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 WILLIAM A. ROZEBOOM 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))

William A. Rozeboom declares as follows:

1. I am over the age of 18, am competent to testify, and have personal knowledge of the facts stated herein.

2. I have reviewed the declarations of Steven G. Jones, Joseph Brascher, Donald W E. Weitkamp, Paul S. Fendt, and the Port of Seattle's Memorandum Opposing ACC's Motion for Stay, all filed by Foster Pepper & Shefelman, PLLC. I have also reviewed the declarations of Ann Kenny, Eric Stockdale, Kelly Whiting, and the Department of Ecology's Response to Appellant's Motion for Stay, all filed by the Attorney General of Washington. I offer responses to the above documents, most of which include some reference to my declaration filed previously in support of ACC's Motion for Stay.

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3. I have also reviewed other recent declarations filed by the Port and Ecology, not identified above, in addition to very large quantities of emails, reports, internal memoranda, and other documents obtained by the ACC from Ecology, the Corps of Engineers, and other agencies through Public Disclosure Requests by the ACC. These documents have been provided to me by the ACC for information and review. I have reasonably comprehensive knowledge of all publicly available documents involving SeaTac hydrology and natural resource issues, and the positions taken on those issues by the Port and Ecology from October 1999 to date.

4. The declaration of Steven Jones, ¶3, discusses Port responses to public comments and attaches as exhibits copies of the Port's responses to comment letters received from Amanda Azous, Dr. Peter Willing, Dr. John Strand, and Tom Luster, together with the original comment letters, all of which were filed by the ACC. The materials provided by Mr. Jones however fail to include my comment letter, also filed by the ACC, or the Port's response to that letter. In order that the record be more complete, my comment letter of February 15, 2001 is attached as Exhibit A, the Port's response to that comment letter is attached as Exhibit B, and my follow-up comment letter of June 25, 2001 is attached as Exhibit C. These documents show that there are many significant issues which have been raised previously and which the Port and Ecology in my opinion have failed to satisfactorily address.

5. Most of the points I will make in this Declaration fall into one of three broad categories of disagreement with the Port and Ecology. First, I strongly disagree with the Port and Ecology's assertions as to the adequacy of the calibration of the HSPF modeling used to assess

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stream low flow impacts to Walker and Des Moines Creeks. Second, I strongly disagree with the Port and Ecology's assertions that effects of Industrial Wastewater System improvements on stream low flow impacts can or should be ignored. Finally, I very strongly disagree with the Port and Ecology's assertions that the significant problems and deficiencies in the low flow mitigation plan can be adequately resolved with the conditions proposed in Ecology's 401 Certification. There also are miscellaneous errors and points of disagreement which do not fall into the above categories.

6. The Declaration of Ann Kenny, ¶19, states that the Port "*agreed to comply with the King County Surface Water Design Manual*". This statement is misleading and inaccurate. The Port agreed to comply with only the technical provisions of the Manual, and negotiated an exemption from what the Port considered to be "procedural" requirements. In particular, the Port claimed exemptions from King County requirements for Drainage Reviews and Financial Guarantees. If the Port had fully complied with the King County Surface Water Design Manual (KCSWDM), the airport improvements would have been subject to a Large Site Drainage Review (KCSWDM Section 1.1.2) and through that process might have incurred additional flow and water quality requirements beyond the KCSWDM minimum requirements. In the initial King County review findings (Paragraph 3, Enclosure 1, Letter dated September 15, 2000 from King County/Bissonnette to Ecology/Luster), King County states, *"If processed under King County regulations, this project would have exceeded the threshold for Large Site Drainage Review and would have been subject to the procedural requirements whereby performance*

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standards are tailored specific to the proposed development." From the King County reviewer's recent declaration (Whiting, Page 5, top bullet) it is stated that *"Enhanced water quality treatment, beyond the Manual's basic menu may be warranted based on the monitoring data presented in the SMP"*. The record should show that the project is not in compliance with the King County regulations and, had such compliance been required, that enhanced water quality treatment would have likely been required.

7. The Port of Seattle's Memorandum opposing ACC's Motion for Stay, at Page 11, Line 8, states *"It bears emphasis that Mr. Rozeboom concedes that there is sufficient water to meet the low flow needs. See Rozeboom, ¶4."* This is incorrect. No such statement or concession was made by me regarding sufficient water to meet low flow needs.

