteria may be adjusted on a site-specific basis when data are made available to the department clearly demonstrating the effective use of the water effects ratio approach established by USEPA . . . information which is used to develop effluent limits based on applying metals partitioning studies or the water effects ratio approach shall be identified in the permit fact sheet . . . and shall be made available for public comment . . ." Public release by the Port of the entire analysis would obviously be more convincing than a summary statement of its conclusions.

The Port's NPDES permit requires monitoring of all Port storm drains that drain areas associated with industrial activity. Five years of permit-required monitoring from Port stormwater outfalls has shown that airfield runoff has concentrations of pollutants lower than typical urban runoff in the Seattle metropolitan area. Moreover, it is anticipated that implementation of the *Comprehensive Stormwater Management Plan* (see Section 7) will improve stormwater quality.

The important point is not whether SeaTac runoff is better than average in the Seattle area, but whether or not it protects water quality standards, and whether or not it impacts beneficial uses in SeaTac area creeks. The Port's "anticipation" is not sufficient to provide reasonable assurance of either of these requirements.

6. The Port believes the streams being referred to are Miller Creek and Des Moines Creek. It should be noted that of the two, Des Moines is the only one listed, and it is listed only for fecal coliform, not metals.

Response acknowledged.

See previous response regarding compliance with water quality standards for metals.

Furthermore, the Fact Sheet issued with the Port's NPDES permit states "The Department has reviewed the ambient water quality monitoring results gathered by the Port..." and "The discharges authorized by this permit should not cause further degradation which would interfere with or become injurious to existing beneficial uses" (Fact Sheet p.23).

It is interesting that the Port's response elected to omit key language in the Fact Sheet, which says "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 Port is attempting by force of argument to claim compliance, minimize the amount of impairment, and say that adding additional pollutant load to creeks already burdened beyond the water quality criterion meets a standard of reasonable assurance. It does not.

7. The balance of water imported and exported from the basin has been evaluated in the *Low Streamflow Analysis* report.

The Des Moines Creek Basin Plan does not intend to mitigate future Port impacts, nor does the Port rely on the Basin Plan to mitigate its proposed project. See Response to General Comments #12 on instream flow mitigation.

This is a new and refreshing concession from the Port. The Stormwater Management Plan, section 7.7.5 should be updated to reflect this new understanding.

8. Examples of successful pollutant identification and best management practices response are described in the Annual Stormwater Monitoring Reports submitted to Ecology.

See previous response to comment #5 regarding water quality issues raised in this comment.

The Port has embraced an adaptive management approach promoted by regulatory agencies elsewhere since it describes a workable approach to managing stormwater quality.

The advertising hyperbole here adds nothing to a situation in which past BMP performance has been inadequate, the Port has admitted that BMP designs need further work, and the Port has no basis for the required reasonable assurance of protecting state waters.

9. See response to comment #2 above regarding biofiltration best management practices (BMPs).

Scientific studies have demonstrated that biofiltration BMPs effectively remove other pollutants besides sediment. In 1992, King County (then Metro) published a document entitled *Biofiltration Swale Performance, Recommendations, and Design Considerations*; this guidance document was funded in part by Department of Ecology. Using design criteria reflected in the current King County and Department of Ecology manuals, this document reported removals of 83 percent total suspended solids, 75 percent oil and grease/total petroleum hydrocarbon, 67 percent total lead, 63 percent total zinc, 46 percent total copper, and 30 percent dissolved zinc (dissolved copper was not reported).

The Port's response uses the plural of "studies," but then reports the results of only one older study. Since 1992 hundreds of other assessments of BMP performance have been carried out, few with the same optimistic conclusions reported for the Metro study. In its review of the Stormwater Management Plan, King County DNR (the successor to Metro) did not agree with the Port's account of the earlier results : "removal of metals is not the performance goal of this facility. The existing relatively high Cu concentrations off the runways indicate they are not great at metals removal" (Enclosure #2 - Final Review Comments - August 2000 Preliminary Comprehensive Stormwater Management Plan, September 14, 2000). The 1992 Metro study did not report dissolved copper, a major pollutant that does not respond well to bioswale treatment. A major nationwide survey of later studies, carried out by the American Society of Civil Engineering, reports that more than half the dissolved copper and other metals routinely pass through bioswales (see discussion in Environmental Protection Agency, 1999).

