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June 20, 2001

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Subj: Rebuttal to Port of Seattle's (Port) Response to 401/404 Comments, Reference: 1996-4-02325, April 30, 2001

Ref: Letter to Jonathan Freedman and Ann Kenny of February 17, 2001, from John Strand on the Subject of Determining Whether the U.S. Army Corps of Engineers (USACOE) Has a Scientifically Adequate Basis to Issue a Permit, Under the Clean Water Act (CWA) Section 404, for the Port's Project Proposed in the Second Revised Public Notice No. 1996-4-02325.

Dear Ms. Walker, Ms. Terzi, and Ms. Kenny:

The attached supplemental comments rebut certain of the Port's responses to my original letter regarding the proposed Master Plan Update Improvements (MPU) at Seattle-Tacoma International Airport (STIA). In some cases, the Port was totally non-responsive to my concerns, or in the case of the General Responses, the Port only partially addressed my concerns. In yet other cases, the Port was not scientifically correct, was insufficiently clear, or was misleading.

I ask that you consider my rebuttal in your final deliberations on whether or not to grant a Section 401 Certification and Section 404 Permit. My rebuttal follows the same organization as used in my February 16th letter. Thank you for the opportunity to again comment on these important issues. I am available by phone, email, or in person to discuss any of my comments in greater detail.

Yours very truly,

John A. Strand

John A. Strand, Ph.D.
Principal Biologist

attachment

cc: Peter Eglick
Kimberly Lockard

Attachment

**Rebuttal to the Port's Response to 401/404 Comments of April 30, 2001**

**The Miller Creek Relocation Project and the Issue Whether or Not the Project Design Protects Affected Aquatic Resources**

The Port has now included scientific citations in support of the proposed design standards based on habitat requirements for cutthroat trout.

It also appears there is agreement that it will take several or more years before new riparian vegetative growth will improve shading along the relocated reach of Miller Creek (see Response # 1, page III-67). This raises important questions about the effectiveness of the proposed mitigation during critical periods.

The Port has still not satisfactorily addressed the question of whether or not the flow, temperature, and dissolved oxygen (D.O.) will support fish during summer months (see Response #1, see page III-67). The flow in the relocated reach will be lower than the Port states, and summer temperature and D.O. will not meet requirements to sustain cutthroat trout, at least in the short term. Whether or not the relocated reach will support fish in the long term is also in doubt.

There still is fundamental disagreement as to what constitutes an adequate assessment of impacts. The Port's analysis of impacts for this project is inadequate because the Port has not yet undertaken a quantitative survey of fish and other aquatic organisms in this reach of Miller Creek. In other words, the Port has not yet established a baseline condition. This is a critical deficiency because the appropriateness of regulatory approval and mitigation must be assessed, using this baseline, before approval of the proposed project can be granted.

Response # 10 (see page III-68) indicates that impacts of the proposed project are assessed in multiple documents: *Appendix F* of the *Final and Supplemental Environmental Impact Statements, A Stream Survey of Miller Creek, Biological Assessment*, Sect. 3.4.1 in the *Sea-Tac Runway Fill Hydrological Studies, Wetland Delineation Report*, the *Wetland Functional Impact Analysis*, and Sect 2.2.1.1 in the *Natural Resources Mitigation Plan*. This is misleading.

It is true that these reports "describe and evaluate" the subject impacts of the proposed project but not in detail, and not quantitatively for fish and other aquatic life. For example, the *Natural Resource Mitigation Plan* (Parametrix 2000a) in Sect 2.2.1.1 only locates Miller Creek geographically and addresses its stream classification. It is actually Sect. 3 in the *Natural Resource Mitigation Plan* that summarizes impacts associated with the MPU but again it only addresses impacts in a very general way. For example, it says on page 3-10 that "impacts to streams resulting from the MPU include filling approximately 980 feet of Miller Creek." It says nothing else, and unfortunately, none of the above documents address how many fish now use the reach of Miller Creek to be relocated and how many fish will be displaced or otherwise lost if the existing section is dewatered, i.e., relocated to the Vacca Farm site.

