Strand

Pre-Filed Testimony of Dr. John Strand

Submitted on behalf of Appellant
Airport Communities Coalition

PCHB No. 01-160
ACC & CASE v. Dept. of Ecology & Port of Seattle

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Prefiled Written Testimony
John A, Strand, Ph.D.
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1. I am an internationally recognized fisheries biologist with over 27 years of post-doctorate 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 Professor of Biological Sciences at Washington State University Tri-Cities, Richland, Washington. I am a Certified Fisheries Professional and have extensive experience assessing the ecological risks from discharges of contaminants to surface 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.

2. In preparing this testimony, I have reviewed the documents and scientific literature listed in **Exhibit B**. In addition, I have, on behalf of and with the help of the ACC, conducted water quality sampling surveys in the streams surrounding Seattle-Tacoma International Airport (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). Conventional water quality measurements (temperature, pH, turbidity, hardness, dissolved oxygen, nutrients) were conducted at the same sites monthly through December 2001. Actual and suspected pollution events were also investigated as they occurred. Sampling, sample handling, and analyses followed methods outlined in PSEP (1996a, 1996b, 1996c) or by the USEPA (1979). A Washington Department of Ecology certified analytical laboratory performed the metals and organic chemical analyses.

3. For the reasons presented in this testimony (see paragraphs 7-38 below), it is my opinion that 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 worsen as a result of the Port of Seattle's (Port) Master Plan Update Improvements. Violations of applicable Water Quality Criteria (WQC) indicate that the valued aquatic resources in the project creeks, particularly Miller and Des Moines Creeks, are at risk and not being protected. Glycols associated with de-icing of aircraft at STIA are 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 additional 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 (Parametrix 2000a), 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. 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.

4. Although disturbed, the project streams (Miller Creek, Walker Creek, Des Moines Creek, Gilliam Creek) 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 2000b). Both the Miller Creek and Des Moines Creek Watersheds are also exploited by resident cutthroat trout (Parametrix 2000b); 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.

5. 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. In my opinion, 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.

The Issue of Whether or Not There Is Reasonable Assurance that Stormwater Discharged from STIA is Not Harmful to the Project Streams, violating Water Quality Standards.

6. **It is my opinion that 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 WQC 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 outfalls) 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, even after dilution in Miller Creek, the concentrations of copper still exceed WQC. 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.

7. 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).

8. 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, 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 Reports (2000a, 2001a) confirm that exceedances of toxic metals criteria in the Port's stormwater discharges continue today.

9. **Additional evidence of toxic metals exceedances linked to STIA stormwater discharges is provided by Herrera Environmental Consultants (Herrera) (2001).** Herrera, in a five-year study undertaken for the City of Des Moines, assessed the effects of a program of stormwater management and nonpoint pollution control under the *City of Des Moines Comprehensive Stormwater Management Plan* (Parametrix 1991). Of key importance in the Herrera study are the numbers of storm samples collected over the five-year study that exceeded the applicable metals WQC, particularly for copper and zinc. These data are summarized on page 54-65 in the *Five-Year Project Report*. For dissolved copper, the acute criterion of 9 ug/L was exceeded in upper Des Moines Creek (Station DM-1 at S 200th Street) 40 percent of the time. Exceedances occurred in four of the five years sampled including 1994-1995, 1996,

1998, and 1999, where peak values were 13.2, 12.2, 9.2 and 10.6 ug/L, respectively. For dissolved zinc, a single exceedance occurred during a storm monitored in 1996, where the peak value recorded was 78 ug/L. The acute WQC was 63 ug/L. These copper and zinc data were obtained from flow-proportionately composited water samples collected during 3-5 qualifying storms each year.

10. Of equal importance, Herrera (2001) offers the following interpretation as to the origins of copper and zinc found in Des Moines Creek. They say on page 54 that, "Runoff carrying pollutants from SeaTac Airport (which is located upstream of Station DM-1) may be responsible for higher dissolved copper concentrations in Des Moines Creek." Regarding zinc, they say on page 61 that, " Water Quality violations for zinc in the upper reaches of these basins may be related to runoff from high traffic area, e.g., SeaTac Airport and parking areas in the Des Moines Creek Basin and SR 99 in the Massy Creek."

11. The results of Herrera's metals analyses differentiated between the concentrations of dissolved and the concentrations of total recoverable metals in Des Moines Creek water samples. As such, these data address the Port's and the Ecology's often heard criticism that it is inappropriate for ACC or anyone else to compare the results of the Port's metals analyses, which are expressed as total recoverable metal, to the WQC, which are based on the dissolved metal concentration (see WAC 173-201A-040). Please note that the Port continues to report the results of their stormwater metals analyses as total recoverable metal (Port 2000a, 2001a). Not measuring and reporting the concentrations of dissolved metals in stormwater, even when the WQC requires this convention, is not good science and could be viewed as an effort to obscure the results of

the Port's monitoring. There can be no reasonable assurance of compliance with WQC where the Port continues to report results of their metals analyses as total recoverable metal.

12. Most recently (January 28, 2002) on a site visit of STIA, I had opportunity to visit specific stormwater outfalls discharging to the project creeks. At the location of an outfall in the tank farm to the East Branch of Des Moines Creek that was identified as SDS1 by Port personnel, I took the picture that is found in **Exhibit C**. The picture documents a substantial milky-white effluent from SDS1 flowing into the East Branch of Des Moines Creek. While I have not seen all testing results that address the nature of the white material in the effluent, turbidity readings I obtained onsite by using a properly calibrated turbidimeter indicated a nearly 10-fold increase in turbidity above ambient (299 vs. 31 NTU [nephelometric turbidity unit], respectively), which greatly exceeds the 5 NTU increase over background allowed by the Washington State Water Quality Criteria for Class AA Freshwater (Chapter 173-201A WAC).

13. The 1997, 1999, 2000a, and 2001a 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 [in Washington], City of Portland[in Oregon]). 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 and 2001 reports. While these data maybe of some scientific interest, 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 Bellevue or Portland. All this means is that the Cities of Bellevue and Portland are also not in compliance with applicable WQC.

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; that is, above the point at which the Port's stormwater discharges enter the stream, 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 from 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 specific 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) 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. **Whole effluent testing (WET) 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-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.

17. 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 and bioaccumulated by 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 2000). The dry season (August 2000) 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 2000) 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 specific 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 ecological risk assessments. These data indicate that lead and zinc are chemicals of concern that require more detailed investigation and additional control.

18. **Glycol-based de-icers and anti-icers, used in de-icing aircraft at STIA and which are supposed to drain only to the industrial waste system (IWS), are also presently found in the project streams.** The Port's Annual Stormwater Monitoring Reports for 1999, 2000, and 2001 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 are still routinely detected at five or six of the Port's stormwater outfalls: SDN1, SDN2, SDN4, SDE4, SDS1, and SDS3 during winter months. 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.

19. 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.

20. 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. 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.

21. 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).

22. Respecting my earlier comments that de-icers and anti-icers were toxic at very low concentrations (LC_{50} of 1.8-8.7 mg/L total glycols), which I based on information presented in Hartwell et al. (1995), the Port suggests that this very low LC_{50} is in error (see Declaration of Linda Logan in support of the Port's Opposition to Stay). The Port indicates that the concentration of glycol in water that Hartwell et al (1995) reported was toxic to fish was off by a factor of 1000. In response to this criticism, let me say that I can neither confirm nor refute the assertion that the Hartwell et al. (1995) article is in error. Hartwell et al. (1995) was reporting the work of another author, Fisher (1994), who studied the toxicity of de-icers in stormwater runoff from a large commercial airport. I am still waiting to hear back from Hartwell or another of his co-authors. However, let me point out that the Hartwell et al. (1995) study is not in question; rather, it is the data developed by Fisher (1994) that may have been incorrectly reported in Hartwell et al (1995).

23. In my opinion, the Hartwell et al. (1995) article is still germane to the

issue of whether or not fish and other aquatic life in area creeks are at risk from glycols. In their own experiments (not Fisher's studies (1994)), Hartwell et al. (1995) documented moderate gill pathology (edema, respiratory cell hypertrophy, and proliferative bronchitis) in fathead minnow exposed to polypropylene anti-icer for seven days at a relatively low concentration of 17.6 mg/L of propylene glycol. Fathead minnow exposed to ethylene glycol de-icer for seven days developed mild gill pathology at 275 mg/L. It is reasonable to assume that fish suffering these symptoms will die if the exposure to glycols continues at these same levels. It also has been documented by ACC and the Port's own measurements (see above) that concentrations of glycols in or entering project streams equals or exceeds levels known to produce these pathologies.

