

Kenny, Ann

Yee
EXHIBIT NO. 25
12-17-01
M. Green

From: Yee, Chung K.
Sent: Tuesday, June 26, 2001 4:58 PM
To: Thompson, Craig E.
Cc: Fitzpatrick, Kevin
Subject: SeaTac

DELIBERATIVE DOCUMENT CURRENTLY EXEMPT FROM PUBLIC DISCLOSURE

Attached please find:

1. Draft Fill Criteria requirements for the 401 Water Quality Certification for the SeaTac Third Runway Embankment project.



2. Spreadsheet deriving the surface water quality criteria needed for the three-phase model calculations for soil cleanup levels for the protection of surface water.



3. Spreadsheet deriving the ground water cleanup levels, the three-phase model calculations for soil cleanup levels for the protection of ground water, and the three-phase model calculations for soil cleanup levels for the protection of surface water.



4. A summary table showing the various soil cleanup levels, natural background concentrations, and PQLs.



The fill criteria requirements have been developed using the Amended MTCA. I have included relevant sections of the regulation into the development of the fill criteria. Specifically, I have developed fill criteria based on the Method A Soil Cleanup Levels (Table 740-1); derived soil cleanup levels using the three-phase model in WAC 173-340-747 first for the protection of ground water and second for the protection of surface water; reviewed soil concentrations presented in Table 749-2

(ecological standards), reviewed natural background soil metals concentrations; and reviewed PQL values for the metals under consideration. The listing of metals being proposed for the fill criteria is based on 40 CFR Part 122 Appendix D Table III (Other Toxics Pollutants). These are required monitoring parameters for the NPDES program.

The bases for the fill criteria are:

1. Use Method A (Table 740-1) values if available.
2. If not, use the lower value of Method B, protection of either ground water or surface water. If Method B value is less than PQL, use PQL. If Method B is less than natural background, use natural background.
3. For the first six feet, use ecological value if it is less than Method B value.

I have also included a ground water and surface water monitoring requirement in accordance with the amended MTCA. I did not incorporate any Institutional Control requirements since the airport access is controlled.

I did not change the soil sampling schedule as proposed by the NWROWQP since I consider the TCP's guidance for petroleum-contaminated soil may not be applicable to this project (cost issue).

Please review and comment and if possible, forward to the TCP Policy group for review and comment. Thanks.

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Draft

E6. Borrow Sites

The use of imported fill for the proposed Third Runway embankment may result in impacts to wetlands or other waters of the state. To ensure compliance with measures designed to minimize potential impacts, the Port of Seattle shall submit borrow site clean fill certification documentation described in the following sections to the Department of Ecology for review and approval prior to fill placement.

E7. Fill Source/Documentation/Fill Criteria

The Port of Seattle shall adhere to the following conditions to ensure that the fill placed for the proposed Third Runway embankment does not contain toxic materials in toxic amounts.

E7a. Fill Sources

Fill materials for the proposed Third Runway embankment shall be limited to the following three sources:

- State-certified borrow pits
- Contractor-certified construction sites
- Port of Seattle-owned properties.

E7b. Documentation

No later than two (2) business days prior to the acceptance of fill materials for the proposed Third Runway embankment, the Port of Seattle shall submit to the Department of Ecology's Northwest Regional Office Water Quality Program for review and approval clean fill certification documentation for the proposed fill source. The documentation shall contain an environmental assessment of the fill source and shall verify the proposed fill source complies with the fill criteria. The environmental assessment shall be conducted by an environmental professional in general conformance with the American Society for Testing and Materials Standard (ASTM) E 1527-00 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, and E 1903-97 Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process. At minimum, the document shall contain the followings:

1. **Fill Source Description:** Provide a description/location of the fill source, general characteristics of the fill source and vicinity, current use, and a site plan identifying the extent of the excavation, project schedule and the estimated quantity of fill to be transported to the proposed Third Runway embankment.

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2. **Records Review:** Obtain and review environmental records of the proposed fill source site and adjoining properties. In addition to the standard federal and local environmental record sources, the following Department of Ecology environmental databases shall be reviewed:

- Confirmed & Suspected Contaminated Site Report
- No Further Action Site List
- Underground Storage Tank List
- Leaking Underground Storage Tank List
- Site Register.

Records review shall also contain historical use information of the fill source and surrounding area to help identify the likelihood of environmental contamination.

3. **Site Reconnaissance:** Conduct a site visit to identify current site use and site conditions to help identify the likelihood of environmental contamination and/or the potential migration of hazardous substances onto the site from adjoining properties.

4. **Fill Source Sampling:** Collect and analyze fill materials for the potential contaminant(s) identified in the Phase I Environmental Site Assessment. At a minimum, fill materials from each fill source shall be analyzed for the following hazardous substances.

- Total Antimony
- Total Arsenic
- Total Beryllium
- Total Cadmium
- Total Chromium¹
- Total Copper
- Total Lead
- Total Mercury
- Total Nickel
- Total Selenium
- Total Silver
- Total Thallium
- Total Zinc
- NWTPH-HCID

¹ Chromium (VI) shall be analyzed if the results of the Phase I Environmental Site Assessment show a likelihood of Chromium (VI) contamination.

For fill sources characterization, the following table presents the minimum sampling schedule for fill sources with no likelihood of environmental contamination.

Cubic Yards	Minimum Number
-------------	----------------

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of Soil	of Samples
<1,000	2
1,000 - 10,000	3
10,000 - 50,000	4
50,000 - 100,000	5
>100,000	6

Samples shall be collected at locations that are representative of the fill destined for the proposed Third Roadway embankment.

For fill sources with suspected contamination or with complex conditions, please consult with the Department of Ecology Northwest Regional Office, Water Quality Program, for the appropriate sampling requirements.

E7b. Fill Criteria

The results of the Phase II sampling and testing shall be compared to the fill criteria to determine the suitability of the fill source for the proposed Third Roadway Embankment. Presented in the following table is the fill criteria established for hazardous substances contained in Section E7b.4.

