POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

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

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 am a professional civil engineer licensed in the State of Washington. I am employed as a senior engineer with Northwest Hydraulic Consultants, located at Suite 350, 16300 Christensen Road, Seattle, Washington, 98188. I have over 20 years of specialized experience in surface water hydrology and hydraulics, including over 5 years as principal reviewer of all Master Drainage Plan, Stormwater Management Plan, and Storm Drainage Technical Information Report documents for the 1,300-acre Snoqualmie Ridge project currently under construction in the city of Snoqualmie. The Snoqualmie Ridge project is similar to the 3rd

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runway project in that it is a large site development which is subject to the requirements of the Washington State Department of Ecology Stormwater Management Manual and the King County Surface Water Design Manual (KCSWDM). Attached as Exhibit A is a copy of my curriculum vita.

3. Northwest Hydraulic Consultants has been retained since October 1999 on behalf of the Airport Communities Coalition (ACC) to provide technical reviews of stormwater facilities and related streamflow impacts from the proposed 3rd runway and other development at SeaTac airport. I have been responsible for this review work. I have reviewed all stormwater management plans, natural resources mitigation plans, low flow analyses, and related documents which have been prepared by or for the Port of Seattle for airport improvements. My review findings were expressed to Ecology and/or the Corps of Engineers in a series of letters dated 11/24/1999, 5/3/2000, 7/31/2000, 9/7/2000, 9/21/2000, 9/25/2000, 9/27/2000, 2/15/2001, 4/30/2001, 6/25/2001, 7/23/2001, and 8/6/2001. Internal review and quality assurance for these letters was provided by co-signer Dr. Malcolm Leytham, PE, who is a principal with NHC. Attached as Exhibit B is Dr. Leytham's curriculum vita. Independent reviews by King County and Pacific Groundwater Group, under separate contracts to Ecology, have generally corroborated the concerns expressed by our review letters.

4. The Port of Seattle's Third Runway Project and Master Plan Updates will alter surface and ground water hydrology in and around Sea-Tac International Airport. One of the impacts of these alterations will be to the quantity of water flowing in the streams surrounding

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the airport, specifically Des Moines, Miller and Walker Creeks. The most recent (July 2001) Stormwater Management Plan for airport improvements, unlike the previous November 1999 and August 2000 versions of the SMP, proposes stormwater detention facilities which should provide sufficient capacity to mitigate for quantitative airport impacts to peak flows (understanding that this capacity does not address water quality concerns). However, the airport activities will have additional impacts to low streamflows which have not been accurately assessed and for which sufficient mitigation is not assured. The concern is that the project as now proposed will have the net effect of reducing low flow in some or all of Miller Creek, Walker Creek, and Des Moines Creek during the late summer period, roughly July through October. Our comments below focus on low flow issues.

5. Storm water flows from the airport and discharges, either directly or through the storm drain system, by both surface and groundwater flow paths, to Des Moines, Miller and Walker Creeks. Alterations to the quantity of water in these streams surrounding the airport will result from activities which change the basin hydrology, the principal activities being: 1) a near-future increase of approximately 300 acres in the amount of impervious surfaces; 2) expansion of and improvements to the industrial wastewater system (IWS); and 3) long-term additional increase in basin impervious surface area consistent with basin land use zoning. Increased areas of impervious surface will decrease groundwater infiltration and groundwater seepage flow to the streams. The IWS collects water from areas naturally tributary to the streams surrounding the airport, and causes that water to bypass the streams and to be discharged directly to Puget Sound.

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Post-1994 expansion and improvements to the IWS, including lagoon linings and other leak reduction efforts, will further decrease the amount of water infiltrating into the ground and eventually feeding base flows in the streams. Long-term future land use changes creating additional impervious surfaces are anticipated from the eventual (per zoning) construction of a business park in now-forested areas of the Des Moines Creek basin where borrow pits are proposed to be developed as a major source of fill material for the third runway.

6. Low flow depletion in Des Moines, Miller and Walker Creeks is an impact of the Third Runway Project and Master Plan Updates that is recognized as requiring mitigation in fulfillment of Section 401 Certification requirements. To that end, the Port has endeavored to develop a Low Flow Technical Analysis and a low flow mitigation plan, termed the "Flow Impact Offset Facility Proposal," both of which have been submitted to the Department of Ecology in draft form only. The Port's conclusions about low flows were encapsulated in a 7-page letter transmitted from the Port to Ecology on July 23, 2001 under cover of a report entitled Low Flow Analysis – Flow Impact Offset Facility Proposal (Parametrix, Inc., July 2001). *See* Exhibit C. Elements of this report were corrected by a July 25, 2001 letter from the Port to Ecology. *See* Exhibit D. Ecology's Section 401 Certification, issued on August 10, 2001, references and incorporates this low flow analysis and identifies a number of conditions.

