Strand
EXHIBIT NO. 37b
DATE: 2/18/02
C. MANGIO, RMR, CRR

POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and THE PORT OF SEATTLE, Respondents.	)	No. 01-133 DECLARATION OF DR. JOHN STRAND IN SUPPORT OF ACC'S MOTION FOR STAY (Section 401 Certification No. 1996-4-02325 and CZMA concurrency statement, issued August 10, 2001, Related to Construction of a Third Runway and related projects at Seattle Tacoma International Airport)

Dr. John Strand declares as follows:

1. I declare the following from personal knowledge and am competent to testify thereto before the Board if necessary.

2. I am an internationally recognized fisheries biologist with over 25 years experience specializing in studies to determine potential effects of human activities on aquatic resources. I received my Ph.D. in Fisheries Biology from the University of Washington in 1975 and currently am the Principal Biologist for Columbia Biological Assessments. I am also an adjunct faculty member of the Environmental Sciences and Regional Planning Program at Washington State University Tri-Cities. I am a Certified Fisheries Professional and have extensive experience assessing the ecological risks from discharges of contaminants to surface

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waters on sensitive aquatic species and their habitats. I also have substantive local knowledge, having studied the fate of stormwater residuals in both Miller and Des Moines Creeks for the Airport Communities Coalition (ACC), an organization composed of the Cities of Burien, Des Moines, Federal Way, Normandy Park and Tukwila and the Highline School District. With the King County Department of Natural Resources, I also recently investigated the fate and effects of combined sewer overflows on aquatic life in the Duwamish River. In addition, a considerable part of my professional career has been spent evaluating the environmental impacts of engineered structures on water resources including a wide variety of projects and field studies in Washington, California, Alaska, British Columbia, Guam and Venezuela. Attached hereto as Exhibit A is a true and correct copy of my Curriculum Vitae.

3. I understand that the ACC has filed an appeal with the Pollution Control Hearing Board (NPCHB) challenging the Washington Department of Ecology's (Ecology) Water Quality Certification (Order #1996-4-02325) for the Port of Seattle's (Port) Master Plan Update Improvements for Seattle-Tacoma International Airport (STIA). I also understand that ACC has requested a stay of the effect of the Water Quality Certification until the questions it has raised concerning compliance with the Clean Water Act have been resolved by the PCHB. I am submitting this declaration in support of ACC's appeal and motion for stay because I am convinced that Ecology's 401 Water Quality Certification will not protect the valuable and remaining water resources around STIA and will, in fact, result in likely harm to these sensitive streams and their aquatic life.

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4. I have previously reviewed and evaluated the database that the Port submitted to Ecology in support of their request for a Water Quality Certification. Attached hereto as Exhibit B is a true and correct copy of comments that I submitted to Ecology on December 13, 1999, on behalf of the Citizens Against SeaTac Expansion. While this comment letter set forth my opinion regarding the impacts of the Port's stormwater on the project creeks, I am submitting this declaration to reiterate, reinforce, and expand on my opinion that the project creeks are valuable water resources worthy of the Board's utmost review and Clean Water Act protection.

5. In preparing this declaration, I have reviewed the documents and scientific literature listed in Exhibit C. In addition, I have, on behalf of and with the help of the ACC, conducted water quality sampling surveys in the streams surrounding STIA: In April and August 2000, corresponding to the wet and dry seasons, respectively, water, sediment, and fish tissue samples were collected at selected sites in Miller and Des Moines Creeks. The objective of this sampling was to determine the nature, extent, and potential sources of pollution entering or already present in Miller and Des Moines Creeks. Chemicals of particular interest were heavy metals, petroleum hydrocarbons, and other organics (glycols). In continuing investigations, conventional water quality measurements (temperature, pH, turbidity, hardness, dissolved oxygen, nutrients) are conducted at the same sites monthly. Actual and suspected pollution events are also investigated as they occur. Sampling, sample handling, and analyses follow methods outlined in PSEP (1996a, 1996b, 1996c) or by the USEPA (1979). A Washington

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Department of Ecology certified analytical laboratory performs the metals and organic chemical analyses.