Hazardous Substances	Fill Criteria mg/kg ²
Antimony	16
Arsenic	20
Beryllium	0.6
Cadmium	2
Chromium ³	42/2000
Copper	36
Lead ⁴	220/250
Mercury	2
Nickel ⁵	100/110
Selenium	5
Silver	5
Thallium	2
Zinc	85
Gasoline	30
Diesel ⁶	460/2000
Heavy Oils	2000

² mg/kg = milligrams per kilogram

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- ³ Fill with total chromium concentration greater than 42 mg/kg and less than 2000 mg/kg may be placed to within six feet of the ground surface. No fill with total chromium concentration greater than 42 mg/kg may be placed on the first six feet of the embankment. No fill with chromium (VI) concentration greater than 19 mg/kg may be placed in the embankment.
- ⁴ Fill with total lead concentration greater than 220 mg/kg and less than 250 mg/kg may be placed to within six feet of the ground surface. No fill with total lead concentration greater than 220 mg/kg may be placed on the first six feet of the embankment.
- ⁵ Fill with total nickel concentration greater than 100 mg/kg and less than 110 mg/kg may be placed to within six feet of the ground surface. No fill with total nickel concentration greater than 100 mg/kg may be placed on the first six feet of the embankment.
- ⁶ Fill with diesel range organics concentration greater than 460 mg/kg and less than 2000 mg/kg may be placed to within six feet of the ground surface. No fill with diesel range organics concentration greater than 460 mg/kg may be placed on the first six feet of the embankment.

For hazardous substances other than those identified in the above fill criteria table that have been identified in the Phase II Environmental Site Assessment, please consult with the Department of Ecology Northwest Regional Office, Water Quality Program, for the applicable fill criteria.

E8. As-Built Documentation

The Port of Seattle shall provide to the Department of Ecology for review quarterly summaries of:

- Fill sources placed for the previous quarter
- Quantities of fill materials from these fill sources
- Locations and elevations of fill source materials placed within the embankment.

The Department of Ecology may require additional fill conditions and/or corrective actions upon Ecology's review of the as-built documents.

E9. Post Construction Monitoring

In order to minimize the potential for migration of hazardous substances, the Department of Ecology expects the Port of Seattle to take appropriate measures to minimize precipitation and subsequent runoff coming into contact with the fill material. Furthermore, the department expects that runoff and seepage from the fill area shall be monitored for compliance with applicable Washington State surface water criteria.

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Ground water down-gradient from the fill area shall be monitored for compliance with applicable ground water criteria.

Within 180 days after the issuance of the 401 Water Quality Certification for the Master Plan Update Improvements for the Seattle-Tacoma International Airport, the Port of Seattle shall submit to the Department of Ecology for review and approval a surface water and ground water monitoring plan. The monitoring plan shall be designed to detect impacts of the fill embankment to the receiving water and to the ground water during fill placement and post fill placement. In the event monitoring detected adverse impacts to the receiving water/ground water, the Department of Ecology may revise the fill criteria and may also institute corrective actions to address these impacts.

AR 017316

SPREADSHEET CREATED BY D. NUNNALLEE, REV. 1.92 BY G. SHERVEY
 FACILITY:
 WATER QUALITY CRITERIA (in ugl unless otherwise noted)

FILENAME: Seatec Third Runway Embankment Project
 RUN DATE: 8/22/2001
 PREPARED BY: Chung Ki Yee

Pollutant, CAS No. & Application Ref. No.	PRIORITY	CARCIN	GEN7	Water Quality Criteria		Human Health Criteria		Organoleptic Effects		
				acute	chronic	Fresh	Marine			
ANTIMONY (INORGANIC) 7440360 1M	Y	N		9000	1600	69	36	14	4300	
ARSENIC (dissolved) 7440382 2M	Y	Y		360	190	69	36			
BERYLLIUM 7440417 3M	Y	Y		130	5.30					
CADMIUM - 7440439 4M Hardness dependent	Y	N		1.75	0.62	42.00	9.3			
CHROMIUM(TRI) - 16065831 5M Hardness dependent	N	N		311.04	100.90	1100	NA			
CHROMIUM(HEX) 18540299	Y	N		15	10	1100	50			1000.00
COPPER - 744058 6M Hardness dependent	Y	N		8.86	6.28	4.80	3.10			
LEAD - 741921 7M Dependent on hardness	Y	N		30.14	1.17	210.00	8.10	0.14	0.15	
MERCURY 7439976 8M	Y	N		2.10	0.012	1.80	0.0250	610	4600	
NICKEL - 7440020 9M - Dependent on hardness	Y	N		787.43	87.45	74.00	8.20	170.00	11000.00	
SELENIUM 7782492 10M	Y	N		20	5	290	71			
SILVER - 7740224 11M dependent on hardness.	Y	N		1.05	NA	1.90	NA			
THALLIUM 7440280 12M	Y	N		1400	40	2130		1.70	6.30	
ZINC - 7440666 13M hardness dependent	Y	N		63.61	58.09	90.00	81.00			5000.00

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STIA CONSTRU I SITE STORMWATER MONITORING

Samplers: K. Ludwa, J. Brandt
 Date: 6/28/01
 Rainfall (depth@date/time): 0.51 @ 2308, 6/27/01
 Rainfall (depth@date/time): 0.52 @ 0500, 6/28/01

Time	Turb	pH	Sheen? (Yes/No)	Comments
(18) Third Runway Embankment Phase 4				
0955	-	-	-	Pond not constructed yet - Discharge being collected and pumped to S. 157th Pl detention pond
S. 160th St. Detention Ponds				
site discharge: observe where runoff from pond construction enters Miller Ck.				
u/s: Miller Ck above point where runoff enters				
d/s: Miller Ck below point where runoff enters				
• THIS POND BEST DONE AFTER #15				
S. 157th Pl. Detention Pond				
1000	-	-	-	No discharge.
site discharge: observe where runoff from pond construction enters Miller Ck.				
u/s: Miller Ck above point where runoff enters				
d/s: Miller Ck below point where runoff enters				
(19) North Safety Fill Construction				
1020	-	-	-	No discharge.
site discharge: diffuser pipe from settling pond				
u/s: Miller Ck. at culvert under road				
d/s: Miller Ck. at dam structure				
(20) Third Runway Embankment Phase 3				
1015	-	-	-	No discharge.
site discharge: outfall in catchbasin vault on S. 156th Way near Miller Ck.				
u/s: Miller Ck. north of S. 156 Way				
d/s: Miller Ck. south of S. 156 Way				
(21) SR 509/S. 176th St. Temp. Interchange				
0850	128	6.71	no	
site discharge: two cell pond W. of SR509 below Walker Ck. outfall under SR509				
0755	9	6.9	no	Same as u/s for Emb. Ph 3 const. & Stockpile
0850	33	6.7	no	
u/s: Wetland 44a in concentrated channel above const.				
d/s: Wetland 43 100' below s/d two cell pond				
0650	203	7.08	no	No discharge.
site discharge: pond W. of SR509 S. of S. 168th St				
u/s: Wetland 44a in concentrated channel above const.				
d/s: Wetland 43 100' below s/d pond nr S. 168th St.				
(xx) Logistic Site (golf course)				
1250	-	-	no	Not enough flow to sample.
site discharge: golf course catchbasin				
u/s: Tye pond (south end)				
d/s: Tye Pond outfall to Des Moines Ck				

Notes:

- (1) if no access do/d @ SDE4-958, u/s @ SDE4-930 (or SDE4-925), d/s @ SDE4-958
- (2) if treating (or not pumping), no measurement required. If pumping w/ no treatment, measure @ spigot on ground line between settling tanks and holding pond.
- (3) if treating (or not pumping), no measurement required. If pumping w/ no treatment, measure @ catchbasin in grass about 100' W. of intersection of 112th Ave S and 173 Ct.