8. I am in partial agreement with the Port and Ecology as to the adequacy of the HSPF model calibration for this project. I agree that some of the calibration is adequate, but strongly disagree that all of the calibration is adequate in light of the range of purposes to which the models are being employed. I disagree in particular with the statement by Fendt, ¶24, that *"The calibration approved by King County in the SMP is also applicable to the Low Flow Analysis."* It is my opinion that the HSPF model calibration to Miller Creek is adequate for a range of applications, but that calibration to Walker and Des Moines Creek is not. The hydrologic processes affecting surface-runoff peak flows are different from the hydrologic processes affecting groundwater-seepage low flows, and successful calibration to peak flows

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does not assure successful calibration to low flows. My overall opinion of the current (September 2001) calibration of the models being used for this project is as summarized below.

HSPF Model -- Flow Regime	Calibration Adequate?
Miller Creek – Peak Flow	YES
Miller Creek – Low Flow	YES
Walker Creek – Peak Flow	YES
Walker Creek – Low Flow	NO
Des Moines Creek – Peak Flow	YES
Des Moines Creek – Low Flow	NO

My statements in the remainder of this declaration focus on the Walker Creek and Des Moines Creek low flow models which are in my opinion deficient.

9. I believe that my assessment of the HSPF model calibration is more or less consistent with the opinions of the King County reviewer retained by Ecology, and possibly the Port's own consultants with credible expertise in HSPF modeling. The King County reviewer's declaration (Whiting, Page 7, Line 7) states that *"These calibrations have been accepted for purposes of SMP flow control mitigations."* However, the King County reviewer does not provide any endorsement or acceptance of the model calibration relative to low flow analysis or mitigation. Instead, he recommends further documentation and discussion of the accuracy of the calibrations in predicting upper-stream low flows (Whiting, Page 7, Line 18). Aqua Terra, the Port's consultant responsible for modeling flows and impacts in Miller and Walker Creeks, states (Brascher, ¶11) that *"The HSPF Modeling that will be included in the final version of the Low Flow Analysis will be peer reviewed and endorsed by Norman Crawford, the hydraulic engineer who actually developed the model itself."* By inference, there is an expectation by the Port's own consultant that

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the current HSPF model(s) will be revised, presumably to correct some deficiency, prior to inclusion in a final low flow analysis. Also, Brascher's statement indicates that the current models have either not been subjected to a competent peer review or that there has been no public disclosure of the results of a competent peer review which may have already occurred.

10. The Port's submittals fail to provide credible information regarding the adequacy of the HSPF model for Des Moines Creek. From the declaration of Aqua Terra / Brascher, ¶4, Aqua Terra performed the modeling of surface water flows for Miller and Walker Creeks, but that *"Parametrix performed the modeling for Des Moines Creek in consultation with other subconsultants."* In the declaration of Parametrix project manager Fendt at ¶2, it is notable that HSPF experience is absent from Mr. Fendt's summary of qualifications. The declaration of Brasher at ¶13 states his opinion that the results of the HSPF model constitute an "*accurate assessment of the impacts on the flows of. . . Des Moines Creek*", but it is not apparent how he could have reached this opinion when the modeling for Des Moines Creek was performed by others apparently not associated with Aqua Terra. In all of the declarations filed by the Port and Ecology, I have been unable to locate a declaration for any person directly responsible for the HSPF low flow modeling of Des Moines Creek.

11. Statements have been made to the effect that my analyses and conclusions are based on a single year of data (Weitkamp, Page 10, Line 19; Fendt, ¶24). This is incorrect. My previous declaration at ¶9 presented a plot of a single year of data (upper Walker Creek, 1991) as an illustration of problems which occur over the period of record for model calibration. One of the

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problems is that the calibration for Walker Creek exaggerates the low flows in late summer and discounts the low flows in June and July. The model simulation has flows which recede more rapidly, and later into the fall, than is indicated by the actual gage data. The table below examines this issue further, considering the full period of record for which calibration data are presented in the SMP for Walker Creek.

