ENVIRONMENTAL PARTNERS INC

Well Decommissioning Interim Measure Work Plan

Boeing Plant 2
Seattle/Tukwila, Washington

Prepared For:

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ACRONYMS

DSOA	Duwamish Sediment Other Area
EPA	United States Environmental Protection Agency
EPI	Environmental Partners, Inc.
EAD	enhanced aerobic degradation
ERD	enhanced reductive dechlorination
FCMS	focused corrective measures study
IM	Interim Measure
LDW	Lower Duwamish Waterway
OA	Other Area
PAH	polycyclic aromatic compound
RCRA	Resource Conservation and Recovery Act
RI/FS	remedial investigation/feasibility study
SWMU	Solid Waste Management Unit
VOC	volatile organic compound
WAC	Washington Administrative Code

1.0 INTRODUCTION

This Interim Measure (IM) Work Plan has been prepared on behalf of The Boeing Company (Boeing) to facilitate future demolition and construction activities at Boeing's Plant 2 in Seattle/Tukwila, Washington. Preparation of this IM Work Plan and implementation of the planned IM will be performed under the Administrative Order on Consent, dated January 18, 1994, between Boeing and the Environmental Protection Agency (EPA) Region X.

This Work Plan for well decommissioning is specific to the central portion of Plant 2, which consists of the 2-31 Area, the 2-40s Area, 2-60s Area, and the 2-66 Area. Other than inclusion of the full network of Shoreline Monitoring wells for reasons of completeness, the proposed future disposition of wells in the North Area, 2-10 Area, and South Yard Area is not discussed in this Work Plan because the currently-planned demolition and construction work will not affect those areas.

The location of Plant 2 is presented in Figure 1, and the central portion of Plant 2, to which this IM applies, is shown in Figure 2. Boeing intends to demolish existing infrastructure and construct new utilities, parking, and habitat in the central portion of Plant 2 beginning in the spring of 2010. The planned work includes removal and excavation of buildings, concrete slabs, and other surface and below-ground features. In addition, new utility corridors will be constructed in some areas and soil excavation will be required.

This IM Work Plan applies to decommissioning wells that will or would likely be impacted by the planned demolition and construction work. Well decommissioning will precede planned demolition and construction work in order to protect groundwater, which can be put at risk if the wellheads or well seals are damaged in the course of demolition and construction work. Decommissioning will follow Washington State Department of Ecology (Ecology) regulations specified in Washington Administrative Code (WAC) 173-160-460. Demolition and construction work activities will be documented separate from this IM Work Plan.

1.1 Work Plan Organization

Monitoring well background information, well decommissioning objectives, and criteria for retaining and protecting or decommissioning wells are presented in Sections 1.2, 1.3, and 1.4, respectively. These sections indicate and provide a rationale for specific wells that Boeing intends to retain through special protective measures, and wells that are proposed for decommissioning. Section 2 presents applicable Ecology regulations governing well decommissioning that will be followed. Section 3 discusses the IM schedule and reporting, and Section 4 presents references cited in this Work Plan.

1.2 Background

Numerous monitoring and injection wells have been installed throughout Plant 2. Most of the Plant 2 monitoring wells were installed for the Remedial Investigation/Feasibility Study (RI/FS) and Corrective Measures Study (CMS) processes to provide data to evaluate water quality

throughout the property. Additional monitoring and injection wells were installed later in the CMS process to provide additional information to fill data gaps or to facilitate IMs.

The shoreline monitoring well network is a subset of the RI/FS and CMS investigation wells that consists of wells installed near the Duwamish Waterway to monitor groundwater quality prior to its entering the waterway. More recently, several remedial IMs have been implemented to help improve groundwater quality at Plant 2. These IMs required installation of new monitoring or injection wells to implement and monitor the IM. IMs that currently have associated monitoring wells include the 2-66 enhanced reductive dechlorination (ERD) IM, the Electrical Manufacturing Facility (EMF) ERD IM, which is administered by EPA under a separate Order, the Other Area (OA)-11 Focused Corrective Measures Study (FCMS), the OA-12 ERD IM, and the OA-9 enhanced aerobic degradation (EAD) IM. All wells in the subject areas are accounted for in this IM Work Plan.

1.3 Objectives of the Planned IM

It will be difficult and impractical to protect all wells in the planned demolition and construction areas during demolition and construction activities. It is likely that many wells, if retained, would be destroyed or damaged during the demolition and removal of the surrounding concrete areas or building superstructures. Accidental damage to wells commonly makes it difficult or impossible to properly decommission the damaged well and damaged wells that cannot be properly decommissioned can act as conduits from the surface to underlying groundwater resulting in otherwise avoidable impacts.

Planned well decommissioning prior to demolition and construction work, as described by this Work Plan, will allow Boeing to focus on protecting and maintaining wells that are important for ongoing and future monitoring programs, and to decommission those wells no longer needed at Plant 2.

1.4 Criteria for Retaining and Protecting Wells

Wells identified as those that will be protected to the extent practicable during demolition and construction activities are grouped into three main categories:

- Current shoreline monitoring wells
- Potential future shoreline monitoring wells
- Injection and monitoring wells associated with ongoing or planned IMs

In Table 1 wells are grouped by function and each group is discussed below along with the criteria for protection or decommissioning objectives. Table 1 lists wells that will be retained and protected with the intent of maintaining well integrity to the extent practicable. These wells are designated as NA (not applicable) in the “Year to be Decommissioned” column. Table 1 also presents wells proposed for decommissioning prior to demolition or construction along with the planned year for decommissioning. Additional information regarding well decommissioning timing is provided in the notes column of Table 1.

