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September 21, 2009

Mr. James Okel
Precision Engineering, Inc.
8440 North Kerby Avenue
Portland, Oregon 97217

Re: Opinion pursuant to WAC 173-340-515(5) on July 21, 2008 *Final Remedial Investigation and Risk Assessment Report*, for the following Hazardous Waste Site:

- **Site Name:** Precision Engineering
- **Site Address:** 1231 South Director Sreet, Seattle, WA 98108
- **Facility/Site No.:** 2056
- **VCP Project No.:** NW 1511

Dear Mr. Okel:

Thank you for submitting documents regarding your proposed remedial action for the Precision Engineering facility (Site) for review by the Washington State Department of Ecology (Ecology) under the Voluntary Cleanup Program (VCP). Ecology appreciates your initiative in pursuing this administrative option for cleaning up hazardous waste sites under the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

This letter constitutes an advisory opinion regarding a review of submitted documents/reports pursuant to requirements of MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing releases at the Site.

Ecology is providing this advisory opinion under the specific authority of RCW 70.105D.030(1)(i) and WAC 173-340-515(5).

This opinion does not resolve a person's liability to the state under MTCA or protect a person from contribution claims by third parties for matters addressed by the opinion. The state does not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D.040(4). The opinion is advisory only and not binding on Ecology.

Ecology's Toxics Cleanup Program has reviewed the following information regarding your proposed remedial action(s):

1. 2009, June 8, *Re: Response to Ecology Comments dated December 29, 2008, for the Former Precision Engineering Site, 1531 SE Director Street, Seattle, Washington,* letter by Maul Foster Alongi

2. 2008, July 21, *Final Remedial Investigation and Risk Assessment Report, Former Precision Engineering, Inc. Site, 1231 South Director Street, Seattle, Washington,* Maul Foster & Alongi, Inc.

3. 2007, July 30, *Sediment Removal Work Plan, Precision Engineering, Seattle,* Maul Foster & Alongi, Inc

4. 2007, February 28, *Re: Comments on July 17, 2006 RI/RA Report – Precision Engineering VCP Site,* email from Mark Adams, Ecology to Alistaire Clary, Maul Foster & Alongi, Inc.

5. 2006, July 17, *Remedial Investigation and Risk Assessment, Precision Engineering, Inc. Site, 1231 South Director Street, Seattle, Washington,* Maul Foster & Alongi, Inc.

6. 2006, February 22, *Supplemental Remedial Investigation, Precision Engineering, Seattle,* Maul Foster & Alongi, Inc.

7. 2005, November 23, *Work Plan for Soil and Groundwater Supplemental Remedial Investigation,* Maul Foster & Alongi, Inc.

8. 2005, October 6, *Re: Precision Engineering, Inc. Addendum to Preliminary Soil and Groundwater Site Assessment Report*

9. 2005, August 5, *Preliminary Soil and Groundwater Assessment Report,* Maul Foster & Alongi, Inc.

10. 1993, July 21, *Independent Remedial Action Report,* Precision Engineering, Inc.

The reports and correspondence listed above will be kept in the Central Files of the Northwest Regional Office of Ecology (NWRO) for review by appointment only. Appointments can be made by calling the NWRO resource contact, Sally Perkins, at 425 649-9190.

The Site is defined by the extent of contamination caused by the following release(s):

- Hexavalent and trivalent chromium, arsenic, cadmium, copper, lead, trichloroethene (TCE), polycyclic aromatic hydrocarbons (PAHs), and diesel- and oil-range petroleum hydrocarbons into the Soil
- Hexavalent and trivalent chromium, TCE, vinyl chloride, diesel- and oil-range petroleum hydrocarbons, and PAHs into the Ground Water
- TCE, cis-1,2-dichloroethene (DCE), and vinyl chloride into the Air

The Site is more particularly described in Enclosure A to this letter, which includes a detailed Site diagram. The description of the Site is based solely on the information contained in the documents listed above.