24. While the Port does not contest that glycols continue to enter the project streams, they do assert that the pathology data produced by Hartwell et al. (1995) are not relevant to this issue. Specifically, the Port asserts, even though the concentrations of glycols entering area creeks exceed the thresholds that produce gill pathology, these data are not relevant because 1) the formulations of de-icers and anti-icers have changed since Hartwell et al. (1995) conducted their study, and 2) the amount of the more toxic formulations used at the STIA are only a small percentage of the total glycols used at STIA.

25. To the contrary, the Hartwell et al. (1995) data are relevant and highlight the need to determine the toxicity specific to the actual de-icers and anti-icers used at STIA. Because formulations change from year to year, we really don't know if the formulations used at the STIA are different than those used by Harwell et al. (1995). Even if they are different, we have no basis for assuming that they are less toxic. To the

best of our knowledge the specific de-icer and anti-icer formulations used at STIA have not been tested for residual toxicity (beyond the tests conducted by the manufacturer during licensing). Clearly testing should be conducted and under site conditions, e.g., using dilution water from area creeks.

26. The Port has also often said that heavy use of de-icers and anti-icers at STIA is "limited to the infrequent, one to two day winter weather episodes." Logan Declaration at ¶ 34. This is not true. The Port's (2001b) *AirCraft Deicing Report for the Period April 1, 2000 to March 31, 2001*, indicates that use at STIA is steady for some airlines, e.g., Alaska, Horizon, particularly over the colder months, November through March. Actually, based on this report, at least 100 gallons of glycols per day were used on at least 20 days of each month, over five months of the year at STIA. On seventeen days out of the year, more than 1,000 gallons per day were used; while 10,000 gallons per day were used on two days out of this period. There can be no reasonable assurance that glycols will not continue to pose risks for valued aquatic life given their historical presence in project streams and absence of appropriate measures to prevent their future introductions.

27. **The Port claims 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 (see Response #32, page III-72, Port of Seattle Response to 401/404 Comments, Reference: 1996-4-02325, April 30, 2001) ."**

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 Port's uncertainty about its own willingness to bear the cost of providing (constructing) additional detention.

28. Of the stormwater basins that discharge to Miller Creek at the north end of the STIA, only SDN1 will be retrofitted with additional detention. And, according to Table 7-8, the SDN2 and SDN4 will not receive a retrofit.

29. 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 2001a).

30. It should also be noted that another escape clause exists in the 401 Certification [see Section J(1)(c)]. This clause allows the Port to retrofit at less than the required rate with respect to the construction of new impervious surfaces; that is, for every 10 percent of new impervious surface, the Port must demonstrate that 20 percent

retrofitting has occurred. The 401 Certification allows the Port to retrofit at less than the 20 percent standard if it can demonstrate that this level of retrofit is infeasible.

31. So I must ask, what really will change? Will stormwater quality at the existing six outfalls improve substantially with the proposed construction at STIA? In my opinion, the Port's proposed retrofit will not improve the existing situation very much, if at all, because it doesn't go far enough. What is required, in my opinion, is additional detention and treatment of all stormwaters presently discharged from STIA to the project creeks.

32. In summary, it is my opinion that there is no reasonable assurance that the Port's discharges comply with the State's numerical metals WQC. There is ample evidence to conclude that exceedances of the State's metals WQC have occurred historically, and continue to occur as a result of stormwater discharged by STIA. I base my opinion on analyses of the Port's own data reported in 1997 that showed the influence (contribution) of the Port's stormwater in Miller Creek. This was possible because the Port in 1995-1996 sampled not only at end-of-pipe but also sampled above and below their outfalls. While the Port no longer reports the concentrations of metals both above and below their outfalls, it is clear that based on metals concentrations in their outfalls (end-of-pipe), the concentrations of metals discharged by STIA have not changed appreciably since surveys were begun in 1995-1996. There also are more recent data (1994-1995, 1996, 1998, 1999) from Des Moines Creek linking exceedances of metals with runoff from STIA. Recent WET testing shows that zinc remains a problem in some of the discharges at STIA. It is also my opinion that metals in stormwater, including those contributed by STIA, are bioavailable and are accumulated by fish inhabiting the

project creeks; and that based on screening levels (TSCs) developed by Shepherd (1999), are high enough to be of concern. Finally, it is my opinion that considerable amounts of glycols are discharged in stormwater at STIA and that concentrations can reach and exceed toxicity thresholds, particularly those resulting in gill pathology in fish. It also is not likely that stormwater quality at STIA will improve because many of the existing outfalls will receive no additional measure of treatment.

The Conditions for Acceptance of Fill for Use in Construction of the Third Runway and the Issue Whether or Not the Fill Stockpile Already Contains Contaminants.

33. It is my opinion that there is no reasonable assurance that fill materials already stockpiled at STIA are not contaminated with a broad spectrum of chemicals that have the potential to percolate through the fill pile to groundwater, contaminating wetlands and surface waters. Chemicals in fill would also have the potential to directly contaminate wetlands and surface waters through runoff following seasonal rains. The Soil Acceptance Criteria described in the 401 Certification [see Section E(1)] are also seriously flawed and do not preclude the acceptance of chemically contaminated fill for use at the third runway site.

34. The Section 401 certification relies in part upon 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 allow the contamination of clean property up to some predetermined level. To the best of my knowledge, the property where the fill is being placed was free of any significant contamination prior to the 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 or in proximity to streams that contain significant aquatic life.

35. In responding to my concerns that the fill already stockpiled contains chemical burdens, Ecology asserts in paragraph 10 of the Declaration of Mr. Fitzpatrick that under Condition E(1)(d) of the 401 Certification, that the Port is "restricted to using only naturally occurring uncontaminated soils as fill material." Ecology also says that the Port is "prohibited from using fill from known contaminated sources" and that "extensive investigation of each fill source is required to assure that no fill is accepted from a contaminated site" (Port Brief on Response to ACC's Motion for Stay, page 18). Both Ecology and the Port are wrong because Condition E(1)(b) of the Certification allows the Port to use fill material from contaminated sites where the contamination falls below the numeric criteria specified in the Certification. While the Certification does call for a Phase I and Phase II assessment of fill sites [Condition E(1)(a)], the very purpose of that sampling is to compare the results "to the fill criteria to determine the suitability of the fill source for Port 404 projects [(Condition E(1) (b)]." In fact, several examples confirm that the Port has already accepted fill from sources other than "naturally occurring uncontaminated soils." These examples also document the acceptance of fill that is

clearly contaminated and which exceeds the standards established for the protection of the aquatic ecosystems down- gradient of the third runway embankment.

36. For example, the 80,000 cubic yards of fill materials obtained from Hamm Creek (see letter from Elizabeth Clark, Port of Seattle, to Roger Nye, Department of Ecology, dated February 4, 2000[**Exhibit D**]) are not "naturally occurring uncontaminated soils." These materials are sediments dredged from the Duwamish River and Hamm Creek that were tested for residual contamination and which failed toxicity tests for open-water disposal (see memo from Beth Doan to Paul Agid, Port of Seattle, dated March 24, 1999 [**Exhibit E**]). The sediments contained DDT and PCBs at 14 and 160 ug/Kg, respectively. The decision to accept these materials was based on the analyses of only four sediment samples, which were composited-down to two samples. It is interesting to note in the memo from Beth Doan (Clark), a Port consultant, to Paul Agid, a Port employee in the Aviation/Environment group, dated March 24, 1999, there is a caveat that "indicates the samples were composited over large areas and depths, and that there is potential for hotspots to go undetected."

37. Another 85,000 cubic yards of fill from the First Avenue Bridge were accepted from the Washington Department of Transportation (WDOT) in the Second Quarter 2000 (see memo from Paul Agid, Port of Seattle, to Chung Yee, Department of Ecology, dated July 27, 2000 [**Exhibit F**]). Initially in this case, five samples were chemically analyzed, with one of the samples indicating 200mg/Kg petroleum hydrocarbons (TPH) in the diesel range (actual value was 870 mg/Kg) (see letter from Tom Madden, Washington Department of Transportation to Beth Clark, Port of Seattle, dated November 29, 1999 [**Exhibit G**]). At this time, the Method A Soil Cleanup Level

was 200mg/Kg. The Port or their consultant collected only three additional samples to delineate the hotspot. These samples contained TPH in excess of the Method A Soil Cleanup Level, but no other samples were collected. Even though the hotspot was not fully delineated, the vast majority of the fill was accepted and transferred by the Port. I should point out that the concentration of 870 mg/Kg for TPH in the diesel range found in soils from the First Avenue Bridge still exceeds, in part, the most recent version of the Ports' Soil Fill Acceptance Criteria [see 401 Certification-Condition E(1)(b)]. The criterion for what is called diesel is 460/2000 mg/Kg, which prohibits the use of the First Avenue Bridge fill materials within the first six feet of the embankment or within the "drainage cover layer" under the "wedge" alternative for construction of the embankment.