Shoreline Monitoring Wells: Wells that are currently included in the shoreline monitoring program will be protected and retained to the extent practicable due to their importance in monitoring the quality of groundwater entering the Duwamish Waterway. These wells are part of a long term, ongoing monitoring program with a large volume of historical data and are listed in Table 1 and shown on Figure 2.

An exception to the intent to protect and retain existing shoreline monitoring wells is PL2-233A, which must be decommissioned prior to the construction of new South Park Bridge and the demolition of the old South Park (16th Avenue) Bridge by King County. The planned alignment of the new bridge passes over the current PL2-233A location such that PL2-233A will be destroyed during construction. Well PL2-233A will be replaced by a new three-level monitoring well cluster (A, B, and C level monitoring wells) approximately 80 to 100 feet south of the current PL2-233A location. The screened interval for PL2-233AR (replacement well) will be 6-21 feet bgs, which is consistent with data gap investigation A level wells and is approximately the same screened interval as the current PL2-233A. Wells PL2-233B and PL2-233C will be screened from approximately 35-45 feet bgs and 75-85 feet bgs, respectively. These well screen intervals might be adjusted based on site-specific geology encountered during drilling. The general area proposed for the replacement wells is shown in Figure 3. The proposed cluster well location is shown as an area rather than a specific point to allow flexibility to avoid subsurface or overhead obstructions during drilling.

Existing shoreline monitoring wells PL2-013A, PL2-015A, PL2-015B, PL2-030A, PL2-030C, PL2-036A, and PL2-036AR will be decommissioned prior to implementation of the planned Duwamish Sediment Other Area (DSOA) project, which is not part of this IM and is scheduled for 2012. The replacement wells for PL2-013A, PL2-015A, and PL2-015B, which were previously installed at appropriate upgradient locations, will be managed as part of the planned DSOA project. A replacement well for PL2-036AR will be installed at an EPA-approved location near the Duwamish Waterway. Replacement well installation will occur after demolition and construction activities are completed in the area, as described in the Notes column of Table 1. The PL2-009 well cluster will be retained as potential future shoreline monitoring wells, replacing sampling locations for PL2-030A and PL2-030C.

Existing shoreline wells that, despite best efforts, become damaged beyond repair during demolition and construction activities will be decommissioned according to well decommissioning regulations in WAC 173-160-460. Replacements for destroyed wells will be installed at locations and with screened intervals in coordination with EPA. Replacement wells will be installed per Ecology guidelines for installation and development of resource protection wells found in WAC 173-160-400. Any necessary replacement wells will not be installed until demolition and construction activities are completed in the area.

Potential Future Shoreline Monitoring Wells: Wells near the Duwamish Waterway that may in the future be added to the shoreline monitoring network and will be protected and retained to the extent practicable are listed in Table 1 and are shown on Figure 2. Most of the potential future shoreline monitoring wells are B and C level wells that complete a three-level cluster at an existing A level shoreline monitoring well location. Other potential future shoreline monitoring

wells are included because they are installed near the Duwamish Waterway and are at locations that are not redundant with current shoreline monitoring wells.

Current IM Monitoring and Injection Wells: Wells associated with ongoing IMs will be protected and retained to the extent practicable. These wells are listed in Table 1 and are shown in Figure 2. These monitoring and injection wells will be protected and retained until the IM that they support is determined to be complete following EPA approval.

The monitoring and bioventing wells associated with the OA-9 IM will be decommissioned when Building 2-44 and 2-49 are demolished, which is planned for 2010. The OA-9 IM addresses residual petroleum hydrocarbon contamination in the vadose zone soil that impacts groundwater. The impacted soil could not be completely removed during previous excavation work in the area due to nearby structures and numerous subsurface utilities. Following building demolition, excavation work is planned for this area to remove subsurface utilities. Boeing will excavate the residual petroleum hydrocarbon impacted soil as part of subsurface utility removal. Following excavation the need for a further remedy will be evaluated as part of the CMS. Boeing's rationale for these various objectives is captured in Table 1.

2.0 DECOMMISSIONING PROCESS

Wells approved for decommissioning, or damaged beyond repair during demolition or construction will be decommissioned by a Washington State-licensed driller according to WAC 173-160-460 "Decommissioning Process for Resource Protection Wells." An Environmental Partners, Inc. (EPI) geologist or engineer licensed by the State of Washington will supervise the driller and document the well decommissioning process.

The decommissioning process will begin by reviewing the well construction logs for the wells to be decommissioned. This review step will determine if the well was constructed according to WAC 173-160-420 "General Construction Requirements for Resource Protection Wells". Wells constructed according to WAC 173-160-420 specifications will be decommissioned following the procedures specified in WAC 173-160-460(2). Wells not constructed according to WAC 173-160-420 specifications will be decommissioned according to WAC 173-160-460(1). Applicable well construction and well decommissioning regulations are presented in Attachment A.

3.0 SCHEDULE AND REPORTING

The schedule for decommissioning wells at Plant 2 is dependent on planned demolition and construction work activities that will begin in 2010 and is expected to continue through 2012. Well decommissioning described in this IM will be implemented in the sequence necessitated by the schedules of planned demolition and construction projects. In other words, wells will be decommissioned in increments directly related to the scope of the demolition or construction, beginning in spring 2010 with PL2-233A to accommodate to the King County Bridge project schedule, wells in the planned duct bank excavation, and those affected by the Building 2-49 and

2-44 demolition. Following this initial activity under this IM Work Plan, wells will be decommissioned in turn in the 2-41, 2-40 and 2-60s slab footprints.

