POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and THE PORT OF SEATTLE, Respondents.	No. 01-133 No. 01-160 DECLARATION OF DR. JOHN STRAND IN SUPPORT OF ACC'S REPLY ON MOTION FOR STAY (Section 401 Certification No. 1996-4-02325 and CZMA concurrency statement, Issued August 10, 2001, Reissued September 21, 2001, under No. 1996-4-02325 (Amended-1))

Dr. John Strand declares as follows:

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

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

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

3. I am submitting this declaration to address comments raised by the Port of Seattle (Port), including their consultants, as well as the Washington Department of Ecology (Ecology), when responding to my initial declaration submitted to the Pollution Control Hearing Board (PCHB) in support of the ACC's motion to stay the 401 Certification issued by the Washington Department of Ecology (Ecology) for the U.S. Army Corps of Engineers (USACOE) Public Notice 1996-4-02325. In particular, I will address comments and opinions regarding water quality in the project streams and the Airport Soil Fill Acceptance Criteria. I will also address changes in the amended 401 Certification issued by Ecology on September 21, 2001, when applicable to these topics. I have previously reviewed and evaluated the database that the Port submitted to Ecology in support of their request for a Water Quality Certification.

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Metals Exceedances in Project Streams and the Issue Whether or Not Metals Exceedances Have Continued in Recent Years:

4. Both the Port and Ecology deny that violations of the State's Water Quality Criteria occur in the project creeks as a result of stormwater discharged by Seattle Tacoma International Airport (STIA). In my opinion both the Port and Ecology are incorrect and multiple lines of evidence do exist to support my contention that chemicals, particularly the metals copper, lead, and zinc exceed the State's Water Quality Criteria (WQC). The Port and Ecology argue that I have inappropriately compared end-of-pipe data to the State's WQC. The Port since 1998 has not reported data other than end-of-pipe.

5. The Port's own data documents exceedances of metals criteria, and this evidence is not based on end-of-pipe analyses. 1995-1996 metals data presented by the Port (1997) indicated that concentrations of copper, lead, and zinc in STIA stormwater discharges (downstream of outfall) greatly exceeded the State's WQC, in some instances by more than an order of magnitude. For example, downstream of the outfall in Miller Creek (Port 1997, page 35), total recoverable copper concentrations ranged from 0.7-44 ug/L, where the concentrations at the outfall was 4.2-82.9ug/L, and the concentration upstream was 4.7-14.8ug/L. The State's criterion was 5.3 ug/L, adjusted for hardness. Even after dilution in Miller Creek, the concentrations of copper discharged from the Port's outfall still exceeded the WQC. For total recoverable lead in Miller Creek, the values downstream, at the outfall, and upstream, were <0.5-106 ug/L, <0.5-21.6 ug/L, and 5.2-34.7 ug/L, respectively, again showing that the influence of lead additions persist downstream. The State criterion for lead was 16 ug/L. The values for

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total recoverable zinc downstream, at the outfall, and upstream were 2.3-295 ug/L, 15-525ug/L, and 37-69 ug/L., respectively, again showing a similar relationship. The State criterion for zinc was 33.7 ug/L. Based on the dissolved metals concentrations (Port 1997, page 35), Toxic Substances Criteria were still exceeded.

6. It is evident that the concentrations of copper, lead, and zinc downstream of the discharges exceeded applicable toxic substances criteria. 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 Wastewater System (IWS). Because the influence of the Port's outfall is evident in these data, the Port is incorrect when it says on page 25 of their Brief (Response to ACC's Motion for Stay) that it is "impossible to attribute to any discharges at STIA."

7. 1998-1999 metals data presented by the Port in 1999 confirm that discharges rich in metals 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 current stormwater-monitoring program.

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8. While I acknowledge the results of instream testing that indicated no toxicity (Logan Declaration, paragraph 9), I question these results in light of the results of companion whole effluent toxicity (WET) testing (Logan Declaration, paragraph 11). I must ask where in relation to the Port's discharges were the samples collected for testing? It is a rule-of-thumb that toxicity will decrease with increase in distance downstream of a discharge, so where the sample is collected is very important. Actually, none of the locations where samples were collected for instream bioassay were located by distance downstream from their discharges (see Logan Declaration Exhibit B). A map should have been included. Also how soon after discharge were the samples to evaluate instream toxicity collected? Were the samples collected from the "first flush" of the runoff period, or were the samples collected after the "peak" of runoff? Samples collected during the first flush are generally more toxic. The methodology is incomplete if these issues are not addressed. Simply stating that the Port's methodology conformed to both USEPA (1993) and WDOE (1997) methods for determining acute toxicity and whole effluent toxicity, respectively, is not enough. Please note that the instream toxicity results described in Exhibit B are also contained in a study in progress, a "draft" study, which suggests that the results have not been peer reviewed.