6. For the reasons presented in this declaration, I believe there is evidence that violations of Toxic Substances (water quality) Criteria in Miller Creek and Des Moines Creek, particularly for copper, lead, and zinc, occur as a result of stormwater discharged by the STIA, and will continue, and potentially worsen as a result of the Port's Master Plan Update Improvements. Glycols associated with de-icing of aircraft at STIA are routinely found in winter in the project creeks at concentrations known to be toxic to fish and other aquatic life. Periodic whole effluent testing of stormwater from the Port's outfalls documents residual toxicity, highlighting the need for stormwater treatment. Although the Port indicates they will retrofit all stormwater outfalls that do not currently receive treatment to improve water quality, looking closer at the Port's *Comprehensive Stormwater Management Plan* (Parametrix 2000a) indicates that a final decision on retrofitting has not been made and that evaluation continues. In other cases, the Port indicates that costs of retrofitting may be prohibitive, suggesting that retrofitting is not certain. There also is evidence that fill already stockpiled by the Port at STIA, contains residual chemicals (PCBs and DDT) that have the potential to percolate the fill pile to groundwater, ultimately contaminating area wetlands and surface waters. Flow reductions in project streams as a result of the proposed airport construction and operation have not been established with any degree of accuracy with the result that simulations conducted by the Port may underestimate summer low-flow impacts and overestimate the contributions of proposed

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mitigation and natural mitigating factors. Finally, in the context of addressing low flows on the project streams, the Port's management approach to monitor the quality of detained or discharged stormwater, and only when a problem is encountered, take steps to mitigate impacts, doesn't provide reasonable assurance that valued aquatic resources will not be impaired.

7. Although disturbed, the project streams (Miller Creek, Walker Creek, Des Moines Creek, Gilliam Creek) still support a diverse and abundant fish fauna and are worthy of protection. Both coho and chum salmon are known to spawn and rear in Miller Creek, Walker Creek, and Des Moines Creek. (Hillman et al. 1999). Chinook salmon frequent the outfalls of Miller and Des Moines Creeks in Puget Sound during their outmigration (Parametrix 2000a). Both the Miller Creek and Des Moines Creek Watersheds are also exploited by resident cutthroat trout (Parametrix (2000a); Miller Creek may include an anadromous race of cutthroat trout. Warm water fish species including yellow perch, black crappie, largemouth bass, and pumpkinseed sunfish have been found in the upper reaches of both watersheds (Parametrix 2000b). Prickly sculpin, three-spined stickleback, and crayfish also occur throughout each watershed (Parametrix 2000b). Gilliam Creek supports many of the same species of fish as found in Miler Creek, Walker Creek and Des Moines Creek. Of considerable interest and importance is the recent finding of juvenile Chinook salmon in Gilliam Creek (personal communication, April 2000, Ryan Partee, City of Tukwila, Tukwila, Washington). Chinook is a listed species under the Endangered Species Act.

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8. In the context of what is known about the natural resources of the project streams, it should be pointed out that the Port's analyses of impacts for the proposed Master Plan Update Improvements are inadequate because the Port has yet to undertake a quantitative survey of the fish and other aquatic organisms found in the project streams. In other words, the Port has not established a baseline condition. This is a critical deficiency because the appropriateness of regulatory approval and mitigation must be assessed, using this baseline, before approval of the proposed project can be granted.

9. Several constituents (metals, fecal coliforms, turbidity) associated with STIA stormwater in Miller and Des Moines Creeks have historically and presently violate State of Washington (State) Water Quality Criteria (Chapter 173-201A WAC). Exceedances of water quality criteria for the metals copper, lead, and zinc are of particular concern given their designation as Toxic Substances. Metals data from 1995-1996, presented by the Port in 1997, indicated that concentrations of copper, lead, and zinc in STIA stormwater discharges (at outfall) greatly exceeded State and U.S. Environmental Protection Agency (USEPA) Toxic Substances Criteria, in some instances by more than an order of magnitude. For example, at the stormwater outfall to Miller Creek (see 1997 report page 35), total recoverable copper concentrations ranged from 4.2-82.9 ug/L. The State's criterion is 5.3 ug/L. The Port's 1997 data also indicated that concentrations (4.7-14.8 ug/L) of total copper upstream of STIA exceeded the State's criteria. That Miller Creek was unable to assimilate the STIA discharges, however, is confirmed by downstream sampling data showing total copper concentrations of 0.72-44 ug/L. In other words,

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even after dilution in Miller Creek, the concentrations of copper still exceed Water Quality Criteria. For total recoverable lead in Miller Creek, the values at the outfall, upstream, and downstream were <0.5-21.6 ug/L, 5.2-34.7 ug/L, and <0.5-106 ug/L, respectively, again showing that the influence of lead additions at the outfall persist downstream. The State criterion for lead is 16 ug/L. The values for total recoverable zinc at the outfall, upstream, and downstream were 15-525 ug/L, 37-69 ug/L, and 2.3-295 ug/L., respectively, again showing a similar relationship. The State criterion for zinc is 33.7 ug/L. Based on the dissolved metals concentrations (see data presented on page 35), Toxic Substances Criteria are still exceeded by as much as an order of magnitude.