Exhibit 11
 Date 12/14/01
 Witness Drabek
 Project #11 - Court Reporter

Source and Comments	Metals Translators			
	Freshwater		Marine	
	Acute	Chronic	Acute	Chronic
NTR - HH				
WAC 173-201A	1.00	1.00	1.00	
Gold Book				
WAC 173-201A	0.947	0.943	0.994	0.994
WAC 173-201A, EXCEPT MARINE ACUTE				
WAC 173-201A	0.962	0.962	0.993	0.993
WAC 173-201A	0.996	0.996	0.83	0.83
WAC 173-201A,	0.466	0.466	0.951	0.95
WAC 173-201A, NTR - HH	0.85		0.85	
WAC 173-201A, NTR	0.998	0.997	0.99	0.99
WAC 173-201A, FR 63, 237-HH				
SEE WAC 173-201A, acute level no	0.85		0.85	
Gold Book, NTR - HH				
WAC 173-201A,	0.996	0.996	0.946	0.946

Pollutant, CAS No. & Application Ref. No.	PRIOR CAR		Water Quality Criteria		Human Health Criteria		Organoleptic Effects
	ITY	CIN	acute	chronic	acute	chronic	Fresh

HARDNESS VALUE USED FOR HARDNESS DEPENDENT LIMITS>>>>
* = INSUFFICIENT DATA TO DEVELOP CRITERIA
VALUE PRESENTED IS T.H.L.O.E.L. LOWEST OBSERVED

50.00 mg/L

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100182801 047

Source and Comments	Freshwater		Metals Transferors		Marine	
	Acute	Chronic	Acute	Chronic	Acute	Chronic

Pollutant, CAS No & Application Ref. No.

PRIOR CAR
ITY CIN
XLTNT'GEN?

acute

Fresh

Water Quality Criteria
chronic

acute

Marine

chronic

Human Health Criteria
fresh

Marine

Organoleptic
Effects

[Empty table area]									
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Source and Comments	Freshwater		Marine	
	Acute	Chronic	Acute	Chronic
[Empty table body]				

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DOI 8 28 01 050

Pollutant, CAS No & Application Ref. No.	PRIOR CAR									
	ITY CIN	acute	Fresh	Water Quality Criteria	Marine	Human Health Criteria	Organoleptic Effects			
	PLTNT GEN?		chronic	acute	chronic	Fresh	Marine			

This spreadsheet is split so that you can copy substances of interest into the top portion of the spreadsheet and obtain a printout of just the pollutants of interest. Updated the formulas and values to match with MAC 173-201A in December of 1992. Enter the hardness value for the receiving water for hardness dependent metals in B200 and TSS values in B199.

... .. with by Gary Bailey in March 1995 and checked by G. Shevry

AR 017324

DOE 8 28 01 051

Source and Comments	Acute Elastomer	Metals Transistors Chronic	Acute Matrix	Chronic

8/22/2001
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11/28/2001

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Pollutant CAS No. & Application Ref. No.	PRIORITY	CIN	acute	Water Quality Criteria		Marine	acute	Human Health Criteria		Organoleptic Effects
				Fresh	chronic			Fresh	Marine	
Pollutant CAS No. & Application Ref. No.	ITY	CIN	acute	Fresh	Water Quality Criteria	Marine	acute	Human Health Criteria	Organoleptic	
ENTER RECEIVING WATER TSS (IF UNKNOWN LEAVE BLANK) >	TY	CIN	acute	Fresh	Water Quality Criteria	Marine	acute	Human Health Criteria	Organoleptic	
ANNUAL DATA INSERT A, OR IF FROM CRITICAL PERIOD INSERT S >	TY	CIN	acute	Fresh	Water Quality Criteria	Marine	acute	Human Health Criteria	Organoleptic	
ENTER HARDNESS>>>>>>>	ITY	CIN	acute	Fresh	Water Quality Criteria	Marine	acute	Human Health Criteria	Organoleptic	
ACENAPTHENE 83329 1B	Y	N	1,700.*	520.*	970.*	710.*	1200.00	2700.00	20.00	
ACROLEIN 107028 1V	Y	N	68.*	21.*	55.*		320	760		
ACRYLONITRILE 107131 2V	Y	Y	7,550.*	2,600.*			0.059	0.06		
ALKALINITY	N	N		20,000.						
ALDRIN 309002 1P	Y	Y	2.50	0.0019	0.71	0.0019	0.00013	0.00014		
ALUMINUM, total recoverable 7429905	N	N	750	87						
AMMONIA, un-ionized - see separate spreadsheets for FW criteria	N	N								
ANTHRACENE 120127 3B	Y	N			233	35				
ANTIMONY (INORGANIC) 7440360 1M	Y	N	9000	1600			9600	110000		
ARSENIC (dissolved) 7440382 2M	Y	Y	360	190	69	36	14	4.000		
ARSENIC (inorganic)	Y	Y								
ARSENIC(PENT)	Y	Y	850	48	2319	13	0.018	0.14		
ARSENIC(TRI)	Y	Y	360	190	69	36				
ASBESTOS 1332214	Y	Y						7000,000 fibers/l		
BACTERIA	N	N								
BARIIUM 7440393	N	N	see document							
BENZENE 71432 3V	Y	Y	5300		5100	700	1.20	71		
BENZIDINE 92875 4B	Y	Y	2500				0.00012	0.00054		
BENZO(A)ANTHRACENE 56553 5B	Y	Y					0.0028	0.031		
BENZOPYRENE 50328 6B	Y	Y					0.0028	0.031		
BENZOFUORANTHENE 205992 7B	Y	Y					0.0028	0.031		
BENZOFUORANTHENE 207089 9B	Y	Y					0.0028	0.031		
BERYLLIUM 740417 3M	Y	Y	130	5.30			0.0039	0.013		
BHC - ALPHA 319846 2P	Y	Y	100		0.34		0.014	0.046		
BHC - BETA 319857 3P	Y	Y	100		0.34		0.0190	0.063		
BHC - GAMMA 56899 4P (Lindane)	N	Y	2	0.08	0.16					
BHC - DELTA 319868 5P	Y	Y								
BIS(2-CHLOROETHYL)ETHER 111444 11B	Y	Y					0.031	1.4		
BIS(2-CHLOROISOPROPYL)ETHER 39638329 12B	Y	N					1400	170000		
BIS(2-ETHYLHEXYL) PHTHALATE 117817 13B	Y	Y	940	3	2944	3.40	1.8	5.9		
BROMOFORM 75252 5V	Y	Y					4.3	360		
BUTYLBENZYL PHTHALATE 85687	Y	Y					3000.0	5200		
CADMIUM - 744039 4M Hardness dependent	Y	N	1.75	0.62	42.00	9.3				