As acknowledged by the commentor, the best management practices proposed for use by the Port are from the King County Basic Water Quality menu. As designed, these BMPs take advantage of the binding capacity of soil particles and the organic and inorganic ligands in soil to render the chemicals inert. These bound chemicals will either not be able to enter the biological compartment, or if they do, they will be unavailable to exert adverse effects.

See discussion under point #2 above.

10. Table 4-6 describes Sea-Tac Airport subbasins as they will be configured for *future* conditions. *The point of the table is to identify future treatment needs.* The table reports both existing untreated pollution-generating impervious surface (PGIS) and future (new) PGIS. Thus, 91.2 acres of "PGIS Not Fully Treated" *does not yet exist:*

SDN6:	4.1 acres
SDW1, SDW2:	55.1 acres
SDS7:	32 acres

Without these 91.2 acres, the *current* untreated PGIS totals approximately 166 acres. Also, SDN6, SDW1, and SDW2 are not in the Sea-Tac Airport land area now. Subtracting these 59.2 acres from the total future PGIS yields approximately 511.3 acres of total current PGIS.

166 ac/511.3 ac = 0.32.

Clarification appreciated. The table is confusing.

11. Rooftops are addressed in Section 7.4 of the *Comprehensive Stormwater Management Plan.* This section includes procedures for identification and treatment of rooftops that act as pollution

generating impervious surfaces (PGIS). This process has identified rooftops in subbasin SDN-1 that act as PGIS; Tables 4-6 and 7-8 account for this PGIS, and treatment of this PGIS is discussed in *Comprehensive Stormwater Management Plan* Sections 7.1.4.1 and 7.4.

Whole effluent toxicity (WET) tests have been conducted for the purpose of describing the quality of stormwater from SDN1 subbasin. The test results and subsequent source tracing/chelation techniques suggested that zinc from two metal roofs is the suspected source of toxicity observed in the tests. Based on this suggested source, the Port is proactively undertaking an investigation and is taking steps to address this identified problem. It should also be noted that the rooftops represent a very limited area of the storm drain system (approximately 0.5 percent) and are not representative of Master Plan Update projects that will not use zinc-treated roofing materials.

The response does not contribute to an understanding of how much pollution generating roof surface there is, and how long it will take to fix it. The suggestion that galvanized roofs are not to be used on future buildings is noted.

12. Ground truthing and examination of plans has showed actual existing bioswale base widths to be greater than 6 feet.

The belated "ground truthing and examination" has not been offered for independent verification, so informed comment is impossible. The point remains that a systematic inventory is not available on the regulatory record and to the public. Surely the Port knows more about stormwater treatment for 99 acres of runoff than is represented by a half acre of swales. Without appropriate detail, there is no basis for an outside observer or regulator to conclude that the swales will meet water quality objectives.

The existing bioswales were sized in accordance with the King County Manual. As stated in footnote (a) of Table 4-7, the sizing assumption of 960 square feet of bioswale area per acre of pollution generating impervious surfaces assumed undetained runoff. With the exception of those existing swales in the future South Aviation Support Area, the existing bioswales are located downgradient of detention facilities, and are thus smaller than the unit size of 960 square feet per acre.

The ratio of 5% of swale to impervious surface is acknowledged. There still has to be some relationship between peak flow and swale size; the Port's response does not explain how the credit for upstream storage was derived. The response also does not say which version of the King County manual was used. The 1998 manual has an elaborate 6-step design sequence for sizing a bioswale; which swales out of the existing inventory meet those sizing guidelines?

13. Average and median data were used to demonstrate that conversion from (a) untreated runoff from developed residential areas to (b) treated runoff from runways and taxiways will not degrade water quality. The median data were the best available regional data, and Sea-Tac Airport data were reported as median data for an equivalent comparison.