Following decommissioning, the Washington State licensed drilling subcontractor will prepare applicable "Notice of Intent to Decommission a Well" forms and submit these forms to the Washington State Department of Ecology. EPI will prepare for Boeing submittal to EPA, a report that documents each well decommissioned or otherwise affected by the planned demolition and construction work, the decommissioning procedures used for each well, and other pertinent information. Information for each decommissioned well will be documented in a decommissioning log. A well decommissioning log template is included in Attachment B. The template includes the following information:

- Well location and well number
- Start and end date and time
- Installation (drilling) method
- Well depth
- Well diameter
- Type of casing
- Type, depth, and length of screened interval
- Decommissioning procedure; WAC 173-160-460(1), or WAC 173-160-460(2)
- Type and volume of grout mixture used
- Surface completion
- Firm completing the decommissioning
- Signature of person who performed the work

4.0 REFERENCES

WAC 173-160-420 *General Construction Requirements for Resource Protection Wells.* Washington Administrative Code.

WAC 173-160-460 *Decommissioning Process for Resource Protection Wells.* Washington Administrative Code.

TABLE

Table 1: Proposed Future Status of Plant 2 Wells South of the New South Park (16th Avenue) Bridge

Well	Northing	Easting	Total Depth (ft. bgs)	Screened Interval (ft. bgs)	Area	Year to be Decommissioned[1,2]	Notes[2]
Existing Shoreline Monitoring Wells							
PL2-013A	195888.4881	1275670.6940	20.82	6-20	2-66	2012	Decommissioned for DSOA project in 2012.
PL2-607A	195924.5	1275731.9	21	6-21	2-66	NA	Protected during demolition and construction.
PL2-015A	196001.6284	1275566.773	20.88	6-20.5	2-66	2012	Decommissioned for DSOA project in 2012.
PL2-015AR	196022	1275589	19.5	9.4-19	2-66	NA	Protected during demolition and construction.
PL2-015B	196008.4253	1275573.957	50	40-50	2-66	2012	Decommissioned for DSOA project in 2012.
PL2-030A	195840.127	1275756.423	30	25-30	2-66		
PL2-030C	195835.404	1275760.301	81.5	75.5-80	2-66		
PL2-036A	196072.6405	1275503.495	20.41	8-18	2-66		
PL2-036AR	196103	1275536	20.5	10.5-20	2-66	2012	Decommissioned to allow utility line removal. Will be replaced with a new well in an EPA-approved location following construction.
PL2-043B	195825.948	1275769.123	56.5	50.5-55.2	2-66	NA	Protected during demolition and construction.
PL2-044B	195811.313	1275808.371	57	51.7-56	2-66		
PL2-214A	197378.5128	1274203.75	30.15	15-30	2-10		
PL2-214B	197394.4537	1274214.747	60.08	45-60	2-10		
PL2-214C	197377	1274193	82	75.5-80	2-10		
PL2-227A	197122.1031	1274457.353	16.5	6-16.5	2-10		
PL2-232A	197241.7314	1274341.943	21.03	5-20	2-10		
PL2-233A	196929.8837	1274627.577	26.5	10-25	2-31	2010	Must be decommissioned for bridge construction. Will be replaced with a new 3-level well cluster in an EPA-approved location following construction.
PL2-258A	197722.453	1273786.284	23.02	8-23	2-10	NA	Protected during demolition and construction.
PL2-258B	197715.527	1273794.851	51.5	40-50	2-10		
PL2-258C	197708.6909	1273802.422	106.5	92-102	2-10		
PL2-420A	196637.0977	1274993.975	29	14-29	2-40s		
PL2-425A	196339.1102	1275445.826	18	8-18	2-40s	NA	Protected during demolition and construction.
PL2-443A	196826.6461	1274807.579	23	8-23	2-40s		
PL2-JF01AR	195768.3965	1275853.797	28	23.2-27	JF	NA	On Jorgensen property, not in planned demolition or construction area
PL2-JF01B	195774.446	1275844.117	51.5	40-50	JF		
PL2-JF01C	195775.795	1275838.557	79	74-78.5	JF		
PL2-JF02A	198707.0644	1274675.733	18	8-18	JF		

Table 1: Proposed Future Status of Plant 2 Wells South of the New South Park (16th Avenue) Bridge