7. In analyzing the Port's low flow proposal it is important to keep in mind that the proposal is unprecedented and that no technical standards exist which are suitable to evaluate the proposal. There are uncertainties about both the quantity and quality of water proposed to

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mitigate for low flow impacts, as well as the practicality of the facilities and devices which will be required. These uncertainties are compounded by the fact that the Port's Low Flow Analysis is very clearly an incomplete draft document. The document's opening page states that "[T]he evaluation and low streamflow impact offset proposal is final. . ." However, the documentation of the evaluation is so poor as to make an informed review virtually impossible, and the impact offset proposal is inconsistent with other project documents. There is an absence of critical design and project operation information necessary to demonstrate how the system will function in practice. Because of these deficiencies, the present "final" proposal does not provide any assurance that impacts to low streamflows will be adequately mitigated.

8. The low flow analysis is also incomplete because it does not address all of the current and proposed activities associated with the airport construction and operation that will affect stream hydrology. For example, the analysis is deficient in that it does not address several of the airport activities and projects that I previously identified in comments to Ecology as likely to cause additional reductions to minimum streamflows in Walker and Des Moines Creeks. These deficiencies include: 1) a failure to account for low-flow impacts likely to result from the post-1994 expansion of and improvements to the Industrial Wastewater System, including lagoon linings and other leak reduction efforts; and 2) a failure to address low-flow impacts of future airport business park development at the site of proposed borrow pits which will eliminate what are now forested areas of the upper Des Moines Creek Basin. This latter point is significant

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because Des Moines Creek appears to be a gaining stream in these forested areas which sustain, in part, low stream flows in the lower creek.

9. Hydrologic model (HSPF) calibration utilized in the low flow analysis is either inadequate or absent, undermining conclusions about the magnitude and timing of impact. For example, for Walker Creek, the calibration of simulated (HSPF) low flows to recorded low flows at the upper basin gage is very poor. HSPF simulation results for all calibration years (1991-1996) produce base flows which become progressively smaller from June through October, with the lowest flows of the year generally occurring in October. These simulation results formed the basis for the low flow analysis report finding that the summer low flow period for Walker Creek begins on August 1 and ends on October 31 and that mitigation be provided for this period only. However, this pattern and definition of low flow period is inconsistent with the actual streamflow record. The recorded data show that the lowest flows of the year actually occurred in June and/or July in half of the years with recorded data. The consequence of using a poorly calibrated model in this situation is that the low flow analysis fails to recognize the low flows which occur in June and July and fails to provide any mitigation for impacts to low flows in those months. The figure below illustrates how the simulated streamflow record fails to adequately represent the low flow conditions in June and July, with the consequence that low streamflow impacts during those months will not be mitigated under the Port's current proposal.