38. As a third example of the Port's willingness to accept contaminated fill, I would like to call your attention to a memo from Beth Clark to Paul Agid, both of the Port, dated April 30, 2001 (**Exhibit H**). This internal Port Memorandum revealed TPH as diesel exceeding the MTCA Method A Soil Fill Cleanup Level (200mg/Kg) in candidate fill from the Black River Quarry. This finding was based on a single sample collected and analyzed on June 9, 2000. Based on subsequent testing of triplicate samples on June 22, 2000, which showed that the tested samples did meet the MTCA standard, fill was accepted and transferred to STIA beginning May 15, 2001. Yet additional testing of duplicate samples of Black River Quarry soil on September 29, 2000, and again on October 2, 2000, unfortunately again showed TPH in excess of the MTCA Soil Cleanup Level of 200mg/Kg. Thus, soils were accepted and transferred by the Port to the STIA that violated an agreed to process and set of standards. What is even

more disturbing is learning that the testing of the Black River Quarry soil samples was undertaken June 9, 2000 and again July 6, 2000, nine or ten months before the Beth Clark Memo containing the results of above testing was sent to Paul Agid. It appears that the Port did not want these results released, perhaps because the *Soil Fill Acceptance Criteria* had already been criticized. If these data had been reported to Ecology in a timely manner, e.g., in the Second Quarterly Report 2000, the Agency could have stopped the transfer of the petroleum hydrocarbon-contaminated soils.

39. Neither Ecology nor the Port responded to my comment that the 401 Certification lacked a consistent and statistically meaningful approach to determine the location and extent of any contamination contained in candidate fill materials. Clearly, 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. Ecology even rejected guidance from their own Toxics Cleanup Program that recommends a much higher sampling effort than proposed in the *Soil Fill Acceptance Criteria* (Condition E (1)(a). See "*Guidance for Remediating Petroleum Contaminated Soils,* Department of Ecology, Publication No. 91-30 (1995). For example, for a 200,000-cubic yard candidate fill stockpile, the Toxics Cleanup Program guidance recommended a minimum number of 226 samples. Notwithstanding this recommendation, the *Soil Fill Acceptance Criteria* subject the same quantity of fill to just six samples.

40. In summary, it is my opinion that there is no reasonable assurance that the

fill criteria in the 401 Certification will not result in increased contamination in area wetlands and streams. The fill materials presently stockpiled at STIA are already contaminated with a broad spectrum of chemicals that have the potential to percolate through the fill pile to groundwater, contaminating wetlands and surface waters. Chemicals in fill would also have the potential to directly contaminate wetlands and surface waters through runoff following seasonal rains. The Soil Acceptance Criteria described in the 401 Certification [see Section E(1)] do not preclude the acceptance of chemically contaminated fill for use at the third runway site and the sampling required is insufficient to ensure compliance with WQC.

Monitoring the Potential for Low Stream Flow Impacts.

41. **Finally, there are still significant flaws in the Port's proposed Low Flow Impact Offset Facility and associated monitoring (Port 2001c).** While it may be of interest to undertake a long-term assessment (10 years) of benthic insect productivity in the project streams (see page 5-4), as demonstrated by the Benthic Index of Biotic Integrity (BIBI) (Karr and Chu 1997), this kind of biological monitoring proposed by the Port and in the 401 certification 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, even if four measurements are collected each year. 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 an unwarranted stretch to suggest that the BIBI can be used to assess any biological effects of the Low Flow Impact Offset Facility.

42. The monitoring requirements contained in the Section 401 Certification [see Section I(1)] also should not be the basis for approving the low flow mitigation plan and cannot provide reasonable assurance of compliance with WQC. 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 or the Port's existing 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 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 in the streams), pilot studies (testing one reserve stormwater vault is not enough) and external peer review.

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

DATED this 22 day of February, 2002, at Richland, Washington.

John Strand, Ph.D.

F

Pre-Filed Testimony
of
Sally Nelson

Submitted on behalf of Appellant
Airport Communities Coalition

PCHB No. 01-160
ACC & CASE v. Dept. of Ecology & Port of Seattle

I am a member of the City Council of Burien, Washington. I have also served in the past as Mayor of Burien and as a member of the Airport Communities Coalition Executive Committee. The purpose of this testimony is to introduce ACC to the Board and to put into perspective for the Board ACC's reasons for participating in this review.

The Airport Communities Coalition is an entity established by interlocal agreement and composed of the Cities of Burien, Des Moines, Federal Way, Normandy Park, and Tukwila, and the Highline School District, with a combined population of over 150,000 citizens. ACC was formed for the purpose of, *inter alia*, participating in the governmental review process related to the Port of Seattle's proposed third runway and related Master Plan developments ("Third Runway Project") at Seattle-Tacoma International Airport ("Sea-Tac Airport" or STIA"). The ACC municipalities and school district would be particularly affected by construction of the Third Runway Project because they are the communities closest to Sea-Tac Airport (excluding the City of SeaTac itself, which receives millions of dollars a year from the Port and supports the Third Runway Project).

The ACC municipalities have particular stewardship responsibilities for the streams and watersheds within their boundaries, including Des Moines Creek, Miller Creek, Walker Creek, and Gilliam Creek. ACC and its members have a vital interest in ensuring that the Port's proposed project complies with the requirements of the Clean Water Act, the Coastal Zone Management Act and state water quality laws. The value of these resources to the communities is illustrated by how we use them.

For example, over fifty percent of the Miller Creek drainage basin is within our city's boundaries. Burien devotes considerable resources to protection and enhancement of area streams and watersheds. The headwaters of Walker Creek, a tributary of Miller Creek which provides low summer flow for salmon habitat in Walker and Miller Creeks, are located within our city's boundaries.

The mouth of Des Moines Creek is located in Des Moines Beach Park, a major focus for the community. The park includes a marina, senior center and numerous historical buildings, and is enjoyed by South King County residents as a whole for its water-oriented amenities.

As ACC's original Notice of Appeal to this Board, filed in August, describes, the Normandy Park Community Recreation Center sits at the mouth of Miller Creek. This community beach parcel includes a community club building, tennis courts, swim club, baseball fields, boat launch and picnic areas on the beach and near the streams. Miller and Walker Creeks flow around and through the community center property, providing a beautiful natural setting for community activities. From an early age and through their school years, children are taught about and enjoy the streams and lakes and participate in field trips and stream

restoration projects on them. Over the years our community groups have undertaken significant efforts to protect and enhance these streams and make them fish-friendly. Many residents fish in the streams and lakes. Streamflows to support area creeks are therefore a concern for all ACC cities.

I am aware that some of the statements submitted to this Board in opposition to ACC's request for a stay, including statements by Department of Ecology personnel, suggest that the Port's proposal should be viewed as a stream restoration project, reversing supposed neglect by our communities. This presents an inaccurate and distorted picture to the Board. The homes and neighborhoods whose elimination the Port and Ecology cite as elements of the "restoration" project were mature rural/suburban communities. These should not be confused with the gashes across the environment which new plats in other locations may sometimes create. The neighborhoods' vegetation is mature, the houses by and large modest, and the lots not intensely developed. These mature neighborhoods were living in supportive co-existence with the area streams and wetlands. Their destruction for the Port's massive project is not synonymous with watershed restoration.

It is my belief that Ecology's decision was driven by politics, rather than science, particularly after October, 2000, when Tom Luster, the Department's senior staff expert on Section 401 matters, was removed abruptly from the process. The Port's subsequent submittal of its (third) Section 401 application and its approval by Ecology despite numerous unanswered questions and yet-to-be-submitted analyses raise more questions in the public's mind than they

In my opinion, then, it's an unwarranted stretch to suggest that the BIBI can be used to assess any biological effects of the Low Flow Impact Offset Facility.

42. The monitoring requirements contained in the Section 401 Certification [see Section I(1)] also should not be the basis for approving the low flow mitigation plan and cannot provide reasonable assurance of compliance with WQC. 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 existing 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 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 in the streams), pilot studies (testing one reserve stormwater vault is not enough) and external peer review.

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

DATED this _____day of February, 2002, at _____, Washington.

_____

John Strand, Ph.D.

resolve concerning whether there really is reasonable assurance that the Port project will not degrade water quality.