Well	Northing	Easting	Total Depth (ft. bgs)	Screened Interval (ft. bgs)	Area	Year to be Decommissioned[1,2]	Notes[2]
Potential Future Shoreline Monitoring Wells (excluding 2-10, North, and South Yard Areas)							
PL2-009A	195896.6187	1275765.326	21.54	6-21	2-66	NA	Will be protected. Part of a three-well cluster.
PL2-009B	195901.9486	1275770.198	50.59	41-50	2-66		
PL2-009C	195890.9527	1275763.525	95.11	85-95	2-66		
PL2-013B	195933.4	1275722.6	45	39-44	2-66	NA	Will be protected. Part of a three-well cluster, see shoreline well list for A-level well.
PL2-013C	195924.2	12275731.9	85	80-85	2-66		
PL2-014AR	195979.4	1275645.1	21	6-21	2-66	NA	Will be protected. Part of a two-well cluster.
PL2-014B	195976.5	1275649/1	45.5	40.5-45.5	2-66		
PL2-015BR	196028	1275591.2	45	40-45	2-66	NA	Will be protected. Part of a two-well cluster, see shoreline well list for A-level well.
PL2-036B	196113.2	1275569.5	45	40-45	2-66	NA	Will be protected. Part of a three-well cluster, see shoreline well list for A-level well.
PL2-036C	198618.3	1275475	85.31	80-85	2-66		
PL2-420B	196340.5	1275442.4	45.5	35-45	2-40s	NA	Will be protected. Each is part of a three-well cluster, see shoreline well list for A-level wells. Also are EMF Monitoring Wells.
PL2-420C	196645.4	1275001.3	80.5	75-80	2-40s		
PL2-443B	196832.6	1274801	45.5	35-45	2-40s		
PL2-443C	196836.8	1274797.4	75.5	70-75	2-40s		
PL2-444A	196767	1274878	26.5	10-25	2-40s	NA	Will be protected.
Interim Measures Wells							
OA-11 FCMS							
PL2-007AR	195818.774	1275875.321	17.5	7-17	2-66	NA	Will be protected. Proposed OA-11 monitoring well.
OA-12 IM							
OA-12-01A	196479.000	1276061.800	25.5	15-25	2-60s	Pending	Will be evaluated prior to construction affecting that area in 2012. Any planned decommissioning will be approved by EPA prior to decommissioning.
OA-12-01B	196474.200	1276067.100	45.5	35-45	2-60s		
OA-12-02A	196447.000	1276099.000	25.5	15-25	2-60s		
OA-12-02B	196441.500	1276104.000	45.5	35-45	2-60s		
OA-12-03A	196414.500	1276134.700	25.5	15-25	2-60s		
OA-12-03B	196408.500	1276141.700	45.5	35-45	2-60s		
PL2-315A	196409.346	1276063.685	19	8.5-18.5	2-60s		
PL2-315B	196396.8971	1276066.426	51.5	40-50	2-60s		
PL2-330A	196357.767	1276030.701	18	8-18	2-60s		
PL2-330B	196362.736	1276024.686	50	40-50	2-60s		
OA-12-04A	196325.700	1275991.500	25.5	15-25	2-60s		
OA-12-04B	196319.900	1275998.000	45.5	35-45	2-60s		
OA-12 05B	196246.600	1275929.700	45.5	35-45	2-60s		

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Well	Northing	Easting	Total Depth (ft. bgs)	Screened Interval (ft. bgs)	Area	Year to be Decommissioned[1,2]	Notes[2]
2-66 Sheetpile ERD IM							
PL2-008A PL2-041AA)	NA	NA	18	15-18	2-66	NA	Will be protected. Part of ongoing 2-66 ERD IM monitoring.
PL2-008B	195822.133	1275802.376	50.7	40.5-50	2-66		
PL2-008C	195825.943	1275796.396	96	80.5-95	2-66		
PL2-010A	195845.345	1275839.895	21.2	6-20	2-66		
PL2-017A	195887.459	1275820.158	21.5	6-20.5	2-66		
PL2-021A	195882.699	1275877.112	19.9	4.5-19	2-66		
PL2-021B	195878.277	1275872.293	49	38.5-48	2-66		
PL2-021C	195877.234	1275878.079	92.1	81.5-91	2-66		
PL2-031A	195840.042	1275768.031	30	25-30	2-66		
PL2-032A	195927.783	1275918.744	30	25-30	2-66		
PL2-035A	195831.094	1275846.311	30	25-30	2-66		
PP-1B-I	195897.325	1275875.908	50.5	48-50	2-66		
PP-2B-I	195824.129	1275837.947	50.5	48-50	2-66		
PP-2B-O	195822.301	1275840.300	50.5	48-50	2-66		
PP-3A-I	195861.505	1275851.046	20.5	18-20	2-66		
PP-3B-I	195861.413	1275844.443	50.5	48-50	2-66		
PP-3C-I	195866.991	1275847.643	90.5	88-90	2-66		
PP-4B-I	195830.968	1275868.308	50.5	48-50	2-66		
PP-4B-O	195828.348	1275870.456	50.5	48-50	2-66		
PP-5B-I	195899.058	1275811.196	50.5	48-50	2-66		
OA-9 IM							
PL2-310A	196467.5884	1275754.609	19	9-19	2-60s	2010	Decommissioned prior to Building 2-44, Building 2-49 demolition. Need for further remedy will be evaluated as part of CMS.
PL2-311A	196497.6732	1275782.804	18	8-18	2-60s		
PL2-604A	196456.05	1275743.69	21.5	6-21	2-60s		
PL2-605AR	196517.4	1275780.24	21.5	6-21	2-60s		
PL2-606A	196508.55	1275796.81	21.5	6-21	2-60s		
BV-01	196486.9	1275765.2	10.5	3-10	2-60s		
BV-02	196511.1	1275828.3	10.5	3-10	2-60s		
BV-03	196486.7	1275845.1	10.5	3-10	2-60s		
BV-04	196462.6	1275823.2	10.5	3-10	2-60s		
BV-05	196436.9	1275800.0	10.5	3-10	2-60s		
BV-06	196415.2	1275780.2	10.5	3-10	2-60s		

Table 1: Proposed Future Status of Plant 2 Wells South of the New South Park (16th Avenue) Bridge