WALKER CREEK STREAMFLOW DATA AT UPPER GAGE, CFS
RECORDED = ACTUAL STREAMFLOW DATA RECORDED BY KING COUNTY
SIMULATED = HSPF MODEL RESULTS FOR SAME PERIOD

	MINIMUM FLOW - RECORDED					MINIMUM FLOW - SIMULATED		
	Jun-Jul	Aug-Sep	Difference			Jun-Jul	Aug-Sep	Difference
1991	1.2	1.3	-0.1		1991	0.94	0.83	0.11
1992	1.2	1	0.2		1992	0.85	0.71	0.14
1993	0.9	0.8	0.1		1993	1	0.71	0.29
1994	0.89	0.73	0.16		1994	0.73	0.64	0.09
1995	0.13	0.12	0.01		1995	0.87	0.74	0.13
1996	0.85	0.41	0.44		1996	0.87	0.74	0.13
	AVERAGE FLOW - RECORDED					AVERAGE FLOW - SIMULATED		
	Jun-Jul	Aug-Sep	Difference			Jun-Jul	Aug-Sep	Difference
1991	1.55	1.62	-0.07		1991	1.17	0.98	0.18
1992	1.37	1.31	0.06		1992	1.01	0.82	0.19
1993	1.46	0.87	0.60		1993	1.35	0.82	0.53
1994	1.17	0.93	0.24		1994	0.92	0.72	0.20
1995	0.77	0.70	0.08		1995	1.05	0.90	0.15
1996	1.25	1.78	-0.53		1996	1.20	1.02	0.18
AVG	1.26	1.20	0.06		AVG	1.12	0.88	0.24

Two key conclusions can be drawn from this summary examination of the calibration data for the Walker Creek upper gage. First, the actual minimum flow recorded for the months of June and July is about as low (see 1995) or is lower (see 1991) than in the months of August and September,

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representing 2 out of 6 years or 30 percent of all years of calibration record. Second, the actual data show that average flows during June and July are on average quite close (within about 5% or 0.06 cfs) to average flows in August and September. The simulated flows, on the other hand, suggest incorrectly that average flows in August and September are significantly lower (by about 21% or 0.24 cfs) than those in June and July. We repeat our previous point that the analysis should pay appropriate attention to the actual data, and that the actual data in this instance do not support the Port's apparent conclusions that Walker Creek low flows occur only in the period of August 1 through October 31, and that mitigation should be provided for that period only.

12. The statement was made that calibration to low flows was accurate because mass balance was achieved (Brascher, ¶14). While I agree with the importance of attaining mass balance, I disagree with this statement, in its present context, for two reasons. First, attainment of mass balance for a long-term (annual or multi-year) period does not provide any assurance that suitable mass balance is attained for the low-flow summer months which in this case is the period of specific interest. Second, the examination presented above of the calibration data for the Walker Creek upper gage show that mass balance was not achieved at that gage for summer low flow months. The data show that for the 6-year period of calibration data, the simulation results on average underestimate the actual flows by about 11% (1.12 vs 1.26 cfs) for June and July, and underestimate the actual flows by about 27% (0.88 vs 1.20 cfs) for August and September. Not only are the low flows consistently under-simulated, but for this gage the data suggest that the simulation data are biased towards too-low flows in late summer and early fall. One practical

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implication of under-simulation is that reliance on the Port's model might cause false conclusions to be drawn regarding whether future low streamflows show evidence of project low flow reductions. For instance, using the actual data, low flow impacts would be indicated (for climate conditions such as during the calibration period) if average August-September fell below 1.2 cfs, but using the Port's model, no mitigation would be offered until the average flows fell below 0.88 cfs. I do not dispute that calibration data may have been accurate for other gages. My point remains that the calibration to low flows is poor or unknown for the upper gages on Walker and Des Moines Creeks.

13. The statement has been made (Brascher, ¶16) that one of the ACC reviewers (presumably meaning me) suggested that calibration should have been done using only the gage located in the upper basin of these watersheds. That is not correct. The actual statement, which may be found on page 8 of my February 2001 letter (Exhibit A) is given below.

> We recognize that model calibration is a challenging process and that data reliability is often an issue. However, because the purpose of this work is to address and mitigate conditions in the upper basin (airport) areas of the watershed, calibration efforts should place more emphasis on matching upper basin flows unless those data are confirmed to be unreliable. The current calibration effort is deficient because it has placed too much emphasis on matching conditions at the lower gage, and has prematurely discounted the more-important upper basin data.

14. The statement is made by Brascher, also at ¶16, that King County has stated that the upper gage is less reliable than the lower gage for Walker Creek. However, no evidence or supporting documentation is provided to show that King County ever made such a statement, and there is no discussion of the specific data quality/reliability issues. The gage data for upper Walker

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Creek cannot be so readily or easily dismissed on hearsay information, particularly since gages typically tend to be more reliable at low flows (which are of interest here) than at high flows for which field streamflow measurements are more difficult to obtain.

