0299
COVER

Port of Seattle

December 17, 2004

Ken Koch
Water Quality Program
WA Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

Subject: Comments on Washington State's Water Quality Assessment [303(d)]

Dear Mr. Koch:

Washington State's most recent version of the 2002/2004 Water Quality Assessment 303(d) has identified segments of Miller and Des Moines Creeks as either waters of concern or impaired waters requiring a TMDL. The Port of Seattle has reviewed the information used to nominate these segments for listing, and provides the attached detailed comments to the Department of Ecology for use in determining the final Water Quality Assessment list.

The Port has a comprehensive knowledge of both the water quality and hydrology of Miller and Des Moines Creek, as they are directly adjacent to the Seattle-Tacoma International Airport (STIA). Our review of the candidate listings identified problems with the information used in the Assessment. We have also identified additional data and studies on each waterbody and Port efforts to prevent stormwater pollution that we believe would change the Assessment results. Copies of relevant additional data and studies are provided for your use. The following is a brief summary of our comments:

Data Problems

Our review of the primary data sources used to propose listing of two segments of Miller Creek, three segments of Des Moines Creek, and the East Tributary of Des Moines Creek found a significant pattern of inadequate or missing documentation of data collection protocols as required by Ecology and EPA guidance for preparing the 303(d) and 305(b) reports. This is particularly of concern regarding the collection of copper and zinc water samples. The failure to document clean techniques for collecting field samples suggests the strong possibility that field contamination could be the reason behind the reported concentrations. An additional issue related to essentially every proposed listing was the lack of representativeness. All but two the twenty-two proposed listings failed to satisfy the spatial representativeness criterion, as required in Ecology's Policy WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003). Lastly, several specific fecal coliform studies failed to meet the required number of exceedances to qualify for candidate listing, disqualifying them for use in making any listing determination.

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

Assessment Results

Our review led us to disagree with the assignment of thirteen combinations of segments and parameters for assignment to the Category 5 – the 303(d) list. The attached memo details our specific disagreements, but overall we found that inappropriate comparisons had been made to water quality criteria and the insufficient weight had been given to evidence for natural sources of pollutants–BOD and fecal coliforms. We are particularly concerned about the use of nationwide water quality criteria when the Port is currently conducting site-specific water quality criteria development (Water Effect Ratios) as required by our current NPDES permit. This ongoing study will establish the specific levels that should be used to determine whether or not segments of Miller and Des Moines Creeks are actually impaired by metal contamination. Any evaluation of these waters for impairment by metals should be made after these site-specific criteria are available.

Additional Data

Lastly, we provide descriptions of the extensive Pollution Prevention efforts undertaken by the Port to reduce and eliminate pollution sources for our stormwater discharges. These efforts have all taken place subsequent to these measurements, further calling into question their applicability in making any determinations that TMDLs could be warranted for either Miller or Des Moines Creeks at this time.

Thank you for this opportunity to provide you comments and to participate in the identification of waters of concern and impaired waters in Washington. Please don't hesitate to contact me if there is any further information or clarification we can provide you in this important endeavor.

Sincerely,

Bob Duffner
Water Resources Manager, Aviation Environmental Division

0299

Parametrix ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

411 108th AVENUE NE, SUITE 1800
BELLEVUE, WA 98004-5571
T. 425 . 458 . 6200 F. 425 . 458 . 6363
www.parametrix.com

M E M O R A N D U M

Date: **December 17, 2004**

To: **Bob Duffner, Port of Seattle**
Scott Tobiason, Port of Seattle

From: **Charlie Wisdom, Parametrix**

Subject: **Comments on Proposed 303(d) Listing of Miller and Des Moines Creeks**

cc: **Paul Fendt**
Linda Logan
File_____

Project Number: **556-2912-001 (01/61D)**

Project Name: **303D Support - WP#102357**

The most recent version of the Washington State's Water Quality Assessment [303(d)] List for 2002/2004 identifies

- Three segments of Miller Creek,
- Three segments of Des Moines Creek, and
- the East Tributary of Des Moines Creek

as either waters of concern or impaired waters requiring a TMDL. These water bodies have been proposed for 303(d) listing based on data reported for:

- Copper,
- Dissolved oxygen,
- Fecal coliforms,
- Temperature, and
- Zinc

As part of the listing process, the Department of Ecology (Ecology) has invited comments on problems with the data and any disagreements with the Assessment results as well as the submission of any data or information on the waterbody that would affect these proposed listings. Parametrix has prepared the following responses on the proposed listings for Miller and Des Moines Creeks at the request of the Port of Seattle. Parametrix reviewed the primary data reports identified on the Department of Ecology's website for these proposed listings:

- Port of Seattle (1997) – 42934, 42935, 42936, 42937
- Hallock (2001) – 10832, 10833, 12568
- Hallock (2004) – 42673, 42542,

- Herrera (2001) – 42312, 42349, 42313, 42314, 42310, 42311, 42306, 42307, 42308, 42309, 42350, 42351, 42352
- Dept. of Ecology EIM database – 9784

This last listing ID# 9784 – fecal coliforms in Miller Creek appears to apply to another "Miler Creek" in a different watershed in WRIA 5 (Township 32N, Range 04E, Section 32). Because this appears to be an erroneous listing, it will not be discussed further in our comments. Consequently, we will address the two segments with proposed listings of the WRIA 9 Miller Creek in this review.

The information provided in these reports was reviewed by Parametrix using the Assessment guidelines identified in Ecology's WQP Policy 1-11 "*Assessment of Water Quality for the Section 303(d) List*" (Ecology 2004). The criterion and requirements identified in this policy for considering data for use in supporting a proposed listing were used to develop the series of questions in Table 1. These questions were used to develop the comments presented herein.

Table 1. Comment Areas Solicited by the Department of Ecology and Related Review Questions used to review the Proposed Candidate Listings.

DATA PROBLEMS
(1) Are all data collection protocols adequately documented?
(2) Are all data of the appropriate age?
(3) Were the data analysis methods appropriate?
(4) Do the samples meet the representativeness criteria?
(5) Are there an adequate number of criteria exceedances to support the Assessment?
DISAGREEMENTS WITH ASSESSMENT RESULTS
(1) Have all the necessary requirements been met to support the assignment of the water body to Category 5 – The 303(d) List?
(2) Are the data comparable with appropriate water quality criteria to support the assignment, e.g., were actual dissolved metal fractions characterized during acute and chronic exposure durations?
(3) Are there potential natural sources of the particular constituent (e.g., fecal coliforms from non-human sources) or natural impacts to a water quality parameter (e.g. dissolved oxygen) that could account for the observed exceedances?
ADDITIONAL DATA
(1) Are there relevant data in other data sources not taken into account in Ecology's current assessment?
(2) Has the Port undertaken any pollution control efforts subsequent to when these measurements were made?

For each 303(d) listing, responses to the questions presented in Table 1 were developed based on a review of the data sources used as a basis for the listing. This review was then used to

assess which category these waterbodies should be assigned to for the 2002/2004 Water Quality Assessment. The relevant categories and rating criteria are outlined in Table 2.

Table 2. Assessment Categories and Rating Criteria as presented in Ecology's Water Quality Policy WQP 1-11 used to develop Alternative Assessment Results.