Table 4-8 of the *Comprehensive Stormwater Management Plan* was updated to reflect the addition of current data. Because pollutant concentrations are on *decreasing* trends, the median values thus decreased.

The reader's only choice is to take the Port's word for it, because we do not have a time series plot of the concentrations. The passage is

still a manipulation of data to prove a doubtful rhetorical point.

14. **Relevant data are reported in the Annual Stormwater Monitoring Reports submitted to Ecology.**

This response ignores the point that the Stormwater Management Plan is deficient in important data and analysis to tell us what is going on. The Plan should stand on its own, and not depend on the industrious reader to ferret out relevant data from piles of reports submitted to Ecology. Again, the Plan should have a tabulation of outfalls, with a water quality summary over time for each one.

15. **See response regarding compliance with state water quality standards above; the comparisons between the concentrations of pollutants in runoff at Sea-Tac Airport and urban runoff were presented to demonstrate that land use conversions from untreated residential areas to treated runways and taxiways will not degrade water quality.**

The point stands: the percentages are meaningless numbers with no substance behind them, intended to convey an impression. The applicable standard is not generic urban runoff, but whether the Port's massive proposal offers reasonable assurance that water quality standards will be met.

16. **No conclusions were changed regarding sources of fecal contamination. The August 2000 *Comprehensive Stormwater Management Plan* described a microbial source tracing study performed in Des Moines Creek by King County (Des Moines Creek Basin Plan, 1997), which reported, "despite the number of unmatched strains, the data strongly imply a higher human proportion of fecal strains downstream of residential unsewered areas."**

The text of this section of the SMP was changed between the August 2000 and December 2000 versions. The latter presented two unreconciled statements, with inferences about the possible sources of bacterial contamination. The data is not presented for the reader to examine, the contradictions are not explained, nor are the limitations of the microbial source tracking techniques described. Aircraft holding tank waste leakage was acknowledged in January 2001 by a Port consultant at a Des Moines City Council meeting. The Port needs to make a candid disclosure of this and other possible sources of human fecal contamination.

Current technical literature is finding that bioswales show low or negative removal rates for bacteria (EPA, 1999; Claytor et al., 1996). These findings, that the outflows are higher in bacterial contamination than the inflows, raise the possibility that grassed swales can operate as culture media for bacteria.

17. **Total suspended solids data are provided for informational purposes, as it is relevant to potential effects on fish habitat. Turbidity data are also reported.**

The original comment stands. If the text of the Stormwater Plan was presented for informational purposes, it contains no useful information. The first sentence is a general statement, and the second relates median values for SeaTac to the rest of the Puget Sound region. Neither contains any insight into impacts on fish habitat in SeaTac area streams.

18. **Although the Industrial Wastewater System treats at variable rates, it provides full**

treatment up to its maximum treatment rate. The commentor's reference to "higher values that would be collected during storm events" does not comport with the record, because nearly all water collected and treated by the Industrial Wastewater System is generated during storms; runoff is stored in the lagoons and treated for up to several days after storms. The Discharge Monitoring Reports are representative of the Industrial Wastewater System treatment performance.

The analysis shows zero overflow events in a 50-year period based on full capacity operation of the wastewater *treatment* system as opposed to "settling," as stated in the comment. In fact, the analysis demonstrated that the treatment rate could be reduced from 4.0 mgd to 3.1 mgd before a single overflow occurred in the King County Runoff Time Series period of record (see Table 4-2 in the *Comprehensive Stormwater Management Plan*).

Explanation acknowledged.

19. See response immediately above. No overflows occurred in the 50-year King County Runoff Time Series period of record, including a margin for reduced treatment capacity.

The increase in storage capacity will be accomplished by expanding Lagoon 3, an *existing* facility. Runoff from small storms is stored in Lagoons 1 and 2, which are netted to prevent bird attraction. Runoff from larger storms would require the use of Lagoon 3. Bird attraction during larger storms is less of a concern, because open water will form in many other depressional areas as well, thus reducing the likelihood of bird attraction specifically to Lagoon 3. As required by Federal Aviation Administration Advisory Circular 150/5200-33, wildlife hazard mitigation techniques such as surface aerators will be employed at Lagoon 3. The site will be monitored and adaptively managed.