Well	Northing	Easting	Total Depth (ft. bgs)	Screened Interval (ft. bgs)	Area	Year to be Decommissioned[1,2]	Notes[2]
EMF Plume IM (2-40s Area Parking Lot)							
EMF-IW-8	197411.2	1275637.1	49	39-49	2-40s	NA	Protected during demolition and construction.
EMF-IW-9	197388.8	1275661.9	49	39-49	2-40s		
EMF-IW-10	197367.0	1275685.1	50	40-50	2-40s		
EMF-IW-11	197345.9	1275708.4	50	40-50	2-40s		
EMF-IW-43	197304.8	1275744.2	50	40-50	2-40s		
EMF-IW-44	197276.4	1275773.7	50	40-50	2-40s		
EMF-WF-30	197340.7	1275660.8	50	40-50	2-40s		
EMF-WF-36	197446.4	1275756.3	50	40-50	2-40s		
PL2-440A	197453.6322	1275746.487	18.5	8-18	2-40s		
PL2-440B	197450	1275746	45.5	40-45	2-40s		
PL2-440C	197451.1	1275749.2	85	79.5-84.5	2-40s	NA	Potential future upgradient monitoring location, not in planned demo area
PL2-441A	197690.4469	1275487.108	19	8-18	2-40s	NA	Protected during demolition and construction.
PL2-441BR	197674.8	1275481.3	45.5	40.5- 45.5	2-40s		
PL2-441C	197678.6	1275478.1	82	76.5-81.5	2-40s	NA	Potential future upgradient monitoring location, not in planned demo area.
PL2-608A	197129.3	1276102.8	21	6-21	2-40s	NA	Potential future upgradient monitoring location, not in planned demo area.
PL2-608B	197125.1	1276107.4	45.5	40.5-45.5	2-40s		
PL2-608C	197122.5	1276101.6	84	79-84	2-40s		
EMF Plume IM (2-40 Building)							
EMF-IW-1	197130.9	1275421.0	45	35-45	2-40s	NA	Protected during demolition and construction.
EMF-IW-2	197117.3	1275435.7	45	35-45	2-40s		
EMF-IW-3	197103.5	1275450.3	45	35-45	2-40s		
EMF-IW-7	197084.2	1275470.3	40	30-40	2-40s		
EMF-IW-39	197063.0	1275493.4	50	40-50	2-40s		
EMF-IW-40	197152.0	1275398.5	47	37-47	2-40s		
EMF-IW-41	197171.0	1275378.5	50	40-50	2-40s		
EMF-IW-42	197192.0	1275356.5	50	40-50	2-40s		
EMF-WF-31	197044.3	1275218.7	39	29-39	2-40s		
EMF-WF-33	197079.2	1275374.6	45	35-45	2-40s	2011	Requires concurrence from EPA RPM for EMF plume.
EMF-WF-34	197055.1	1275317.2	45	35-45	2-40s		
EMF-WF-35	197023.4	1275260.0	45	35-45	2-40s		

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Well	Northing	Easting	Total Depth (ft. bgs)	Screened Interval (ft. bgs)	Area	Year to be Decommissioned[1,2]	Notes[2]
EMF Plume IM (2-41 Building)							
EMF-IW-4	196897.1	1275089.6	45	35-45	2-40s	NA	Protected during demolition and construction.
EMF-IW-5	196874.0	1275114.0	40	30-40	2-40s		
EMF-IW-6	196851.7	1275138.5	40	30-40	2-40s		
EMF-IW-38	196831.8	1275161.0	50	40-50	2-40s		
EMF-IW-37	196916.7	1275066.2	50	40-50	2-40s		
EMF-WF-32	196707.4	1274946.9	35	25-35	2-40s		
PL2-442A	196748.5543	1275013.196	18	8-18	2-40s	2011	May need to be decommissioned due to planned stormwater swale placement; will be saved/protected if swale can be redesigned.
PL2-442B	196749.5	1275014	45.5	35-45	2-40s		
PL2-442C	196751.7	1275009.7	80.5	75-80	2-40s		
EMF-WF-39					2-40s	NA	Proposed new wells. Protected if installed prior to demolition.
EMF-WF-40					2-40s		
EMF-WF-41					2-40s		
2-31 Area Wells Not Currently Used or Planned for Use							
PL2-501A	197303.3024	1274930.303	20.5	10-20	2-31	2011	Decommissioned for Building 2-31 demolition.
PL2-501B	197300.3464	1274937.211	50.5	40-50	2-31		
PL2-501C	197297.6254	1274944.929	78.5	68-78	2-31		
PL2-502A	197110.8655	1274798.368	18	8-18	2-31		
PL2-503A	197531.7809	1274941.327	17.5	7-17.5	2-31	NA	Not in planned demolition area.
PL2-504A	197570.0865	1274990.552	14.7	4.2-14.7	2-31		
PL2-505A	197585.3839	1274908.443	24.5	9-24.5	2-31		
PL2-507A	198199.8943	1274944.021	18	8-18	2-31		
PL2-507B	198169.6	1274967.6	45.5	35-45	2-31		
PL2-507C	198185.4	1274948.6	75.5	65-75	2-31		
PL2-508A	197342.6062	1274962.046	19	9-19	2-31	2011	Decommissioned for AOC 2-31.21 excavation.
PL2-509A	197344.644	1274954.656	18.9	8-18	2-31		
PL2-509B	197342.06	1274952.296	50.5	40-50	2-31		

Table 1: Proposed Future Status of Plant 2 Wells South of the New South Park (16th Avenue) Bridge

