ORIGINAL

BEFORE THE POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, CITIZENS AGAINST SEA-TAC EXPANSION, Intervenor/Appellant, v. STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and PORT OF SEATTLE, Respondents.	PCHB No. 01-160 DIRECT TESTIMONY OF CHUNG KI YEE SUBMITTED ON BEHALF OF THE DEPARTMENT OF ECOLOGY

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ATTORNEY GENERAL OF WASHINGTON
Ecology Division
PO Box 40117
Olympia, WA 98504-0117
FAX (360) 586-6760

Chung Ki Yee declares as follows:

1. I am an Environmental Engineer 3 in the Department of Ecology, Toxics Cleanup Program. I served as site manager for the Site Cleanup and Underground Storage Tank Unit managing several Navy cleanup sites and the Asarco site in Tacoma. With respect to site cleanup activities, I have a total of 5.5 years of experience (4.5 years with the Ecology Central Regional Office Toxics Cleanup Program (TCP) and one year with the Site Cleanup and Underground Storage Tank Unit). I am a registered professional engineer in the State of Washington. Attachment A is a copy of my resume.

2. Regarding the Port of Seattle's (Port) application for a Clean Water Act § 401 Certification (401 Certification) for its proposed construction at the Sea-Tac International Airport, I was asked to develop fill criteria for the Third Runway project that are "technically consistent with Toxics Program policy and guidance and do not contradict or present a conflict with the Model Toxics Control Act." I addressed the potential impact of the fill materials to water quality indirectly by deriving fill criteria using procedures presented in the Model Toxics Control Act (MTCA). Specifically, I used the WAC 173-340-747 (4) "Fixed parameter three-phase partitioning model" to derive the soil values. The following is a summary of the work I completed for the Northwest Regional Office Water Quality Program (NWRO/WQ).

3. In June 2001, Kevin Fitzpatrick of the NWRO/WQ asked me (through Mr. Craig Thompson, the then Temporary Unit Supervisor for the Site Cleanup and Underground Storage Tank Unit) to develop fill criteria for Port's Third Runway fill project that are "technically consistent with TCP policy and guidance" and do not "contradict or present a conflict with MTCA regulations." (Email dated June 4, 2001, from Kevin Fitzpatrick to Chung Ki Yee.)

4. As the starting point for my work, I used then existing fill criteria. I received the existing fill criteria by Email dated June 4, 2001, from Kevin Fitzpatrick. The existing fill criteria required fill materials to comply with the Model Toxics Control Act (Amended January

1996) Method A soil cleanup levels for total petroleum hydrocarbons and priority pollutants metals. Based on the exiting fill criteria, I derived the draft fill criteria based on soil values and procedures presented in the Model Toxics Control Act Cleanup Regulation Chapter 173-340 WAC, Amended February 12, 2001. The following is the procedure I used in developing the draft fill criteria.

5. **Metals** – I based the draft fill criteria for metals on 40 CFR Part 122 Appendix D Table III. These metals are antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc.

6. **Total Petroleum Hydrocarbons** – For the draft fill criteria, I replaced the combined total petroleum hydrocarbons parameter in the existing fill criteria with separate criteria for gasoline, diesel, and heavy oils.

7. **MTCA Method A** - For parameters listed in the Table 740-1 Method A soil cleanup levels for Unrestricted land Uses (MTCA), I incorporated the Method A values in the table into the draft fill criteria. These listed parameters are arsenic, cadmium, chromium (VI), chromium (III), lead, mercury, gasoline, diesel, and heavy oils. For parameters not listed in Table 740-1, I derived the soil values using the procedures presented in WAC 173-340-747 "Deriving soil concentrations for ground water protection." Specifically, I derived the soil values using the WAC 173-340-747 (4) "Fixed parameter three-phase partitioning model." For this three-phase model, the required variables are Cw (ground water cleanup level established under WAC 173-340-720) and Kd (distribution coefficient). To derive soil concentrations for surface water protection, I used the Ecology Water Quality Program tsdcalc9.xlw spreadsheet using a surface water hardness of 50 milligrams per liter to derive the required Cw (surface water criteria). I based the 50 milligrams per liter of hardness on my professional judgment. I took the Kd values from Table 747-3, Metals Distribution Coefficients (MTCA) or, where the draft fill criteria referenced the EPA Soil Screening Guidance for some Kd values, I used the

ATTORNEY GENERAL OF WASHINGTON
Ecology Division
PO Box 40117
Olympia, WA 98504-0117
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US EPA Screening Guidance: User's Guide, Attachment C, Chemical Properties for SSL Development, Table C-4, Metal Kd Values.