ACC scientists -- and Tom Luster -- have testified in writing to the Board that the flaws in the first two applications were not cured in the third, and that the difference appears to be in how Ecology has viewed the application, applied the applicable standards for 401 certification, and allowed the Port to defer resolution of issues which have been outstanding now for more than three years.

While ACC cities have been characterized as NIMBYs and our concerns denigrated on this basis, the label does not ring true. We have lived with Sea-Tac Airport for many years and endured past impositions with more equanimity than many could muster. The issue here is whether the Port's plan for an extraordinarily intrusive expansion, involving massive alterations to the natural environment, meets the state standard requiring reasonable assurance that water quality standards will not be violated. Because of our past experience, we engaged the most reputable scientists available to advise on this question. Their responses have been uniformly that the Port has not done its homework and that Ecology, since Tom Luster's departure, has not required it to do so. On this basis, our cities ask this Board to reverse the Ecology certification.

DATED this 22 day of February, 2002

Sally Nelson

Pre-Filed Testimony
of
Dr. John Strand

INDEX TO EXHIBITS

A. Curriculum Vitae of Dr. John Strand

B. List of Documents and Scientific Literature Relied upon in Testimony related to Section 401 Water Quality Certification for Third Runway at Sea-Tac Airport

C. Photograph taken by Dr. Strand on January 28, 2002 at the location of an outfall in the tank farm to the East Branch of the Des Moines Creek

D. Letter from Elizabeth Clark, Port of Seattle, to Roger Nye, Department of Ecology, dated February 4, 2000, regarding fill from Hamm Creek

E. Memo from Beth Doan, U.S. Army Corps of Engineers, to Paul Agid, Port of Seattle, dated March 24, 1999, regarding the Hamm Creek Coil Quality Review

F. Letter from Paul Agid, Port of Seattle, to Chung Yee, Department of Ecology, dated July 27, 2000, transmitting environmental documentation for fill material

G. Letter from Thomas Madden, Department of Transportation, to Elizabeth Clark, Port of Seattle, dated November 29, 1999, regarding potential use of fill from the First Avenue Bridge project

H. Memo from Beth Clark, Port of Seattle, to Paul Agid, Port of Seattle, dated April 30, 2001, regarding potential fill from the Black River Quarry

CURRICULUM VITAE

January 1,2002

JOHN A. STRAND

1314 Cedar Avenue, Richland, WA 99352
(509) 943-4347; jstrand427@aol.com or jstrand@tricity.wsu.edu

EDUCATION

B.A.	Biology, Lafayette College	1960
M.S.	Biology, Lehigh University	1962
Ph.D.	Fisheries Biology, University of Washington	1975

EXPERIENCE

1999 - Independent Consultant, Columbia Biological Assessments, Richland, WA.

Evaluates environmental impacts of engineered structures and assesses ecological risks from discharge of contaminants to surface waters.

Also, Adjunct Professor, Biological Sciences, with joint appointment in the Environmental Sciences and Regional Planning Program, Washington State University Tri-Cities, Richland, WA.

1996 - 1999 Water Quality Planner, King County Department of Natural Resources, Seattle, WA.

Assessed ecological risks of combined sewer overflows to the Duwamish River and Elliott Bay, Washington. Also, evaluated King County programs and policies most relevant to the conservation of chinook salmon. Non-supervisory position.

1993 -1995 Senior Biologist and Group Leader, EA Engineering, Science, and Technology, Inc., Redmond, WA.

Developed, managed, and performed environmental assessments of engineered structures. Conducted ecological risk assessments of chemical discharges on aquatic resources. Supervised up to 10 staff.

1992 - 1993 Member and then Co-Chair, representing the National Oceanic and Atmospheric Administration of the Interagency Exxon Valdez Oil Spill Restoration Planning Working Group, Exxon Valdez Oil Spill Trustees, Anchorage, AK.

Working Group assigned responsibility for developing comprehensive restoration plan, and for designing, implementing and reviewing long-term restoration and monitoring projects. Supervised up to 10 staff.

1990 - 1993 Restoration Manager, Office of Oil Spill and Damage Assessment and Restoration, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Alaska Region, Juneau, AK.

Helped plan and coordinate overall restoration project efforts of NOAA related to Exxon Valdez oil spill. Non-supervisory position.

1988 - 1990 Senior Scientific Advisor and Staff Scientist, Marine Sciences Laboratory, Battelle, Pacific Northwest Division, Sequim, WA.

Advised Laboratory Director and served as Principal Investigator on laboratory and field projects to determine fate and effects of chemical contaminants in aquatic ecosystems. As Principal Investigator, supervised up to 10 staff.

1987 - 1991 Affiliate Associate Professor, School of Fisheries, College of Ocean and Fisheries Sciences, University of Washington, Seattle, WA.

Served on thesis committees. Also administered U.S. Department of Energy Northwest College and University Association for Science (NORCUS) Fellowship Program for University of Washington students and faculty at Marine Sciences Laboratory, Battelle Northwest Division, Sequim, WA.

JOHN A. STRAND (continued)

1982 - 1988	Manager (Director), Marine Research Laboratory, Battelle, Pacific Northwest Division, Sequim, WA. Managed a research and development program to assist government agencies and industry engaged in management of marine resources and development of marine technologies. Supervised 45 scientists, technicians, faculty and students.
1969 - 1982	Senior Research Scientist and Manager, Aquatic Ecology Section, Ecosystems Department, Battelle, Pacific Northwest Laboratory, Richland, WA. Conducted and managed various laboratory and field projects to determine fate and effects of radioactive and chemical contaminants in aquatic ecosystems. Supervised up to 20 staff.
1964 - 1969	Special Engineering Projects Officer and Scientific Investigator, Biophysics Branch, Biomedical Division, U.S. Naval Radiological Defense Laboratory, San Francisco, CA. Conducted laboratory research on fate of radionuclides in aquatic ecosystems. Supervised 2 staff.
1963 - 1964	Deck and Engineering Officer, U.S.S. Maury (AGS-16), U.S. Navy, Pearl Harbor, HA. Responsible for fire fighting and damage control capability of ship. Supervised 40 staff.
1962 - 1963	Research Assistant, Tri-State Survey of Delaware River and New Jersey Pollution Unit, New Jersey Bureau of Fisheries Laboratory, Lebanon, NJ. Biological Technician. Non-supervisory position.
1961 - 1962	Teaching Assistant and Field Research Assistant, Lehigh University, Bethlehem, PA. Taught General Biology Laboratory to 20 non-biology major students. Conducted fish bioassays.

SPECIALTY AREAS

Resource Management and Planning. In 1999, Dr. Strand was appointed to a seven-member Biological Review Panel to evaluate King County policies and programs (e.g., Sensitive Areas Ordinance, Clearing and Grading Code, Surface Water Design Manual, and basin plans) most relevant to the conservation of salmon. The Panel's recommendations were published as Chapter 6 in Return of the Kings, Strategy for the Long-Term Conservation and Recovery of the Chinook Salmon, King County's response report to the Endangered Species Act listing.

While with the National Marine Fisheries Service 1990-1993, Dr. Strand served on the Exxon Valdez Oil Spill Interagency Restoration Planning Work Group. He was Federal Co-Chair of the Work Group. This Group was established by the Trustee Agencies and assigned the responsibilities for developing a restoration plan, and for designing, implementing and reviewing long-term restoration and monitoring projects. Under Dr. Strand's leadership, the Restoration Planning Work Group published in April 1993 a Draft Exxon Valdez Oil Spill Restoration Plan Summary of Alternatives for Public Comment. Dr. Strand also helped plan and coordinate the overall restoration project efforts of four divisions of NOAA (Alaska Fisheries Center, Auke Bay Laboratory, National Marine Mammal Laboratory, and the Environmental Conservation Division of the Northwest Region) related to the Exxon Valdez oil spill.

From 1987 to 1990, Dr. Strand was a member of the Committee on Research in Puget Sound for the Puget Sound Water Quality Authority. He served as Chairman of the Subcommittee on Institutional Issues and coordinated the development of a proposal to create a "Puget Sound Research Foundation." This proposed independent non-profit corporation provided for the first time, a mechanism to coordinate research priorities that cut across issue- or mission-specific perspectives of any one group or agency and focused on the entirety of Puget Sound. Dr. Strand also was a member of the Sequim Bay Watershed Management Committee between 1987 and 1990 and helped produce the Sequim Bay Watershed Management Plan. An evaluation of this document, which focuses primarily on mitigation of the cumulative effects of nonpoint source pollution, can be found in the Canadian Journal of Fisheries and Aquatic Sciences 48 (7): 1326-1333, 1991.