Based on a review of supporting documentation listed above, pursuant to **requirements contained in MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing release(s) at the Site, Ecology has determined:**

1. **Characterization of the Site.**

Ecology has determined your characterization of the Site **is not** sufficient to establish cleanup standards and select a cleanup action based on the following:

- A conclusion had been reached that the uppermost aquifer would not yield 0.5 gallons per minute (gpm) to a properly constructed water supply well, and therefore need not be considered a current or future source of drinking water (WAC 173-340-720(2)(b)(i)). This conclusion, as expressed in the Ecology February 28, 2007 email referenced above, was based on the geometry and estimated permeability of the uppermost aquifer beneath the Site. While Ecology still believes this opinion is likely to be correct, supporting data in the form of pumping tests, along with yield calculations, are needed to confirm the conclusion. An argument has also been advanced that regardless of the yield, Ecology accepts shallow ground water in the general Duwamish industrial area as being non-potable. This is not true; Ecology continues to make site-specific determinations regarding potability based on the criteria outlined in WAC 173-340-720(2). A non-potability determination also requires a demonstration that hazardous substances are not likely to be transported in ground water to an area where the ground water is being or may be used as a potable source (WAC 173-340-720(2)(c)). The first part of this demonstration has been made (no current use), and the second part (future use) has been made from the standpoint of land use regulations. However the second part has not been fully demonstrated in terms of the physical attributes of flow, yield, and quality.

- Ground water modeling has been used to demonstrate that Site contaminants do not reach the Duwamish River. Ecology accepts the modeling as a reasonably conservative predictor of ground water conditions. However, additional field data is required to verify the modeling predictions. At least one, and preferably two, down gradient monitoring wells are necessary for this purpose. Ecology recognizes the potential difficulty of siting wells in an area with other contaminant sources, but believes this higher standard of proof is necessary given the inherent variability in ground water flow in alluvial environments.

- Only two rounds of ground water monitoring have been completed at the Site, and the last round was over three years ago. An additional round of monitoring is necessary to confirm that ground water conditions have not changed. Samples should be analyzed for the complete suite of contaminants present at the Site, whether above or below site-specific cleanup levels.

2. Cleanup Levels.

a. Indoor Air

Residential use is the standard air exposure scenario under MTCA unless a site qualifies as an industrial property, in which case Method C air cleanup levels may be used (WAC 173-340-706 (1)(c)). The Site currently meets the definition of an industrial property (see below).

Indoor Air – Industrial Worker
The primary air exposure route at the Site is indoor worker inhalation of soil vapor migrating through the building floor slab. A Method C cleanup level protective of indoor workers was therefore developed. The cleanup levels are provided below. Note that the Method C value for TCE was adjusted in October 2008 from 0.22 to 1.0 ug/m^3.

TCE	1.0 ug/m^3 (carcinogen)
DCE	35 ug/m^3 (non-carcinogen)
Vinyl chloride	2.8 ug/m^3 (carcinogen)

b. Soil

The Site meets the definition of an industrial property (WAC 173-340-745(1) and -200), and is expected to do so for the foreseeable future. The reasonable maximum exposure for soils should therefore be based on industrial land use. However, the presence of adjoining residential property requires consideration of soil cleanup levels based on unrestricted use. MTCA addresses this issue in WAC 173-340-745(1)(a)(iii) and -745(1)(b)(iii), and establishes a number of criteria that must be met.

If institutional controls were implemented and the contaminated soils capped at the Site as part of a final cleanup action, the criteria outlined in the referenced sections would likely be met. Industrial cleanup levels would be appropriate for the Site in that case.

For industrial soils, either Method A or Method C cleanup levels are potentially applicable. Method C is the appropriate choice for this Site because of the number of contaminants and the non-routine nature of the cleanup. If institutional controls were ultimately not chosen as part of the cleanup action at this Site, then Method C cleanup levels would no longer be appropriate.

Various modified Method C cleanup levels were developed for different exposure pathways. Those listed below are for contaminants that exceed cleanup levels. The final cleanup level for any compound is the most stringent value among the exposure pathways.