10. It is evident that the concentrations of copper, lead, and zinc downstream of the discharges exceeded applicable toxic substances criteria. In their various reports, the Port also does not provide evidence that would support a scientifically valid conclusion that stormwater from STIA does not impact either Miller or Des Moines Creeks downstream of their respective outfalls. Persistence of the influence of stormwater downstream, and at the magnitudes illustrated above suggests the need for treatment of the waste streams, or connections to the Industrial Waste System (IWS).

11. Metals data from 1998-1999, presented by the Port in 1999, confirm that exceedances of toxic metals criteria continued to occur at the Port's stormwater outfalls to the creeks. In addition, the downstream stations, where sampled, show that the influences of STIA stormwater discharges persist in the receiving waters. What appears missing in the 1999 report,

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however, is any indication that the Port sampled upstream of STIA. The Port's failure to maintain the original sampling protocol in this regard greatly diminishes the value of their stormwater-monitoring program. Data presented by the Port in their most recent Annual Stormwater Monitoring Report (2000) confirm that exceedences of toxic metals criteria in the Port's stormwater discharges continue today.

12. In my opinion, STIA stormwater adversely impacts the water quality of Miller and Des Moines Creeks. The Port's sampling data confirms that STIA stormwater greatly contributes to exceedences of toxic metals criteria in the receiving waters.

13. The 1997, 1999, and 2000 Annual Stormwater Reports prepared by the Port include comparator concentrations for metals, fecal coliforms, turbidity and other water quality parameters in stormwater. Comparator concentrations are based on stormwater data collected by other authorities (e.g., City of Bellevue, City of Portland). These comparators are found in Table 21 in the Port's 1997 report, in table 4 in the Port's 1999 report, and in Table 4 of the 2000 report. While these data maybe of some scientific interest, these data do not address the question of whether documented exceedances in water quality criteria in Miller and Des Moines Creeks are attributable to stormwater discharges from STIA. What is germane in this case is a comparison of the concentrations of metals discharged to Miller and Des Moines Creeks with the applicable State Water Quality Criteria. It really doesn't matter if the concentrations of metals in Miller Creek are the same as the concentrations of metals occurring in surface waters near

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Bellevue or Portland. All this means is that the Cities of Bellevue and Portland are also not in compliance with applicable Water Quality Criteria.

14. Additional evidence that STIA stormwater adversely affects the aquatic resources of Miller Creek is found in the sediments below Lake Reba, into which the Port discharges its stormwater (Port 1997 [see Table 4]). Values for copper in sediments from three samples above Lake Reba were 17.4, 8.4, and 9.9 mg/Kg dry weight, while copper in sediments from three samples below lake Reba were 22.3, 47.8, and 19.7 mg/Kg dry weight. The quantities of copper below the impoundment are substantially greater than the quantities of copper above the impoundment. A similar relationship for lead exists above and below Lake Reba. Lead in sediments from three samples above Lake Reba were 39, 34, and 38 mg/Kg dry weight, while lead in sediments form three samples below Lake Reba were 77, 172, and 56 mg/Kg dry weight. Levels of zinc in three samples above Lake Reba were 105, 90.2, and 94.1, mg/Kg dry weight, while zinc values in three samples below Lake Reba were 165, 402, and 148 mg/Kg dry weight.