Assessment Category	WQP Policy 1-11 Rating Criteria
Category 2. Waters of Concern	The data show some exceedances of an applicable water quality standard, but not enough exceedances as required for listing as impaired
	The data suggest impairment, but there is substantial contradictory data
	The data suggest impairment, but there are problems regarding quality assurance, sampling, laboratory procedure, or similar issues.
Category 4. Impaired but does not require a TMDL	4b. Has a Pollution Control Plan
Category 5. The 303(d) List	Toxics: Two or more samples within a three-year period exceed the numeric state water quality criteria

The results of this review are presented in Tables 3 and 4. Table 3 lists the listing identification number, the potentially affected waterbody, Ecology's proposed listing parameter, Ecology's proposed Assessment category, and the waterbody segment proposed for listing. The WQP 1-11 establishes that for small streams, such as Miller and Des Moines Creeks, the listed segment is the entire stream reach included in the Township/Section/Range where the samples were collected. Table 3 identifies which questions are relevant to each specific proposed listing, and directs the reader to Table 4 for the response. This approach was selected to reduce the redundancy in providing responses (i.e., the issues and concerns observed for different studies often applied equally to all data reported in that study). Additionally, some questions are relevant only to specific listing parameters (e.g., toxics, fecal coliforms).

This same information is repeated in an alternate organization in Attachment A to this memo. Here we have organized this same information by the data report used as the basis for the proposed listing and lists the specific issues or concerns identified with each specific parameter/water body proposed listing. This alternative presentation approach may prove to be valuable to a reader focusing on a single or subset of reaches evaluated here.

PORT POLLUTION PREVENTION EFFORTS

In addition to the concerns raised here concerning the data used to prepare the candidate list, much of the data for the proposed listings predate important BMPs implemented by the Port at the Seattle-Tacoma International Airport (STIA). Similarly, the Port implements an ongoing stormwater management program. Therefore, these stormwater pollution prevention efforts should be taken into account before any further listing actions are taken it's the Port's

stormwater management program for STIA includes three key programs described briefly below and in the Port's NPDES Permit Fact Sheet on pages 48-53. This Fact Sheet also provides a brief summary of STIA stormwater quality characterization and receiving water studies.

Stormwater Monitoring Program

The Port's stormwater monitoring program covers NPDES stormwater permit required monitoring and other supplemental water quality studies and sampling activities that provide feedback on the overall performance of the Port's stormwater management program.

From the time such monitoring began in 1994, the requirements of the permit have been modified as the Port and Ecology have learned more about the quality of STIA stormwater. For example, constituents have been eliminated either because they were infrequently detected or because the activity generating them has been discontinued. In 1998, the permit was modified to include whole effluent toxicity (WET) testing for characterization at four of the Port's principal outfalls. These outfalls represent both airfield and landside subbasins and constitute about two thirds of the total STIA storm drainage area.

Samples are collected following an Ecology approved "Procedures Manual" (POS 1999) which describes the target storms, sampling protocols, quality assurance and representativeness criteria that are to be followed. The samples are analyzed for a suite of permit-required parameters at an Ecology accredited laboratory. Data for samples that meet the representativeness criteria of the manual are reported to Ecology in monthly DMRs. The Port also submits annual stormwater monitoring reports to Ecology that also include the results for samples not meeting these criteria and for samples that were collected for other purposes (e.g., POS 2001b, 2002, 2003). Stormwater sampling data are regularly reviewed as part of the Port's SWPPP and adaptive management program. Several examples of adaptive managemnt are described below.

Storm Water Pollution Prevention Plan (SWPPP)

The Port's SWPPP describes the overall facility, its operations, activities and corresponding BMPs. The Port has been implementing its SWPPP at the airport since 1994 (POS 1995, 1998, 2001a). Drainage from more than 300 acres of aircraft servicing and other areas flows via the Industrial Waste System (IWS) to the Industrial Waste Treatment Plant (IWTP). The IWS is a key stormwater best management practice (BMP) that prevents contaminated runoff from entering the storm drainage system to the surrounding creeks. Examples of other stormwater BMPs include restricting aircraft servicing to the IWS areas, pump stations to divert snowmelt to the IWS, implementing soil erosion and sediment control BMPs in contractor staging areas, as well the use of treatment BMPs such as wet vaults, filtration systems, grass swales and filter strips, oil-water separators, catch basins and catch basin inserts. The SWPPP provides a listing and description of these BMPs serving the storm drainage system (SDS). Over the years, the SWPPP has included many operational and capital improvements as part of the Port's adaptive management strategy to prevent the discharge of contaminated stormwater runoff to the receiving waters.

Adaptive Management Program

As part of the SWPPP, during the 1995-1997 period, the Port of Seattle completed a number of capital improvement projects that diverted drainage from more than 70 acres of the SDS to the IWS. All aircraft service areas have been completely eliminated from drainage basins SDN2, SDS1 and SDE4. In addition, the Port's maintenance shop yard drainage was re-routed to the

IWS, while the vehicle wash at the Taxi Yard was covered and has had associated drainage rerouted to sanitary. .Thus, many of these BMPs were implemented during or after data was collected in studies used as the basis for several proposed 303(d) listings. Therefore, several of the proposed 303(d) listings do not represent the current quality of STIA stormwater. Many other BMPs have been implemented in the past few years.

An outcome of this rigorous monitoring program has been the Port's proactive tracing of potential pollutant sources and investigation of source or treatment BMPs to reduce pollutant levels in airport runoff. For example, source tracing and toxicity identification evaluation testing of runoff from one small subbasin indicated that the source of toxicity observed in WET tests was most likely due to zinc leaching from galvanized metal rooftops (POS 2000, Tobiason and Logan 2000, 2001). As a result, the Port painted the rooftops to reduce the source of zinc loadings to the storm drain system. Furthermore, in 2003, the Port installed StormFilter media filtration devices at the downspouts of a cargo building another drainage basins. Data collected to date show that these units are removing and average of 80 % of the dissolved zinc in the roof runoff (Tobiason 2004). A StormFilter unit was also recently installed under Air Cargo Road south of the terminal service tunnel to treat runoff from a relocated section of the road. Two bioswales were also installed in the vicinity of the unit to serve another portion of the relocated road.

Because of sporadic elevated levels of fecal coliform bacteria observed in some outfall samples, the Port initiated a microbial source tracing study using state-of-the-art forensic techniques (Herrera 2001, Tobiason et al. 2002). The study found that animals, primarily birds, accounted for more than 90 percent of the fecal coliforms in STIA runoff. For aircraft safety, the Port implements a wildlife management program, which results in the control of several bird species at the airport.

Comprehensive Stormwater Management Plan (CSMP)

The CSMP (Parametrix, 2000) describes flow control and water quality BMPs for future development and retrofits associated with the Port's Master Plan Update (MPU), which includes the Third Runway. In response to this planning effort, the Port has initiated a Comprehensive Stormwater Management Program (CSWPrgm) specifically targeted to implement the flow control and water quality retrofit needs identified in the plan. Key elements to the water quality portion of the CSMPrgm include in-basin characterization focused on aiding the selection and design of BMPs, completion of early action BMPs where known opportunities exist, and the design and construction of BMPs in compliance with related §401 Water Quality Certification. These CSMPrgm efforts are being conducted parallel to other non-§401 related pollution prevention efforts and are being integrated into the Airport's SWPPP as they occur. A brief summary of efforts completed to date is provided below.

In November 2003, the Port implemented a stormwater quality source characterization program at the airport to aid in design of BMPs needed to meet the retrofit requirements of the §401 and NPDES permits. The primary focus of the program has been a water quality characterization of land uses and activities within the STIA boundary, subsequent source tracing if necessary, and identification of source control opportunities. Over 400 stormwater samples have been collected during the past year from more than 30 locations that have included runways, taxiways, terminal driveways, parking lots, parking garages, and rooftops. Monitoring has also included non-airport activities of surrounding jurisdictions such as adjacent highways and other urban sources that combine with airport stormwater prior to discharge to the receiving waters.