Environmental Impact Assessment. Dr. Strand has conducted and managed numerous studies to determine the impacts of technology development, including nuclear power plants, hydroelectric impoundments, petroleum and synthetic fuel refineries, mines and smelters, ballast water treatment facilities, and general construction projects. In 1994-1995, Dr. Strand managed an environmental assessment of alternative sites for replacement base housing at McChord Air Force Base, Tacoma, Washington. In 1985-1987, Dr. Strand designed and managed data collection in support of an environmental assessment of the Navy's Southeast Alaska Acoustic Measurement Facility near Ketchikan, Alaska.

Fate and Effects of Petroleum and Synthetic Fuels in Aquatic Systems. Dr. Strand has conducted research on the fate and effects of the water-soluble fractions of crude and product oils in aquatic systems. Particular attention was focused on the saturate and polynuclear aromatic hydrocarbon fractions, their bioaccumulation and depuration. In 1990, he evaluated the design and sampling procedures of a monitoring program to determine fate and effects of oil refinery and coking plant wastes on aquatic resources of Amuay Bay, Venezuela. With the help of University of Washington researchers, Dr. Strand conducted and managed a program of research in 1989 to determine the fate and effects of spilled Bunker C fuel oil on beaches of Olympic National Park, Olympic Peninsula, Washington. From 1980-1982. Dr. Strand managed the Battelle, Pacific Northwest Division's program of research for the U.S. Department of Energy on the fate and effects of synthetic fuel (SRC-I, -II) residuals in terrestrial and aquatic habitats. Dr. Strand and other Battelle researchers studied persistence of North Slope crude oil spilled in Port Angeles harbor (Port Angeles, Washington) in December 1985.

Fate and Effects of Radionuclides in Aquatic Systems. Dr. Strand spent nearly ten years in studies of the fate and effects of tritium oxide (HTO) and other radionuclides in aquatic systems. He conducted experiments to determine the bioaccumulation of HTO under long-term (18 month) exposure. He also studied the radiosensitive nature of early life stages (embryo/larvae) of rainbow trout exposed to HTO. He focused on the effect of latently expressed inhibition of antibody synthesis following early embryo exposure. Dr. Strand is internationally recognized for his work in radioecology. In 1981, he was an invited participant to a United States and Japan Exchange (A-25) on Tritium Radiobiology and Health Physics held at the National Institute of Radiobiological Sciences, Chiba, Japan.

Toxicology and Risk Assessment for Aquatic Systems.
Dr. Strand's other research interest is the application of risk assessment to understanding fate and potential effects of chemical contaminants in aquatic systems. Particular attention has been devoted to studies of hydrodynamic and geochemical processes that control the distribution of contaminants. This effort has led to development and application of exposure pathways models to determine fate of radionuclides, heavy metals, and complex organic chemicals discharged to surface waters. From 1999 to the present, Dr. Strand has assessed risks to fish and other aquatic life from stormwater additions to the Miller Creek, Walker Creek, and Des Moines Creek Watersheds, King County, Washington. From 1996 to 1999, Dr. Strand and other King County scientists studied the ecological and human health risks associated with chemical and biological contaminants entering the Duwamish Estuary, Washington, from combined sewer overflows. At a gold mine in Alaska in 1994, Dr. Strand assessed human health risks of arsenic discharged in treated tailings pond effluents. In other mining related studies, Dr. Strand and his Battelle colleagues studied the physical, chemical, and biological fate of metal sulfides in marine food chains leading to man from disposal of mine tailings in coastal waters of British Columbia.

OUTSIDE APPOINTMENTS AND CONSULTANTSHIPS

Member, Water Environment Research Foundation (WERF) Project Subcommittee to review Project 97-HHE-2, Demonstration of the WERF Aquatic Ecological Risk Assessment Methods for Risk-Based Water Quality Management, 1998 - present.

Director, Northwest Washington District, American Institute of Fisheries Research Biologists, 1994 - 1996.

Member, Expert Panel to review Puget Sound Ambient Monitoring Program, Puget Sound Water Quality Authority, 1995.

Director, Southeast Alaska Chapter, American Institute of Fisheries Research Biologists, 1992 - 1993.

Member, Sequim Bay Watershed Management Committee, Clallam County Department of Community Development, 1987 - 1990.

Chairman, Subcommittee on Institutional Issues, Committee on Research on Puget Sound, Puget Sound Water Quality Authority, 1986 - 1990.

John A. Strand (continued)

Member, Peninsula Development Association Board of Directors Serving Jefferson and Clallam Counties, 1984 - 1990.

Member Peninsula College General Vocational Advisory Committee and Fisheries Technology Committee, 1983 - 1990.

Member, Steering Committee for the Olympic Park Institute. 1987.

Field Officer and Commanding Officer (ONR NRL TAC 522) in Technology Mobilization Subprogram, Office of Naval Research, 1976 - 1985. (Retired as Capt., USNR in 1985.)

PROFESSIONAL AFFILIATIONS

American Institute of Fisheries Research Biologists
American Men and Women of Science
American Fisheries Society
Northwest Scientific Association

HONORS AND AWARDS

Promotion to Fellow, American Institute of Fisheries Research Biologists, 1993.

Certificate of Recognition and Quality Step increase for outstanding performance for period 04-01-92 to 03-31-93, U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

Certificate of Recognition of high level of performance for period 04-01-91 to 03-31-92, U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

Selection to Citizen Ambassador Program of People to People International's Fisheries Delegation to Japan, People's Republic of China, and the Republic of Korea, 1985.

Fellowship, Battelle Seattle Research Center, 1 year while attending the University of Washington, 1972 - 1973.

Technical Merit Reviewer, U.S. Environmental Protection Agency, 1972.

Certified Fishery Scientist (No. 442), American Fisheries Society, January 15, 1969

Fellowship in Biology (teaching), 1 year while attending Lehigh University, 1962 - 1963.

Scholarship (part tuition), 4 years while attending Lafayette College, 1956 - 1960.

INVITED PARTICIPATION

Invited to participate in Workshop on Ecological Risk and Decision Making. Sponsored by the U.S. Environmental Protection, Region 10. Held in Seattle, Washington, November 4-6, 1997.

Invited to present Plenary Session paper: Restoration Planning Following the Exxon Valdez Oil Spill. Exxon Valdez Oil Spill Symposium. Sponsored by the Exxon Valdez Oil Spill Trustee Council, University of Alaska Sea Grant College Program, and the American Fisheries Society. Held in Anchorage, Alaska, February 2-5, 1993.

Invited to present Sommer Memorial Lecture: Critical Biological Pathways for Transfer of Radioactive and Heavy Metal Contaminants to Biota and Man in Relation to Development of the Uranium Industry in British Columbia. Sponsored by the Oregon Health Sciences University School of Medicine Alumni Association. Held in Portland, Oregon, April 9-10, 1987.

Invited to participate in Workshop on Alternative Approaches to Toxicity Testing: Use Non-Mammalian Organisms. Sponsored by the National Institute of Environmental Health Sciences, National Cancer Institute, U.S. Environmental Protection Agency, U.S. Department of the Army, and Battelle Memorial Institute. Held in Columbus, Ohio, November 1986.

Invited to participate in Workshop on Establishment of Consistent Protocols for Conducting Laboratory Bioassays on Puget Sound Sediment. Sponsored by Region 10, U.S. Environmental Protection Agency. Held in Seattle, Washington, October 1985.

Invited to participate in Workshop on Identification of Potentially Useful Bioassessment Methodologies for Regulatory Testing of Dredged Materials. Sponsored by Environmental Laboratory, Waterways Experiment Station, U.S. Army Corps of Engineers. Held in Vicksburg, Mississippi, February 1985.

Invited to participate in Meeting on Pathways Modeling. Sponsored by AMAX of Canada, Ltd. Held in Vancouver British Columbia, March 1982.

Invited to participate in Retreat on Health and Environmental Research Program Related to Coal Conversion Technologies and Their Future Direction. Sponsored by the Ecological Research Division, Office of Energy Research, U.S. Department of Energy. Held in Warrenton, Virginia, January 1982.

Invited to participate in Workshop on Tritium Radiobiology and Health Physics. Exchange A-25, U.S.-Japan Fusion Cooperation Program. Sponsored by U.S. Department of Energy and Japan Science and Technology Agency. Held at National Institute of Radiological Sciences, Chiba, Japan, October 1981.

Invited to participate in Workshop on Freshwater Research Program Plan Development. Sponsored by the Ecological Research Division, Office of Energy Research, U.S. Department of Energy. Held in Washington, D.C., March 1981.