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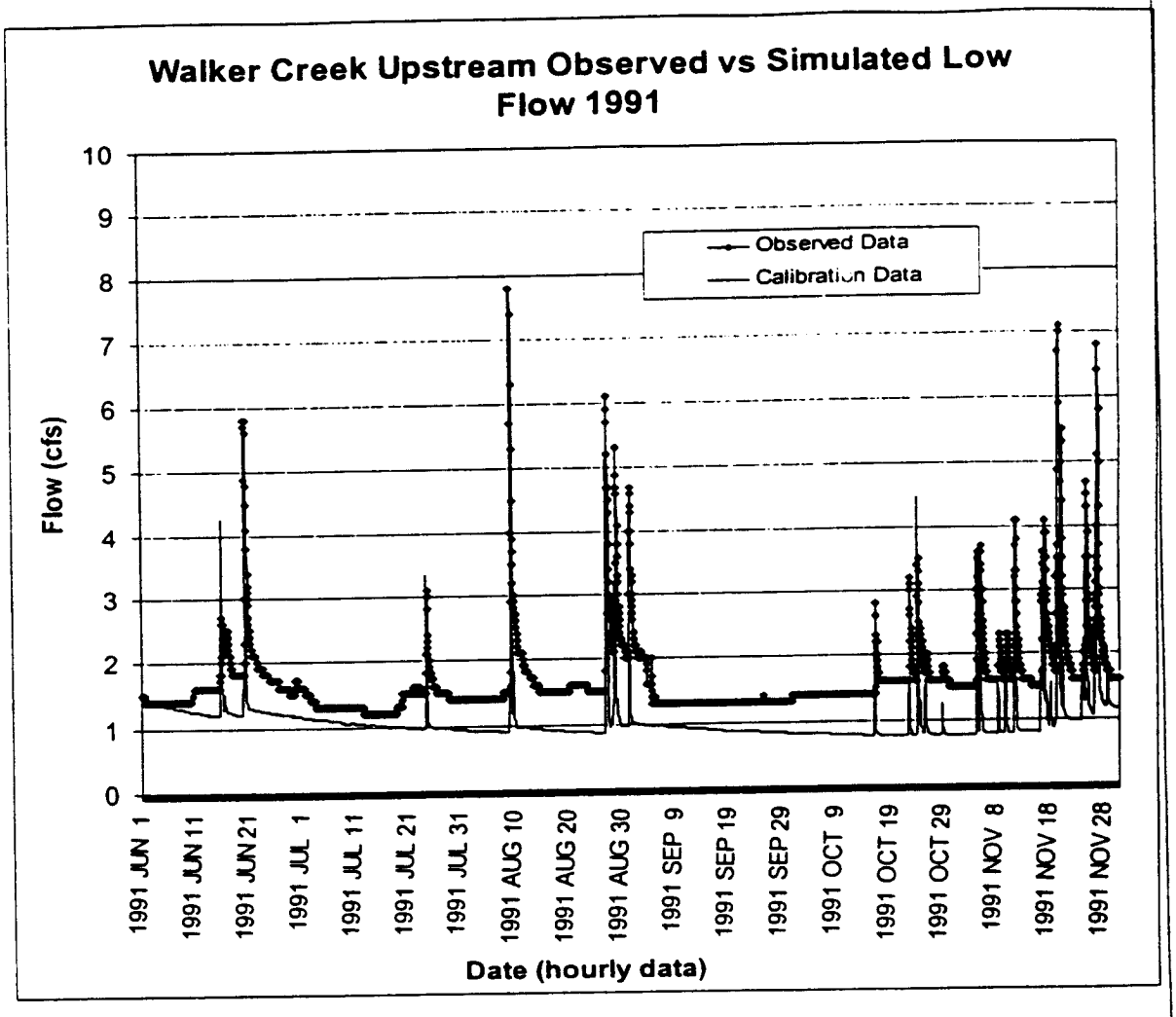

10. The comment above demonstrates that the poor model calibration in the Walker Creek basin has resulted in a mitigation plan which fails to provide any mitigation during part of the year when adverse impacts to low streamflows may be occurring. The comment below demonstrates that the model calibration in the Walker Creek basin may furthermore be so poor as to either significantly underestimate the magnitude of low streamflow impact or be incapable of quantifying the actual amount of low streamflow impact caused by airport activities.

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11. We have commented previously that Walker Creek appears to be vulnerable to low streamflow reductions as a result of impervious surface diversions to the Industrial Wastewater System. This comment was based on groundwater mapping shown by SMP Figure B2-23 which showed that the IWS service area covers nearly half of the non-contiguous groundwater recharge area for Walker Creek. We speculated that IWS expansion, and IWS leak reduction activities, could potentially cause progressive reductions in low streamflows. The low flow report's calibrated Walker Creek HSPF model data and the corresponding recorded data provides the basic information necessary to examine whether changes in streamflow are in fact occurring, unrelated to climatic variability.

12. The existing conditions Walker Creek hydrologic model serves to simulate streamflows for the land use conditions which existed in 1994. If the model were perfectly calibrated to the 1994 condition, then differences between the recorded and simulated data for other years could indicate changes in basin conditions. We examined the average summer low flow at the upper basin gage for each year of record, to see if the recorded (actual) flows were changing relative to the simulated flows. For this evaluation, days with observed and/or computed flows greater than 1.5 cfs (representing surface runoff) were excluded from the calculation of average summer low flows. Average value for simulated and recorded low flows were computed for each year, and plotted as a time series. The results are shown below.