Related studies have assessed the leaching and mobilization of zinc from various galvanized metal objects such as guardrails, metal towers, fences, light poles and rooftops (TAI 2004, Tobiason (2004). To date, these studies have guided the Port with implementing several early action source control BMPs in 2003/2004. BMPs completed include painting of the metal structures to reduce the loading of metals to the storm drain system such as highway guardrails, galvanized metal rooftops, and a variety of metal structures on the terminal building roof. In addition, one year of sampling has demonstrated that a media filtration device removes an average of 80% of the dissolved zinc in runoff from a 1-acre metal rooftop. Other completed early action BMPs have focused on roadway runoff and include installation of enhanced treatment "ecology embankments" and other treatment bioswales..

Site Specific Water Quality Standards (SSWQS) project

As required by the §401 and NPDES permits, the Port is implementing a Site Specific Water Quality Standards (SSWQS) project which will develop appropriate standards for copper and zinc for Miller, Walker and Des Moines Creeks. This project is using the EPA-approved water effects ratio (WER) process. The data collection phase is underway and expected to be completed in 2005. Because this is an Ecology mandated study, any listing actions for copper and zinc in receiving waters proximal to STIA must take the studies findings into account.

PROPOSED ALTERNATIVE ASSESSMENT AND CATEGORY ASSIGNMENTS

This review has revealed a number of data quality issues that affect their utility and interpretation, as well as the proposed listing categories for the 2002/2004 303(d) list. This information was then used to evaluate the criteria presented in Ecology's WQP 1-11 to determine to which category that these parameters/waterbody segments should be assigned (Table 5).

The result of this evaluation is our determination that all segments proposed for inclusion in Category 5 by Ecology in the Assessment of Water Quality for the Section 303(d) List should be instead assigned to **Category 2. Waters of Concern**.

We base this conclusion on the numerous data quality issues or incorrect application of listing criteria cited in Ecology's WQP 1-11 and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).

Table 3. Review comments on data quality issues, assessment results and additional information concerning specific proposed 303(d) listings for Miller and Des Moines Creeks. The presence of a number in any cell under the different comment categories indicates that a problem of that nature exists for that specific listing. The number included in each cell refers to specific comments presented in Table 4.

Listing ID	Waterbody	Parameter	Ecology Proposed Category[a]	Segment[b]	Problems were discovered with reported information					Disagreements were formed with Assessment Results			Additional data or information on the waterbody would change the Assessment results	
					Documentation of Data Collection	Data Age	Data Analysis	Sample Representative-ness	Exceedance of appropriate criteria	Determination of Category 5 Status	Comparison of Data to Appropriate Water Quality Criteria	Natural Sources of listed constituent	Other data source not yet considered by Ecology	Port Pollution Control Efforts
42934	Des Moines Creek	Copper	2	T22N R04E S04	15[c]		5	10, 17	4, 27		3			24, 25
42935	Des Moines Creek	Zinc	2	T22N R04E S04	15		5	10, 17	4, 27		3		26	20, 24, 25
10832	Des Moines Creek	Temperature	2	T22N R04E S08				7						
10833	Des Moines Creek	Dissolved Oxygen	2	T22N R04E S08	12			7				28	28	21, 22
42312	Des Moines Creek	Copper	2	T22N R04E S08	16			7						24, 25
42673	Des Moines Creek	Fecal Coliform	2	T22N R04E S08				7				19	19	23, 25
42936	Miller Creek	Copper	2	T23N R04E S20	15		5	10, 17	4, 27		3			24, 25
42937	Miller Creek	Zinc	2	T23N R04E S20	15		5	10, 17	4, 27		3		26	20, 24, 25
42349	Des Moines Creek, East Tributary	Dissolved Oxygen	2	(T23N R04E S33)	12							28	28	21, 22
42313	Des Moines Creek	Dissolved Oxygen	5	T22N R04E S04	12			11		6		28	28	21, 22
42314	Des Moines Creek	Fecal Coliform	5	T22N R04E S04				11				19	19	23, 25
12568	Des Moines Creek	Fecal Coliform	5	T22N R04E S08		2		7	1			19	19	23, 25
42310	Des Moines Creek	Dissolved Oxygen	5	T22N R04E S08	12			7				28	28	21, 22
42311	Des Moines Creek	Fecal Coliform	5	T22N R04E S08				7				19	19	23, 25
42306	Des Moines Creek	Dissolved Oxygen	5	T22N R04E S09	12			8				28	28	21, 22
42307	Des Moines Creek	Fecal Coliform	5	T22N R04E S09				8				19	19	23, 25
42308	Des Moines Creek	Zinc	5	T22N R04E S09	16			8	27, 29					20, 24, 25
42309	Des Moines Creek	Copper	5	T22N R04E S09	16			8	27, 29					24, 25

Listing ID	Waterbody	Parameter	Ecology Proposed Category[a]	Segment[b]	Problems were discovered with reported information					Disagreements were formed with Assessment Results			Additional data or information on the waterbody would change the Assessment results	
					Documentation of Data Collection	Data Age	Data Analysis	Sample Representative-ness	Exceedance of appropriate criteria	Determination of Category 5 Status	Comparison of Data to Appropriate Water Quality Criteria	Natural Sources of listed constituent	Other data source not yet considered by Ecology	Port Pollution Control Efforts
42542	Miller Creek	Fecal Coliform	5	T23N R04E S30				9				18	18	23, 25
42350	Des Moines Creek, East Tributary	Dissolved Oxygen	5	(T23N R04E S33)	12			13		6		28	28	21, 22
42351	Des Moines Creek, East Tributary	Fecal Coliform	5	(T23N R04E S33)								19	19	23, 25
42352	Des Moines Creek, East Tributary	Copper	5	(T23N R04E S33)	16			14	27, 29					24, 25

[a]Category 2 – Waters of Concern, Category 5 – The 303(d) List
[b]The Township/Section/Range included in parentheses were determined by Parametrix staff, and not identified on the Ecology website.
[c]A number included in a cell indicates that this question is relevant to this parameter/waterbody listing. The number itself refers to specific comments included in Table 4. This approach was used to reduce the repetition of answers to questions applied to the different proposed listings.

Table 4. Specific comments addressing data quality issues, sample representativeness, Ecology category assignments, additional data, and Port pollution control efforts. The numbers in this table correspond to the numbers assigned to specific listings identified in Table 3.

Comment Number	Constituent	Data source for Ecology Listing	Comment
1	Fecal Coliforms	Hallock 2001	• **Conclusion: Insufficient Exceedances** • 12 monthly samples available from 10/20/1993 – 9/21/1994, ranging from 12 – 480 colonies/100 ml. Shows a geometric mean of 30 does not exceed the criterion and that 0% of the samples does not exceed the percentile criterion from 3 samples collected during 1993. • Samples collected at Des Moines Creek near Mouth show a geometric mean of 67, which exceeds the criterion and that 33% of the samples exceed the percentile criterion from 9 samples collected during 1994.
2	Fecal Coliforms	Hallock 2001	• **Conclusion: Data is aged** • Data nearing the age limitation of ten years.
3	Metals	Port of Seattle 1997	• **Conclusion: Inappropriate comparison of data to criteria** • The report's methods used an inappropriate sampling duration basis for comparison to acute WQC. • Copper and zinc were measured in flow-weighted composite samples collected over each event's hydrograph data, which is inconsistent with the 1-hr averaging period associated with acute WQC.
4	Metals	Port of Seattle 1997	• **Conclusion: Inappropriate comparison of data to criteria** • The report does not provide direct comparisons of each sample result with the applicable criteria. • Dissolved copper and zinc concentrations in Miller Creek are cited in the report only as summarized ranges and with inappropriate comparisons to WQC in Tables 19 and 20 that are based on the acute WQC calculated at the 10^{th} percentile hardness concentrations. The use of the 10^{th} percentile hardness is highly conservative and is inappropriate for this purpose