GRANTS AND CONTRACTS AS INDIVIDUAL RESEARCHER

Airport Communities Coalition (ACC), Des Moines, Washington. Contract (Task Order Agreement) Nos. 2000-2, 2001-2, 2002-1. 1999 to present. Provide technical support to Helsell Fetterman, representing the ACC, in their efforts to assess existing and future impacts of the Seattle-Tacoma International Airport on area aquatic resources. ($30K) Principal Investigator.

Washington Department of Ecology, Olympia, Washington. Contract No. C0000245. 2000-2001. Lower Duwamish Waterway Project Community Advisory Group Technical Support. ($5K) Principal Investigator.

JOHN A. STRAND (continued)

Olympic Environmental Council, Port Angeles, Washington. Contract No. 2000-4. 2000. Assess Pollution Potential of Leachates from the Rayonier Hazardous Waste Cleanup Project, Port Angeles, Washington. ($1K) Principal Investigator.

U.S. Department of the Navy, Engineering Field Activity, Northwest. Contract No. N44255-94-D-7309. 1994. Delivery Order 003, Monitoring Plan Preparation, Naval Undersea Warfare Center, Division, Keyport, Washington. ($103K) Delivery Order Manager and Co-Principal Investigator.

Holland and Hart, Boise, Idaho. EA Engineering Contract No. 12907. 1994-1995. Review of Biological Opinion and Other Issues Pertaining to Impacts of Beartrack Mine on Aquatic Resources of Napias Creek, Salmon, Idaho. ($50K) Project Manager and Principal Investigator.

U.S. Department of the Air Force, Armstrong Laboratory. Contract F33615-89-D-4002, Order 110. 1994. Environmental Assessment (EA) and Environmental Baseline Survey (EBS), McChord Air Force Base, Washington. ($136K) Delivery Order Manager and Co-Principal Investigator.

Bariven Corporation. Contract No. 16627. 1990. Evaluation of Lagoven, S.A. Refinery Environmental Monitoring Program of Amuay Bay, Venezuela. ($20K) Project Manager and Principal Investigator.

U.S. Department of the Interior, Minerals Management Service. Contract No. TD-2884. 1989-1990. Monitoring of Olympic National Park Beaches to Determine Fate and Effects of Spilled Bunker C Fuel Oil. ($413k) Project Manager and Co-Principal Investigator.

Envirosphere Company. Contract No. 12716. 1989-1990. Study Biological Effects of Organotin in Aquatic Life. ($247K) Project Manager and Principal Investigator.

U.S. Department of the Navy, Naval Facilities Engineering Command. Contract No. 12716. 1988. Environmental Assessment for Marine Mammal Facility, SUBASE, Bangor. ($71K) Co-Principal Investigator.

JOHN A. STRAND (continued)

Alyeska Pipeline Service Company. Contract No. 15035A. 1988. Chemical and Biological Assessment of Treated Wastewater. ($45k) Project Manager.

Unocal Corporation. Contract 14265. 1988. Chemical and Biological Assessment of Wastewater Discharge. ($31K) Project Manager.

U.S. Department of the Navy, David Taylor Naval Ship Research and Development Center. Contract No. 300A02652/TD-2201. 1985-1987. Environmental and Engineering Technical Services in Support of Southeast Alaska Acoustic Measurement Facility. ($370K) Project Manager and Co-Principal Investigator.

U.S. Environmental Protection Agency. Contract No. 300A02187/TD-1789. 1983-1985. Puget Sound Water Quality Management Program. ($355K) Project Manager and Co-Principal Investigator.

AMAX of Canada Ltd. Contract No. 2311205390. 1982-1983. Identification of Critical Model Parameters to Assess the Fate of Metal Sulfides in Marine Food Chains of Alice Arm, British Columbia. ($25K) Project Manager and Co-Principal Investigator.

U.S. Department of Energy. Contract No. 003237/83237. 1980-1982. Ecological Effects of Coal Conversion (SRC-II). (1.59M) Project Manager.

U.S. Department of Energy. Contract No. 002720/80720. 1979-1981. Biological Effects of Magnetic Fields. ($85K) Project Manager and Principal Investigator.

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C

john strand.jpg (2072x1397x24b jpeg)

D

Port of Seattle
Sea-Tac International Airport
Third Runway Fill
WQ 3.13

Port of Seattle

February 4, 2000

Mr. Roger Nye
Department of Ecology
Northwest Regional Office
3190 169th Ave. SE
Bellevue, WA 98008-5452

Dear Roger:

This letter transmits the environmental documentation for fill material used for the Third Runway Project during 1998 and 1999. Portions of this information have been previously submitted to Ecology. This documentation was developed consistent with the requirements of the 1998 and 1999 Airfield Project Soil Fill Acceptance Criteria and updates and corrects prior submittals. One of the fill sources, STIA sediment ponds, previously reported (November 3, 1999) was never actually constructed. Please delete this site from prior lists.

If you have any questions regarding this information, I can be reached at (206) 431-4918.

Sincerely,

Elizabeth Clark

Elizabeth Clark
Environmental Management Specialist

Cc: Jim Thomson, John Rothnie, Barbara Hinkle and Paul Agid (Port of Seattle)

Seattle-Tacoma
International Airport
P.O. Box 68727
Seattle, WA 98168 U.S.A.
TELEX 703433
FAX (206) 431-5912

Third Runway Cumulative Fill Summary

Material Placed 1/98 through 12/99

Source Name	Supplier	Category	Description	Env. Approv. (Year)	Placed (Year)	App. Volume (CY)
Crawford Parking	Crawford (Port)	A	Crawford Parking Area	1998	1998	800
Dieringer	City Transfer	Borrow	Borrow Pit Sumner, WA	N/A	1998	90,000
Lakeland Pit	City Transfer	Borrow	Borrow Pit Sumner, WA	N/A	1998	400,000
Lonestar Pit	City Transfer	Borrow	Borrow Pit Dupont, WA	N/A	1998	50,000
Stellacom Pit	City Transfer	Borrow	Borrow Pit University Place, WA	N/A	1998	50,000
North Emp. Park Lot	Port	A	Former FAA Transmitter Site	1998	1998	120,000
UAL/CAL Facility	United (Port)	A	Site Overexcavation	1998	1998	190
Stoneway Pit	City Transfer	Borrow	Borrow Pit Ravensdale, WA	N/A	1998	300,000
Sunset North	City Transfer	A	Development Bellevue	1998	1998	1,500
Parking Garage	Port	A	Toll Plaza, Cooling Towers	1998	1998/9	25,000
West Side - Taxi C	Port	A	Taxiway C - 1998 and 1999	1998	1998/9	345,000
Hamm Creek	USCOE	A	Duwamish River Restoration Site	1999	1999	80,000
Concourse B	Port	A	Panel Replacement B-9,11	1999	1999	4,000
Airborne Exp.	Port	A	Former Airborne Express Property	1999	1999	1,500
Bellevue NE12th St	City Transfer	A	Bellevue Office Complex	1999	1999	13,000
North Hardstand	Port	A	North Hardstand	1999	1999	10,000

N/A: Not applicable. Environmental review of state certified borrow pits is not required.

ec2/3/00

E

MEMORANDUM
TO: Paul Agid
FROM: Beth Doan
DATE: March 24, 1999

RE: Hamm Creek Soil Quality Review

Background
The Corp of Engineers (USCOE) has supplied the Port of Seattle with soil quality information for the Hamm Creek Restoration Project Site located along West Marginal Way, south of Boeing Field. This information includes partial copies of a 1990 site assessment by the Boeing Company, a 1997 USCOE Sampling and Analysis Plan, and a 1997 USCOE Sediment Characterization Report including Appendix C and E. These reports will be placed in the Port files.

The review of the site data does not indicate any exceedences of MTCA cleanup levels. The material, therefore, should be suitable for use as fill material for the third runway. Several source issues have been evaluated, and should be considered before the Port makes the final decision to accept the material. Our evaluation of these issues are discussed below, and include responses from the USCOE project manager Pat Cagney, and information received informally from Pete Rude, a sediment specialist for Landau Associates, Inc..

Data Summary
The following is a brief summary of some of the detected constituents:

Constituent	Maximum Level (USCOE)	Maximum Level (Boeing)	PSDDA SL	Draft MTCA Method A (Residential)
Total DDT	14 ppb	ND	6.9 ppb	1000 ppb
Total PCB	160 ppb	ND	130 ppb	400 ppb
PAHs (Carc)	ND	459 ppb	1,800 ppb (HPAH)	700 ppb
Mercury	0.074 ppm	0.51 ppm	0.21 ppm	1.0 ppm

ND = Not detected

Discussion
- The USCOE study detected PCBs and DDTs above the PSDDA screening levels but below MTCA cleanup levels. Since the samples were composited over large areas and depths, there is a potential for "hotspots" to go undetected. However, the Boeing study, which did look for problem areas, did not detect PCBs and DDTs.
- Pat Cagney indicated that the USCOE did follow up bioassay tests in accordance with PSDDA protocol (this data was not supplied) and there were some failures. They believe the failures were caused by the oxidized nature of the site as compared to a marine environment (from which the test

organisms are obtained) and have nothing to do with the low levels of PCBs and DDTs.