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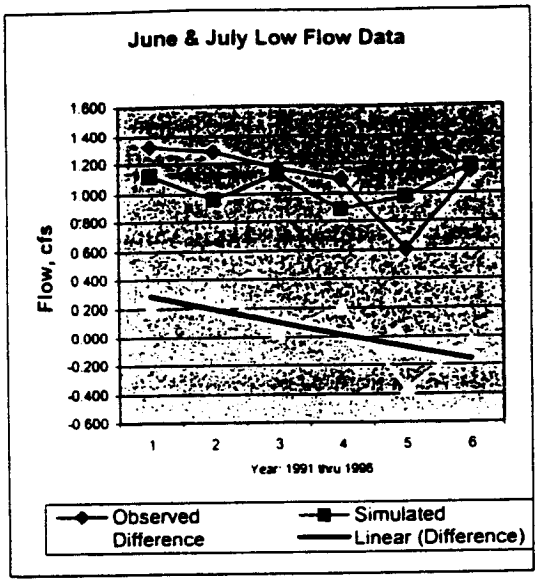

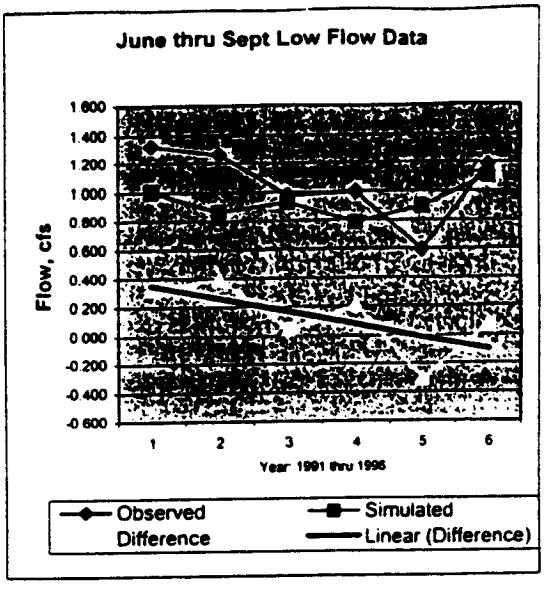

Walker Ck Streamflow Analysis Fig B

13. We have two alternative interpretations of these results. One interpretation is that there is a pronounced declining trend in the observed data relative to the simulated data for the same period. The analysis shows that summer streamflows are declining independent of climatic variability, and that there has been an average summer low flow reduction of about 0.5 cfs over the period 1991 to 1996. The alternative interpretation is that the Walker Creek HSPF model calibration to low flows, in conjunction with uncertainty as to the quality of observed streamflow data, is too poor to draw any conclusions about anything. Under the first interpretation, the proposed low streamflow mitigation of 0.09 cfs for Walker Creek is probably insufficient to compensate for actual airport impacts which may actually be greater than 0.5 cfs if the data are to be believed. Under the second interpretation, there is substantial uncertainty as to whether the

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HSPF model is useful for assessing low streamflow impacts or devising a mitigation plan for Walker Creek. Under either interpretation there is great uncertainty as the adequacy and efficacy of proposed low flow mitigation measures.

14. The low streamflow analysis fails to provide any low streamflow calibration data for Des Moines Creek, such as was provided for Miller and Walker Creeks. Without such data, it is not possible to provide an informed review of the low streamflow analysis or mitigation plan for Des Moines Creek. Based on calibration issues we have raised previously relative to the Des Moines Creek basin, it is probable that the proposed Des Moines Creek low flow mitigation plan has flaws as serious as those identified above for Walker Creek.

15. The low flow analysis also contains inconsistencies that are generally resolved in favor of the Port. For example, the Port's low streamflow analysis makes the claim that summer flows in Miller Creek will be improved due to attenuation effects in the fill material which will be imported for the third runway embankment. Because significant quantities of that same fill is being excavated (to depths of up to 100 feet) and exported from borrow pits in the upper Des Moines Creek basin, it follows that there will be some corresponding impairment of summer flows in Des Moines Creek. The inconsistency is that while the benefits to Miller Creek are claimed, the corresponding impacts to Des Moines Creek are ignored.

16. The low flow mitigation plan, termed the "Flow Impact Offset Facility Proposal" is also deficient because it is incomplete, inconsistent with other project documents, and lacks critical design and project operation information that is necessary to demonstrate how the system

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will function in practice. Several of the sections identified in the report table of contents, and which are vital to understanding the analysis and flow offset proposal, are not provided. The missing sections of particular interest to our review include the Introduction (all but an opening paragraph is missing) and the major section discussing Determination of Impacts to Streamflow. The document does not include any preliminary facility drawings to show the feasibility of providing the proposed storage at the proposed locations. There are no preliminary drawings to show how or where various water quality elements and features described in the text for circulation, venting, aeration, and turbidity control would be accomplished in practice. There are no preliminary drawings showing outfall locations and outlet flow paths to demonstrate that the summer-period reserve storage flow releases could reach the streams without significant transit losses by evaporation, transpiration, and seepage. These omissions create uncertainty as to the feasibility and eventual performance of the flow offset proposal. Because of these deficiencies, it is not possible to know whether or how well the Port's low flow augmentation plan will work, including whether the plan will effectively mitigate impacts to aquatic resources.