This response is speculative: the Port has offered no basis for its observations on bird distribution during storms. The claims made would be more reassuring if they included any information about depth-duration-frequency relationships for the 3rd lagoon.

20. See previous responses to comment #5 on compliance with state water quality standards.

21. The South Aviation Support Area detention facility performance analysis (Hydrologic Simulation Program-Fortran (HSPF) and King County Runoff Time Series (KCRTS) is included with the similar analyses of other detention facilities in *Comprehensive Stormwater Management Plan* Appendix A.

22. The draft Ecology Stormwater Manual requires application of stormwater requirements to the *maximum extent practicable* for the entire site. Section 7.1.5 demonstrates that retrofitting of some existing areas is not currently practicable. The relative benefit of retrofitting these areas would not justify the expense of $188,000 per acre.

Unverified Port claims of vault construction cost are not an adequate basis for leaving 80 pollution-generating acres of the airport in their current condition until some indefinite future redevelopment date.

See previous responses to comment #5 with respect to compliance with the National Pollution Discharge Elimination System permit and a lack of toxicity seen in directly testing 100 percent (undiluted) stormwater.

The Port's failure to provide the study rather than just cite it

leaves open the critical question: when was the 100% undiluted stormwater collected? There can be several orders of magnitude difference in many constituents between one part of a storm hydrograph and another. The Port provides no reasonable assurance, if it provides no opportunity for the agencies and public to scrutinize the study it relies upon.

23. The King County Manual states that uncoated metal rooftops are considered pollution-generating impervious surfaces (PGIS). The King County Manual does not state specific treatment best management practices (BMPs) for rooftop runoff, only that all PGIS be routed through a treatment BMP in the designated water quality menu. The most appropriate practicable BMP will be applied to treat these rooftops, either a coating or a treatment BMP.

The "most appropriate practicable BMP" leaves vast discretion to the Port, but provides no present reasonable assurance of cleaning up a known water pollution problem. The King County Manual does show that the Basic Water Quality Menu provides no treatment for dissolved metals, such as would leach from a galvanized roof.

24-35. See General Response GLR7, Instream Flow Mitigation.

The Port's five-page general response to comments on its instream flow mitigation proposals is too long to repeat here. The salient rebuttal points can be summarized as follows:

- The Port has now appeared to settle on seasonal detention of stormwater as a water supply for low stream flow augmentation. In doing so, it has left open the possibility of returning to the former Highline Water District well #1. In the continuing absence of a definite plan for augmentation water, it is impossible to obtain reasonable assurance that water resources of the Des Moines and Miller Creek basins will be protected.
- Negotiations with Seattle Public Utilities and the Department of Ecology were apparently undertaken without the benefit of public involvement. It is impossible to evaluate the reliability of any of the information that resulted from these discussions and decisions, having been excluded from them. This weakness contaminates the Port's conclusion that the use of stored stormwater will protect the waters of the state.
- The stormwater management facility designs still lack specificity as to where and how the requisite amount of stormwater will be stored and treated.

36. The collection and storage of surface water in underground facilities (e.g., cisterns) is not a new concept; this practice has historically been used to store water for many uses, including drinking. Long-term storage of water is the basic concept of wetponds and wetvaults, which are pollutant *removal* BMPs. "Dead" sediment storage would be provided, so that water drawn from the facilities would not re-entrain settled material. If necessary, reaeration can be accomplished for the small flow from the facilities, likely using passive aeration systems such as drip towers or cascades over roughened surfaces.

Widespread experience with drinking water cisterns is no guarantee that the water quality characteristics of stored SeaTac stormwater, in dead storage for four months or more, will be a satisfactory source of augmentation water for local creeks. The Port has offered no information to show that its specific proposal has been implemented or proven elsewhere. A cesspool is a more apt analogy to the Port's proposal than is a drinking water cistern. In any event, reasonable

assurance that water quality standards will be met must be based on specific designs and documentation, not on analogies.