15. While Washington has not adopted Sediment Quality Standards-Chemical Criteria for Freshwater Sediments, the copper, lead, and zinc values in sediments below Lake Reba exceed standards adopted in Canada, which are good indicators of water quality problems. For example, all the values for copper in sediments below Lake Reba exceed the Lowest Effects Level (16 mg/Kg dry weight) for copper from the Guidelines for the Protection and Management of Aquatic Sediments in Ontario (Persuad et al. 1993). Similarly, all the values for lead and zinc in sediments below Lake Reba exceed the Lowest Effects Levels for lead (31 mg/Kg dry weight)

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and zinc (120 mg/Kg dry weight) from the Guidelines for the Protection and Management of Aquatic Sediments in Ontario Guidelines (Persuad et al. 1993). (Lead in sediments above Lake Reba also exceeds the Canadian Guidelines but only slightly.) This is some of the most compelling evidence that stormwater from STIA has impacted Miller Creek. Based on the Canadian Guidelines, there is a high probability that sediment concentrations of copper, lead, and zinc occurring below Lake Reba are toxic to greater than five percent of the aquatic genera inhabiting this site.

16. While it is unknown precisely how far downstream the impacts of copper, lead, and zinc occur in Miller Creek and Des Moines Creek, it is evident from recent (April and August 2000) ACC water quality surveys, that copper, lead, and zinc are bioavailable to aquatic life in both Miller and Des Moines Creeks. Copper, lead, and zinc residue levels in cutthroat trout from upper Miller Creek (S 157th PL crossing) were 6.5, 0.31, and 137 mg/Kg dry weight, respectively in the wet season (April). The dry season (August) data at the same location on Miller Creek were 6.5, 0.74, and 145 mg/Kg dry weight, respectively. Comparable data from upper Des Moines Creek (S 200th Street crossing) collected in the wet season (April) were 4.3, 0.34, and 129 mg/Kg dry weight, respectively. No trout were collected at this location during the dry season. While Washington has not adopted water quality standards based on tissue residue concentrations, the lead and zinc concentrations found in cutthroat trout in the upper reaches of both Miller Creek and Des Moines Creek exceed the tissue screening concentrations (TSCs) for lead (0.32 mg/Kg dry weight) and zinc (100 mg/Kg dry weight) used by Shepherd (1999) in

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ecological risk assessments. These data indicate that lead and zinc are chemicals of concern that require more detailed investigation and additional control.

17. Glycol-based de-icers and anti-icers, used in de-icing aircraft at STIA, which are required to drain only to the IWS are also presently found in the project streams. The Port's Annual Stormwater Monitoring Reports for 1999 and 2000 indicate that glycols occur in stormwater at STIA outfalls that discharge both to Miller and Des Moines Creeks. While the IWS at STIA is designed to collect aircraft de-icers and anti-icers reaching the tarmac, glycols in de-icers and anti-icers are still routinely detected at six of the Port's stormwater outfalls: SDN1, SDN2, SDN4, SDE4, SDS1, and SDS3. Outfalls SDN1, SDN2, and SDN4 are located on the north end of the STIA and discharge to Lake Reba on Miller Creek. Outfalls SDE4, SDS1, and SDS3 are located at the south end of STIA and discharge to the East Tributary or Northwest Ponds on Des Moines Creek.

18. The concentrations of glycols entering the project streams vary widely and are not trivial. For example, glycols of 12, 810, and 364 mg/L were found in SDE4, SDS1, and SDS3 outfall discharges, respectively, following aircraft de-icing on January 11-12, 2000 (Port 2000). The most recent data from February 2001, indicated that glycols of 46.7, 48.7 and 419.4 mg/L were found in stormwater being discharged from the same three outfalls, respectively (Port 2001). The majority of the glycols at each discharge were propylene glycol.

19. The ACC also detected propylene glycol in duplicate samples from Des Moines Creek on February 9 and 19, 2001 at S 200th Street, just south of the Tyee Valley Golf Course.

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Propylene glycol was not detected in duplicate samples on either of these dates in the West Tributary of Des Moines Creek at 192nd Street, which is above any known influence of STIA. . These finds suggest that this glycol entered Des Moines Creek on the West Tributary below 192nd Street, or entered on the East Tributary somewhere above the confluence of the West and East Tributaries. The likely source of this contamination was one of the STIA outfalls: SDE4, SDS1, or SDS3. The concentrations of propylene glycol in these four samples ranged between 11 and 17 mg/L. Because this is propylene glycol, the source is likely an aircraft anti-icer and not an aircraft de-icer or auto/truck anti-freeze that are mainly ethylene glycol based.