15. The statement has been made (Brascher, again at ¶16) that if calibration was based on gage data for the upper basin, then the model would have been out of calibration. This seems to be a concession that the model is not well calibrated to the upper basin gage. It is my opinion that the calibration effort should seek to understand the physical processes affecting each individual stream and to model these accordingly, rather than ignore available data which may be difficult to model or reproduce. For example, in the case of Des Moines Creek (for which low flow modeling was performed by persons unknown), we have previously identified several calibration issues including groundwater processes which would likely result in difficulty in reproducing low flows and attaining mass balance at both the upper and lower gages. The relevant text from Page 7 of my February 2001 comment letter is repeated below.

> Another groundwater-related problem with calibration is that it has overlooked possible stream losses to groundwater in the lower part of the basin. Figure B1-3 groundwater mapping shows that the Des Moines Creek below about elevation 200 feet does not intersect the regional groundwater table. This transition area corresponds roughly to the location of a knickpoint described in SMP page P-2 where the Des Moines Creek channel gradient increases and where bed sediments change from fine grained materials to relatively coarse materials with boulders, cobbles, gravel, and fine sand. Considering the evidence of the streamflow data, it seems likely that the lower part of Des Moines Creek includes a "losing reach" which has cut through the perching layer which supports the regional shallow groundwater table. The physical condition of a losing reach would be consistent with streamflow data at the mouth which show unexpectedly low flow peaks and volumes relative to streamflow data for the headwater areas. It is possible that the "poor calibration" problems described by SMP page B1-13, and the difficulty in

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reconciling measured flows at the upper and lower gages, could be rectified if the presence of a losing reach were confirmed.

16. Statements are made to the effect that the Port's analysis is accurate because it is based on 47 or nearly 50 years of flow record for each stream (Fendt, ¶¶13, 15, Weitkamp, ¶16). Such statements are misleading in that they fail to acknowledge that the analysis is based fundamentally on about six years of streamflow record and 47 years of rainfall record. If the calibration is poor, as appears to be the case for the upper gages for Walker and Des Moines Creeks, then the HSPF modeling effort has produced a 47-year series of synthetic streamflow data which are similarly poor. Given a choice between 1) a 47-year sequence of unreliable synthetic flows based on a very poor calibration and 2) a six-year sequence of actual recorded flows, it is my opinion that the actual recorded flows should provide useful data and most certainly should not be ignored in favor of a longer synthetic sequence of dubious accuracy.

17. It is stated (Kenny, ¶21) that "*by the time Ecology issued the 401 Certification in August every single issue pertaining to the adequacy of the stormwater plan had been successfully resolved and the SMP amended to reflect those changes.*" This is misleading on at least two counts. First there are numerous stormwater and related issues described in my recent review and follow-up letters (See Exhibits A and C) which in my opinion have not been successfully resolved. Second, at the time of those review comments, the SMP included the low flow analysis and low flow mitigation plan as one element of the SMP document, and the low flow analysis had clearly become the greatest remaining hurdle to approval of the SMP. I consider it misleading for Ecology to assert that every single issue had been successfully resolved when the primary remedy was to

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remove the low-flow analysis from the SMP discussion and to process it as an independent document. This resolution is inconsistent with King County review requirements (KCSWDM Section 2.3) that drainage review documents include specific Technical Information Report materials including "Special Reports and Studies." Under King County regulations, special reports and studies serve to "further address the site characteristics, the potential for impacts associated with the development, and the measures which would be implemented to mitigate impacts". The project low flow analysis would most likely be a required special study under the King County drainage review process. The "successful resolution" described by Kenny required ignoring substantive technical issues which in my opinion remain unresolved, as well as apparent non-compliance with the procedural requirements of the King County Surface Water Design Manual.

18. Port and Ecology responses to my comments on the low flow impacts of the Industrial Wastewater System (IWS) seem to have focused on the footprint of impervious surface at the IWS lagoons and IWS Lagoon 3 in particular (Kenny, ¶35; Ecology's Response, Page 12, Line 7; Port's Response, Page 10, Line 13; Fendt, ¶34) My comments have apparently been mis-interpreted, and will be clarified here. My concern is not with the relatively-small footprint of the lagoons, but rather with the fact that these lagoons have to some extent functioned historically as infiltration ponds and have allowed some fraction of the water from the entire IWS collection area, approximately 300 acres, to be infiltrated to groundwater at IWS Lagoons 1 and 2 which are located at the groundwater basin divide between Walker and Des Moines Creeks. A description of the

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condition of the IWS lagoons at issue was provided on Page 9 of my February 2001 comment letter and is repeated below.