37. It is the Port's belief that there is uncertainty in the application of all predictive models; however, the degree of uncertainty is reduced through the process of model calibration. The Hydrologic Simulation Program-Fortran (HSPF) model was calibrated using the recorded flow data available. The calibration of the HSPF model is presented in the *Comprehensive Stormwater Management Plan*, Volume 3, Appendices B1 (Des Moines Creek) and B2 (Miller/Walker Creek) and was not, therefore, reiterated in the *Low Streamflow Analysis* report.

The comment misrepresents how the model results were used, and this is important when characterizing the significance of model uncertainty. The analysis results were not used to establish target flows for the stream systems, but rather they were used to estimate the low streamflow impacts from the proposed project to guide the design of mitigation measures. Therefore, the degree of uncertainty in model results would apply strictly to the proposed mitigation; the uncertainty would amount to a percentage of a small percentage of the total low flow in the stream systems. To place the uncertainty of the flow estimates in context, the low flow volumes in the streams are dominated by hydrologic and geohydrologic responses to conditions that lie outside the Sea-Tac Airport area.

The Port is dealing with highly valued streams that have already suffered degradation from generations of Port activities. The remaining dry-season base flows have already been reduced to the bare minimum to support beneficial uses. The Port and its consultants do not have a complete understanding of the existing groundwater and streamflow interactions. The Port claims to want to minimize the possible effect of its developments on the remaining flows. Errors of the magnitude of the modeling uncertainty, on the order of tenths of a cubic foot per second, mean the difference between life and death for these creeks.

38. Tables were provided by Parametrix in a November 28, 2000, memorandum.

39. The *Low Streamflow Analysis* report specifically considered wetting of filter strips from direct precipitation at:

p. 10, item 3, where total water input to the filter strip includes runoff from pavement plus direct rainfall on the filter strip.

p. 11, 1st and 2nd paragraphs, references to consideration of direct rainfall on filter strips in assessing infiltration capacity

Figures 1, 2 and 3, plots of "rainfall on filter strip"

Page 15 paragraph 1 refers to incident precipitation being considered in Figures 4, 5 and 6.

Explanation acknowledged.

40. The Port has acknowledged that some environmental contamination has occurred in the fifty-plus years of operations at the Airport. The Port and its tenants continue to work with Ecology under the Model Toxics Control Act (MTCA) to monitor and remediate contamination within the Airport Operations and Maintenance Area (AOMA) and elsewhere at the Airport. In addition, the Port is complying with the MTCA Agreed Order that it entered into with Ecology on May 25, 1999. Under the Agreed Order, the Port is studying groundwater contamination at the Airport.

As described in the May 1999 Agreed Order, the AOMA is the area of the Airport where most aircraft fueling and maintenance operations have historically occurred. Within the AOMA, contaminated groundwater exists in several localized, discrete sites. The boundaries of the contaminated groundwater have been defined by site investigation data that were obtained through the placement and sampling of groundwater monitoring wells. Ground water monitoring continues where appropriate. The factual record does not support the commentor's assertions regarding existing soil contamination. Known contaminated sites at the airport are managed consistent with MTCA.

The Port's response does nothing to change the original comment. The groundwater study required under the Agreed Order, completion of which is requisite to both the preferred pathway analysis and to the Section 401 determination, has not been completed. No comprehensive 3-dimensional map of existing contamination sites has been offered.

41. Construction of the Aircraft Hydrant Fueling System (AFS) should not accelerate the migration of soil or groundwater contamination. For example, contrary to the commentor's assertion, the AFS will not be constructed with porous backfill material. The estimated volume of soil excavated for construction of the AFS is 45,000 cubic yards, and the system piping backfill will mostly consist of controlled density fill (a lean concrete mix that is relatively impermeable), rather than soil or sand backfill materials. The AFS routing crosses several known contaminated areas. Each of these areas has been, or will be, investigated, characterized, and managed consistent with MTCA. Construction activity that encounters contamination in known contaminated areas will be conducted such that contamination management and contractor activity are consistent with MTCA and other applicable environmental regulations. In the event that unanticipated contamination is encountered during construction activity, contamination management and contractor activity will be consistent with MTCA requirements, and investigation and characterization of the encountered contamination will be performed as appropriate.