Comment Number	Constituent	Data source for Ecology Listing	Comment
5	Metals	Port of Seattle 1997	• **Conclusion: Inappropriate comparison of data to criteria** • Inappropriate data analysis methods used in the report. • Dissolved copper and zinc concentrations in samples should be directly compared with WQC calculated at the hardness of the particular sample. When this is done for the data in this report on a sample-by-sample basis, dissolved zinc concentrations never exceeded acute WQC. The limited number of apparent exceedances of acute copper WQC are subject to the comment #3 above.
6	DO	Herrera 2001	• **Conclusion: Insufficient exceedances** • The number of exceedances reported (2 samples - 1995, 1 sample - 1996) do not meet the WQP 1-11 (p.25) requirements for listing as category 5: "When data are available from fewer than seven days in any 30-day period…A waterbody segment will be placed on the 303(d) list for temperature or dissolved oxygen when these data show a violation of the water quality standard on at least one day in at least three different years."
7	Temp, DO, Cu, Fecal Coliforms	Hallock 2001 Herrera 2001 Hallock 2004	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time), however, only a single sampling location was employed in the specified reach (T22N R04E S08, approx 1 1/3 mi). • The listing documentation does not include sufficient justification that this single location provides sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).

Comment Number	Constituent	Data source for Ecology Listing	Comment
8	DO, Fecal Coliforms, Cu, Zn	Herrera 2001	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time), however, only a single sampling location was employed in the specified reach (T22N R04E S09, approx 1/3 to 1/2 mi). • The listing documentation does not include sufficient justification that this single location provides sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).
9	Fecal Coliforms	Hallock 2004	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time), however, only a single sampling location was employed in the specified reach (T23N R04E S30, approx 1 mi). • The listing documentation does not include sufficient justification that this single location provides sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).
10	Cu, Zn	Port of Seattle 1997	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time), however, only a single sampling location was employed in the specified reach. • The listing documentation does not include sufficient justification that this single location provides sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).

Comment Number	Constituent	Data source for Ecology Listing	Comment
11	DO, Fecal Coliforms	Herrera 2001	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time); however, only two sampling locations were employed in the specified reach (T22N R04E S04, approx 1 1/3 mi). • The listing documentation does not include sufficient justification that these two locations provide sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).
12	DO	Hallock 2001 Herrera 2001	• **Conclusion: Improper sampling techniques** • The listing documentation does not indicate proper sampling techniques were followed according to WQP 1-11. • DO was measured in the field; documentation does not include instrument calibration and accuracy/precision information, as required in WQP 1-11 (p.20).
13	DO	Herrera 2001	• **Conclusion: Inadequate representativeness** • The available data may not accurately represent the waterbody segment as a whole (spatially and over time) as required in WQP 1-11 (p.19). • Sampling location where exceedences occurred (DM-6) may not be representative of the entire reach listed (T23N R04E S33, approx. 2/3 mi). Data collected from an additional sampling location (DM-4) within the listed reach in 1995 and 1996 all met criteria, except for one sample collected in 1996.
14	Cu	Herrera 2001	• **Conclusion: Inadequate representativeness** • The available data may not accurately represent the waterbody segment as a whole (spatially and over time) as required in WQP 1-11 (p.19). • Sampling location where exceedences occurred (DM-6) may not be representative of the entire reach listed (T23N R04E S33, approx. 2/3 mi). Data collected from an additional sampling location (DM-4, 12/7/95 and 3/27/96 events) within the listed reach were all less than criteria.

Comment Number	Constituent	Data source for Ecology Listing	Comment
15	Metals	Port of Seattle 1997	• **Conclusion: Inadequate documentation of sampling procedures** • The sampling procedures were not adequately identified (e.g., EPA Method 1669), as specified in the Ecology Water Quality Program (WQP) Policy 1-11 document (p.20). • No evidence of QC methods and QC data to support low bias needed for metals WQC assessments.
16	Metals	Herrera 2001	• **Conclusion: Inadequate documentation of sampling procedures** • The listing documentation does not indicate proper sampling techniques were followed according to WQP 1-11. • Specifically, the sampling procedures were not identified as "clean techniques" (e.g., EPA Method 1669), as specified in the Ecology Water Quality Program (WQP) Policy 1-11 document (p.20).
17	Metals	Port of Seattle 1997	• **Conclusion: Inadequate representativeness** • The available data may not accurately represent the waterbody segment as a whole (spatially and over time) as required in WQP 1-11 (p.19). • The report does not adequately segregate data representing receiving waters from discharge samples. Some sampling locations included in data summary tables in the report do not represent receiving waters.
18	Fecal Coliforms	Hallock 2004,	• **Conclusion: Natural sources for listing parameter** • The standards require that a waterbody segment will not be placed on the 303(d) list when characteristics are due to natural conditions. Ecology has not sufficiently determined that the exceedances of fecal coliforms are due to human or natural conditions. • A Microbial Source Tracking (MST) study conducted by the Port of Seattle (Port of Seattle 2001) suggests prevalence of natural sources found in Des Moines Creek would also be present in Miller Creek.

Comment Number	Constituent	Data source for Ecology Listing	Comment
19	Fecal Coliforms	Hallock 2001 Hallock 2004 Herrera 2001	• **<u>Conclusion</u>: Natural sources for listing parameter** • The standards require that a waterbody segment will not be placed on the 303(d) list when characteristics are due to natural conditions. Ecology has not sufficiently determined that the exceedances of fecal coliforms are due to human or natural conditions. • Data from the Port's MST study (Port of Seattle 2001) and Des Moines Creek Basin Plan (Des Moines Creek Basin Committee 1997) for several sampling locations in Des Moines Cr. indicated the presence of natural sources of fecals (e.g., 92% of fecal coliform genetic isolates were from natural sources (animals) at some locations), and that human sources, while present in some samples, were limited and sporadic.
20	Zn	Port of Seattle 1997	• **<u>Conclusion</u>: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11) • The Port of Seattle has conducted numerous stormwater pollution control studies at STIA and is currently conducting both a Facilities Assessment and Source Control study to identify sources of zinc on their property. These studies have determined that galvanized rooftops and galvanized guardrails are sources of zinc in stormwater. The Port has undertaken a program in 2004 to paint and seal galvanized surfaces to reduce or eliminate the contribution of these sources to stormwater.
21	DO	Hallock 2001	• **<u>Conclusion</u>: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11) • The Port of Seattle has removed all storm drainage areas associated with aircraft servicing such as deicing/anti-icing activity. Drainage from these areas is prevented from reaching Miller and Des Moines creeks because it is routed to a separate industrial waste drainage system (IWS) and Industrial waste treatment plant (IWTP).