Source and Comments	Metals Translators			
	Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic
(GMI) Book, FR 63, 237-HH NTR, Gold Book				
Gold Book, NTR - HH Gold Book				
WAC 173-201A, NTR EPA 440/5-86-008 WAC 173-201A NTR				
NTR - HH WAC 173-201A NTR	1.00	1.00	1.00	
Gold Book Gold Book NTR:HH				
Gold Book Gold Book, NTR - HH Gold Book, NTR - HH NTR				
Gold Book, NTR - HH Gold Book, NTR - HH 173-201A, NTR - HH no criteria available, substance listed on NPLES applic. NTR				
Gold Book, NTR NTR				
FR 63, 237-HH WAC 173-201A	0.943	0.943	0.994	0.994

Pollutant, CAS No. & Application Ref. No.	PRIOR CAR		Fresh acute	Water Quality Criteria		Marine chronic	Human Health Criteria		Organoleptic Effects
	ITY	CIN		acute	chronic		acute	chronic	
Based on hardness in next column	50								
CARBON TETRACHLORIDE 56235 6V	Y	Y	35200		50000		0.25	4.40	
CHLOROBENZENE 108907 7V	Y	N					680	21000	
CHLORDANE 57749 6P	Y	Y	2.4	0.0043	0.09	0.004	0.00057	0.00059	
CHLORODIBROMOMETHANE 124481 8V	Y	Y					0.41	34	
CHLORIDE (dissolved) in nyl 16887006	N	N	660	230					
2-CHLORONAPHTHALENE 91587 16B	Y	N	1600						
CHLORINE 7782505	N	N	19	11	7.50	7.50	1700.00	4300.00	
CHLORALKYL ETHERS	Y	N	238000						
CHLOROETHYL ETHER (BIS - 2) 111444	Y	Y							
CHLOROFORM 67663 11V	Y	Y	28900	1240			0.031	1.40	
CHLOROISOPROPYL ETHER (BIS-2) 108601	Y	Y					5.70	470	
(1111) (K1M1:11V1 F 1111 R (111S))	N	Y					1400	170000	
2-CHLOROPHENOL 95578 1A	Y	N	4380	2000			0.00000376	0.00184	
4-CHLOROPHENOL 106489	N	N					120.00	400.00	0.10
(1111) (K1P111:11X1Y 111:K111 111:11:11:2,4,5-1P) 93721	N	N			29700				
(1111) (K1P111:11X1Y 111:K111 111:11:11:2,4,5-1P) 94757	N	N			10 in drinking water				
CHLORPYRIFOS 2921882	N	N			100 in drinking water				
CHLORO-4-METHYL-3-PHENOL	N	N	0.083	0.041	0.11	0.0056			
CHROMIUM(HEX) 18540299	N	N	30	10	1100	50			
CHROMIUM(III) -16065831 5M Hardness dependent	Y	N	15	100.90	1111111	NA			
Based on hardness in next column	50.0		311.04						
CHRYSENE 218019 18B	Y	Y				0.0028		0.031	
COPPER - 744058 6M Hardness dependent	N	N							
Based on hardness in next column	50.0		8.86	6.26	4.80	3.10			1000.00
CYANIDE 57125 14M	Y	N							
DDT 50293 7P	Y	N	22	5.20	1.00	1.00	700	220000	
DDT METABOLITE (DDE) 72559 8P	Y	Y	1.10	0.001	0.13	0.00059	0.00059	0.00059	
DDT METABOLITE (DDD) 72548 9P	Y	Y	1.10	0.001	0.13	0.00059	0.00059	0.00059	
DEMETON	Y	N	1.10	0.001	0.13	0.00083	0.00083	0.00084	
DIBENZOPHENANTHRACENE 53703 19B	Y	Y							
DIBUTYLPHTHALATE 84742	Y	Y	940	3	2944	0.0026	0.031		
1,2-DICHLOROETHANE 95561 20B	Y	N	1120	763	1970	3.40	2700	12000	
1,3-DICHLOROETHANE 541731 21B	Y	N	1120	763	1970		2700	17000	
1,4-DICHLOROETHANE 106467 22B	Y	N	1120	763	1970		400	2600	
3,3-DICHLOROETHANEDINE 91941 23B	Y	N	1120	763	1970		400	2600	
DICHLOROBROMOMETHANE 75274 12V	Y	Y					0.04	0.077	
1,2-DICHLOROETHANE 107062 15V	Y	Y					0.27	22	
1,1-DICHLOROETHYLENE 75354 16V	Y	Y	118000	20000	113000		0.38	99	
2,3-DICHLOROPHENOL	Y	Y	11600		224000		0.057	3.20	
2,4-DICHLOROPHENOL 1208312 2A	N	N	2020	365			93.00	790.00	0.04
2,5-DICHLOROPHENOL	Y	N							0.30
2,6-DICHLOROPHENOL	Y	N							0.50
1,2-DICHLOROPROPANE 78875	Y	N	23000	5700	10300	3040	0.52	39.00	
1,3-DICHLOROPROPENE 542755	Y	N	6060	244	790	87		14100	0.20

AR 017328

Source and Comments	Freshwater		Metals Translators	
	Acute	Chronic	Acute	Chronic
Gold Book, NTR - HH				
NTR				
WAC 173-201A, NTR				
NTR				
SEE WAC 173-201A FOOTNOTES				
Gold Book, FR 63, 237-HH				
WAC 173-201A				
Gold Book				
NTR				
Gold Book, NTR - HH				
NTR				
Gold Book, FR 63, 237-HH				
Gold Book				
Gold Book				
WAC 173-201A	0.982	0.962	0.993	0.993
WAC 173-201A	0.982	0.962	0.993	0.993
WAC 173-201A, EXCEPT MARINE ACUTE	0.316	0.86		
NTR				
WAC 173-201A	0.996	0.996	0.83	0.83
WAC 173-201A, NTR				
WAC 173-201A, NTR				
WAC 173-201A, NTR				
WAC 173-201A, NTR				
Gold Book				
NTR				
Gold Book, NTR - HH				
NTR - HH				
NTR - HH				
NTR - HH				
NTR - HH				
NTR				
Gold Book, NTR - HH				
Gold Book, NTR - HH				
NTR - HH				
Gold Book, FR 63, 237-HH				
Gold Book				