8. **Derived Ground Water Cleanup Levels** – I derived the ground water cleanup levels using the procedures presented in WAC 173-340-720 (4)(b)(iii)(A) Equation 720-1 for non-carcinogens and WAC 173-340-720 (4)(b)(iii)(B) Equation 720-2 for carcinogens. For noncarcinogens, Equation 720-1 requires one variable RfD (reference dose). I obtained RfDs from the Ecology document Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC II) Update, February 1996 or if not available in CLARC II, from the US EPA Integrated Risk Information System (IRIS) substance file. I constructed a spreadsheet incorporating Equation 720-1 deriving the ground water cleanup levels and included it as a part of my draft clean fill criteria submittals to the NWRO WQ Program (Email dated June 26, 2001, from Chung Ki Yee to Kevin Fitzpatrick). For carcinogens, Equation 720-2 requires one variable CPF (carcinogenic potency factor). I took the CPFs from the Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC II) Update, February 1996. I constructed a spreadsheet incorporating Equation 720-2 deriving the ground water cleanup levels and included it as a part of my draft clean fill criteria submittals to the NWRO WQ Program (Email dated June 26, 2001, from Chung Ki Yee to Kevin Fitzpatrick).

9. **Derived Surface Water Criteria** – I derived surface water criteria using the Ecology Water Quality Program tsdcalc9.xlw spreadsheet. Based on my past experience, I used a hardness value of 50 milligrams per liter to derive the chronic surface water criteria. The tsdcalc9.xlw spreadsheet was included as a part of my draft clean fill criteria submittals to the NWRO WQ Program (Email dated June 26, 2001, from Chung Ki Yee to Kevin Fitzpatrick).

10. **Derived Soil Concentration Criteria** – I derived soil concentration criteria using the fixed parameter three-phase partition model, Equation 747-1 (WAC 173-340-747 (4)). For the protection of ground water, I constructed a spreadsheet incorporating Equation

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Ecology Division
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747-1. The spreadsheet used the lower of the noncarcinogenic or carcinogenic ground water cleanup levels derived above. A copy of the spreadsheet was included as a part of my draft clean fill criteria submittals to the NWRO WQ Program (Email dated June 26, 2001, from Chung Ki Yee to Kevin Fitzpatrick). For the protection of surface water, I also constructed a spreadsheet incorporating Equation 747-1. The spreadsheet used the chronic surface water criteria derived above. I included a copy of the spreadsheet as part of my draft clean fill criteria submittals to the NWRO WQ Program (Email dated June 26, 2001, from Chung Ki Yee to Kevin Fitzpatrick).

11. **Selecting Soil Concentration** – I compared the soil concentrations derived above to natural background soil metals concentrations and to the practical quantitation limits (PQLs). Selected soil concentrations were based on the higher of the concentrations derived above, the natural background soil metals concentrations, and the practical quantitation limits. If the calculated soil level is less than the practical quantitation limit, I based the proposed criterion on the practical quantitation limit. If the calculated soil level is less than the natural background concentration in Puget Sound soil, I based the proposed criterion on the natural background concentration. I based the use of natural background or the practical quantitation limit as the criterion on WAC 173-340-700 (6)(d).

12. **Natural Background Soil Metals Concentrations** – I obtained the natural background soil metals concentrations from Ecology document Natural Background Soil Metals Concentrations in Washington State, Table 1, Puget Sound.

13. **Practical Quantitation Limits** – I obtained the practical quantitation limits (PQLs) from Department of Ecology Implementation Memo No. 3. For substances with multiple practical quantitation limits, I selected the limit indicated by the "thumbs-up" icon as the limit for the draft fill criteria. I selected the "thumbs-up" limits based on the selection of 2.0 milligram (a "thumbs-up" practical quantitation limit) as the practical quantitation limit for

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Ecology Division
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Olympia, WA 98504-0117
FAX (360) 586-6760

cadmium presented in Table 740-1 of the Model Toxics Control Act, Amended February 12, 2001.

14. **Soil Concentrations Selected for Proposed Fill Criteria:**

a. **Antimony** - 16 milligrams per kilogram (mg/kg): The proposed fill criterion is based on the practical quantitation limit of 16 mg/kg.

b. **Arsenic** - 20 mg/kg: The proposed fill criterion is based on the Method A soil cleanup level for unrestricted land uses (Table 740-1).

c. **Beryllium** - 0.68 mg/kg: The proposed fill criterion is based on the Method B soil cleanup level for ground water protection.

d. **Cadmium** - 2 mg/kg: The proposed fill criterion is based on the Method A soil cleanup level for unrestricted land uses (Table 740-1).

e. **Chromium (VI)** - 19 mg/kg: The proposed fill criterion is based on the Method A soil cleanup level for unrestricted land uses (Table 740-1). Note - "total chromium" is not part of this calculation. It is simply based on the terrestrial soil table.