> The IWS has a direct significant impact on seepage and base flows in the Walker and Des Moines Creek systems by its removal of large areas of basin which would naturally form the headwater recharge areas for those streams. Until recently, the effects of these diversions have been partially offset by infiltration recharge to groundwater from the three IWS storage lagoons which are located near the groundwater divide between Walker and Des Moines Creeks.
>
> Our source of information on the history and status of the IWS system is a recent hydrogeologic study by Associated Earth Sciences, Inc., "Hydrogeologic Study, Industrial Waste System (IWS) Plant and Lagoons, Seattle Tacoma International Airport," prepared for Port of Seattle, June 21, 2000. Lagoon 1 has been used to store wastewater since 1965. Lagoon 2 was built in 1972 and "is utilized during times of heavy rainfall events." Lagoon 3 was constructed in 1979 and "is used to provide excess storage capacity for industrial wastewater in the event that Lagoons 1 and 2 reach capacity." The bottoms of the lagoons most regularly in service - Lagoons 1 and 2 - were reportedly "composed of compacted gravelly sand" which should have a relatively high infiltration capacity. A program to install leak prevention liner systems in the lagoons has been underway since 1996: Lagoon 1 was lined in 1996, Lagoon 2 was lined in 1997, and construction documents have been prepared for Lagoon 3 to be lined in the near future.

My point is that the unlined IWS lagoons have historically allowed potentially significant volumes of groundwater recharge from water collected from hundreds of acres of the IWS collection system, and that IWS system leak reduction efforts, such as lining of Lagoons 1 and 2 in particular, seem likely to have some impact on stream low flows. While the lagoons were not constructed or operated with the objective of achieving infiltration to groundwater (Fendt, ¶31) the unlined lagoons have nonetheless served to perform an infiltration function. It is my opinion that these effects should be addressed in the assessment of airport impacts to stream low flows.

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19. It is apparently argued by the Port and Ecology that the IWS lagoon leak reduction efforts (such as lagoon linings) should not be considered in the low flow analysis since these linings already exist and because Section 401 Certification is not being sought for those activities. I respond that year 1994 is clearly identified in the SMP (Page 2-2) as the base year to define existing airport land use conditions, and that the lagoon linings are not grandfathered as they were constructed subsequent to that regulatory base year. Second, while Section 401 Certification is not being sought directly for the IWS improvements, the proposed stormwater system clearly does rely on IWS expansion to accommodate a significant amount of the increased runoff resulting from the airport Master Plan Update (MPU) improvements. MPU improvements are expected to add approximately 305 acres of new impervious surface to the airport, of which approximately 67 acres or 22% will be diverted away from the storm drain system (which discharges to the area streams) and into the IWS system (which discharges directly to Puget Sound).

20. The statement is made by Fendt, ¶30, that I contended that the IWS Lagoon 3 is in the Walker Creek groundwater contribution area. The intent of my previous declaration at ¶11 has been misconstrued and will be clarified here. First, I did not state or intend to suggest that Lagoon 3 is in the Walker Creek groundwater contribution area. It is not. My point was and is that the IWS service area—that is the area from which water is captured and removed from the stream systems and diverted into the IWS system—occupies a significant portion of the area mapped by SMP Figure B2-2 as comprising the Walker Creek groundwater contribution area. To my knowledge, the IWS system has been progressively enlarged through the period for which calibration