AR 017329

sealocais

Pollutant, CAS No. & Application Ref. No.	PRIOR CAR		Fresh acute	Water Quality Criteria		Marine chronic	Human Health Criteria		Organoleptic Effects
	ITY	CIN		acute	chronic		acute	chronic	
1,3-DICHLOROPROPYLENE 542756 18V	Y	N							
DIELDRIN 60571 10P	Y	Y	2.50	0.0019	0.71	0.0019	10	1700	
DIMETHYLPHTHALATE 84662 24B	Y	N	940	3	2944	3.40	0.00014	0.00014	
2,4-DIMETHYLPHTHALATE 105679	Y	N	2120				23000	120000	
DIMETHYLPHTHALATE 131113 25B	Y	N	940	3	2944	3.40	540.00	2300.00	400.00
DIB-N-BUTYL PHTHALATE 84742 26B	Y	N					313000	2900000	
2-METHYL-4,6-DINITROPHENOL 534521 4A	Y	N					2700	12000	
2,4-DINITROPHENOL 51285 5A	Y	N	330	230	590	370	13.4	765	
DINITRO-1,4-DIAMINE 2,4 121142 27H	Y	N	330	230	590	370	70.0	14000	
DINITRO-1,4-DIAMINE 2,6 646202 28H	Y	N					0.11	9.10	
DINITRO-1,4-DIAMINE 2,4	Y	N							
DIOXIN (2,3,7,8-TCDD) 1746016	Y	Y	0.01	0.00001			13.40	765.00	
1,2-DIPHENYLHYDRAZINE 122667 30B	Y	Y	270				0.04	0.54	
DI-2-ETHYLHEXYLPHTHALATE 117817	Y	Y	940	3	2944	3.40	1.8	5.9	
ENDOSULFAN a 959988 11P, b 33213659 12P	Y	N	0.22	0.056	0.034	0.0087	0.93	2.0	
ENDOSULFAN SULFATE 1031078 13P	Y	N					0.93	2.0	
ENDRIN 72208 14P	Y	N	0.18	0.0023	0.037	0.0023	0.76	0.81	
ENDRIN ALDEHYDE 7421934 15P	Y	N					0.76	0.81	
ETHYLBENZENE 100414 19V	Y	N	32000		430	16	3100	29000	
FLUORANTHENE 206440 31B	Y	N	3980		40		300	370	
GAASES, TOTAL DISSOLVED	N	N					1300	14000	
GUTHION 86500	N	N							
HALOETHERS	N	N					0.01		
HALOMETHANES	Y	N	380	122			0.19	15.70	
HEPTACHLOR 76448 16P	Y	Y	11000		12000	6400			
HEPTACHLOR EPOXIDE 1024573 17P	Y	Y	0.52	0.0038	0.0530	0.0036	0.00021	0.00021	
HEXACHLOROBENZENE 118741 33B	Y	Y	0.52	0.0038	0.0530	0.0036	0.00010	0.00011	
HEXACHLOROBUTADIENE 87683 34B	Y	Y	90	9.30	32		0.00075	0.00077	
HEXACHLOROCYCLOHEXANE-ALPHA 319846 2P	Y	Y					0.44	50	
HEXACHLOROCYCLOHEXANE-BETA 319857 3P	Y	Y					0.0039	0.013	
HEXACHLOROCYCLOHEXANE-GAMMA (lindane) 58899 4P	Y	Y	2	0.08	0.16		0.014	0.046	
HEXACHLOROCYCLOHEXANE-DELTA 319868 5P	Y	Y					0.019	0.063	
HEXACHLOROCYCLOPENTADIENE 77474 35B	Y	N	7	5.20	7.0		0.0123	0.0414	1
HEXACHLOROETHANE 67721 36B	Y	Y	980	540	940		240	17000	
INDENOL(1,2,3-cd)PYRENE 193395 37B	Y	Y					1.90	8.90	
IRON 7439896	N	N		1000			0.0026	0.031	
ISOPHORONE 78591	Y	Y	117000		12900	8.10	300.00	600	
LEAD 7439921 7M (dependent on hardness)	Y	N	30.14	1.17	210.00		8.40		
Based on hardness in next column			50.0						
MALATHION 121755	N	N		0.10					
MANGANESE 7439965	N	N				0.10			
2-METHYL-4-CHLOROPHENOL				See Gold Book			50.00	100.00	1800.00
3-METHYL-4-CHLOROPHENOL 59507									3000.00
3-METHYL-6-CHLOROPHENOL									20.00
METHYL BROMIDE 74839 20V	Y	N					48	4000	

AR 017330

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Source and Comments	Metals Translators			
	Esthwater Acute	Chronic	Acute	Metals Chronic
NTR				
WAC 173-201A, NTR				
Gold Book, NTR - HH				
Gold Book, FR 63, 237-HH				
Gold Book, NTR - HH				
NTR				
NTR				
Gold Book, NTR - HH				
Gold Book				
Gold Book				
Gold Book, NTR - HH				
Gold Book, NTR - HH				
WQC based on Gold Book values for phthalate esthers, HH-NTR				
WAC 173-201A, NTR				
NTR				
WAC 173-201A, NTR				
NTR				
Gold Book, NTR - HH				
Gold Book, NTR - HH				
Gold Book, NTR - HH				
WAC 173-201A, NTR				
Gold Book				
Gold Book				
WAC 173-201A, NTR				
WAC 173-201A, NTR				
NTR - HH				
NTR - HH				
NTR				
NTR				
WAC 173-201A, NTR				
FR 63, 237-HH				
Gold Book, NTR - HH				
Gold Book, NTR - HH				
NTR				
Gold Book				
Gold Book, NTR - HH				
WAC 173-201A,	0.466	0.466	0.951	0.95
Gold Book				
FR 63, 237-HH				
NTR				