- Some of the USCOE data indicated PCBs above MTCA cleanup levels (12,000 ppb). Pat explained that this was data TOC normalized in accordance with PSDDA requirements. The actual high concentration was 160 ppb (see table). Pete confirmed that the normalized data was not relevant to MTCA.

- TPH was not analyzed at this site. According to Pat there was no indication of TPH at this site based on site uses and sampling observations. This is consistent with a review of the logs and with the lack of detection of associated organics.

- The Boeing data indicated levels of mercury and PAHs above what they considered to be background levels. However, these values are below MTCA cleanup levels and the USCOE samples had much lower values (see table).

- The USCOE sampling plan mentions that 10,000 yards of material was not analyzed. According to Pat, that material was closely associated with material that was analyzed and he has no reason to believe that it should be any different. The Boeing data looked at the entire site.

- The issue of changes in chemical environment from the Duwamish area to the airport was discussed briefly with Pete. He said there were two general issues, the change in the oxidation state, and the potential marine impacts (salt water). Based on location, there should not be significant impacts from saltwater. He also felt that change in oxidation states (anaerobic to aerobic) would only be a potential concern if metals were at elevated levels. Except for mercury in the one sample, Boeing concluded metals were at background levels.

Conclusions

The Boeing and USCOE reports provide sufficient information to evaluate the soil quality of the Hamm Creek site. The evaluation of the data relative to MTCA indicates that the Hamm Creek material is suitable for third runway fill. The material does not meet PSDDA requirements for open water disposal which could potentially cause some public perception concerns about using this material; however, given the intended use of this material as upland fill these concerns are not technically supported.

F

Port of Seattle

July 27, 2000

Mr. Chung Yee
Department of Ecology
Northwest Regional Office
Water Quality Program
3190 160th Ave S.E.
Bellevue, WA 98008-5452

Dear Mr. Yee:

This letter transmits the environmental documentation for fill material used for the Third Runway Project during the second quarter 2000. This documentation was developed consistent with the requirements of the 1999 Airfield Project Soil Fill Acceptance Criteria.

If you have any questions regarding this information, I can be reached at (206) 439-6604.

Sincerely,

Paul W. Agid
Environmental Program Manager

Cc: John Wietfield (Ecology)
John Rothnie, Jim Thomson (Port of Seattle)

Attachments:
Fill summary table
Environmental documentation

Seattle-Tacoma
International Airport
P.O. Box 68727
Seattle, WA 98168 U.S.A.
TELEX 703433
FAX (206) 431-5912

THIRD RUNWAY FILL SUMMARY -- SECOND QUARTER 2000

Source Name	Supplier	Category	Description	Month Initial Receipt	Year Initial Receipt	Month Final Receipt	Year Final Receipt	Final Est. Volume (CY)
Airborne Express/ FAA	FAA (Port Property)	A	New FAA Tower -- Phase 2	April	2000	Ongoing		
Airfield 2000 -Taxiway B	Port	A	Taxiway B Improvements	April	2000	June	2000	5,300
First Avenue Bridge	WSDOT	A	First Avenue Bridge, Seattle	April	2000	June	2000	85,000
No. Esplanade	Port	A	No. Esplanade - Conc. D	May	2000	May	2000	1,700
NW Hangar Project	NW/CTI (Port Property)	A	New NW Hangar	June	2000	Ongoing		
Lakeland Pit (2000)	CTI	A	Borrow Pit, Sumner	June	2000	Ongoing		
CTI Pit No. 3 (a)	CTI	Borrow	Borrow Pit, Sumner	June	2000	Ongoing		
Auburn Pit (a)	CTI	Borrow	Borrow Pit, Auburn	June	2000	Ongoing		
Stoneway Pit (a)	CTI	Borrow	Borrow Pit, Ravensdale	June	2000	Ongoing		
Airfield 2000 - So. Set. (b)	Port	A	Duct Bank, IWS Improve.	June	2000	Ongoing		

(a) State Certified Borrow Pit. Environmental documentation not required.

(b) This project is being conducted in phases. Samples are being collected as access becomes available to each phase of the project. Samples for the initial phase were all below MTCA Method A Cleanup Levels. The complete documentation for this project will be provided third quarter 2000.

Third Runway Cumulative Fill Summary

Material Placed 1/98 through 12/99

Source Name	Supplier	Category	Description	Env. Approv. (Year)	Placed (Year)	App. Volume (CY)
Crawford Parking	Crawford (Port)	A	Crawford Parking Area	1998	1998	800
Dieringer	City Transfer	Borrow	Borrow Pit Sumner, WA	N/A	1998	90,000
Lakeland Pit	City Transfer	Borrow	Borrow Pit Sumner, WA	N/A	1998	400,000
Lonestar Pit	City Transfer	Borrow	Borrow Pit Dupont, WA	N/A	1998	50,000
Steilacom Pit	City Transfer	Borrow	Borrow Pit University Place, WA	N/A	1998	50,000
North Emp. Park Lot	Port	A	Former FAA Transmitter Site	1998	1998	120,000
UAL/CAL Facility	United (Port)	A	Site Overexcavation	1998	1998	190
Stoneway Pit	City Transfer	Borrow	Borrow Pit Ravensdale, WA	N/A	1998	300,000
Sunset North	City Transfer	A	Development Bellevue	1998	1998	1,500
Parking Garage	Port	A	Toll Plaza, Cooling Towers	1998	1998/9	25,000
West Side - Taxi C	Port	A	Taxiway C - 1998 and 1999	1998	1998/9	345,000
Hamm Creek	USCOE	A	Duwamish River Restoration Site	1999	1999	80,000
Concourse B	Port	A	Panel Replacement B-9,11	1999	1999	4,000
Airborne Exp.	Port	A	Former Airborne Express Property	1999	1999	1,500
Bellevue NE12th St	City Transfer	A	Bellevue Office Complex	1999	1999	13,000
North Hardstand	Port	A	North Hardstand	1999	1999	10,000

N/A: Not applicable. Environmental review of state certified borrow pits is not required.

ec2/3/C0

G

Washington State Department of Transportation
Sid Morrison
Secretary of Transportation

Northwest Region
6431 Corson Avenue South
Seattle, WA 98108

(206) 768-5700

November 29, 1999

Port of Seattle
Beth Clarke, POS environmental Section
17900 International Blvd., Suite 402
Seattle, WA 98188

RE: First Avenue South Bridge Vicinity
Available Fill Material

Dear Beth:

This letter is written to fulfill the Port of Seattle's requirements to accept the fill material from the First Avenue Bridge construction site. As you are aware, there are approximately 120,000 cubic yards of excess material available southwest of the First Avenue Bridge. A copy of a memorandum from Mike Stephens of WSDOT Environmental Affairs Office, summary and sampling results from the stockpile by Health Risk Associates, Inc. and a site map showing where samples were taken are attached to this letter.

According to Health Risk Associates, Inc., the top few feet of soil on the original ramp embankments contain slightly elevated levels of Petroleum Hydrocarbons. The levels of contamination may have come from several sources, including the past practice of oiling the city streets by the City of Seattle in this area. Please refer to the attached report for more details.

WSDOT is willing to set aside the top few feet of the contaminated material and analyze it again using a different procedure. If further analysis indicates the material is contaminated above the levels acceptable to the Port, the WSDOT will not propose transporting the material to your site. The remaining majority of material on the site doesn't appear to be environmentally impaired based on the analytical testing.

If the Port of Seattle decides to accept the fill material, it is available for use immediately. The existing fill material could be used for embankment construction during dry weather, but may not be suitable for use during wet weather. The Port will need to notify the State where the fill material will go including a haul route and any restrictions to the route if an agreement is reached.

We are also aware that the Port has geotechnical concerns over the material. Please advise us as to the acceptability of the material environmentally so we can begin the engineering required to assure the fill will be placed in a manner that will provide the stable base required to meet your project needs.

We are looking forward to working with the Port of Seattle in wrapping up this matter. If you require additional information or have questions, please feel free to contact me at (206) 768-5861.