20. At issue is the toxicity of the de-icing or anti-icing agents. In particular, it is the presence of additives in the commerce de-icer or anti-icer that account for most of the toxicity (Hartwell et al 1995). Some examples of additives found in de-icers and anti-icers that may affect toxicity include: sodium nitrite, sodium benzoate, borax, diethylene glycol, ethylene oxide, acetaldehyde, dioxane, high-molecular weight polymers, polyamines, triazoles, and urea, (MacDonald et al. 1992; Hartwell et al. 1995; Lokke 1984).

21. It is my opinion that de-icers and their additives can be toxic to aquatic life at relatively low concentrations (1.8-8.7 mg/L), which I base on the work of Hartwell et al. (1995). Hartwell et al. (1995) determined that the 7-day LC_{50} for commercial anti-icer to fathead minnow ranged between 24.2 and 43.3 mg/L, based on the concentration of total glycols in the test solution. By definition, these results indicate that the LC_{25} or LC_{10} (the concentrations killing 25% and 10% of the test population in 7 days) will occur at lower concentrations of total glycols,

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that is, in the range of glycol concentrations found recently by the ACC. Hartwell et al. (1995) also observed that gill pathology (edema, respiratory cell hypertrophy, and proliferative bronchitis) occurred in fish exposed to anti-icer at 17.6 mg/L propylene glycol. It is reasonable to assume that a fish with these symptoms will die if the exposure continued at this same level. Hartwell et al. (1995) also observed toxicity and similar gill pathology in fathead minnows exposed to stormwater from a stream receiving winter runoff from a large commercial airport. In these tests, which included detailed chemical monitoring, the LC_{50} ranged between 1.8 and 5.4 mg/L total glycols. The concentrations of total glycols cited in the 1999 and 2000 Annual Stormwater Monitoring Reports, and in the February 2001 stormwater analyses (Port 2001) also exceed the concentrations reported by Hartwell et al. (1995) to be toxic to aquatic life.

22. Whole effluent testing of STIA stormwater as required in their National Pollution Discharge Elimination System Permit has also detected toxicity in the Port's stormwater (see Table 7-15, page 7-25, *Biological Assessment* [Parametrix 2000b]). In effluent from SDN1, the percent survival of daphnia ranged between 10 and 80 percent over three test dates, the most recent 1/24/99. Mean survival over these three tests was only 40 percent. Percent survival of fathead minnow ranged between 40 and 78 percent, with a mean of 60 percent. Whole Effluent Testing (WET) at the Port's stormwater outfalls also demonstrates that at two other outfalls (SDN4 and SDE4), percent survival was as low as 75 and 63 percent, respectively, on at least one of the four dates when tests were conducted, indicating that toxicity occurs more often than the Port would have us believe. This level of toxicity is not trivial and indicates that acute (short-

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term) toxicity of fish and other aquatic life can occur in Miller Creek, into which the discharge of SDN1 flows. The above testing approach does not address chronic (longer-term) toxicity that could occur at much lower concentrations of stormwater.

23. The Port wants us to believe that "the quality of stormwater from STIA will improve in the future for several reasons. First, areas where stormwater is currently not treated will be retrofitted to improve water quality. Second, for areas with new impervious surfaces, stormwater will be detained and treated."

24. These statements suggest that the five or six major stormwater outfalls (SDN1, SDN2, SDN4, SDE4, SDS1, and SDS3) that now discharge to Miller and Des Moines Creeks will be retrofitted to improve water quality, yet this is not what is indicated in the *Comprehensive Stormwater Management Plan* (Parametrix 2000c). Section 7.1.5 indicates that a final decision to retrofit certain stormwater basins with additional detention, e.g., wet vaults or detention vaults, has not been made and that evaluation of the need continues. This affects both the SDE4 and SDS3 drainage basins, which outfall to Des Moines Creek at the south end of STIA. The reason for the delay is the cost in providing (constructing) additional detention.

25. Of the stormwater basins that discharge to Miller Creek at the north end of the STIA, only SDN1 could be retrofitted with additional detention capabilities but this too is subject to change. The Port in Section 7.1.4.1 indicates that they could also approve another alternative to improve treatment, although this alternative is yet to be determined. And, according to Table

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7-8, the SDN2 and SDN4 will not receive a retrofit as the presently employed best management practices, e.g., bioswales, filter strips, are believed to be effective.

26. According to the *Comprehensive Stormwater Monitoring Plan*, all of the SDS1 basin drainage was transferred to the IWS, although there still is a discharge from this basin that likely includes a contribution from STIA. For example, as recently as February 2001, stormwater from SDS1 still contained a total glycols concentration of 48 mg/L, which was mostly (43 mg/L) propylene glycol (Port 2001).