That no quantitative survey of either vertebrate (fish) or invertebrate fauna has been conducted on the project streams to date is bad science. To my knowledge there isn't even a full taxonomic list of what organisms are found in each project stream. How then can you assess the impacts of the proposed project?

Let me cite an example. In *Appendix F-Stream Survey Report for Miller Creek* (FAA 1997), it says that "resident salmonids, probably cutthroat, were observed throughout the study reach from below First Avenue S. up to the waterfall located approximately 0.2 mile upstream of South 160$^{th}$ Street." The point is if the surveyors had bothered to cast a net in Miller Creek they would have verified whether or not these fish were cutthroat trout or some other species.

Similarly (see the next paragraph in *Appendix F*), if proper analyses were employed, the surveyors would not have to "assume that glide and run type habitats that contained accumulations of silt and sand were inhabited by midges and worms." If they had employed Surber or other invertebrate sampling devices (USEPA 1989), they would have known that midges and worms could be found in Miller Creek.

Not even E&E, employed by the Washington Department of Ecology to conduct an independent survey of the fishery resources of project creeks, presented a complete list of the fishes inhabiting the Miller Creek and Des Moines Creek Watersheds (Pacific Groundwater Group et al. 2000). For example, E&E did not report finding prickly sculpin, yellow perch, or black crappie, yet each of these species have been recently collected in Miller Creek.

I will just add that nowhere in the Port's literature is it documented that either or both Miller Creek and Des Moines Creek contain abundant populations of crayfish, (*Pacifastacus leniusculus*), yet this species has been found throughout both the Miller Creek and Des Moines Creek Watersheds (Strand 2000, Columbia Biological Assessments, Richland, WA., personal communication).

**The Third Runway Fill Stockpile and the Issue of Whether or Not it Contains Chemical Contaminants that Pose a Risk for Project Wetlands and Streams**

Nothing the Port has included in their *Responses to General Comments* on the topic (see GLR2 and GLR2, page II-2 thru II-4) has resolved this matter. The Port was non-responsive to some of the key issues I raised.

The Port did not respond to my comment that the Ecology-approved *Soil Fill Acceptance Criteria* were seriously flawed, because they "lacked a consistent and statistically meaningful approach to determine the location and extent of any contamination contained in candidate fill materials." Statistically rigorous 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 Port's *Soil Fill Acceptance Criteria*.

The Port also did not respond to my criticism that "neither the Boeing (1990) nor the Corps of Engineers studies (1997) were very useful in certifying the Hamm Creek sediments as free of serious contamination." For example, the Port did not acknowledge that neither study was undertaken for the expressed purpose of screening sediments for the Third Runway, that the two studies were done seven years apart, or that the two studies reported vastly different values for PCBs and DDT. While the Port did admit that the Corps of Engineers did not collect the sediments samples in "accordance with typical upland sampling protocols" (see second paragraph, page II-4 of GLR2), they also failed to acknowledge that the locations at Hamm Creek studied by Boeing and the Corps were not the same. They also chose to ignore my suggestion that a third, independent, sediment study be undertaken.

**Metals Exceedences in Project Streams and the Issue Whether or Not They will Continue and Potentially Worsen if the Port's Proposed Project is Approved**

The Port suggests that my statement, "the metals copper and zinc are of particular concern" is not substantiated by the results of the whole effluent toxicity (WET) testing, which they concluded did not demonstrate appreciable toxicity (see Response # 27, page III-70). The Port's response is again misleading.

To the contrary, appreciable toxicity did occur during the above referenced WET tests (see Table 7-15 on page 7-25 of the *Biological Assessment* [Parametrix 2000b]), most notably when the discharge from SDN1 was tested. Percent survival of daphnia ranged between 10 and 80 over three test dates, the most recent 1/24/99. Mean survival over these three test dates was only 40 percent. Percent survival of fathead minnow ranged between 40 and 78, with a mean of 60 percent. This level of toxicity is not trivial and begs the question, what is the level of the offending chemical(s) in the stormwater discharged at SDN1?