Comment Number	Constituent	Data source for Ecology Listing	Comment
22	DO	Hallock 2001 Herrera 2001 Hallock 2004	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11) • The Port of Seattle institutes numerous source controls for ground (e.g. runway/taxiway) deicing/anti-icing chemical applications. These source controls include substitutions of chemicals with less potential impacts, application controls, ice prevention through preventive chemical applications that use less volume than if ice were allowed to form, snowmelt drainage separation (to the IWS).
23	Fecal Coliforms	Hallock 2001 Hallock 2004 Herrera 2001	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port has implemented a number of stormwater BMPs for FC bacteria. Aircraft bird strike programs actively manage bird populations at the airport, including trapping starlings and pigeons. Known pigeon roosting areas were removed during concourse a demolition in 2001 and new facility designs are intended to minimize bird attraction. Aircraft lavatory waste transport vehicles and disposal procedures were modified to reduce and eliminate potential for spillage of aircraft lavatory waste during transfer and transport to the sanitary sewer system (Port of Seattle 2001)
24	Cu, Zn	Herrera 2001 Port of Seattle 1997	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11) • The Port of Seattle has conducted numerous stormwater pollution control studies at STIA and is currently conducting both a Facilities Assessment and Source Control study to identify sources of zinc on their property. These studies have determined that galvanized rooftops and galvanized guardrails are sources of zinc in stormwater. The Port has undertaken a program in 2004 to paint and seal galvanized surfaces to reduce or eliminate the contribution of these sources to stormwater. • A separate copper source assessment study has been completed and is being used to develop best construction practices aimed at reducing exposure of copper bearing electrical components to stormwater runoff.

Comment Number	Constituent	Data source for Ecology Listing	Comment
25	Cu, Zn, Fecal Coliforms	Hallock 2001 Herrera 2001 Port of Seattle 1997	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port has addressed copper, zinc, and fecal coliform sources by routing runoff from aircraft service areas to the IWS treatment system.
26	Zn	Port of Seattle 1997	• **Conclusion: Additional available data contradicts listing studies** • A 303(d) listing is not required, as available data meets water quality standards. • Data appropriate for acute and chronic WQC evaluations for Cu and Zn in Miller Creek were generated by a study funded by the POS and ILZRO. Data for a Miller Creek sampling station between SR518 and the LRSF did not indicate any exceedances of acute or chronic WQC for Cu or Zn. This project provided adequate sampling methods, QC and representativeness for evaluating acute and chronic WQC for Cu and Zn.
27	Cu, Zn	Port of Seattle 1997 Herrera 2001	• **Conclusion: Inappropriate use of criteria** • Site specific WQC are being determined by an Ecology-required study being conducted in Miller, Walker and Des Moines Creeks. Because this study is representing instream conditions that are affected by a variety of jurisdictions, 303(d) listings should give deference to the study's outcomes expected in 2005.
28	DO	Hallock 2001 Herrera 2001	• **Conclusion: Natural sources for listing parameter** • The standards require that a waterbody segment will not be placed on the 303(d) list when characteristics are due to natural conditions. • POS study indicated natural conditions caused depressed DO in NW ponds, which was also apparent in depressed DO observed in Des Moines Creek downstream of NW ponds (Port of Seattle 2000).
29	Cu, Zn	Herrera 2001	• Exceedances occurred only in storm flow-weighted composite samples, prepared from grab samples collected at approx. 1-hr intervals over a 3-hr duration. This procedure does not provide for a sampling duration that is comparable to the 96-hr duration for the chronic WQC. The procedure is also not comparable with acute (1-hr average) WQC.

Table 5. Alternative assessment results from reviewing 303(d) submittal data for Miller and Des Moines Creeks. The presence of a number in any cell under the different assessment categories indicates that the reviewed data supports assignment to this category. The number included in each cell refers to specific comments presented in Table 4.

Listing ID	Waterbody	Parameter	Ecology Proposed Category	Segment	Category 2. Waters of Concern			Category 4. Impaired but does not require a TMDL	Alternative Proposed Category
					The data show some exceedances of an applicable water quality standard, but not enough exceedances as required for listing as impaired	The data suggest impairment, but there is substantial contradictory data	The data suggest impairment, but there are problems regarding quality assurance, sampling, laboratory procedure, or similar issues	4b. Has a Pollution Control Plan	
42934	Des Moines Creek	Copper	2	T22N R04E S04			3, 4, 5, 10, 15, 17, 27	24, 25	2
42935	Des Moines Creek	Zinc	2	T22N R04E S04		26	3, 4, 5, 10, 15, 17, 27	20, 24, 25	2
10832	Des Moines Creek	Temperature	2	T22N R04E S08			7		2
10833	Des Moines Creek	Dissolved Oxygen	2	T22N R04E S08		28	7, 12	21, 22	2
42312	Des Moines Creek	Copper	2	T22N R04E S08			7,16	24, 25	2
42673	Des Moines Creek	Fecal Coliform	2	T22N R04E S08		19	7	23, 25	2
42936	Miller Creek	Copper	2	T23N R04E S20			3, 4, 5, 10, 15, 17, 27	24, 25	2
42937	Miller Creek	Zinc	2	T23N R04E S20		26	3, 4, 5, 10, 15, 17, 27	20, 24, 25	2
42349	Des Moines Creek, East Tributary	Dissolved Oxygen	2	(T23N R04E S33)		28	12	21, 22	2
42313	Des Moines Creek	Dissolved Oxygen	5	T22N R04E S04	6	28	11, 12	21, 22	2
42314	Des Moines Creek	Fecal Coliform	5	T22N R04E S04		19	11	23, 25	2
12568	Des Moines Creek	Fecal Coliform	5	T22N R04E S08		19	1, 2, 7	23, 25	2
42310	Des Moines Creek	Dissolved Oxygen	5	T22N R04E S08		28	7, 12	21, 22	2
42311	Des Moines Creek	Fecal Coliform	5	T22N R04E S08		19	7	23, 25	2
42306	Des Moines Creek	Dissolved Oxygen	5	T22N R04E S09		28	8, 12	21, 22	2
42307	Des Moines Creek	Fecal Coliform	5	T22N R04E S09		19	8	23, 25	2
42308	Des Moines Creek	Zinc	5	T22N R04E S09			8, 16, 27, 29	20, 24, 25	2
42309	Des Moines Creek	Copper	5	T22N R04E S09			8, 16, 27, 29	24, 25	2
42542	Miller Creek	Fecal Coliform	5	T23N R04E S30		18	9	23, 25	2
42350	Des Moines Creek, East Tributary	Dissolved Oxygen	5	(T23N R04E S33)	6	13	12	21, 22	2
42351	Des Moines Creek, East Tributary	Fecal Coliform	5	(T23N R04E S33)		19		23, 25	2
42352	Des Moines Creek, East Tributary	Copper	5	(T23N R04E S33)		14	16, 27, 29	24, 25	2

LITERATURE CITED

Brix, K.V. 2004. Synopsis: Fate, Transport And Effects Of Zinc In Stormwater Runoff From The Seattle Tacoma International Airport. Prepared for Andrew Green, Ph.D., ILZRO, Research Triangle Park, North Carolina, Prepared by Kevin V. Brix, EcoTox, Key Biscayne, Florida, October 2004.

CSMP. 2000. Comprehensive Stormwater Management Plan. Master Plan Update Improvements Seattle-Tacoma International Airport. Prepared for the Port of Seattle. Prepared by Parametrix, Inc. December 2000.

Des Moines Creek Basin Committee, 1997, Des Moines Creek Basin Plan: Seattle, King County Department of Public Works, Surface Water Management Division, 6 chapters.

Ecology. 2004. Water Quality Monitoring Station 09C070 - Des Moines Creek nr Mouth. Washington State Department of Ecology River and Stream Water Quality Monitoring Database (WRIA 09). http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?theyear=&tab=notes&scrolly=0&sta=09C070 (accessed November 29, 2004).

Ecology. 2004. Water Quality Monitoring Station 09D070 - Miller Creek nr Mouth. Washington State Department of Ecology River and Stream Water Quality Monitoring Database (WRIA 09). http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?theyear=&tab=notes&scrolly=0&sta=09D070 (accessed November 29, 2004).