27. So I must ask, what really will change? Will stormwater quality at the existing six outfalls likely improve with the proposed construction at STIA? The Port's proposed retrofit will not, in my opinion, improve the existing situation. The Port's assertion that "stormwater quality will improve in the future," is also misleading and without scientific basis.

28. To provide a site for the Third Runway, the Port proposes to fill a ravine west of the airport with twenty (20) million cubic yards of fill. The fill would be stabilized in part by a retaining wall, fifteen stories high and close to fifteen hundred feet long. Underneath the 20 million cubic yards of fill, the Port proposes to construct an enormous rock drain field to "capture" groundwater and transport it down slope in the hope of supporting the streams and wetlands below. Chemicals associated with fill materials at the fill placement site at STIA have the potential to percolate through the fill pile to groundwater, contaminating wetlands and surface waters. The Soil Acceptance Criteria contained in the Section 401 certification are seriously flawed and do not preclude the acceptance of chemically contaminated fill for use at the

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third runway site. Already, there is evidence that fill, e.g., Hamm Creek Restoration Project sediments, already stockpiled at STIA, contains residual chemicals (PCBs, and DDTs). Chemicals in fill would also have the potential to directly contaminate wetlands and surface waters through runoff following seasonal rains.

29. The Section 401 certification uses the State's Model Toxic Control Act (MTCA) to set the standard for acceptable fill for the third runway project. The fundamental purpose of MTCA is to cleanup existing contaminated or hazardous waste sites. MTCA sets reasonable standards for the amount of toxic material that can be left in a contaminated site. MTCA does not purport to clean-up to natural or background conditions. Instead, MTCA recognizes that there is a certain level below which it is not practical or feasible to clean. These standards are not, nor have they ever been, meant to contaminate clean property up to some predetermined level. To the best of my knowledge, the STIA property where the fill is being placed was free of contamination prior to any fill placement. It is my professional opinion that MTCA does not apply and should not be used for the purpose of screening soils or sediments for use on the STIA Third Runway Fill Project. It is an inappropriate standard for determining the quality of fill material to be placed in the area of wetlands and streams that are now in relatively pristine condition and which contain significant aquatic life.

30. The Section 401 certification Soil Fill Acceptance Criteria are supposed to preclude chemical contamination. However, they are fundamentally flawed in their lack of a consistent and statistically meaningful approach to determine the location and extent of any

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contamination contained in candidate fill materials. Statistically rigorous sampling approaches exist, e.g., systematic grid system (Gilbert 1982), over sampling and compositing (Skalski and Thomas 1984) and are used routinely to survey sites for buried waste, yet no such approach is adopted in the 401 certification Soil Fill Acceptance Criteria. While such an approach need not be undertaken at State-certified borrow pits, they should be required at all sites like the First Avenue Bridge and Hamm Creek where contamination is known to occur.

31. In the past year, I have repeatedly advised the Ecology, the Army Corps of Engineers and the USEPA of my serious concerns about the inappropriate use of MTCA as a fill acceptance criteria for the third runway site. Attached hereto are true and correct copies of my letters to the agencies on this topic: Ex. D, August 31, 2000 letter to Tom Luster, Washington Department of Ecology; Ex. E, December 19, 2000 letter to Charles Findley, U.S. Environmental Protection Agency; and Ex. F, February 16, 2001 Comment letter to DOE and the Army Corps of Engineers.

32. There are also problems with the Port's Low Stream Flow Analyses (see Comprehensive Stormwater Management Plan [Parametrix 2000a]) in that the predictions may underestimate summer low flow impacts and overestimate the contributions of proposed mitigation and natural mitigating factors. For example, one option that the Port proposed in mitigation of predicted low stream flows is the use of "additional storage volume in the base of selected detention facilities, that can be used to store winter (wet) season runoff until needed to support low flows in the summer (dry) season." According to Mr. William Rozeboom of

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Northwest Hydraulic Consultants, Seattle, Washington (also working on behalf of ACC and submitting comments), some of the proposed detention facilities that are to be used in this way do not have "dead storage" capacity for reserve storm water release, with the result the total proposed storage falls short of the target volumes. Mr. Rozeboom also points out that the potential mitigating effect of the "fill infiltration discharge" from the proposed runway embankment to Miller Creek is overestimated, and that the "IWS lagoon lining improvements" would specifically reduce recharge for Walker and Des Moines Creeks. For these reasons and others (see the full text of Mr. Rozeboom's comments, attached to his declaration in support of ACC's request for stay), the Port's conclusion indicating that base lows will not be diminished beyond the values presented in Table 5 (page 18) of the Biological Assessment – Supplement (Parametrix 2000) is in serious doubt. Clearly, flow reductions have not been established with any degree of certainty.