Soil Direct Contact – Industrial Worker

The following modified Method C cleanup levels are based on the assumption that industrial workers will come into contact with subsurface soils. The Method C values include total risk from incidental ingestion, dermal contact, and vapor inhalation.

TCE	6.78	mg/kg (carcinogen)
Arsenic	20	mg/kg*
Lead	1000	mg/kg**
Chromium (hex)	775	mg/kg (carcinogen)

* Method A industrial cleanup level, selected as more stringent than Method C
** Method A, Method C value not calculable.

Direct contact soil cleanup levels were not established for carcinogenic PAHs (cPAHs), primarily because they were present at highest concentration in ditch sediment and not obviously associated with Precision operations (PAHs are present in soils beneath the Precision building, but at much lower concentrations). Method C cleanup levels were deveveloped for individual PAHs, and Site concentrations were below these levels.

Soil Concentration Protective of Indoor Air – Industrial Worker

A cleanup level for soil protective of indoor air quality was developed using an attenuation factor calculated with the USEPA Johnson-Ettinger model. The attenuation factor was inserted into the air risk equations in WAC 173-340-750 to back-calculate soil cleanup levels based on carcinogenic and non-carcinogenic risk. A cleanup level was calculated for TCE only, as the contaminant present in greatest concentration in the soil. There is no need to calculate cleanup levels for DCE and vinyl chloride at this time, unless soil excavation and removal are ultimately selected as part of the final cleanup action.

TCE	.042 mg/kg (carcinogen)

Soil Concentration Protective of Ground Water Beneficial Uses

Soil concentrations protective of ground water have not been calculated, nor is there a need to do so at this time. Ground water data can be used to empirically demonstrate soil impact on ground water.

C. Ground Water

As noted above, shallow ground water at the Site is provisionally being considered non-potable until additional support is provided. The following steps outline the regulatory analysis used to develop the ground water cleanup levels, based on the assumption that the highest beneficial use for ground water is other than as potable water. Discussion of individual cleanup levels follows the outline.

Step 1: A site-specific risk assessment is conducted for protection of other beneficial uses (WAC 173-340-720(6)(b)(ii)). Exposure pathways and beneficial uses were identified as follows:

- Construction worker direct contact with contaminated ground water
- Industrial worker inhalation of contaminants volatilizing from ground water
- Protection of surface water beneficial uses

Step 2: The Site qualifies for Method B ground water cleanup levels, but not for Method C cleanup levels (WAC 173-340-720(6)(c)(i and ii)), because Method A or B cleanup levels would not be below area background, and because attainment of Method A or B cleanup levels would not have the potential for creating a significantly greater threat than would be posed by attainment of Method C levels (WAC 173-340-706(1)(a)(i and ii))

Step 3: The risk assessment demonstrates that the Method B cleanup levels do the following (WAC 173-340-720(6)(c)(i)(A - F):

- Meet applicable state and federal laws
- Result in no significant effects on human health
- Result in no exceedance of a 10-6 upper bound excess cancer risk
- Limit free product for petroleum compounds
- Not exceed surface water or sediment standards, unless it can be shown contaminants do not reach surface water
- Not pose a threat to surface water via other flow paths (e.g., storm drains)

Step 4: Limitations on the use of site-specific assessments exist, if the resulting cleanup levels exceed potable ground water cleanup levels. Specifically, various parties are to be notified, including potentially affected property owners, and institutional controls are to be implemented to prevent use of contaminated ground water (WAC 173-340-720 (6)(c)(iii)). These provisions have not been addressed as yet because they are, properly speaking, not part of the RI/RA; they are part of selecting and implementing the cleanup action.

Ground Water Direct Contact – Construction Worker

MTCA does not provide for calculation of cleanup levels for workers in direct contact with contaminated ground water. However, because this exposure presents a potential risk, we recommend further evaluation should an occasion arise for contact with ground water. The Oregon Department of Environmental Quality has developed an approach to calculating protective levels for this type of exposure, as described in the July 21, 2008 report by Maul Foster & Alongi.