Pollutant CAS No. & Application Ref. No.	PRIORITY	CARCIN	acute	Water Quality Criteria		acute	Marine	chronic	Human Health Criteria		Organoleptic Effects
				Fresh	chronic				Fresh	Marine	
METHYLENE CHLORIDE 75092 22V	Y	Y							4.7	1600	
MERCURY 7439976 9M	N	N	2.10	0.012	1.80	0.0250	0.14	0.15	100.00		
METHOXYCHLOR	N	N		0.03		0.03					
MIREX 2385855	N	N		0.001		0.001					
MONOCHLORO BENZENE 108907	Y	Y		See Chlorobenzene							20.00
NAPHTHALENE 91203 39B	Y	N	2300	620	2350		610	4600			
NICKEL - 7440020 9M - Dependent on hardness	Y	N	787.43	87.45	74.00	8.20					
NITROBENZENE 98953 40B	Y	N			6680		17	1900		30	
2-NITROPHENOL 88755	Y	N	27000	150.00	4850						
NITRATE/NITRITE (N)	N	N	230	See Gold Book							
NITROSAMINES	Y	Y	5850	See Gold Book	3300000		10000.00	1.24	0.008	0.587	
NITROSODIBUTYLAMINE N 924163	Y	Y		See Gold Book			0.0064	0.587			
NITROSODIETHYLAMINE, N 55185	Y	Y		See Gold Book			0.00	1.24			
NITROSODIMETHYLAMINE N 62759 41B	Y	Y		See Gold Book			0.00069	8.10			
N-NITROSODI-N-PROPYLAMINE 621647	Y	Y					0.0005	1.40			
NITROSODIPHENYLAMINE N 86306 43B	Y	Y					5	16			
NITROSOPIPYRROLIDINE, N 930552	Y	Y					0.016	91.90			
OIL AND GREASE	Y	Y		See Gold Book							
OXYGEN DISSOLVED 7782447	N	N		See Gold Book and EPA 440/9-76-023							
PARATHION 56382	N	N	0.065	0.013			3.50	4.10			
PENTACHLOROPHENOL 87865 8A (pH dependent in fresh water) Enter pH in next cell>>>>>>>>	N	Y	20.27	12.79	13.	7.90	0.28	8.20		30.00	
PHENOL 108952 10A	N	N		6.5 - 8.5		7.0 - 8.5					
PHOSPHORUS-ELEMENTAL 7723140	Y	N	10200	2560	5800	0.10	21000	4600000		300	
Polychlorinated Biphenyls (PCBs) 53469215, 11097691, 1104282, 11	N	Y		0.014	10	0.03	0.000170	0.000170			
POLYNUCLEAR AROMATIC HYDROCARBONS	Y	Y	2		300		0.0028	0.0311			
PYRENE 129000 45B	Y	N					960	11000			
SELENIUM 7782492 10M	Y	N	20	5	290	71	170.00	11000.00			
SILVER - 7740224 11M dependent on hardness. Based on hardness in next column.	Y	N	1.05	N/A	1.90	N/A					
SOLIDS DISSOLVED AND SALINITY	N	N		See Gold Book			250000.00	R 63, 237-HH			
SOLIDS SUSPENDED AND TURBIDITY	N	N		See EPA 440/9-76-023 and WAC 173-201A							
SULFIDE, HYDROGEN SULFIDE 7783064	N	N		2.0		2.0					
TETRACHLORINATED ETHANES	Y	N	9320								
TETRACHLORO BENZENE 1,2,4,5 95943	Y	N		See Gold Book			2.30	2.90			
TETRACHLOROETHANE 1,1,2,2 79345 23V	Y	Y		2400	9020		0.17	11.00			
TETRACHLOROETHANE	Y	Y	9320								
TETRACHLOROETHYLENE 127184 24V	Y	Y		840	10200	450	0.80	8.85		1.00	
TETRACHLORO PHENOL 2,3,4,6 95954	Y	Y	5280				26000.00	9800.00			
TETRACHLORO PHENOL 2,3,5,6	Y	N									
THALLIUM 7440280 12M.	Y	N	1400	40	440	5000	1.70	6.30			
TOLUENE 108883 25V	Y	N	17500		2130		6800	200000			
TOXAPHENE 8001352 25P	Y	N	0.73	0.0002	6300	0.0002	0.00073	0.00075			
1,2-TRANS-DICHLOROETHYLENE 156605	Y	Y			0.21		700	140000			

Source and Comments	Acu	Metals Translators	
		Freshwater Chronic	Marine Chronic
NTR			
WAC 173-201A, NTR - HH	0.85	0.85	
Gold Book			
WAC 173-201A, NTR	0.998	0.997	0.99
Gold Book, NTR - HH			
Gold Book			
Gold Book, FR 63, 237-HH			
FR 63, 237-HH			
NTR			
FR 63, 237-HH			
NTR			
FR 63, 237-HH			
WAC 173-201A,			
FR 63, 237-HH			
WAC 173-201A, NTR			
WAC 173-201A,			
Gold Book, NTR - HH			
Gold Book			
WAC 173-201A, NTR			
Gold Book			
NTR			
WAC 173-201A, FR 63, 237-HH			
SEE WAC 173-201A, acute level no to be exceeded at any time	0.85		0.85
FR 63, 237-HH			
FR 63, 237-HH			
Gold Book			
FR 63, 237-HH			
Gold Book, NTR - HH			
Gold Book			
FR 63, 237-HH			
Gold Book, NTR - HH			
Gold Book			
FR 63, 237-HH			
Gold Book, NTR - HH			
Gold Book, NTR - HH			
WAC 173-201A, NTR			
FR 63, 237-HH			

AR 017333

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Pollutant, CAS No. & Application Ref. No.	PRIORITY		acute	Water Quality Criteria		Marine		Human Health Criteria		Organochlorine Effects
	Y	N		acute	chronic	acute	chronic	Fresh	Marine	
TRIBUTYL TIN (TBT)	Y	Y	0.460	0.063	0.37	0.01	260	940		
TRICHLOROETHENE 1,2,4	Y	Y	18000							
TRICHLORINATED ETHANES	Y	Y								
TRICHLOROETHANE 1,1,1	Y	N		9400	31200		18400.00	1030.00		
TRICHLOROETHANE 1,1,2	Y	Y		21900	2000		0.60	42.00		
TRICHLOROETHYLENE 2,3,4,5	Y	Y	45000	See Gold Book			2.70	61.00		
TRICHLOROPHENOL 2,4,6	N	N		970			2.10	6.50	1.00	
TRICHLOROPHENOL 2,4,6	Y	Y					2	525	2.00	
VINYL CHLORIDE 75014	Y	Y								
ZINC - 7440666	Y	N	63.61	58.09	90.00	81.00			5000 (10)	
Based on hardness in next column										
* : INSUFFICIENT DATA TO DEVELOP CRITERIA VALUE PRESENTED IS THE LOWEST OBSERVED										
CADMIUM ACUTE CONVERSION FACTOR 0.97										
CADMIUM CHRONIC CONVERSION FACTOR 0.94										
LEAD CONVERSION FACTOR 0.89										