f. **Chromium (III)** - 2000 mg/kg: The proposed fill criterion is based on the Method A soil cleanup level for unrestricted land uses (Table 740-1).

g. **Copper** - 36 mg/kg: The proposed fill criterion is based on the natural background concentration of 36 mg/kg in Puget Sound soil.

h. **Lead** - 250 mg/kg: The proposed fill criterion is based on the Method A soil cleanup level for unrestricted land uses (Table 740-1).

i. **Mercury** - 2 mg/kg: The proposed fill criterion is based on the Method A soil cleanup level for unrestricted land uses (Table 740-1).

j. **Nickel** - 110 mg/kg: The proposed fill criterion is based on the Method B soil cleanup level for surface water protection.

k. **Selenium** - 5 mg/kg: The proposed fill criterion is based on the practical quantitation limit of 5 mg/kg.

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ATTORNEY GENERAL OF WASHINGTON
Ecology Division
PO Box 40117
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l. **Silver** - 5 mg/kg: The proposed fill criterion is based on the practical quantitation limit of 5 mg/kg.

m. **Thallium** - 2 mg/kg: The proposed fill criterion is based on the Method B soil cleanup level for ground water protection.

n. **Zinc** - 85 mg/kg: The proposed fill criterion is based on the natural background concentration of 85 mg/kg in Puget Sound soil.

o. **Gasoline** - 30 mg/kg: The proposed fill criterion is based on the Method A soil cleanup level for unrestricted land uses (Table 740-1).

p. **Diesel** - 2000 mg/kg: The proposed fill criterion is based on the Method A soil cleanup level for unrestricted land uses (Table 740-1).

q. **Heavy Oils** - 2000 mg/kg: The proposed fill criterion is based on the Method A soil cleanup level for unrestricted land uses (Table 740-1).

15. **Selecting Terrestrial Ecological Soil Concentrations** - I selected the following terrestrial ecological soil concentrations based on WAC 173-340-7492 (2)(c)(ii) Table 749-2 (Unrestricted land use).

a. **Antimony** - There is no terrestrial ecological evaluation soil concentration established for this metal in Table 749-2. Therefore the 16 mg/kg value applies for the entire fill.

b. **Arsenic** - 20 mg/kg: This is the same as the Method A soil cleanup level for unrestricted land uses (Table 740-1).

c. **Beryllium** - 25 mg/kg. This is greater than the Method B value of 0.68 mg/kg. Therefore 0.68 mg/kg applies for the entire fill.

d. **Cadmium** - 25 mg/kg: This is greater than the Method A value of 2 mg/kg. Therefore 2 mg/kg applies for the entire fill.

e. **Chromium (total)** - 42 mg/kg: This applies to the top six feet of the fill.

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f. **Chromium (VI)** - There is no terrestrial ecological evaluation soil concentration established for this metal in Table 749-2. Therefore the Method A 19 mg/kg value applies for the entire fill.

g. **Chromium (III)** - There is no terrestrial ecological evaluation soil concentration established for this metal in Table 749-2. Therefore the 2000 mg/kg value applies to within six feet of the ground surface.

h. **Copper** - 100 mg/kg: This is greater than the natural background concentration of 36 mg/kg in Puget Sound soil. Therefore the 36 mg/kg value applies for the entire fill.

i. **Lead** - 220 mg/kg: This applies to the top six feet of the fill.

j. **Mercury** - 9 mg/kg: This is greater than the Method A value of 2 mg/kg. Therefore 2 mg/kg applies for the entire fill.

k. **Nickel** - 100 mg/kg: This applies to the top six feet of the fill.

l. **Selenium** - 0.8 mg/kg: This value is less than the practical quantitation limit of 5 mg/kg. Therefore 5 mg/kg applies for the entire fill.

m. **Silver** - 5 mg/kg: There is no terrestrial ecological evaluation soil concentration established for this metal in Table 749-2. Therefore the proposed fill criterion based on the practical quantitation limit of 5 mg/kg applies for the entire fill.

n. **Thallium** - There is no terrestrial ecological soil concentration established for this metal in Table 749-2. Therefore the 2 mg/kg value derived for the protection of ground water applies for the entire fill.

o. **Zinc** - 270 mg/kg: This is greater than the natural background concentration of 85 mg/kg in Puget Sound soil. Therefore 85 mg/kg applies for the entire fill.

p. **Gasoline** - 200 mg/kg: This is greater than the Method A value of 30 mg/kg. Therefore 30 mg/kg applies for the entire fill.

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q. **Diesel** - 460 mg/kg: This applies to the top six feet of the fill.

r. **Heavy Oils** - There is no terrestrial ecological evaluation soil concentration established for this material in Table 749-2. Therefore the Method A value applies for the entire fill.