Ground Water Concentration Protective of Indoor Air – Industrial Worker

Cleanup levels for ground water protective of indoor air quality were developed using the same methodology outlined above for developing a soil cleanup level protective of air.

TCE	10.8 ug/L
DCE	not yet calculated
Vinyl Chloride	71.5 ug/L

The DCE cleanup level protective of indoor air needs to be calculated.

Ground Water Concentrations Protective of Surface Water

The portion of the Duwamish River down gradient from the Site is brackish, containing a mixture of both fresh water and salt water. It is therefore not potable. As such, only surface water cleanup levels protective of aquatic species and of human ingestion of fish are applicable. None of the available surface water criteria explicitly address these exposures in brackish water, so the most stringent was selected as the target surface water standard. The contaminants at the Site which exceed these target concentrations are listed below.

Actual ground water cleanup levels were then developed by modelling contaminant attenuation between the Property line and the Duwamish River using the USEPA BIoChlor model, assuming that the Property line is the point of compliance (this remains to be determined). This process of developing cleanup levels is implicitly allowed, if "it can be demonstrated that the hazardous substances are not likely to reach surface water" (WAC 173-340-720 (6)(c)(i)(F)). The Duwamish River is approximately 1,800 feet from the edge of the Property, and the modeling did, in fact, show that contaminants present at the Property would not reach the river at detectable concentrations (additional field data is being requested to support the modeling conclusions). The cleanup levels derived in this manner are listed below.

Note that diesel- and oil-range petroleum hydrocarbons are present in ground water at the Site at concentrations above cleanup levels for potable water. However, there are no state or federal surface water standards for total petroleum hydrocarbons, and the chemical properties necessary to run the attenuation modeling are not available for diesel and oil.

Instead, selected PAHs that were detected in ground water were modeled as hydrocarbon surrogates. The results of this modeling showed that the PAHs would not be detectable at the river.

	Provisional Site-specific CUL		Most stringent surface water criterion
TCE:	600	ug/L	2.5 ug/L (Clean Water Act – fresh water)
Vinyl Chloride	4	ug/L	.025 ug/L (Clean Water Act – fresh water)
Chromium (trivalent)	950,000	mg/L	57 ug/L (173-201A WAC - fresh/chronic)
Chromium (hexavalent)	85	ug/L	10 ug/L (173-201A WAC - fresh/chronic)
Benzo (a) anthracene*	145,000	mg/L	.0038 ug/L (Clean Water Act – fresh water)
Chrysene*	95,000	mg/L	.0038 ug/L (Clean Water Act – fresh water)

* Selected PAHs. CULs also calculated for benzo (b) fluoranthene, benzo (k) fluoranthene, dibenzo (a,h) anthracene, idendo (1,2,3-cd) pyrene. **Note that there are discrepancies between PAH cleanup levels reported in the June 8, 2009 letter (Table 32), the July 21, 2008 report (Table 32), and in Appendix A of the July 21, 2008 report (Table A2, A4). The correct value needs to be clarified.**

3. Point of Compliance.

This opinion letter does not address points of compliance pending a final determination on the highest beneficial use for ground water.

4. Cleanup.

Two interim cleanup actions and various environmental investigations have been completed at the Site. The first interim action occurred in 1993, and involved the excavation and removal of chromium- and TCE-contaminated soil from beneath the Precision building floor slab. Washington State Dangerous Waste criteria then in existence were used to guide the excavation, resulting in soil being left in place that contained contaminants at concentrations greater than MTCA cleanup levels.

Various site investigations then took place beginning in 2005 and extending through 2006. These included soil, ground water, ditch sediment, indoor air, and soil vapor sampling and analysis.