AR 017334

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Source and Comments	Freshwater		Marine	
	Acute	Chronic	Acute	Chronic
Proposed 62 FR 42554 B/97				
FR 63, 237:HH				
Gold Book				
Gold Book				
Gold Book, NTR - HH				
Gold Book, NTR - HH				
Gold Book, NTR - HH				
NTR				
WAC 173-201A	0.996	0.996	0.946	0.946

AR 017335

AMMONIA WATER QUALITY CRITERIA CALCULATION

Calculation Of Ammonia Concentration and Criteria for fresh water. Based on EPA Quality Criteria for Water (EPA 400/5-86-001) and WAC 173-201A. Revised 1-5-94 (corrected total ammonia criterion). Revised 3/10/95 to calculate chronic criteria in accordance with EPA Memorandum from Heber to WQ Stds Coordinators dated July 30, 1992.

INPUT

1. Ambient Temperature (deg C; $0 < T < 31$)	27.0
2. Ambient pH ($6.5 < \text{pH} < 9.0$)	7.25
3. Acute TCAP (Salmonids present- 20; absent- 25)	20
4. Chronic TCAP (Salmonids present- 15; absent- 20)	15

OUTPUT

1. Intermediate Calculations:	
Acute FT	1.00
Chronic FT	1.41
FPH	1.93
RATIO	24
pKa	9.18
Fraction Of Total Ammonia Present As Un-ionized	1.15114
2. Un-ionized Ammonia Criteria	
Acute (1-hour) Un-ionized Ammonia Criterion (ug NH ₃ /L)	134.7
Chronic (4-day) Un-ionized Ammonia Criterion (ug NH ₃ /L)	12.4
3. Total Ammonia Criteria:	
Acute Total Ammonia Criterion (mg NH ₃ + NH ₄ /L)	11.7
Chronic Total Ammonia Criterion (mg NH ₃ + NH ₄ /L)	1.1
4. Total Ammonia Criteria expressed as Nitrogen:	
Acute Ammonia Criterion as mg N	9.6
Chronic Ammonia Criterion as N	0.89

AR 017336

The spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in [EPA] National Standard Decision for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA600/7-90-001) on page 56. User input columns are shown with red headings. Corrected formulas in Col G and H on 508 (28)

Parameter	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (as assayed)	State Water Quality Standard		Max concentration at edge of		LIMIT RECD/D7	Effluent percent	Pn	Max effluent conc. measured (meas as max. secondary)	Coeff Variation	s	# of samples n	Multiplier	Acute Dfm Factor	Chronic Dfm Factor	COMMENTS
				Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone											
	0.95	0.95	2.0000	11.5800	5.8400	5.14	3.95	NO	0.95	0.050	60.00	0.60	0.55	1	6.20	112	180	
	0.95	0.95	2.0000	40.2000	17.6600	35.97	5.99	NO	0.95	0.050	60.00	0.60	0.55	1	6.20	112	180	
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.050		0.60	0.55					

WATER QUALITY BASED
 PERMIT LIMIT CALCULATIONS

Permit Limit Calculations Summary									
Parameter	Unit	Average	Maximum	Minimum	Standard Deviation	Standard Error	Standard Deviation	Standard Error	Standard Deviation
Parameter	Unit	WQA	WQA	WQA	WQA	WQA	WQA	WQA	WQA
Parameter	Unit	WQA	WQA	WQA	WQA	WQA	WQA	WQA	WQA
Lead	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Vanadium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Barium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Strontium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Aluminum	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Iron	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Copper	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Zinc	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Manganese	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Nickel	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Selenium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Fluoride	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chloride	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Sulfate	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Calcium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Magnesium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Silica	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Phosphate	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Nitrate	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Nitrite	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Ammonia	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Boron	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Cadmium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Mercury	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium VI	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium III	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Vanadium V	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Barium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Strontium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Aluminum	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Iron	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Copper	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Zinc	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Manganese	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Nickel	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Selenium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Fluoride	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chloride	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Sulfate	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Calcium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Magnesium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Silica	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Phosphate	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Nitrate	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Nitrite	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Ammonia	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Boron	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Cadmium	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Mercury	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium VI	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium III	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Vanadium V	ug/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

The spreadsheet calculations were quality based permit limits based on the two value steady state model using the State Water Quality Model. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality Based Toxic Criteria, U.S. EPA, March, 1991 (EPA/600/7-90/001) on page 89. Last revision date 10/98. Written by G. Shewey.

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PERFORMANCE-BASED EFFLUENT LIMITS	
USE EXCEL TO PERFORM THE LOGNORMAL TRANSFORMATION	
AND CALCULATE THE TRANSFORMED MEAN AND VARIANCE	
LOGNORMAL TRANSFORMED MEAN =	2.5456
LOGNORMAL TRANSFORMED VARIANCE =	0.1238
NUMBER OF SAMPLES/MONTH FOR COMPLIANCE MONITORING =	4
AUTOCORRELATION FACTOR (USE 0 IF UNKNOWN) =	0
E(X) =	13.5652
V(X) =	24.248
VARn	0.0324
MEANn =	2.5913
VAR(Xn) =	6.062
MAXIMUM DAILY EFFLUENT LIMIT =	28.904
AVERAGE MONTHLY EFFLUENT LIMIT =	17.948

PERFORMLIM

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WAC 173-340-747 Deriving soil concentrations for ground water protection
 Seatac Third Runway Embankment Project

Equation 747-1 Based on the protection of ground water

Hazardous Substance	Cs mg/kg	Cw ug/liter	UCF mg/ug	DF	Kd liter/kg	Ow mL water/ mL soil	Oa mL air/ mL soil	Hcc	Pb kg/liter
Antimony (2)	5.79	6.4	0.001	20	45	0.3	0.13	0	1.5
Arsenic (1)	2.92	5	0.001	20	29	0.3	0.13	0	1.5
Beryllium (2)	0.01	0.02	0.001	20	17	0.3	0.13	0	1.5
Cadmium (1)	0.69	5	0.001	20	6.7	0.3	0.13	0	1.5
Chromium +3 (2)	2000.40	100	0.001	20	1000	0.3	0.13	0	1.5
Chromium +6 (1)	18.43	48	0.001	20	19	0.3	0.13	0	1.5
Copper (1)	262.85	592	0.001	20	22	0.3	0.13	0	1.5
Lead (1)				20	10000	0.3	0.13	0	1.5
Mercury (1)	2.09	2	0.001	20	52	0.3	0.13	0.47	1.5
Nickel (1)	417.28	320	0.001	20	65	0.3	0.13	0	1.5
Selenium (1)	8.32	80	0.001	20	5	0.3	0.13	0	1.5
Silver (2)	21.12	80	0.001	20	13	0.3	0.13	0	1.5
Thallium (2)	2.28	1.6	0.001	20	71	0.3	0.13	0	1.5
Zinc (1)	5971.20	4800	0.001	20	62	0.3	0.13	0	1.5

Kd from: (1) MTCA Table 747-3; (2) Soil Screening Guidance: Technical Background Document, 9355.4-17A, May 1996, Table 46.