Sincerely,

Thomas R. Madden, P.E.
Project Engineer

File: C4962 project file
cc: C. Arnold NB82 - 230

TRM:ms
MS

H

Port of Seattle

Memo

To: Paul Agid

From: Beth Clark

CC: Elizabeth Leavitt, Jim Thomson

Date: 04/30/01

Re: Black River Quarry

Rock aggregate was imported to the Third Runway embankment from the Black River Quarry during August through October 2000. The site, owned by Stoneway Rock & Recycling, also operates as a concrete crushing and recycling center. Blasting and crushing of bedrock derived from the quarry produces aggregate that is used for various construction projects in the Puget Sound. Chemical testing was conducted on samples of the aggregate by AMEC, environmental consultant to the supplier City Transfer, Inc. (CTI). The initial test results for this site were submitted to Ecology in the Port's Third Quarterly Report 2000. On the request of the Port, AMEC conducted additional chemical testing on the aggregate. These test results have been discussed with Mr. Chung Yee of the Department of Ecology (various telecommunications fall, 2000) and are discussed further below.

Testing for Petroleum Hydrocarbons

Table 1, prepared by AMEC, summarizes the test results for petroleum hydrocarbons. The initial test results indicated the presence of diesel and heavy oil range petroleum (TPH diesel and oil) at 200 and 310 ppm respectively. This exceeds the current Method A standard of 200 ppm, but is well below the new MTCA Method A standard of 2000 ppm which becomes effective August 15, 2001. The presence of TPH was attributed to the inadvertent mixing of residual asphaltic materials found in the recycling operations with the stockpiled soil. Subsequent samples collected on 6/22/00 and 7/6/00 of newly blasted rock also detected TPH but at levels below current and proposed MTCA Method A standards. Based on the results of the initial chemical testing, the Port agreed to accept only newly blasted rock and required AMEC to conduct ongoing TPH testing as a condition to the acceptance of the material to the Third Runway embankment. The initial test results were submitted to Ecology.

The results of the ongoing sampling of the aggregate are also summarized in Table 1 (9/25/00 through 10/11/00). The results indicate the continued presence of low levels of TPH (primarily oil). The results varied from non-detect up to 270 ppm. After careful review of the site operations, AMEC concluded that the only apparent source of TPH was residual material in the crushing equipment left from the asphalt recycling operations. The Port stopped the import of material from the Black River Quarry in October and instructed CTI and Stoneway to evaluate potential modifications in procedures to better separate the asphalt recycling and rock crushing operations. Based on their evaluation, Stoneway modified operations to include:

(1) Thorough cleaning of the crushing equipment after the asphalt recycling operations and before the switch to rock crushing, and
(2) Discard of the first hundred tons of rock crushed after the use of the equipment for asphalt recycling.

Subsequent on-site testing conducted by AMEC on 10/2400 through 10/30/00, after the modifications in operations, indicate levels below current and proposed Method A standards. Although there were no exceedances of Method A standards, none of this material was placed at the Third Runway.

Testing for Metals

After review of the Port's Third Quarterly Report 2000, Mr. Chung Yee of Ecology called the Port to discuss the metal data. He particularly noted the presence of copper at levels above typical background levels for Puget Sound, but for which there is not MTCA Method A standard. The initial test results are summarized on Table 2 (6/9/00). Based on Mr. Chung Yee's evaluation, the Port requested AMEC to conduct additional sampling of the aggregrate for total metals. AMEC and the Port also discussed the potential sources of copper and concluded that copper was naturally occurring in the rock formation and that there were no known on-site sources of copper contamination.

These results of the additional metals testing are also summarized on Table 2 (11/30/00). The results of the testing are compared to current and proposed MTCA Method A standards for analytes for which these standards are published, and MTCA Method B standards when there are no published Method A standards. The Method B standards were developed based on protection of groundwater using the Three Phase Partitioning Model (WAC 173-340-747). Ecology uses this conservative model to back-calculate soil concentrations that are protective of drinking water. The default assumptions used by Ecology in the regulations were used in the calculations. Metal test results in Table 2 in all cases are below the published MTCA Method A and calculated Method B standards.

Status

The Port stopped the import of material from the Black River Quarry in mid-October to allow time for the operational changes and additional testing discussed above. CTI did not bring any additional material from this site after mid-October 2000.

TABLE 1
SUMMARY OF ANALYTICAL RESULTS ON SOIL SAMPLES:
PETROLEUM HYDROCARBONS
BLACK RIVER QUARRY, KING COUNTY, WASHINGTON

Date Collected	Sample No.	TPH-G	TPH-D	TPH-O
6/9/00	S-1	<20	>50	>100
6/9/00*	S-1*	NT	[redacted]	[redacted]
6/22/00	S-2	NT	29.4	65.6
	S-3	NT	48.4	83.4
	S-4	NT	28.4	50.6
7/6/00	S-1	NT	<10.0	31.5
	S-2	NT	<10.0	35.0
9/25/00	S-3	NT	<10	<25
	S-4	NT	<10	<25
9/27/00	S-2	NT	<10	<25
	S-4	NT	<10	<25
9/29/00	S-2	NT	<25	150
	S-4	NT	<10	[redacted]
10/02/00	S-3	NT	19	130
	S-4	NT	31	[redacted]
10/9/00	S-3	NT	<10	43
	S-4	NT	<10	26
	S-7	NT	<10	<25
	S-8	NT	<10	<25
10/11/00	S-3	NT	<10	<25
	S-4	NT	<10	<25
10/24/00	S-1	NT	<10	<25
	S-2	NT	<10	<25
10/25/00	S-1	NT	<10	87
	S-2	NT	<10	33
10/27/00	S-1	NT	<10	<25
	S-2	NT	<10	33
	S-3	NT	<27	<53
	S-4	NT	<27	<53
10/30/00	S-1	NT	13	62
	S-2	NT	[illegible]	<25
MTCA Method "A" Cleanup Level		100	200	200

MTCA = Washington State, Model Toxic Control Act
(NT = Not Tested)
Sample collected on 6/9/00 was tested for TPH-G, TPH-D, TPH-O = Gasoline-, diesel-, and heavy oil-range petroleum hydrocarbons, (respectively), by Washington State Method WTPH-HCID.
* Sample re-tested for TPH-D and TPH-O = diesel-, and heavy oil-range petroleum hydrocarbons, (respectively), by Washington State Method WTPH-D (extended).
Samples collected after 6/9/00 were tested for TPH-D, TPH-O = Diesel-, and heavy oil-range petroleum hydrocarbons, (respectively), by Washington State Method WTPH-D (extended)
All results in parts per million (ppm)
Shaded Numbers = In excess of MTCA Method "A" Cleanup Levels

TABLE 2
SUMMARY OF ANALYTICAL RESULTS ON SOIL SAMPLES: METALS
BLACK RIVER QUARRY, KING COUNTY, WASHINGTON

Sample	Date	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
S-1	6/9/00	ND	3.8	<0.2	0.25	22	101	111	0.1	34	ND	4.3	ND	92.5
B-1	11/30/00	ND	ND	ND	ND	20	83	ND	ND	32	ND	ND	ND	81
S-2	11/30/00	NA	NA	NA	NA	NA	89	NA	NA	NA	NA	NA	NA	NA
S-3	11/30/00	ND	ND	ND	ND	28	95	ND	ND	40	ND	ND	ND	78
S-4	11/30/00	NA	NA	NA	NA	NA	77	NA	NA	NA	NA	NA	NA	NA
S-5	11/30/00	ND	ND	ND	ND	26	91	ND	ND	38	ND	ND	ND	59
S-6	11/30/00	NA	NA	NA	NA	NA	110	NA	NA	NA	NA	NA	NA	NA
S-7	11/30/00	ND	ND	ND	ND	31	83	ND	ND	41	ND	0.64	ND	59
S-8	11/30/00	ND	ND	ND	ND	23	96	ND	ND	43	ND	ND	ND	68
S-9	11/30/00	NA	NA	NA	NA	NA	100	NA	NA	NA	NA	NA	NA	NA
S-10	11/30/00	NA	NA	NA	NA	NA	88	NA	NA	NA	NA	NA	NA	NA
MTCA Standards														
MTCA Method A Current		N/A	20	N/A	2	100	N/A	250	1	N/A	N/A	N/A	N/A	N/A
MTCA Method A Proposed		N/A	20	N/A	2	2000 (Cr III)	N/A	250	2	N/A	N/A	N/A	N/A	N/A
MTCA Method B GW (a)		--	--	--	--	--	260	--	--	417	--	74	--	5,970

Notes:

All values reported in *mg/kg*

ND = Not Detected

NA = Not Analyzed

N/A=Not applicable; no published standard

(a) Method B Standards for protection of drinking water calculated using MTCA WAC 173-340-747 Three Phase Partitioning Model.
Calculated for those *detected* constituents for which Method A standards are not available.