In 2007 and 2008, the area of soil contamination associated with a highway ditch at the south end of the Property was cleaned up. Approximately 100 cubic yards of soil were removed from this area and disposed offsite. Confirmation samples collected from the sides and base of the excavation showed that the volume of soil containing lead, chromium, cadmium, arsenic, chrysene, and diesel/oil-range hydrocarbons above cleanup levels had been removed.
Selection and implementation of a final cleanup action remains to be completed.

This opinion does not represent a determination by Ecology that a proposed remedial action will be sufficient to characterize and address the specified contamination at the Site or that no further remedial action will be required at the Site upon completion of the proposed remedial action. To obtain either of these opinions, you must submit appropriate documentation to Ecology and request such an opinion under the VCP. **This letter also does not provide an opinion regarding the sufficiency of any other remedial action proposed for or conducted at the Site.**

Please note that this opinion is based solely on the information contained in the documents listed above. Therefore, if any of the information contained in those documents is materially false or misleading, then this opinion will automatically be rendered null and void.

The state, Ecology, and its officers and employees make no guarantees or assurances by providing this opinion, and no cause of action against the state, Ecology, its officers or employees may arise from any act or omission in providing this opinion.

Again, Ecology appreciates your initiative in conducting independent remedial action and requesting technical consultation under the VCP. As the cleanup of the Site progresses, you may request additional consultative services under the VCP, including assistance in identifying applicable regulatory requirements and opinions regarding whether remedial actions proposed for or conducted at the Site meet those requirements.

If you have any questions regarding this opinion, please contact me at 425 649-7107.

Sincerely,

Mark Adams
NWRO Toxics Cleanup Program

ma/kp

Enclosures (1): A – Site Description

cc: Merideth Gibson, Maul Foster Alongi
Tom Newlon, Stoel Rives LLP

ENCLOSURE A

SITE DESCRIPTION

Site Description

Site Definition and Area Description

The Site comprises a former Precision Engineering facility (Precision property or Property) and off-Property areas to the south and east. The Precision property is located at 1231 South Director Street in the South Park area of Seattle. The Site includes a portion of a drainage ditch impacted by runoff from the Precision property, and down gradient areas to the east potentially impacted by contaminated ground water.

The Site is within the area generally known as the Duwamish industrial area, and land use in the immediate area is mixed; residential housing to the north and west, industrial/commercial property to the east, and Highway 99 ramps on the south. The Precision property itself is zoned industrial, as are areas to the east and south. Immediately adjoining businesses include a refrigerator sales and repair operation (west), and a towing and limousine service (east). The property to the east was reportedly used as a paint shop in the 1970s and a fiberglass boat manufacturing facility before that.

Property History

The Precision property currently has a large manufacturing building on it surrounded by asphalt parking. Part of the building was constructed in 1966, and part in 1979. The Property was apparently undeveloped prior to that. Precision operated continuously between 1966 and 2005, specializing in the manufacture and repair of large hydraulic cylinders and metal rolls, large marine items such as propellers, and special blade assemblies. Services included grinding, polishing, honing, hard-chrome plating, milling, welding, and coating. Chromic acid was used extensively along with the degreaser, trichloroethene (TCE).

Physiographic Setting

The Site is situated in the Duwamish River valley, with the river about 1,800 east of the Precision property line. The land surface in the valley is generally flat-lying. However, there are a few small hills in the area, and the Precision property has been cut into one of them (termed "South Park hill" for purposes of this letter). The northern and western edges of the property therefore consist of steep cut slopes ranging up to about 40 feet high. The rest of the property slopes gently down to the east and south, merging with the slope of the valley floor.

Surface Water Conditions

Surface water drainage in the area is generally towards and into the Duwamish River. However, Highway 99 has disrupted the drainage creating a complex series of interconnected ditches and ponds. Surface water at the Precision property drains into one of the highway ditches along the southern border of the property. Part of the drainage is through overland flow; part is through collection in catch basins and discharge via culvert.