33. From a fish or fish habitat perspective, it is my opinion, that if flows in the project streams fall much below 1.0 cfs, impacts to anadromous as well as resident fish species will likely occur, and over most of the length of the streams on the project site. If flows diminish, depths will surely decrease resulting in elevated temperatures and lower dissolved oxygen concentrations. Fish and other mobile aquatic life could be displaced to other reaches of the stream where preferred conditions persist. Diminished flow and depth could also limit movement of fish throughout the stream length and conceivable lead to stranding and mortality of larger fish.

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34. Finally, the Port's Low Flow Analysis/Flow Impact Offset Facility Proposal is incomplete and denies opportunity for meaningful scientific comment. The Port's management approach is to monitor the quality of detained or discharged stormwater, and only when a problem is encountered, will it take steps to mitigate the impacts of altered water quality. For example, if the problem is low dissolved oxygen, the Port will aerate. How the waters in the proposed detention vaults or the stream will be aerated, we aren't told except in a very general way. While several types of aeration devices are listed on page 18 , including microbubble diffusers, gas injection, mechanical aerators, etc., there is no commitment at this time to any of these technologies. It may be expected that one or more of these devices will work better than others but this has not been determined. This plan is not ready for scientific scrutiny.

35. There is also the important issue of how frequently to monitor the stored stormwater during discharge. For example in the case of dissolved oxygen, the Port proposes a weekly monitoring requirement for the operational period, August through October which may not detect early signs of degradation. Dissolved oxygen, can change very quickly (in a matter of hours) in response to biochemical oxygen demand, rainfall, and even air temperature. I therefore cannot agree with the Port's assertion that "water quality of stored water is not expected to change." More frequent monitoring, at least daily for dissolved oxygen, turbidity, and temperature during the operational (discharge) period is necessary to assure that degradation does not occur. Modeling and bench-scale testing should have been required of the Port to determine how long-term (three month) detention can change the basic properties of stormwater.

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36. While it may be of interest to undertake a long-term assessment (10 years) of benthic insect productivity in the project streams (see page 34), as demonstrated by the Benthic Index of Biotic Integrity (BIBI), this kind of biological monitoring also will not detect potential early impacts associated with the discharge of detained stormwater to the project streams. In other words, harm to the resource could occur before it was detected. There is also no real BIBI baseline for the project streams because so few samples have been collected to date from which the BIBI can be calculated. Using this approach, one will also have to wait several years to see a trend in the data that had sufficient statistical reliability to determine if benthic invertebrate productivity was being altered. In my opinion, then, it's a stretch to suggest as the Port does on page 34, "this monitoring will be able to be used in assessing any biological effects of the flow offset facility in the receiving water." Instead of the BIBI, use of either laboratory or *in situ* bioassays aimed at determining potential bioaccumulation and toxicity of metals and other chemicals is one approach that would provide more timely indications of whether or not stored stormwater was having an impact on the receiving water.

37. The monitoring requirements contained in the Section 401 Certification should not be the basis for approving the low flow mitigation plan. If monitoring detects a problem it usually means that the stream(s) has/have suffered some degree of harm. More importantly, the streams will continue to undergo harm until the problem(s) is /are rectified. If the monitoring is flawed as the Port's monitoring appears to be, the degree of harm incurred could be all that more. Reasonable assurance that the water quality will not be impaired, in my opinion, should not be

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based on monitoring alone. Rather, it should be based on a facility design that is well grounded on scientific principles, a learned assessment of the potential problems, laboratory experimentation (not experimentation on the streams), and external peer review. *See also* my comment letters to Ecology and the Corps dated June 20, 2001 (Exhibit G), and August 6, 2001 (Exhibit H).

I declare under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

DATED this 11th day of September, 2001, at Richland, Washington.

John Strand

John Strand, Ph.D.

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