Well	Northing	Easting	Total Depth (ft. bgs)	Screened Interval (ft. bgs)	Area	Year to be Decommissioned[1,2]	Notes[2]
2-40s Area Wells Not Currently Used or Planned for Use							
PL2-321A	196419.014	1275649.363	18	8-18	2-40s	2010	Decommission prior to demolition.
PL2-401A	197159.0309	1275105.281	23	12-22	2-40s	2011	Decommission prior to demolition.
PL2-410A	196661.3479	1275566.594	21.5	11-21	2-40s		
PL2-425B	196340.5	1275442.4	45.5	40-45	2-40s	2010	In planned duct bank alignment.
PL2-425C	196340.3	1275437.1	82.5	77-82	2-40s		
PL2-430A	196940.2226	1274862.459	25	15-25	2-40s	2010	Decommission prior to duct bank excavation
PL2-435A	197142.8391	1275496.11	19	8-18	2-40s	2011	Decommission prior to demolition.
PL2-435B	197136	1275491.6	45	39.5-44.5	2-40s		
PL2-435C	197135.1	1275498.2	84	78.5-83.5	2-40s		
PL2-445A	197350	1275654	20	10-20	2-40s	NA	Not in planned demolition area.
PL2-446A	196943.045	1274838.135	18.5	8-18	2-40s	2010	Decommission prior to duct bank excavation
PL2-447A	196992.86	1274859.891	18.5	8-18	2-40s		
2-60s Area Wells Not Currently Used or Planned for Use							
PL2-312A	196856.6879	1276081.086	18	8-18	2-60s	2010	Decommission prior to demolition of 2-44 and 2-49 Buildings.
PL2-314A	196685.1499	1276175.829	18.5	8.5-18.5	2-60s	2012	Decommission prior to demolition.
PL2-316A	196655.2527	1276215.709	18	8-18	2-60s		
PL2-316B	196650.2538	1276213.034	50	40-50	2-60s		
PL2-316C	196660.2758	1276204.581	85	75-85	2-60s		
PL2-317AR	196178.782	1276200.795	18	8-18	2-60s		
PL2-319A	196978.7256	1276290.399	18	8-18	2-60s	NA	Potential future upgradient monitoring location, not in planned demo area
PL2-325A	196235.2995	1275841.271	18	8-18	2-60s	2012	Decommission prior to demolition.
PL2-325B	196237.4115	1275832.947	50	45-50	2-60s		
PL2-326A	196747.296	1276306.189	18.5	8-18	2-60s		
PL2-326B	196742.764	1276311.532	50.5	40-50	2-60s		
PL2-327A	196581.34	1276101.59	19	8.5-18.5	2-60s		
PL2-327B	196587.606	1276095.551	50.5	40-50	2-60s		
PL2-328A	196467.832	1276236.195	18.5	8-18	2-60s		
PL2-328B	196470.705	1276232.987	50.5	40-50	2-60s		
PL2-329A	196418.579	1275991.348	18.5	8-18	2-60s		
PL2-329B	196424.067	1275984.836	50.5	40-50	2-60s		
PL2-331A	196333.318	1276093.248	18.5	8-18	2-60s		
PL2-331B	196337.412	1276088.981	50.5	40-50	2-60s		
PL2-332A	196370.431	1275726.922	18.5	8-18	2-60s	2010	Decommission prior to demolition of 2-44 and 2-49 Buildings.

Table 1: Proposed Future Status of Plant 2 Wells South of the New South Park (16th Avenue) Bridge

Well	Northing	Easting	Total Depth (ft. bgs)	Screened Interval (ft. bgs)	Area	Year to be Decommissioned[1,2]	Notes[2]
2-66 Area Wells Not Currently Used or Planned for Use							
EW-1			20	9-19	2-66	2010	Decommission prior to demolition of 2-44 and 2-49 Buildings.
PL2-002A	196003.2285	1275964.947	20	4.5-19	2-66	2010	Decommission prior to duct bank excavation.
PL2-002B	196003.7534	1275969.569	49	39-48	2-66		
PL2-002C	195996.4235	1275963.1	94.5	85-94.5	2-66		
PL2-004A	195870.7879	1275929.813	16.9	6.5-16.5	2-66	2012	Decommission prior to demolition.
PL2-005A	195850.9588	1275970.933	17.1	7-16.7	2-66		
PL2-005B	195847.2878	1275967.803	51.4	41-50.5	2-66		
PL2-005C	195856.7848	1275967.736	93.1	83-92	2-66		
PL2-006AR	195814.993	1275941.14	16.5	6-16	2-66		
PL2-011A	195943.1434	1275806.756	21.1	5.5-20	2-66	2010	Decommission prior to duct bank excavation.
PL2-012A	195983.6846	1275743.224	21.5	6-20.5	2-66		
PL2-013AR	195941	1275725	24	14.7-23.3	2-66	2012	Decommission prior to demolition.
PL2-014A	195939.4403	1275617.631	21.1	5.5-20	2-66		
PL2-018A	195963.8149	1275887.254	20.5	5-20	2-66	2010	Decommission prior to duct bank excavation.
PL2-019A	195972.2121	1275839.907	21.37	6-21	2-66		
PL2-020A	196035.3143	1275764.668	20.5	6-20.5	2-66		
PL2-022A	196006.8587	1275919.88	20	6-19.5	2-66	2010	Decommission prior to duct bank excavation
PL2-023A	195999.621	1275862.699	20.5	5.5-20	2-66	2010	Decommission prior to duct bank excavation.
PL2-024A	195997.4332	1275810.671	19.7	4-19	2-66		
PL2-025A	195952.1428	1275920.886	19.7	4.5-19	2-66		
PL2-026A	196096.4948	1275649.56	20.5	6-19.5	2-66		
PL2-026B	196106.0307	1275661.82	50	40-50	2-66		
PL2-026C	196091.5168	1275649.094	85	75-85	2-66		
PL2-027A	195816.1686	1276029.596	18	8-18	2-66	2012	Decommission prior to demolition.
PL2-028A	196094.4235	1275699.1	17.5	7.5-17.5	2-66	2010	Decommission prior to duct bank excavation
PL2-028B	196102.1615	1275702.996	49.5	39.5-49.5	2-66		
PL2-029A	195847.056	1275726.971	18	8-18	2-66	2012	Decommission prior to demolition.
PL2-033A	195936.4248	1275926.056	30	25-30	2-66	2010	Decommission prior to duct bank excavation.
PL2-033AR	195938	1275928	31	25.7-30.2	2-66		
PL2-034A	195820.339	1275837.069	30	25-30	2-66	2012	Decommission prior to demolition.
PL2-037A	196041.0265	1275526.895	18	8-18	2-66		
PL2-038A	196144.5745	1275477.836	23.5	13.5-23.5	2-66	2010	Decommission prior to demolition of 2-44 and 2-49 Buildings.
PL2-039A	196315.5624	1275622.664	20	10-20	2-66		
PP-1B-O	195898.850	1275873.976	50.5	48-50	2-66	2012	Decommission prior to demolition.
PP-5B-O	195900.664	1275809.547	50.5	48-50	2-66		