Biological Conditions

The Property and surrounding area is developed, and little or no natural habitat exists nearby except for storm water detention and drainage features associated with Highway 99. A large vegetated area associated with a former school is located about 500 feet northwest of the Property on top of the South Park hill. It is possible, but unlikely, that terrestrial species frequenting the school grounds would have access to the Site.

Geologic Conditions

The Precision property is located, as mentioned above, at the edge of the South Park hill within the Duwamish River valley. Consequently the property sits astride a boundary between geologic deposits. The western two-thirds of the Property is underlain by dense glacially-consolidated till. The till appears to transition downward at a depth of about 30 feet into more permeable outwash deposits. On the eastern third of the Property, recent floodplain sediments form a wedge lapping onto the underlying till. The wedge is about 20 feet thick at the eastern Property line, and thickens eastward. The alluvial floodplain sediments are composed of relatively fine-grained silty sands and silts. Five to seven feet of gravelly fill overlies the alluvial sediments.

Ground Water Conditions

Shallow ground water occurs within the alluvial sediments under unconfined (water table) conditions, and the outwash deposits under confined conditions. The depth to the water table is typically five feet or less. Ground water also occurs in more permeable zones within the till. Most of the shallow ground water directly beneath the Precision building occurs in the till. Flow directions in the permeable till/alluvial aquifer are to the east towards the Duwamish River. Flow directions in the underlying outwash aquifer are not known. However, the hydraulic head in the outwash aquifer is above land surface on the western part of the Property and below the water table on the eastern portion suggesting rapid discharge into the alluvial aquifer at some location to the east or north closer to the river.

Soil Contamination

Contaminants were released at the Property primarily into the soils directly beneath the Precision building. Most of the contamination appears to be associated with an area of historical trench drains and tank vaults in the "chrome shop" and "grinding shop". Elevated concentrations of TCE and chromium (both hexavalent and trivalent) are present in this area. Diesel- and oil-range petroleum hydrocarbons are also present below the southeastern corner of the building associated with the former boiler room and steam cleaning area. PAHs were also present at low concentrations associated mostly with the petroleum hydrocarbon contamination, but also within the TCE/chrome area.

Some contaminants also appear to have been released outside the Precision building and carried off-Property via overland surface water flow into the highway drainage ditch. The contaminated area measured about 40 feet in width along about 80 feet of ditch, and contained elevated arsenic, cadmium, chromium, copper, lead, PAHs, and oil-range hydrocarbons. The type and distribution of contaminants suggested contribution from the Precision property and highway runoff, and perhaps from the property to the east.

Ground Water Contamination

Shallow ground water has been contaminated at the Property with TCE and its breakdown products cis-1,2-dichloroethene (DCE) and vinyl chloride (VC), hexavalent and trivalent chromium, diesel- and oil-range petroleum hydrocarbons, and PAHs. Arsenic is also present in both the alluvial and outwash aquifers at concentrations above cleanup levels. However, it appears to be present at natural or area background, not associated with releases from Precision. The area of ground water contamination occurs beneath the Precision building and extends to the east and southeast. The extent of ground water contamination off-Property to the east has not been established, but modeling has shown that most contaminants would be undetectable within 300 to 700 feet of the Property line. Vinyl chloride is an exception. Modeling shows it extending almost to the Duwamish River. The model results are conservative and detectable ground water contamination probably does not extend very far beyond the Property line.

Soil Vapor

TCE and its breakdown products are continuing to volatilize from contaminated soil and ground water. Consequently these contaminants are present in soil vapor beneath the Precision building, and specifically below the former chrome and grinding shops. The TCE concentrations in soil vapor below the building slab are well above the current air cleanup level. TCE was also detected in indoor air within the building, but at concentrations well below the cleanup level and close to concentrations found in air outside the building.