Low permeability trench backfill is a design feature that has not been previously described. Claims for its effectiveness are acknowledged, although not documented.

42. It is the Port's belief that construction of the Master Plan Update improvements will not result in preferred pathways for contaminant migration. Within the Airport Operations and Maintenance Area (AOMA), areas of contaminated groundwater exist in both shallow perched zones and in the shallow regional aquifer (Qva). The perched zones are isolated and discontinuous, while the Qva is continuous.

Regulatory authorities considering the Master Plan Update projects have to have more than belief to sustain their decisions. The requisite hydrogeologic investigation to support this statement has not been completed, so the statement is premature. It is an inference that is subject to revision. If the claim does not stand up under further analysis, there is no reasonable assurance of performance.

Evidence collected from individual site investigations within the AOMA have demonstrated that existing perched zone contamination has remained localized within the AOMA and that it has not migrated significantly along constructed utilities or infrastructure, despite the very significant density of such underground facilities in the AOMA. The results of the previous investigations and the discontinuous nature of the perched zones, support the conclusion that construction activity should not materially impact the migration of the existing perched zone contamination.

Similarly, evidence collected from individual site investigations within the AOMA have also demonstrated that existing Qva aquifer contamination remains localized, despite the presence of

several facilities that have been constructed at depth within the AOMA. There is no evidence that the Qva contamination has migrated significantly, and the available evidence demonstrates that it remains located well within the AOMA. Accordingly, construction of other infrastructure should not create a contaminant pathway that would accelerate the off-site migration of the existing contamination in the Qva aquifer.

There has been no agreement on what constituents to look for at existing contaminated sites. Many of the site investigations have looked for total petroleum hydrocarbons only, even though other contaminants are known to have been spilled in the area. There has been no comprehensive look for the evidence of contamination.

43. As noted above, contaminated sites are managed in accordance with the Model Toxics Control Act (MTCA), using typical MTCA site management techniques. With respect to the Crawford remediation, as described clearly in the remediation documentation, contaminated soil was bioremediated; the resulting soil was determined to be clean in accordance with MTCA, and was beneficially reused by being combined with other soil for use as fill. Crawford soil that was not fully bioremediated was removed for appropriate offsite treatment.

The response does not specifically claim that the Crawford site was not managed by spreading out contaminated soil to lower the average soil contaminant levels below the MTCA threshhold. Port construction should not rely on this practice.

44. To date, the Port has spent over $1,000,000 to comply with the Agreed Order and to complete the groundwater study. Project work is ongoing, currently awaiting required approvals and additional input from Ecology in anticipation of the next funding approval cycle. The Master Plan Update improvements and the MTCA groundwater study are distinct projects with separate funding sources.

Expenditure of money is not the same as compliance with the order. The permitting of the MPU projects and the Agreed Order are not distinct; the Governor's certification letter ties them together. If Section 401 and 404 approvals are issued before the groundwater study is fully and properly completed, the State has no reasonable assurance that its standards will be met.

Conclusion of Second-round Response to Port of Seattle

The Port of Seattle's widespread revisions to the documentation and analysis of its application for Section 401 and 404 certification under the Clean Water Act have unfortunately not satisfied basic deficiencies in the case. These deficiencies include continuing discharge of pollutants from the stormwater management system, reliance on inadequate and inappropriate Best Management Practices for stormwater, lack of a convincing mitigation proposal for the low flows of Des Moines and Miller Creeks, and missing design details, supporting data, and cogent analysis of the contentions made in the Stormwater Management Plan. These deficiencies make it impossible for regulatory authorities to find that the Port's proposal offers a reasonable assurance of meeting the state's water quality standards.

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