9. Review of the Port's 2000 *Annual Stormwater Monitoring Report* indicates that concentrations of copper, lead, and zinc have not diminished. Clearly, the Port's best management practices (BMPs) do not always work. By Dr. Logan's own admission (see page 7) zinc remains a problem in at least one of the Port's outfall (SDN1), where WET testing showed

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that toxicity occurs. Although not acknowledged by Dr Logan in her declaration, Figure 10, on page 30 of the Port's *Annual Stormwater Monitoring Report* (2000) indicates that the concentrations of zinc discharged at the Port's SDE4 and SDS1 outfalls may also be problematic. Zinc concentrations range between 80-130 ug/L and between 200-210 ug/L, respectively. These ranges are for the middle 50 percent of the data and do not include the extreme values. The range of zinc concentrations at SDN1 is 120-320ug/L. The highest value for zinc at SDN1 is 613 ug/L These data actually agree quite well with data reported in the Port's 1997 *Stormwater Receiving Environment Monitoring Report* above. So, I can't agree with the Port's suggestion on page 25 of their Brief (Response to ACC's motion for Stay) that the 1997 data are atypical and contain widely varied results.

10. Dr Logan mischaracterizes my testimony regarding tissue screening concentrations (TSCs) (Shepherd 1999). TSCs are simply an indication of which chemicals are accumulated by biota and are of concern and should be investigated more thoroughly (see page 11 of my initial declaration). TSC data do not "provide conclusive evidence" of risk to the aquatic resources of Miller and Des Moines Creeks. My reference to the tissue burdens of metals in trout inhabiting the project creeks served to indicate that metals in the creeks from stormwater are readily available and are accumulated to levels in fish that some scientists (Shepherd 1999) say are of concern. However, Dr. Logan is incorrect to say that WQCs, on which Shepherd's TSC concept is based, are "usually driven by sensitive invertebrates, and not

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specifically applicable to trout." Salmonid data (trout and salmon) are included in the datasets used in setting WQCs for metals and other chemicals (USEPA 1994).

11. While Dr. Logan suggests that the approach developed by Parametrix is more useful, she provided no information by which to evaluate her conclusion. All we have is Dr. Logan's word that the Parametrix TSCs are more appropriate. She provides no report or scientific article that described the methods and dataset on which she concludes that the TSCs derived by Parametrix are 10 times higher than those developed by Shepherd. Lacking scientific foundation, her conclusion should be disregarded.

12. The Port indicates that Ecology has reasonable assurance that the WQC will be met because the new project at STIA must comply with site-specific standards to be developed through a Water Effects Ratio (WER) or other site-specific study. The Port goes on to say that they already have evidence, albeit preliminary, that the site specific standard derived using a WER approach will be 7 to 16 times higher than the generic numeric standards. While this is interesting, the Board should be aware that this is preliminary evidence that has had no outside peer review, and should not be considered evidence to indicate that the Port is in compliance, or will be in compliance with the State's WQC. This is also the first time that the general scientific community has heard this information.

13. The Port also criticizes my use of the sediment data that I derived from the 1997 *Stormwater Receiving Environment Monitoring Report.* In my first declaration (see page 9, Strand initial decl.), I included copper data from above and below Lake Reba, into which STIA

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discharges stormwater. The quantities of copper, lead, and zinc below the impoundment were substantially greater than the quantities above the impoundment, indicating the contribution of stormwater discharged by STIA. I offered these data as an additional line of evidence to indicate that stormwater from STIA is affecting the resources of Miller Creek. The Port asserts that the pollutants in the sediments are impossible to attribute to STIA, yet clearly STIA discharges significant volumes of stormwater to Lake Reba during the wet season. Dr. Weitkamp, a consultant for the Port, says that Lake Reba is not a "water of the State," so any comparison to freshwater sediment standards I make is invalid. His point, correct or not, is irrelevant. I am not referring about the sediments in Lake Reba but the sediments in Miller Creek below Lake Reba!

14. Respecting my testimony regarding glycols, the Port asserts that the report on which I based my assessment (Hartwell et al. 1995) was in error; that is, the concentration of glycol in water that was toxic to fish was off by a factor of 1000. The Port also asserts the tests conducted by Hartwell et al (1995) were done on glycol formulations that are different than those that the Port currently uses. In response, let me first say that I can neither confirm nor refute the assertion that the Hartwell et al. (1995) article is in error. Actually Hartwell et al. (1995) reports the work of another author Fisher (1994) who determined that the 48-h LC50s of stormwater runoff from a large commercial airport ranged between 1.9 and 8.7 mg/L total glycols for *Daphnia magna*. I am still waiting to hear back from the authors. The Hartwell et al. (1995) study is not in question; rather it is the data developed by the other scientist (Fisher 1994) that may have been incorrectly reported in Hartwell et al. (1995).

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15. Therefore, 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 [1995]), 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 a mild gill pathology at 275 mg/L. I believe that it is reasonable to assume that a fish with these symptoms will die if the exposure to glycols continues at these same levels.

16. The concentrations of glycols entering the streams at STIA 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 as individual Discharge Monitoring Reports, indicate 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.

17. While the Port does not contest that glycols continue to enter the project streams, they 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

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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.