Hallock, D. 2001. River and Stream Ambient Monitoring Report for Water Year 2000. Washington State Department of Ecology, Environmental Assessment Program, Olympia, Washington.

Hallock, D. 2004 (In preparation). River and Stream Ambient Monitoring Report for Water Year 2004. Washington State Department of Ecology, Environmental Assessment Program, Olympia, Washington.

Herrera 2001. Microbial Source Tracking Study Report, Seattle-Tacoma International Airport Stormwater Monitoring Program. Herrera Environmental Consultants, September 2001.

Herrera. 2001. Five-Year Project Report, City of Des Moines Water Quality Monitoring Program. Unpublished report by Herrera Environmental Consultants to City of Des Moines Surface Water Management Utility, Des Moines, Washington.

Port of Seattle 1995. Storm Water Pollution Prevention Plan. Seattle-Tacoma International Airport. Port of Seattle. November 1995.

Port of Seattle. 1997. Storm Water Receiving Environment Monitoring Report for NPDES Permit No. WA-002465-1. Volumes 1 (Report) and 2 (Technical Appendices). Unpublished report by Port of Seattle to Washington State Department of Ecology, Olympia, Washington.

Port of Seattle. 1998. Storm Water Pollution Prevention Plan. Seattle-Tacoma International Airport. Port of Seattle. November 1998

Port of Seattle. 1999. Procedure Manual for Stormwater Monitoring, Sea-Tac International Airport, Seattle, WA. Revision 6, April 1999.

Port of Seattle. 2000a. Stormwater Whole Effluent Toxicity (WET) Testing at Seattle-Tacoma International Airport: Final Report. May 2000.

Port of Seattle. 2000b. Examining the effects of runway deicing on dissolved oxygen in receiving waters: Results of the 1999-2000 winter season. SEATAC International Airport, Seattle, Washington. Volume 1. Report. November 2000.

Port of Seattle. 2001a Storm Water Pollution Prevention Plan. Seattle-Tacoma International Airport. Port of Seattle. December 2001.

Port of Seattle. 2001b. Annual Stormwater Monitoring Report Seattle Tacoma International Airport for the period June 1, 2000 through June 30, 2001. September 2001.

Port of Seattle. 2002. Annual Stormwater Monitoring Report Seattle Tacoma International Airport for the period July 1, 2001 through June 30, 2002. November 2002.

Port of Seattle. 2003. Annual Stormwater Monitoring Report Seattle Tacoma International Airport for the period July 1, 2002 through June 30, 2003. September 2003.

Taylor Associates Inc. 2004. Zinc Leaching Study: An Assessment of Zinc Sources to Stormwater Runoff. Prepared for the Port of Seattle. Prepared by Taylor Associates, Inc. February 2004.

Tobiason, S. and Logan L.R. J. 2000. Whole Effluent Toxicity (WET) Testing and Source Tracing at Seattle-Tacoma International Airport. Presented at WEFTEC 2000 Annual Conference of the Water Environment Federation, Anaheim, CA. October 2000.

Tobiason, S. and Logan, L.R. J. 2001. Trickle Down Effect. In Industrial Wastewater, Vol 9, No 6, Nov/Dec 2001. Water Environment Federation.

Tobiason, S. (2004) *Stormwater Metals Removal by Media Filtration: Field Assessment Case Study.* Proceedings of Watershed 2004, Conference of the Water Environment Federation, Dearborn MI. July 2004

Tobiason, S., Nickerson, C., Zisette, R., and Samadpour, M. 2002. Stormwater Bacteria Source Tracing at Seattle-Tacoma International Airport. In Proceedings of Watershed 2002, Conference of the Water Environment Federation, Ft. Lauderdale FL, February 2002.

Washington Department of Ecology (Ecology). 2002. WQP Policy 1-11 Assessment of Water Quality for the Section 303(d) List. October 4, 2002. http://www.ecy.wa.gov/programs/wq/303d/2002/303d_policy_final.pdf, Accessed December 7, 2004.

ATTACHMENT A – ISSUES AND CONCERNS ASSOCIATED WITH EACH PARAMETER/WATERBODY PROPOSED LISTINGS – ORGANIZED BY DATA REPORT

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
Hallock 2001	DO	10833	12	• **Conclusion: Inappropriate sampling techniques** • The listing documentation does not indicate proper sampling techniques were followed according to WQP 1-11. • DO was measured in the field; documentation does not include instrument calibration and accuracy/precision information, as required in WQP 1-11 (p.20).
Hallock 2001	DO	10833	28	• **Conclusion: Natural sources for listing parameter** • The standards require that a waterbody segment will not be placed on the 303(d) list when characteristics are due to natural conditions. . • POS study indicated natural conditions caused depressed DO in NW ponds, which was also apparent in depressed DO observed in Des Moines Creek downstream of NW ponds.
Hallock 2001	DO	10833	21	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11) • The Port of Seattle has removed all storm drainage areas associated with aircraft servicing such as deicing/anti-icing activity. Drainage from these areas is prevented from reaching Miller and Des Moines creeks because it is routed to a separate industrial waste drainage system (IWS) and Industrial waste treatment plant (IWTP).
Hallock 2001	DO	10833	22	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11) • The Port of Seattle institutes numerous source controls for ground (e.g. runway/taxiway) deicing/anti-icing chemical applications. These source controls include substitutions of chemicals with less potential impacts, application controls, ice prevention through preventive chemical applications that use less volume than if ice were allowed to form, snowmelt drainage separation (to the IWS).

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
Hallock 2001	Fecal Coliforms	12568	1	• **Conclusion: Insufficient exceedances** • 12 monthly samples available from 10/20/1993 – 9/21/1994, ranging from 12 – 480 colonies/100 ml. Shows a geometric mean of 30 does not exceed the criterion and that 0% of the samples does not exceed the percentile criterion from 3 samples collected during 1993. • Samples collected at Des Moines Creek near Mouth show a geometric mean of 67, which exceeds the criterion and that 33% of the samples exceed the percentile criterion from 9 samples collected during 1994.
Hallock 2001	Fecal Coliforms	12568	2	• **Conclusion: Data is aged** • Data nearing the age limitation of ten years.
Hallock 2001	Fecal Coliforms	12568	19	• **Conclusion: Natural sources for listing parameters** • The standards require that a waterbody segment will not be placed on the 303(d) list when characteristics are due to natural conditions. Ecology has not sufficiently determined that the exceedances of fecal coliforms are due to human or natural conditions. • Data from the Port's MST study for several sampling locations in Des Moines Cr. indicated that 92% of the fecal coliform genetic isolates were from natural sources (animals), and that human sources were limited and sporadic.
Hallock 2001	Fecal Coliforms	12568	23	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port has implemented a number of stormwater BMPs for FC bacteria. Aircraft bird strike programs actively manage bird populations at the airport, including trapping starlings and pigeons. Known pigeon roosting areas were removed during concourse a demolition in 2001 and new facility designs are intended to minimize bird attraction. Aircraft lavatory waste transport vehicles and disposal procedures were modified to reduce and eliminate potential for spillage of aircraft lavatory waste during transfer and transport to the sanitary sewer system.
Hallock 2001	Fecal Coliforms	12568	25	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port has addressed fecal coliform sources by routing runoff from aircraft service areas to the IWS treatment system.