Also, despite the Port's statement in the *Biological Assessment* (see page 7-25), that says "Of the four outfalls tested, three met the WET performance standards, demonstrating an overall lack of toxicity in WET tests of 100% stormwater from the Port's discharges," Table 7-15 actually demonstrates that at two of the outfalls (SDN4 and SDE4), percent survival was as low as 75 and 63%, respectively, on at least one of the three or four dates when tests were conducted, indicating that toxicity occurs more often than the Port would have us believe.

Also, how can the Port suggest that metals, particularly zinc, are not of concern when they admit in Sect 7.1.3.3 of the Biological Assessment (see page 7-26), that the source of toxicity in the above mentioned WET tests conducted on SDN1, has been identified as galvanized rooftops that leach zinc?

Zinc in three of six stormwater outfalls operated by the Port exceeded the Washington State Standards of 0.072 mg/L (see Figure 10 and Table 4 in *Annual Stormwater Monitoring Report*, September 2000). Zinc concentrations in the discharge from SDN1 exceeded 0.060 mg/L, which indicated that the Port has not yet solved the problem of high zinc occurring in this discharge. Copper in four of five of the same stormwater outfalls also exceeded the Washington State Standard of 0.010 mg/L as total recoverable metal (see Figure 8 and Table 4 in the Port's most recent *Annual Stormwater Monitoring Report*, September 2000).

Also knowing that the removal rates for copper and zinc in Lake Reba are no greater than 33 percent (see Table 7-19 of *Biological Assessment*), a significant (undetermined) quantity of the copper and zinc found in the discharge from SDN1 and other outfalls passes through Lake Reba and into Miller Creek. Clearly some of this copper and zinc is biologically available and accumulated in aquatic organisms in Miller Creek.

The ACC's PIT determined that copper levels in three composite fish samples (3-5 fish/composite) of cutthroat trout in Miller Creek ranged between 4.3 and 9.4 mg/Kg dry weight, while copper in a single cutthroat trout from the outfall of Daniels Creek in Cottage Lake (reference site) was only 2.0 mg/Kg dry weight (Strand 2000, Columbia Biological Assessments, Richland, WA., personal communication). A single yellow perch collected at the same time at the Cottage Lake reference site also contained 2.0 mg/Kg dry weight of copper. Zinc levels in two composite fish samples (3-5 fish/composite) of cutthroat trout in Miller Creek were 137 and 145 mg/Kg dry weight, while zinc in the single cutthroat trout from the outfall of Daniels Creek in Cottage Lake (reference site) was only 71.3 mg/Kg dry weight (Strand, 2000, Columbia Biological Assessments, Richland, WA., personal communication). The single yellow perch collected at the same time at the Cottage Lake reference site contained 63.3 mg/Kg dry weight of zinc. Zinc concentrations in cutthroat trout from Miller Creek exceeded the tissue screening concentration of 100 mg/Kg dry weight used by Shepherd (1999) as a screening tool.

The Port also responded to my concern about metals levels in STIA stormwater by indicating that the results of instream toxicity screening studies also reported in the Port's *Biological Assessment*, see Section 7.1.3.3, page 7-24, demonstrated that stormwater from STIA did not add to toxicity levels in Miller Creek and Des Moines Creek (see Response # 29, page III-71).

While I acknowledge that the results of instream testing (see *Biological Assessment*, Table 7-14, page 7-24) indicated no toxicity, I question these results in light of the results of companion WET tests (see above). For example, where in Miller Creek in relation to the stormwater discharges were the samples for instream bioassay collected? It is a rule-of-thumb that toxicity will decrease with increase in distance downstream of an outfall, so where the samples were collected is very important. Actually, none of the stations where samples were collected for instream tests were located by distance downstream from their outfalls. At minimum, a map showing these locations should have been included.

Also, how soon after discharge (following a rain event) were the samples to evaluate instream toxicity collected? Were these 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. Clearly, the Port is remiss for not providing the reader with a detailed and complete methodology. To do otherwise casts uncertainty on the results of the Port's tests.

Actually, the data to which the Port is referring in their response, i.e., both the instream toxicity as well as the WET test results addressed above, comes from a study in progress, a "draft" study. Unfortunately, the reader of the *Biological, Assessment* will not realize this from reviewing the text, rather he/she will need to review the reference list before this is apparent. This is not good science, and would not pass most peer reviews! This is but one indication that the Port's project should have been peer-reviewed by an independent, third party. The data the Port offers from an incomplete, unpublished and non peer-reviewed report should also not be used as a basis for the agencies' decisions here.