Equation 747-1 Based on the protection of surface water

Hazardous Substance	Cs mg/kg	Cw ug/liter	UCF mg/ug	DF	Kd liter/kg	Ow mL water/ mL soil	Oa mL air/ mL soil	Hcc	Pb kg/liter
Antimony (2)	1446.40	1600	0.001	20	45	0.3	0.13	0	1.5
Arsenic (1)	110.96	190	0.001	20	29	0.3	0.13	0	1.5

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Beryllium (2)	1.82	5.3	0.001	20	17	0.3	0.13	0	1.5
Cadmium (1)	0.09	0.62	0.001	20	6.7	0.3	0.13	0	1.5
Chromium +3 (2)	2018.40	100.9	0.001	20	1000	0.3	0.13	0	1.5
Chromium +6 (1)	3.84	10	0.001	20	19	0.3	0.13	0	1.5
Copper (1)	2.79	6.28	0.001	20	22	0.3	0.13	0	1.5
Lead (1)	234.00	1.17	0.001	20	10000	0.3	0.13	0	1.5
Mercury (1)	0.01	0.012	0.001	20	52	0.3	0.13	0.47	1.5
Nickel (1)	114.03	87.45	0.001	20	65	0.3	0.13	0	1.5
Selenium (1)	0.52	5	0.001	20	5	0.3	0.13	0	1.5
Silver (2)	0.28	1.05	0.001	20	13	0.3	0.13	0	1.5
Thallium (2)	56.96	40	0.001	20	71	0.3	0.13	0	1.5
Zinc (1)	72.26	58.09	0.001	20	62	0.3	0.13	0	1.5

Kd from: (1) MTCA Table 747-3; (2) Soil Screening Guidance: Technical Background Document, 9355.4-17A, May 1996, Table 46.
 Surface water quality values derived from WQP spreadsheet using a hardness value of 50 mg/liter.

WAC 173-340-720(4)(b)(A) Standard Method B potable ground water cleanup levels - Noncarcinogens
 Equation 720-1 (Ground water cleanup level for noncarcinogens)

Hazardous Substance	GWCL ug/liter	RfD mg/kg/day	ABW kg	UCF ug/mg	HQ	AT years	DWIR liter/day	INH	DWF	ED years
Antimony (1)	6.4	0.0004	16	1000	1	6	1	1	1	6
Arsenic (1)	4.8	0.0003	16	1000	1	6	1	1	1	6
Beryllium (1)	32	0.002	16	1000	1	6	1	1	1	6
Cadmium (1)	8	0.0005	16	1000	1	6	1	1	1	6
Chromium +3 (1)	24000	1.5	16	1000	1	6	1	1	1	6
Chromium +6 (1)	48	0.003	16	1000	1	6	1	1	1	6
Copper (2)	592	0.037	16	1000	1	6	1	1	1	6
Lead			16	1000	1	6	1	1	1	6
Mercury (2)	4.8	0.0003	16	1000	1	6	1	1	1	6
Nickel (2)	320	0.02	16	1000	1	6	1	1	1	6
Selenium (1)	80	0.005	16	1000	1	6	1	1	1	6
Silver (1)	80	0.005	16	1000	1	6	1	1	1	6
Thallium (2)	1.6	0.0001	16	1000	1	6	1	1	1	6
Zinc (1)	4800	0.3	16	1000	1	6	1	1	1	6

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RID from: (1) U.S. EPA IRIS Substance file; (2) MTCA Cleanup Levels and Risk Calculations (CLARC II) Update, February 1996

Equation 720-2 (Ground water cleanup level for carcinogens)

Hazardous Substance	GWCL ug/liter	RISK	ABW kg	AT years	UCF ug/mg	CPF kg-day/mg	DWIR liters/day	ED years	INH	DWF
Antimony										
Arsenic	0.06	0.000001	70	75	1000	1.5	2	30	1	1
Beryllium	0.02	0.000001	70	75	1000	4.3	2	30	1	1
Cadmium										
Chromium +3										
Chromium +6										
Copper										
Lead										
Mercury										
Nickel										
Selenium										
Silver										
Thallium										
Zinc										

CPF from MTCA Cleanup Levels and Risk Calculations (CLARC II) Update, February 1996

**SeaTac Third Runway Embankment Project
Summary of Hazardous Substance Levels**

Hazardous Substances	Method A Soil Cleanup Levels (Table 740-1) (mg/kg)	Method B Soil Cleanup Levels Ground Water Protection (mg/kg)	Method B Soil Cleanup Levels Surface Water Protection (mg/kg)	Terrestrial Ecological Evaluation Soil Concentration (Table 749-2) (mg/kg)	Natural Background Soil Metals Concentrations In Puget Sound ¹ (mg/kg)	PQL ¹ (mg/kg)
Arsenic	20	6	1450	none 95 (As ¹⁵)	none	16
Beryllium	none	0.01	2	25	0.6	0.15
Cadmium	2			25	1	
Chromium				42	48	
Chromium ⁶ (Chromium ⁶)	19					
Copper	2000	260	3	100	36	3
Lead	250			220	24	
Mercury	2			9	0.07	
Nickel	none	420	110	100	48	7.5
Selenium	none	8	0.5	0.8	none	5
Silver	none	20	0.3	none	none	5
Thallium	none	2	60	none	none	
Zinc	none	6000	70	270	85	1
Total Petroleum Hydrocarbons						
Gasoline	30			200		
Diesel	2000			460		
Heavy Oils	2000					

¹ Source: "Natural Background Soil Metals Concentrations in Washington State", Publication #94-115, Washington State Department of Ecology
¹ Source: Implementation Memo No. 3, PQLs as Cleanup Standards, by Steve Robb, Washington State Department of Ecology, November 24, 1993.