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
Hallock 2001	Temp, DO, Fecal Coliforms	10832, 10833, 12568	7	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time), however, only a single sampling location was employed in the specified reach (T22N R04E S08, approx 1 1/3 mi). • The listing documentation does not include sufficient justification that this single location provides sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).
Hallock 2004	Fecal Coliforms	42542	9	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time), however, only a single sampling location was employed in the specified reach (T23N R04E S30, approx 1 mi). • The listing documentation does not include sufficient justification that this single location provides sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).
Hallock 2004	Fecal Coliforms	42542	18	• **Conclusion: Natural sources for listing parameter** • The standards require that a waterbody segment will not be placed on the 303(d) list when characteristics are due to natural conditions. Ecology has not sufficiently determined that the exceedances of fecal coliforms are due to human or natural conditions. • A study conducted by the Port of Seattle (Port of Seattle 2000) suggests prevalence of natural sources found in Des Moines Creek would also be present in Miller Creek.
Hallock 2004	Fecal Coliforms	42673	7	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time), however, only a single sampling location was employed in the specified reach (T22N R04E S08, approx 1 1/3 mi). • The listing documentation does not include sufficient justification that this single location provides sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
Hallock 2004	Fecal Coliforms	42673	19	• **Conclusion: Natural sources for listing parameter** • The standards require that a waterbody segment will not be placed on the 303(d) list when characteristics are due to natural conditions. Ecology has not sufficiently determined that the exceedances of fecal coliforms are due to human or natural conditions. • Data from the Port's MST study for several sampling locations in Des Moines Cr. indicated that 92% of the fecal coliform genetic isolates were from natural sources (animals), and that human sources were limited and sporadic.
Hallock 2004	Fecal Coliforms	42673, 42542	23	• **Conclusion: Pollution control plan is in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port has implemented a number of stormwater BMPs for FC bacteria. Aircraft bird strike programs actively manage bird populations at the airport, including trapping starlings and pigeons. Known pigeon roosting areas were removed during concourse a demolition in 2001 and new facility designs are intended to minimize bird attraction. Aircraft lavatory waste transport vehicles and disposal procedures were modified to reduce and eliminate potential for spillage of aircraft lavatory waste during transfer and transport to the sanitary sewer system.
Hallock 2004	Fecal Coliforms	42673, 42542	25	• **Conclusion: Pollution control plan is in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port has addressed fecal coliform sources by routing runoff from aircraft service areas to the IWS treatment system.

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
Herrera 2001	Zinc	42308	20	• **Conclusion: Pollution control plan is in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11) • The Port of Seattle has conducted numerous stormwater pollution control studies at STIA and separate relevant work for each constituent: Zn, Cu, and fecal coliforms. The Port is currently conducting both a Facilities Assessment and Source Control study to identify sources of zinc on their property. These studies have determined that galvanized rooftops and galvanized guardrails are sources of zinc in stormwater. The Port has undertaken a program in 2004 to paint and seal galvanized surfaces to reduce or eliminate the contribution of these sources to stormwater.
Herrera 2001	DO	42310	7	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time), however, only a single sampling location was employed in the specified reach (T22N R04E S08, approx 1 1/3 mi). • The listing documentation does not include sufficient justification that this single location provides sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).
Herrera 2001	DO	42310, 42313, 42349, 42306, 42350	28	• **Conclusion: Natural source for listing parameter** • The standards require that a waterbody segment will not be placed on the 303(d) list when characteristics are due to natural conditions. . • POS study indicated natural conditions caused depressed DO in NW ponds, which was also apparent in depressed DO observed in Des Moines Creek downstream of NW ponds.
Herrera 2001	DO	42350	13	• **Conclusion: Inadequate representativeness** • The available data may not accurately represent the waterbody segment as a whole (spatially and over time) as required in WQP 1-11 (p.19). • Sampling location where exceedances occurred (DM-6) may not be representative of the entire reach listed (T23N R04E S33, approx. 2/3 mi). Data collected from an additional sampling location (DM-4) within the listed reach in 1995 and 1996 all met criteria, except for one sample collected in 1996.

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
Herrera 2001	Cu	42352	14	• **Conclusion: Inadequate representativeness** • The available data may not accurately represent the waterbody segment as a whole (spatially and over time) as required in WQP 1-11 (p.19). • Sampling location where exceedances occurred (DM-6) may not be representative of the entire reach listed (T23N R04E S33, approx. 2/3 mi). Data collected from an additional sampling location (DM-4, 12/7/95 and 3/27/96 events) within the listed reach were all less than criteria.
Herrera 2001	Temp, DO, Cu, Fecal Coliforms	42311, 42312	7	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time), however, only a single sampling location was employed in the specified reach (T22N R04E S08, approx 1 1/3 mi). • The listing documentation does not include sufficient justification that this single location provides sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).
Herrera 2001	Cu, Zn	42309, 42352, 42308	27	• **Conclusion: Inappropriate use of criteria** • Site specific WQC are being determined by an Ecology-required study being conducted in Miller, Walker and Des Moines Creeks. Because this study is representing instream conditions that are affected by a variety of jurisdictions, 303(d) listings should give deference to the study's outcomes expected in 2005.
Herrera 2001	Cu, Zn	42309, 42352, 42308	29	• **Conclusion: Inappropriate use of criteria** • Exceedances occurred only in storm flow-weighted composite samples, prepared from grab samples collected at approx. 1-hr intervals over a 3-hr duration. This procedure does not provide for a sampling duration that is comparable to the 96-hr duration for the chronic WQC. The procedure is also not comparable with acute (1-hr average) WQC.
Herrera 2001	Cu, Zn	42309, 42352, 42308, 42312	16	• **Conclusion: Inadequate documentation of sampling procedures** • The listing documentation does not indicate proper sampling techniques were followed according to WQP 1-11. • Specifically, the sampling procedures were not identified as "clean techniques" (e.g., EPA Method 1669), as specified in the Ecology Water Quality Program (WQP) Policy 1-11 document (p.20).

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
Herrera 2001	Cu, Zn	42309, 42312, 42352, 42308	24	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port of Seattle has conducted numerous stormwater pollution control studies at STIA and is currently conducting both a Facilities Assessment and Source Control study to identify sources of zinc on their property. These studies have determined that galvanized rooftops and galvanized guardrails are sources of zinc in stormwater. The Port has undertaken a program in 2004 to paint and seal galvanized surfaces to reduce or eliminate the contribution of these sources to stormwater. A separate copper source assessment study has been completed and is being used to develop best construction practices aimed at reducing exposure of copper bearing electrical components to stormwater runoff
Herrera 2001	Cu, Zn	42309, 42312, 42352, 42308	25	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port has addressed copper, zinc, and fecal coliform sources by routing runoff from aircraft service areas to the IWS treatment system.
Herrera 2001	Fecal Coliforms	42307, 42311, 42314, 42351	19	• **Conclusion: Natural sources for listing parameter** • The standards require that a waterbody segment will not be placed on the 303(d) list when characteristics are due to natural conditions. Ecology has not sufficiently determined that the exceedances of fecal coliforms are due to human or natural conditions. • Data from the Port's MST study for several sampling locations in Des Moines Cr. indicated that 92% of the fecal coliform genetic isolates were from natural sources (animals), and that human sources were limited and sporadic.