I should also point out that the WET and instream test protocols employed by the Port utilize only an "acute" approach of 48 to 96 hr duration. As I have said many times before, the Port also should be required to conduct chronic tests, as stormwater discharges during the rainy season can be nearly continuous.

Finally the Port responds to my concern for metals pollution by indicating that "the quality of stormwater from Sea-Tac Airport is anticipated to 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)."

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

Of the stormwater basins that discharge to Miller Creek at the north end of the STIA, only SDN1 could be retrofitted with additional detention capabilities but this too is subject to change. The Port in Section 7.1.4.1 indicates that they could also approve another alternative to improve treatment, although this alternative is yet to be determined. And, according to Table 7-8, the SDN2 and SDN4 will not receive a retrofit as the presently employed best management practices, e.g., bioswales, filter strips, are effective.

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

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

**Use of De-Icers and the Issue of Whether or Not They Pose a Risk to Aquatic Resources of the Site**

In responding to my comments on the fate and effects of glycols in project streams, the Port said that "glycol-based fluids are only used to de-ice aircraft, and stormwater associated with that activity drains to the Industrial Wastewater System (IWS) (see Response #34, page III-72)." This suggests that the Port's consultant does not believe that glycols can enter area streams because the IWS, after treatment, discharges directly to Puget Sound.

To suggest that glycols from de-icing and anti-icing activities at STIA do not enter area streams is untrue, particularly since the Port's Annual Stormwater Reports for 1999 and 2000 already indicated that glycols occur in stormwater at STIA outfalls that discharge both to Miller and Des Moines Creeks. While the IWS at STIA is designed to collect aircraft de-icers and anti-icers reaching the tarmac, glycols in de-icers and anti-icers are still routinely detected at six stormwater outfalls: SDN1, SDN2, SDN4, SDE4, SDS1, and SDS3. Outfalls SDN1, SDN2, and SDN4 are located on the north end of the STIA and discharge to Lake Reba on Miller Creek. Outfalls SDE4, SDS1, and SDS3 are located at the south end of STIA and discharge to the East Tributary or Northwest Ponds on Des Moines Creek.

The concentrations of glycols entering area 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 was propylene glycol.

The ACC's PIT 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 (Strand 2001, Columbia Biological Assessments, Richland, WA., personal communication). Propylene glycol was not detected in duplicate samples on either of these dates in the West Tributary of Des Moines Creek at 192nd Street, suggesting 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 likely source is an aircraft anti-icer and not an aircraft de-icer or auto/truck anti freeze that are ethylene glycol based. Possible sources of the fugitive emissions are periodic overflows of the IWS or an incomplete or leaking IWS.

At issue is the toxicity of the de-icing or anti-icing agent. The Port indicates that Type I de-icers are not very toxic and cites a 96 hr $LC_{50}$ for rainbow trout of 17,000 mg/L, and a 48 hr $EC_{50}$ for the water flea of 44,000 mg/l. Unfortunately, the reference that the Port cites, which is USEPA 2000, is incomplete so that verification is not possible. The Port does not include toxicity data for Type II, Type III, or Type IV, which are likely to be more toxic because these anti-icers contain propylene glycol. The Port also does not include any chronic data or toxicity based on endpoints other than acute toxicity.

I am also surprised that the Port did not comment on my statement that "de-icers and their additives are toxic to aquatic life at relatively low concentrations (1.8-8.7 mg/L)," which I based on the work of Hartwell et al. (1995). Hartwell et al. (1995) determined that the 7-day $LC_{50}$ for commercial anti-icer to fathead minnow ranged between 24.2 and 43.3 mg/L, based on the concentration of total glycols in the test solution. By definition, these results indicate that the $LC_{25}$ or $LC_{10}$ (the concentrations killing 25% and 10% of the test population in 7 days) will occur at lower concentrations of total glycols, that is, in the range of glycol concentrations found recently by the ACC's PIT. Hartwell et al. (1995) also observed that gill pathology (edema, respiratory cell hypertrophy, and proliferative bronchitis) occurred in fish exposed to anti-icer at 17.6 mg/L propylene glycol. It is reasonable to assume that a fish with these symptoms will die if the exposure continued at this same level. Hartwell et al. (1995) also observed toxicity and similar gill pathology in fathead minnows exposed to stormwater from a stream receiving winter runoff from a large commercial airport. In these tests, which included detailed chemical monitoring, the $LC_{50}$ ranged between 1.8 and 5.4 mg/L total glycols.