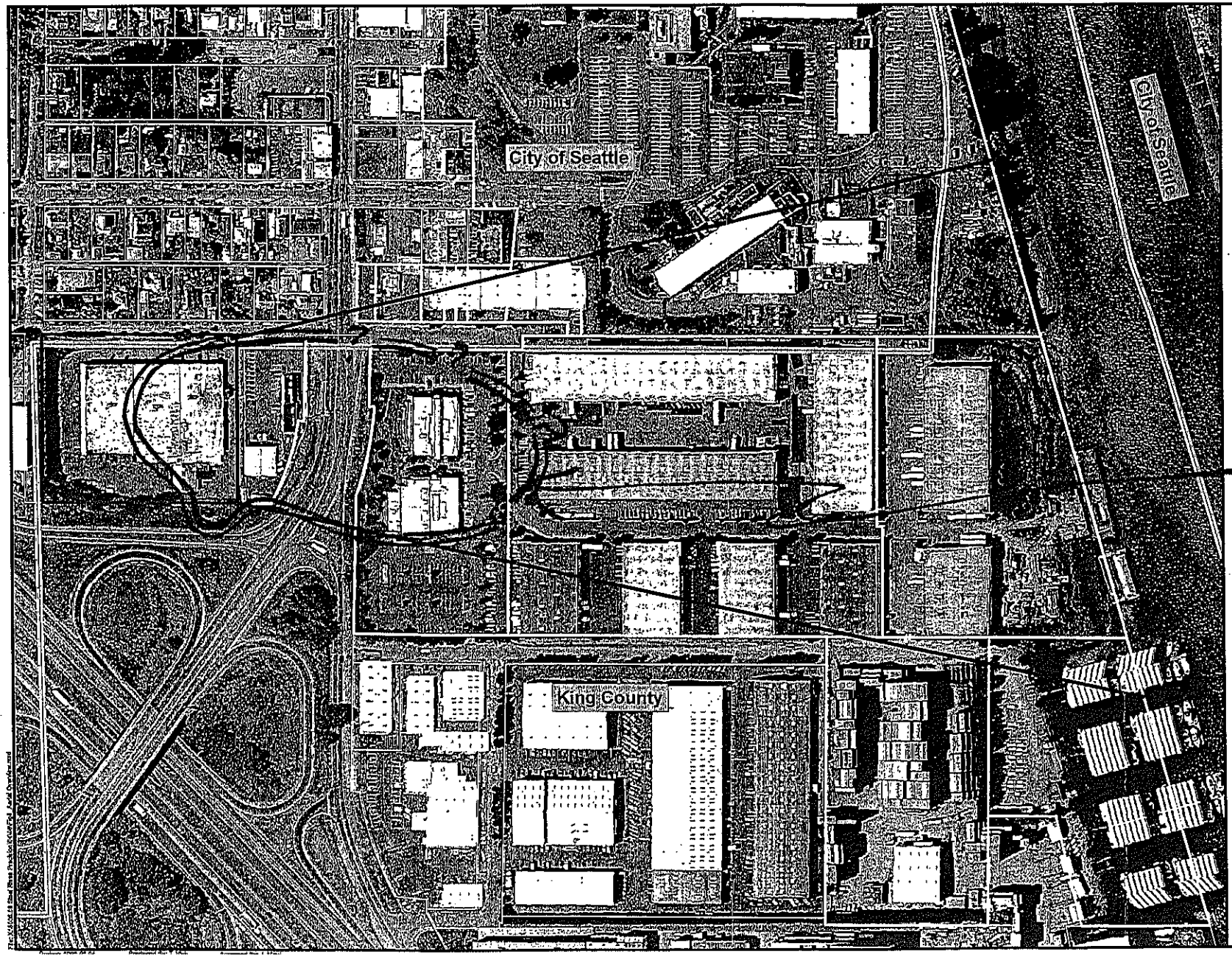

Figure 8
Aerial Overview

Precision Engineering, Inc.
Seattle, Washington

Legend
- Groundwater Plume Extent
- Tax Lots
- Tax Lots - Study Area
- Precision Equipment
- City of Seattle - King County Border

Source: Aerial Photograph (2002) obtained from USGS Seamless Server

SITE, APPROXIMATE BOUNDARY
M. ADAMS
9/21/09

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Feet

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