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streamflow data are provided in the SMP; the future year 2006 footprint of the IWS service area is shown by SMP Figure B2-23. If one overlays this footprint of the IWS service area (Figure B2-23) over the Walker Creek groundwater contribution area (Figure B2-2), it can be seen that the IWS service area captures (and diverts into the IWS system) nearly one half of the non-contiguous groundwater recharge area for Walker Creek. It follows that the IWS system could potentially cause up to about a 50% reduction in Walker Creek groundwater recharge and stream base flows relative to a pre-airport basin condition. Examination of the groundwater basin mapping further shows that IWS lagoons 1 and 2 (both constructed in gravelly sand and expected to be leaky prior to being lined in 1996-97) straddle the groundwater divide between Walker and Des Moines Creeks. Lagoon 1 mostly overlies the Des Moines Creek groundwater basin while Lagoon 2 mostly overlies the Walker Creek groundwater basin. Prior to these lagoons being lined, one or both likely provided some groundwater recharge which in turn supported Walker Creek low flows. It is my opinion that Walker Creek low flows may be particularly sensitive to IWS expansion and IWS system leak reduction efforts, including but not limited to lining of Lagoons 1 and 2. My previous declaration at ¶¶12 and 13 provided an analysis of the available data relevant to this issue and found that either the data indicate a significant (about 0.5 cfs) decline in Walker Creek low flows over the 1991-1996 period of calibration data, or that the model calibration and streamflow data are too poor to draw any conclusions about anything.

21. The statement is made (Fendt, ¶38) that excavation in the borrow pit area would cause an increase in recharge to the shallow regional aquifer. This misses my concern which

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involves gravel mining effects on flow timing, not recharge quantity. In light of the detailed assessments which have been made to identify low flow timing benefits of embankment construction in the Miller Creek basin, it seems unbalanced that there has been no comparable assessment of potentially-adverse low flow timing impacts resulting from mining in the upper Des Moines Creek basin to obtain the materials for embankment construction.

22. The statement is made (Fendt, ¶29) that I (Rozeboom) am confused over *"the fact that the SMP is not intended to show precise size of low flow mitigation vaults – only their probable locations."* Mr. Fendt's response does not allay my concern, as identified in my previous declaration at ¶17, that the SMP causes confusion for me and probably others because it identifies locations for low flow mitigation vaults which are different from the locations identified in the Low Flow Mitigation Plan. More complete details of this conflict between the SMP and Low Flow documents as to the probable locations of facilities were previously provided to Ecology in a letter by me dated August 6, 2001, as follows.

> The (Low Flow) document is inconsistent with the Stormwater Management Plan (SMP) as to what reserve storage facilities are proposed. One of our comments on the SMP was that, while reserve storage was included in some preliminary facility drawings, there was no comprehensive summary of what facilities were proposed to provide reserve storage. From the present (July 23, 2001) low flow analysis document, it appears that the facilities being proposed are those identified for each stream after the divider sheets titled "Summary of Low Stream Flow Mitigation Vault Storage and Filling." These parts of the low flow analysis document identify the following facilities: for Miller Creek - Vaults NEPL, Cargo, SDN2X/4X, and SDN3X; for Des Moines Creek - Vaults SDS3 and SDS4; and for Walker Creek – Vault F. However, these are different from the facilities for which preliminary reserve storage designs have been provided in the December 2000 SMP and recent SMP addenda. Very recently, on July 2, 2001, the Port (by Parametrix) provided Ecology with "Deliverable 7A (Miller Creek)" SMP revisions which included Exhibits C150 and C151 showing reserve stormwater storage and reserve stormwater release from Vaults C1, C2,

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and G1. These are different from the reserve storage vaults which are identified in the low flow analysis. With the conflicting documentation in hand, it is uncertain what is actually being proposed.

The SMP final versions of Figures C150 and C151, transmitted as part of a large set of SMP replacement pages by Parametrix to Ecology on July 27, 2001, continues to show reserve storm water releases from Vaults C1 and G1. Again, these vaults are different from the facilities identified in the Low Flow plan as providing reserve storage for purposes of low flow mitigation. If the intent of the SMP, as stated by Mr. Fendt, is to show the locations of the low flow vaults in relationship to the proposed stormwater detention vaults, then the SMP has failed to achieve that intent.

23. The statement is made (Fendt, ¶85) that "*the mere fact that there is not a technical manual for the low flow proposal does not mean it is not feasible or based on sound engineering*" and "*the constructability and engineering issues are far from unique and do not raise feasibility concerns.*" I agree fully that it is feasible to engineer and construct vaults and pipes. At issue is whether those vaults and pipes will function as intended and will provide sufficient flow rates and quantities to mitigate for the low flow impacts of airport activities. From my review work of stormwater facilities at Snoqualmie Ridge, I have experience reviewing many "unique" stormwater facilities including flow splitters and enclosed storage vaults which have been designed and engineered without specific guidance from technical manuals. From that experience, it is my opinion that lack of an applicable technical manual creates a significant opportunity for design oversights and/or errors which can adversely affect facility performance. It is further my opinion