18. To the contrary, the Hartwell et al. (1995) data are relevant and highlight the need to determine the toxicity of the de-icers and anti-icers used at STIA. We really don't know if the formulations used at the STIA are different than those used by Harwell et al. (1995). 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. We also don't know if the formulations currently used at STIA are the same as those tested by the USEPA (2000) as Dr. Logan infers on page 13 of her declaration, so estimates of residual toxicity based on the USEPA study may not apply to the formulations used at the STIA.

19. Dr. Logan states that heavy use of de-icers and anti-icers at STIA is "limited to the infrequent, one to two day winter weather episodes." This is not true. Looking at the Port's (2001) *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.

20. Regarding the retrofit requirements set forth in the 401 Certification, I continue to question the Port's assertion that stormwater quality at STIA will improve as a result of the requirement to retrofit all or most existing outfalls with additional treatment, generally, additional BMPs. In my initial declaration (see pages 14-15, Strand initial decl.), I noted that

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language in the *Comprehensive Stormwater Monitoring Plan* (Parametrix 2000) suggested that retrofits might be delayed or eliminated when costs were prohibitive. The escape clause that allows the Port to avoid retrofit, at least as far as the schedule of retrofit that is required, remains in the 401 Certification, providing that if it isn't feasible, the Port need not retrofit at 20 percent for every 10 percent of new impervious surface constructed. I am also reminded that as part of the Port's retrofit plans, they allegedly transferred all of the SDS basin drainage to the Internal Waste Drain (IWS), yet as recently as February 2001, stormwater from SDS1 still contained total glycols at 48 mg/L, most of it (43 mg/L) propylene glycol.

21. In summary, I still believe 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 exceedences 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. Recent WET testing shows that zinc remains a problem in some of the discharges at STIA. I also believe that I have adequately established that metals in stormwater, including those contributed by STIA, are bioavailable and

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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.

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:

22. In responding to concerns that the Port's *Airport Fill Acceptance Criteria* are flawed, Ecology asserts in paragraph 10 of the Declaration of Mr. Fitzpatrick that under Condition E(1)(d) of the 401 Certification, the Port is "restricted to using only naturally occurring uncontaminated soils as fill material." The Port's assessment is cagier stating 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)]." We now have clear and documented examples of the Port's accepting fill from sources other than "naturally occurring uncontaminated soils." In fact the Port has accepted fill that is clearly

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contaminated and which exceeds the standards that they established for the protection of the aquatic ecosystem down- gradient of the third runway embankment.

23 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 B]) 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 failed toxicity tests for open-water disposal (see memo from Beth Doan, U.S, Army Corps of Engineers, to Paul Agid, Port of Seattle, dated March 24, 1999 [Exhibit C]). 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 to Paul Agid, 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 unprotected."

24. 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 D]). 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

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Transportation to Beth Clark, Port of Seattle, dated November 29, 1999 [Exhibit E]). 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 access 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.

25. 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 E). 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 fill 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. The Port believed the contamination was due to residual asphaltic

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materials left in crushing equipment used to recycle pavement at the site. The same equipment was used to also process natural soils at the site. The point is that 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* have already been criticized. Is it also possible that the Port did not want these data released until a new 2000 mg/Kg standard for TPH (diesel) took effect on August 15, 2001? This way the contaminated fill might not have had to be removed from the STIA. Also 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.

26. 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 (1995) even rejected guidance from their own Toxics Cleanup Program (Publication 91-30) that recommends a much higher sampling effort than proposed in the *Soil Fill Acceptance Criteria* (Condition E (1)(a).

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For example, for a 200,000-cubic yard candidate fill stockpile, the Toxics Cleanup Program guidance recommended a minimum number of 226 samples as compared to six samples as provided in the *Soil Fill Acceptance Criteria*.

27. The *Airport Soil Fill Acceptance Criteria*, as articulated in the 401 Certification, does not appear to meet the requirements of the U.S. Fish & Wildlife Service (USFWS) *Biological Opinion* (2001), despite what the Port says in this regard. The USFWS requires that candidate fill must be rejected where it exceeds the upper bounds of MTCA Method A Soil Cleanup Levels. The Port appears to ignore this requirement and states that as long as a candidate fills pass a Synthetic Precipitation Leaching Procedure (SPLP), they can be accepted for use at most locations in the fill embankment. This clearly reduces the level of protection intended by the USFWS. There does not appear to be any rational given for this change. This issue is addressed in more detail by Dr. Lucia's Declaration.

28. Given the knowledge that fill already stockpiled at STIA contains DDT and PCBs from Hamm Creek, and TPH from both the First Avenue Bridge and the Black River Quarry, and that the fill already stockpiled at STIA is imperfectly characterized, it is my opinion that the Port's *Soil Fill Acceptance Criteria* in the 401 Certification remains flawed and do not preclude the acceptance of chemically contaminated fill in the future. This increases my concern that chemical contaminants at the fill placement site have the potential, if not the probability, to percolate through the fill pile into the groundwater, ultimately contaminating wetlands and surface waters that may be connected to the groundwater stream.

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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 October, 2001, at _____, Washington.

_____
John Strand, Ph.D.

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

DATED this 8th day of October, 2001, at Richland, Washington.

John Strand, Ph.D.

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