17. The mitigation plan is inconsistent with other project documents, most importantly, the Comprehensive Stormwater Management Plan (SMP), which presumably is the master document identifying stormwater storage facilities for the Third Runway Project and Master Plan Updates. Reserve storage vaults were included in some preliminary facility drawings provided with the SMP, but the SMP contains no comprehensive summary of what facilities were proposed to provide reserve storage. The mitigation plan appears to propose

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facilities that are different from those for which preliminary reserve storage designs have been provided in the December 2000 SMP and recent SMP addenda. As late as July 2, 2001, the Port (by Parametrix) provided Ecology with SMP updates showing reserve stormwater storage and reserve stormwater release vaults different from the reserve storage vaults which are identified in the low flow analysis. It is impossible to ascertain from this conflicting documentation what is actually being proposed.

18. Another inconsistency involves the collection of reserve storage water for Walker Creek. The Walker Creek flow offset proposal includes installation of an impervious liner for approximately six acres of drainage swale, in order to establish a dependable water supply for the reserve storage vault. We understand that the swales would be lined primarily to ensure that runoff from runway impervious surfaces is not lost to groundwater, and is available to provide reserve storage. (Note that the previous December 2000 Low Streamflow Analysis by Earth Tech concluded that nearly all of the runway runoff would infiltrate to groundwater.) It seems counterproductive for this project to assert on one hand that runway runoff will infiltrate to groundwater (minimizing low flow impacts) and then propose the forced capture of that same runoff (maximizing low flow impacts) to support a low flow offset plan.

19. The low flow mitigation plan does not address and assess design and operational elements that control the effectiveness of the mitigation, calling into question the feasibility of the design. For example, the magnitude of dry-period transit losses from the storage facilities to the streams should be examined and accounted for at all reserve storage facilities. In particular,

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if flow paths include open ditches, then seepage losses (to groundwater or to supply transpiration by bank vegetation) could be significant and would need to be accounted for. If flow paths are via dispersal or infiltration systems which are set back some distance from the stream or which provide wetland recharge, then transpiration losses could be significant and would need to be accounted for. An evaluation of transpiration losses should examine the flow path and estimate the acres of soils that are hydraulically connected to the flow path. This would be a function of topography as well as soil type. The magnitude of transit losses by plant transpiration, assuming grass, would be in the order of one inch per week. At this rate, transit losses of 0.1 cfs (representing approximately the total amount of reserve storage flow for each stream) would occur if the flow path were hydraulically connected to about 17 acres of vegetation. The Miller Creek Detention Facility may provide the opportunity for a hydraulic connection and transit losses of this magnitude.

20. Another example of questionable design involves how the augmentation proposal will accomplish controlled release of water to streams, an element of the system for which no information is provided. Short of a closely monitored system which is actively managed in perpetuity, this is a technically challenging assignment. Flows will need to be released at heads varying from about zero to 10 feet at the release point (based on some preliminary designs) through small orifices which will be prone to plugging. If all storage facilities are operated for simultaneous flow release in proportion to their storage volumes, then facility release rates as low as 0.01475 cfs (Des Moines Vault SDS4) and 0.0129 cfs (Miller Creek Cargo Vault) are

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indicated. Flow rates this small, assuming a 5 foot head, would require an orifice with a diameter smaller than 0.5 inches. King County normally requires that flow control orifices be no smaller than 1.0 inches to minimize the likelihood of blockage. The report provides no assurance that constant-release flow controls are feasible for this application.

21. Hence, the low flow mitigation plan is flawed for its dependence on incomplete and inaccurate technical analysis that is likely to underestimate the magnitude of low streamflow impacts to Des Moines, Miller and Walker Creeks. It is also flawed for its inconsistency with other project documents, and its failure to describe design and operational elements of the mitigation plan that will directly influence the effectiveness of the proposal in offsetting low flow impacts and protecting the instream resource values of these local streams.

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

DATED this 11 day of September, 2001, at Tukwila, Washington.

William A. Rozeboom

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