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that there is currently a high risk that the Port's low flow plan, if approved in its present draft form and without the scrutiny of ongoing public review, will fail to achieve its intended mitigation objectives. I base this opinion in part on the track record of design and analysis errors and oversights by the Port's consultants. For example, the Port's November 1999 and August 2000 versions of the project Stormwater Management Plan contained very serious analysis flaws which were identified only by the diligence of the ACC's review of the project documents and subsequently by King County's review efforts. As an example of a recent construction plan design oversight, the Port issued runway embankment construction plans in January 2001 which could have substantially de-watered one of the wetlands which the project is claiming to protect. That design oversight was identified by me on behalf of the ACC and brought to Ecology's attention as Comment 20f of my February 2001 letter (Exhibit A). The situation was subsequently addressed by the Port and I responded as shown below with Comment 43 from my letter of June 2001 (Exhibit C) .

> We appreciate that the Port recognizes the need for additional analyses and management solutions to the challenge of pumping erosion control water from a pond which will be excavated, within a wetland, to a depth which is about 9 feet below the seasonal groundwater level. However, this is a situation which should have been identified and corrected prior to Port approval of the construction plans[1] and specifications which describe this work. The oversight illustrates that the Port's "systematic, critical construction plan review process" (Port response 41) is fallible and would benefit from additional independent review.

1Port of Seattle major contract construction plans titled "Third Runway - Embankment Construction - Phase 4", Work Order #101346, Project STIA-0104-T-01, approved 1/25/01. The accompanying two-volume Project Manual, including Specifications, is dated January 29, 2001.

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Again, for the reasons and history given above, it is my opinion that there is a high risk that the Port's low flow plan, if approved in its present incomplete draft form and without the scrutiny of ongoing public review, will fail to achieve its intended mitigation objectives.

24. It has been stated (Kenny, ¶33) that *"Ecology was reasonably assured that the (low flow) impacts had been appropriately identified and that the proposed mitigation was technically feasible."* I fail to understand how there can be assurance of impacts being appropriately identified when the accuracy and adequacy of low-flow model calibration is clearly at issue, as evidenced by Ecology's Certification Condition I.1.a.iii which requires a discussion of the accuracy of the calibration and a statement of the adequacy of the calibrations for the purpose of low flow simulation. As to the technical feasibility of the proposal, it is my opinion that feasibility has been demonstrated at only a highly conceptual level and that there is presently no assurance that this conceptual plan can or will be successfully implemented. It is noteworthy that the King County's review of the low flow impact analysis (See low flow impact analysis letter dated August 3, 2001 from King County/Bissonnette to Ecology/Kenny, Page 1) identified several inconsistencies and/or gaps in the low flow analysis with *"the potential to affect facility design and plan effectiveness beyond a trivial amount."* The declaration of the King County reviewer confirms (Whiting, Page 6, Line 13) that the low flow plan has *"some unresolved design challenges."* My point, which the King County comments seems to support, is that conceptual-level technical feasibility provides no assurance that unresolved, non-trivial, design challenges can or will be adequately resolved.

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25. Ecology's water quality certification for this project includes four pages (22 through 25) containing 137 lines of conditions affecting mitigation of low flow impacts. Attorneys for Ecology (Ecology Response, Page 9, Line 17) argue that these conditions are sufficient to ensure that low flow impacts will be offset. In my opinion the conditions as proposed are for many reasons insufficient to provide any such assurance. The single greatest problem with the conditions is the requirement that the revised low flow plan be submitted within 45 days, and then that there is no opportunity or requirement for subsequent review or approval of the revised plan. This time frame is in my opinion far too short to suitably address the outstanding issues, and I would anticipate that at least two or three additional cycles of review would be necessary to produce an adequate plan. Other of the conditions provide insufficient direction to know what would constitute an acceptable plan. For example, what exactly happens if the revised report (per Ecology Condition I.1.a.iii) concurs with our suggestion that the upper-basin calibration is very poor and not adequate for the purposes of low flow simulation? The conditions only require that an analysis and statement be made—the consequences of the findings are not addressed. Furthermore, because the Port's consultants have already declared that the models are in their opinion accurate (Fendt, ¶23; Brascher, ¶13), Ecology's condition that the Port provide a statement of model adequacy seems to be a rather futile exercise.

DATED this 8 day of October, 2001, at Tukwila, Washington.

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