16. **Sampling Schedule** - The fill source sampling schedule remained the same as the existing fill criteria requirements provided by the NWRO/WQ Program in the email dated June 4, 2001 from Kevin Fitzpatrick to Chung Ki Yee. The existing sampling schedule was: minimum of two soil samples for less than 1000 cubic yards of soil, minimum of three soil samples for 1000 to 10,000 cubic yards of soil, minimum of four soil samples for 10,000 to 50,000 cubic yards of soil, minimum of five soil samples for 50,000 to 100,000 cubic yards of soil, and minimum of six soil samples for soil volume greater than 100,000 cubic yards. I submitted a copy of the draft fill criteria along with my bases for establishing those criteria to Kevin Fitzpatrick in the Northwest Regional Office Water Quality Program by emailed dated June 27, 2001. The draft fill criteria concluded my work in this project.

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

DATED this 7th day of March, 2002 at Olympia, Washington.

CHUNG KI YEE

Chung Ki Yee.

ATTORNEY GENERAL OF WASHINGTON
Ecology Division
PO Box 40117
Olympia, WA 98504-0117
FAX (360) 586-6760

q. **Diesel** - 460 mg/kg: This applies to the top six feet of the fill.

r. **Heavy Oils** - There is no terrestrial ecological evaluation soil concentration established for this material in Table 749-2. Therefore the Method A value applies for the entire fill.

16. **Sampling Schedule** - The fill source sampling schedule remained the same as the existing fill criteria requirements provided by the NWRO/WQ Program in the email dated June 4, 2001 from Kevin Fitzpatrick to Chung Ki Yee. The existing sampling schedule was: minimum of two soil samples for less than 1000 cubic yards of soil, minimum of three soil samples for 1000 to 10,000 cubic yards of soil, minimum of four soil samples for 10,000 to 50,000 cubic yards of soil, minimum of five soil samples for 50,000 to 100,000 cubic yards of soil, and minimum of six soil samples for soil volume greater than 100,000 cubic yards. I submitted a copy of the draft fill criteria along with my bases for establishing those criteria to Kevin Fitzpatrick in the Northwest Regional Office Water Quality Program by emailed dated June 27, 2001. The draft fill criteria concluded my work in this project.

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Ecology Division
PO Box 40117
Olympia, WA 98504-0117
FAX (360) 586-6760

Chung Ki Yee
Washington State Department of Ecology
Toxics Cleanup Program/SC & UST
360-407-6991

WORK EXPERIENCE

Environmental Engineer 3—February 2001 to Present
Washington State Department of Ecology, Toxics Cleanup Program/SC & UST

Serves as facility manager for contaminated sites in the state.

Environmental Engineer 4—May 2000 to February 2001
Washington State Department of Ecology, Northwest Regional Office – Water Quality Program

Served as facility manager for King County Metro, Everett, and other surrounding municipal wastewater treatment facilities. Served as facility manager for SeaTac International Airport.

Environmental Engineer 3—December 1995 to May 2000
Washington State Department of Ecology, Central Regional Office - Toxics Cleanup Program

Served as facility manager for contaminated sites in Central Washington.

November 1995
Landau Associates, Inc., Edmonds, Washington

Completed a wastewater outfall dilution analysis for a paper manufacturing facility.

Principal—May 1994 to November 1995
PCA Consultants Ltd., Richmond, B. C. Canada

Provided environmental engineering services to Environment Canada and industries in British Columbia, Canada.

Project Engineer—October 1993 to April 1994 (On Leave from Ecology)
CJ Anderson Consultants, West Vancouver, B. C., Canada

Completed a storm water management project for Environment Canada.

Project Engineer—February 1993 to January 1994 (On Leave from Ecology)
Westmar Environmental Consultants Inc., North Vancouver, B. C., Canada

Completed environmental projects for Environment Canada and for industries.

Environmental Engineer 5—August 1988 to May 1994
Washington State Department of Ecology, Industrial Section

Served as the Technical Unit Supervisor. Completed engineering review of wastewater treatment facilities. Evaluated outfall mixing reports.

Environmental Engineer 3—March 1988 to August 1988
Washington State Department of Ecology, Construction Grants Section

Served as project engineer for municipal wastewater projects in the state.

Environmental Engineer 2—March 1986 to February 1988
Washington State Department of Ecology, Southwest Regional Office - Water Quality Program

Served as facility engineer for industrial and municipal wastewater facilities.

Senior Engineer—July 1980 to October 1985
Autocon Industries, Inc., St. Paul, Minnesota

Served as project engineer for the Technical Services Section.

EDUCATION

University of Minnesota—September 1969 to December 1980
Minneapolis, Minnesota

Ph.D., Civil Engineering
M.S., Civil Engineering
B.S., Mineral Engineering

PROFESSIONAL ENGINEER REGISTRATION

State of Washington (Civil Engineering and Chemical Engineering)