Clearly, the concentrations of total glycols cited in the 1999 and 2000 Annual Stormwater Monitoring Reports, and in the February 2001 stormwater analyses (Port 2001) exceed the concentrations reported by Hartwell et al. (1995) to be toxic to aquatic life.

I also disagree with the Port's assertion that use of de-icers and anti-icers at STIA will be "infrequent and minimal, and that "further studies are not likely to change the findings reported thus far (see Response # 38, page III-73)." What will happen during a hard winter where de-icing or anti-icing will be the norm for two weeks or more?

Clearly, because the Port still finds glycols in their stormwater, and because the Port will not acknowledge scientific studies demonstrating that de-icers and anti-icers are toxic to aquatic life at levels now found in stormwater entering the project streams, additional investigations of the fate and toxicity of de-icers and anti-icers used by the Port should be undertaken before any decisions are made on the Port's application for additional airport construction and facilities.

**Mitigation of Low Stream Flow Impacts by Detaining and Releasing Stormwater Stored in Detention Ponds and Vaults**

The Port now says it will no longer need additional sources of water, e.g., Seattle Public Utilities (SPU) water or well water, to mitigate low summer flows in project creeks (see General Response GLR7, pages II-7 thru II-8). They have proposed to manage the release of stormwater detained during the rainy season.

I would, however, caution the use of detained or stored stormwater because of the same reason I cautioned the use of SPU or well water. There will be differences in water quality that will have to be reconciled before its release into Des Moines Creek. Even assuming that the stormwater will be treated in the sense that particulates will be removed (settle out), this does not guarantee removal of all toxic chemicals, metals or organics, nor does it assure D.O. and temperature compatibilities? Stored waters could be devoid of D.O. and harmful to the biology of receiving waters. Temperatures of stored waters also will need to be the same, or nearly the same, as the temperatures of the receiving waters to avoid temperature shock for fish and other aquatic life.

**Cumulative Impacts Are Not Assessed**

The Port gives essentially a non-response to my comment that "each of the proposed construction projects or discharges stand alone and are not evaluated in the context of the overall change that Miller Creek, Walker Creek, or Des Moines Creek will undergo if the Port is permitted to build the third runway.

While the *Comprehensive Stormwater Management Plan* may evaluate cumulative impacts of changes in flow of individual drainage basins (see Response # 48, page III-73), this is but one of many potential impacts the Port should evaluate cumulatively. As an example of another cumulative impact to assess, what about the changes in water quality (e.g., turbidity) that could potentially occur if construction stormwater from multiple projects is allowed to simultaneously enter the project creeks? Similarly, what changes in water quality (e.g., metals) will occur if new impervious surfaces are added in several basins draining to the project creeks?

What is required is a full (quantitative) assessment of impacts of each individual construction project and how they change the water quality of the project creeks; then, an assessment of the overall impact that all of the proposed projects have on the water quality of the project creeks. Finally, the potential impacts of the Port's proposed projects must be assessed in relation to how the existing non-Port projects have already affected the water quality of the project creeks (watersheds). I repeat, I see no attempt to undertake a cumulative impact analysis of this kind, yet it is required by the *National Environmental Policy Act Regulations* (40 CFR 1500).

In response to Response # 49 (page III-73), an aquatic ecological risk assessment, e.g. Parkhurst et al. (1996) is a useful approach to assess potential cumulative impacts that chemicals in stormwater can have both individually and in concert. Estimates of risk (toxicity) from chemicals discharged to surface waters from individual projects can be addressed as well as the estimates of total (cumulative) risk from chemicals discharged to surface water from all of the projects. All of this must occur before an informed decision can be made on the Port's application.

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