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
Herrera 2001	Fecal Coliforms	42314, 42311, 42307, 42351	23	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port has implemented a number of stormwater BMPs for FC bacteria. Aircraft bird strike programs actively manage bird populations at the airport, including trapping starlings and pigeons. Known pigeon roosting areas were removed during concourse a demolition in 2001 and new facility designs are intended to minimize bird attraction. Aircraft lavatory waste transport vehicles and disposal procedures were modified to reduce and eliminate potential for spillage of aircraft lavatory waste during transfer and transport to the sanitary sewer system.
Herrera 2001	Fecal Coliforms	42314, 42311, 42307, 42351	25	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port has addressed copper, zinc, and fecal coliform sources by routing runoff from aircraft service areas to the IWS treatment system.
Herrera 2001	DO	42313, 42349, 42310, 42306, 42350	21	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11) • The Port of Seattle has removed all storm drainage areas associated with aircraft servicing such as deicing/anti-icing activity. Drainage from these areas is prevented from reaching Miller and Des Moines creeks because it is routed to a separate industrial waste drainage system (IWS) and Industrial waste treatment plant (IWTP).
Herrera 2001	DO	42313,42350	6	• **Conclusion: Insufficient exceedances** • The number of exceedances reported (2 samples - 1995, 1 sample - 1996) do not meet the WQP 1-11 (p.25) requirements for listing as category 5: "When data are available from fewer than seven days in any 30-day period…A waterbody segment will be placed on the 303(d) list for temperature or dissolved oxygen when these data show a violation of the water quality standard on at least one day in at least three different years."

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
Herrera 2001	DO, Fecal Coliforms	42313, 42314	11	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time); however, only two sampling locations were employed in the specified reach (T22N R04E S04, approx 1 1/3 mi). • The listing documentation does not include sufficient justification that these two locations provide sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).
Herrera 2001	DO	42306, 42310, 42313,42350, 42349	12	• **Conclusion: Improper sampling techniques** • The listing documentation does not indicate proper sampling techniques were followed according to WQP 1-11. • DO was measured in the field; documentation does not include instrument calibration and accuracy/precision information, as required in WQP 1-11 (p.20).
Herrera 2001	DO	42306, 42310, 42313,42350, 42349	22	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11) • The Port of Seattle institutes numerous source controls for ground (e.g. runway/taxiway) deicing/anti-icing chemical applications. These source controls include substitutions of chemicals with less potential impacts, application controls, ice prevention through preventive chemical applications that use less volume than if ice were allowed to form, snowmelt drainage separation (to the IWS).
Herrera 2001	DO, Fecal Coliforms, Cu, Zn	42306, 42307, 42308, 42309	8	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time), however, only a single sampling location was employed in the specified reach (T22N R04E S09, approx 1/3 to 1/2 mi). • The listing documentation does not include sufficient justification that this single location provides sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
POS 1997	Zn	42935, 42937	20	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11) • The Port of Seattle has conducted numerous stormwater pollution control studies at STIA and is currently conducting both a Facilities Assessment and Source Control study to identify sources of zinc on their property. These studies have determined that galvanized rooftops and galvanized guardrails are sources of zinc in stormwater. The Port has undertaken a program in 2004 to paint and seal galvanized surfaces to reduce or eliminate the contribution of these sources to stormwater.
POS 1997	Cu, Zn	42934, 42935, 42936, 42937	3	• **Conclusion: Inappropriate comparison of data to criteria** • The report's methods used an inappropriate sampling duration basis for comparison to acute WQC. • Copper and zinc were measured in flow-weighted composite samples collected over each event's hydrograph data, which is inconsistent with the 1-hr averaging period associated with acute WQC.
POS 1997	Cu, Zn	42934, 42935, 42936, 42937	4	• **Conclusion: Inappropriate comparison of data to criteria** • The report does not provide direct comparisons of each sample result with the applicable criteria. • Dissolved copper and zinc concentrations in Miller Creek are cited in the report only as summarized ranges and with inappropriate comparisons to WQC in Tables 19 and 20 (verify #s) that are based on the acute WQC calculated at the 10^{th} percentile hardness concentrations. The use of the 10^{th} percentile hardness is highly conservative, inappropriate for this purpose, and bears some resemblance to a "Reasonable Potential" calculation, which would be applicable to discharges, not receiving waters.
POS 1997	Cu, Zn	42934, 42935, 42936, 42937	5	• **Conclusion: Inappropriate comparison of data to criteria** • Inappropriate data analysis methods used in the report. • Dissolved copper and zinc concentrations in samples should be directly compared with WQC calculated at the hardness of the particular sample. When this is done for the data in this report on a sample-by-sample basis, dissolved zinc concentrations never exceeded acute WQC. The limited number of apparent exceedances of acute copper WQC are subject to the comment #3 above.

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
POS 1997	Cu, Zn	42934, 42935, 42936, 42937	10	• **Conclusion: Inadequate representativeness** • Sampling should be conducted to represent the waterbody segment as a whole (spatially and over time), however, only a single sampling location was employed in the specified reach. • The listing documentation does not include sufficient justification that this single location provides sufficient spatial representativeness, as required in WQP 1-11 (p.19) and EPA's Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act (2003).
POS 1997	Cu, Zn	42934, 42935, 42936, 42937	15	• **Conclusion: Inadequate documentation of sampling procedures** • The sampling procedures were not adequately identified (e.g., EPA Method 1669), as specified in the Ecology Water Quality Program (WQP) Policy 1-11 document (p.20). • No evidence of QC methods and QC data to support low bias needed for metals WQC assessments.
POS 1997	Cu, Zn	42934, 42935, 42936, 42937	17	• **Conclusion: Inadequate representativeness** • The available data may not accurately represent the waterbody segment as a whole (spatially and over time) as required in WQP 1-11 (p.19). • The report does not adequately segregate data representing receiving waters from discharge samples Some sampling locations included in data summary tables in the report do not represent receiving waters
POS 1997	Cu, Zn	42934, 42935, 42936, 42937	24	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port of Seattle has conducted numerous stormwater pollution control studies at STIA and is currently conducting both a Facilities Assessment and Source Control study to identify sources of zinc on their property. These studies have determined that galvanized rooftops and galvanized guardrails are sources of zinc in stormwater. The Port has undertaken a program in 2004 to paint and seal galvanized surfaces to reduce or eliminate the contribution of these sources to stormwater. A separate copper source assessment study has been completed and is being used to develop best construction practices aimed at reducing exposure of copper bearing electrical components to stormwater runoff.

Data source	Constituent	Listing ID	Table 3 Comment Number	Comment
POS 1997	Cu, Zn	42934, 42935, 42936, 42937	25	• **Conclusion: Pollution control plan in place** • A 303(d) listing is not required, as a pollution control plan is in effect that is expected to meet water quality standards (WQP 1-11 p.11). • The Port has addressed copper, zinc, and fecal coliform sources by routing runoff from aircraft service areas to the IWS treatment system.
POS 1997	Zn	42935, 42937	26	• **Conclusion: Additional available data contradicts listing studies** • A 303(d) listing is not required, as available data meets water quality standards. • Data appropriate for acute and chronic WQC evaluations for Cu and Zn in Miller Creek were generated by a study funded by the POS and ILZRO. Data for a Miller Creek sampling station between SR518 and the LRSF did not indicate any exceedances of acute or chronic WQC for Cu or Zn. This project provided adequate sampling methods, QC and representativeness for evaluating acute and chronic WQC for Cu and Zn. • A zinc fate and transport study during three storm events was conducted in the Miller Creek basin from approximately May 2002 to February 2003. This study included one sampling station within Miller Creek. Surface water samples were 1-hr composites collected every other hour for 96 hours. Between four and seven of these samples were analyzed based on various flows identified in the hydrograph. Dissolved zinc concentrations in each 1-hr composite sample never exceeded the acute Zn WQS based on the hardness from the same sample.
POS 1997	Cu, Zn	42934, 42935, 42936, 42937	27	• **Conclusion: Inappropriate use of criteria** • Site specific WQC are being determined by an Ecology-required study being conducted in Miller, Walker and Des Moines Creeks. Because this study is representing instream conditions that are affected by a variety of jurisdictions, 303(d) listings should give deference to the study's outcomes expected in 2005.