Table 1: Proposed Future Status of Plant 2 Wells South of the New South Park (16th Avenue) Bridge

South Yard Area Wells Not Currently Used or Planned for Use
Not included because demolition is not currently planned for this area

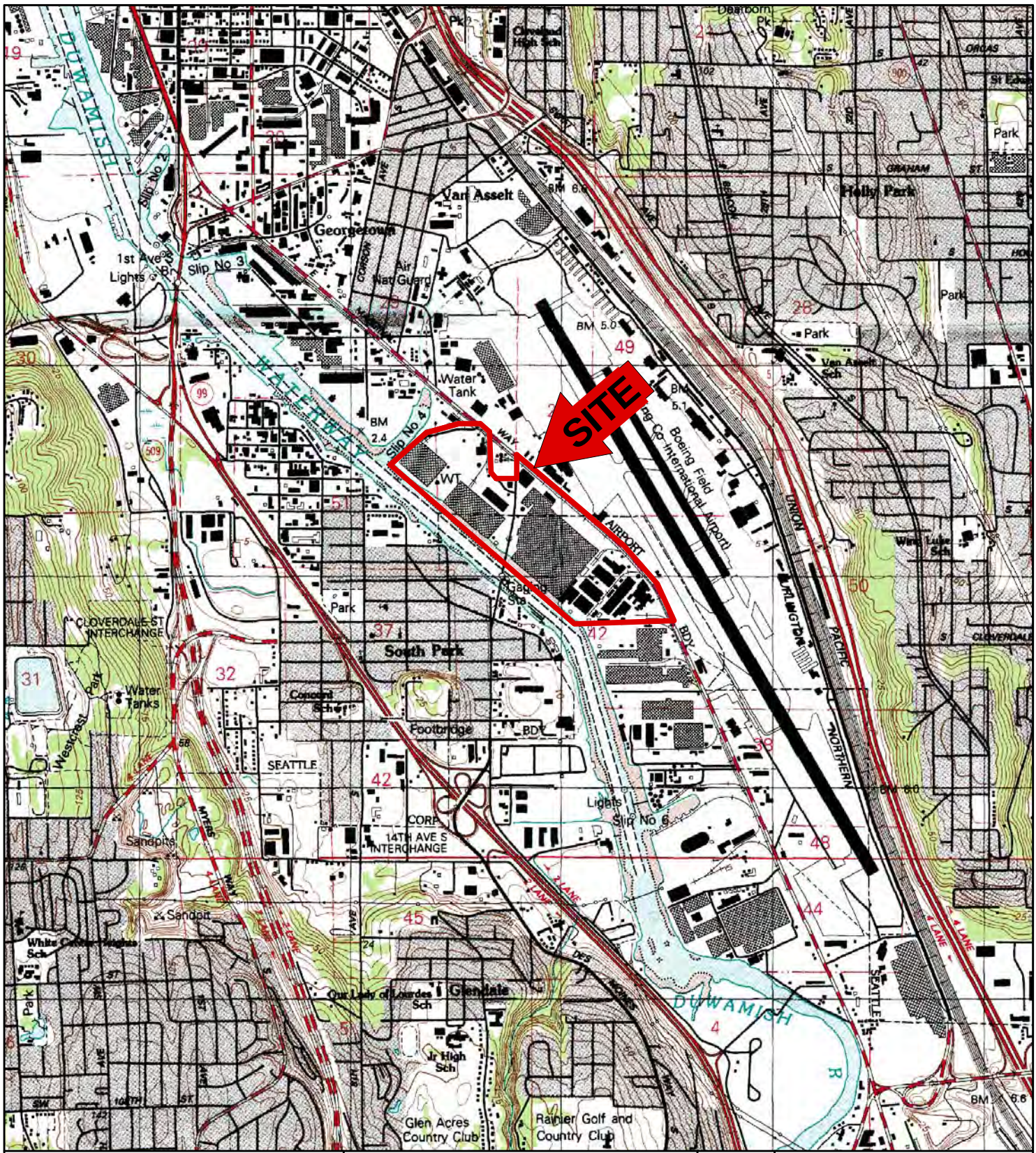
2-10 Area Wells Not Currently Used or Planned for Use
Not included because demolition is not currently planned for this area

North Area Wells Not Currently Used or Planned for Use
Not included because demolition is not currently planned for this area

Notes:

[1]Wells retained within the construction area (see Figure) have the potential to be damaged accidentally during demolition or construction activities. Wells designated as NA (not applicable) in this column will be protected to the extent practicable, and will be replaced or repaired if damaged.
[2] Dates provided are approximate and subject to change to accommodate project schedule requirements

FIGURES



KEY:

N

SOURCE: USGS 7.5 MINUTE QUANDRANGLE (TOPOGRAPHIC)

SEATTLE SOUTH
1983

SCALE = 1:25,000

ENVIRONMENTAL PARTNERS INC
295 NE Gilman Boulevard, Suite 201
Issaquah, Washington 98027

FIGURE 1

BOEING PLANT 2
GENERAL LOCATION

PROJECT	OA-9 IM SEMIANNUAL REPORT
PREPARED FOR	THE BOEING COMPANY
LOCATION	BOEING PLANT 2 SEATTLE/TUKWILA, WASHINGTON

SHEET	DRAWN BY	REVIEWED BY	DATE
1 of 1	ARM	JLD	01/13/10

EAST MARGINAL WAY

EAST MARGINAL WAY S

2-22

2-25

2-15

2-40

2-45

2-63 SVE

2-65 SVE

2-80

16TH AVENUE SOUTH

PLANNED EXCAVATION ALIGNMENT

EW-1 (PRODUCT RECOVERY WELL)

DUWAMISH COMMERCIAL WATERWAY

LEGEND

- WELLS TO BE PROTECTED / SAVED
- WELLS THAT CAN BE DECOMMISSIONED

N
PLANT NORTH

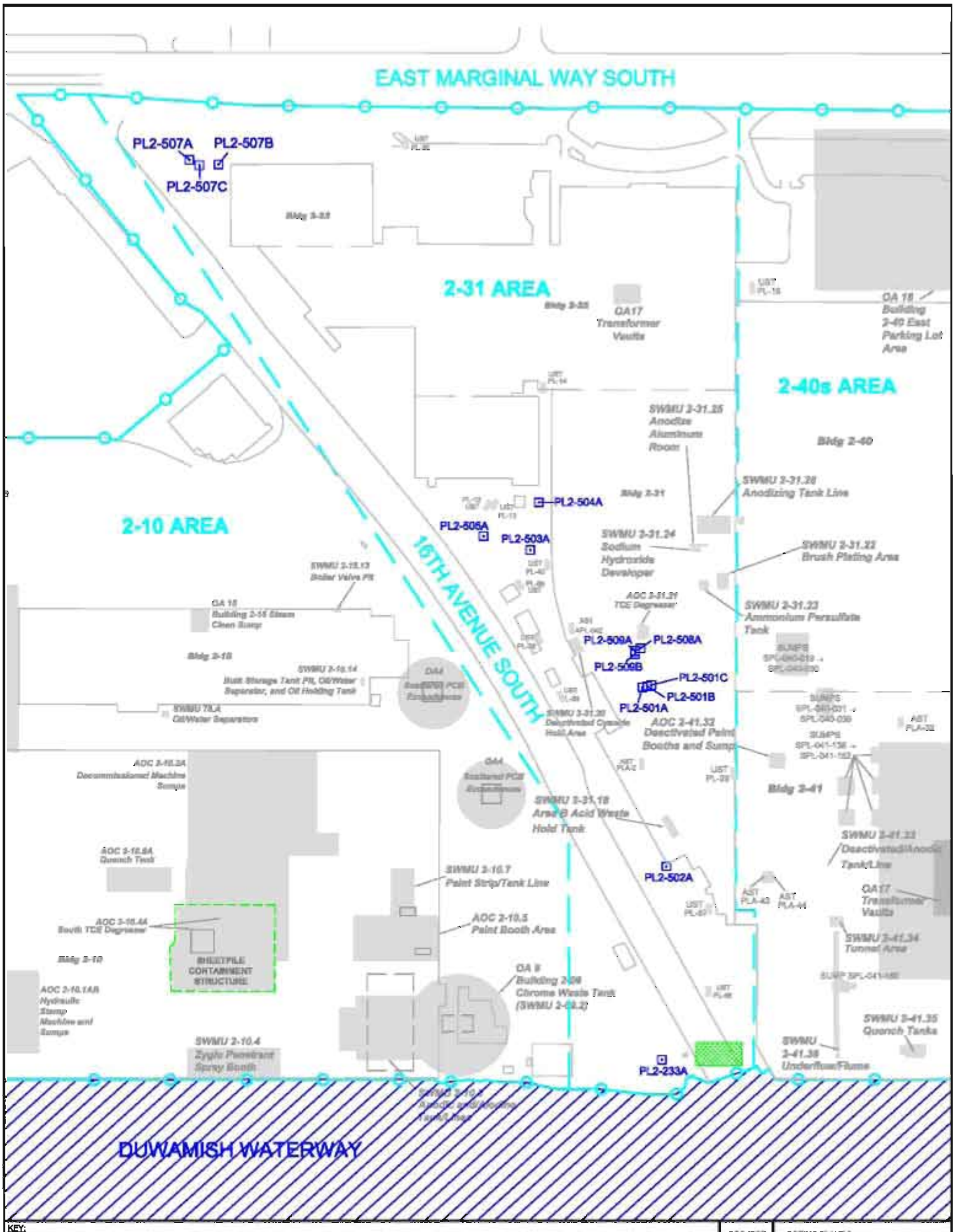
N
TRUE NORTH

0 160 320
SCALE IN FEET

FIGURE **2** REVISED 06/01/10

WELLS TO PROTECT OR DECOMMISSION

BOEING PLANT 2



KEY:

- CURRENT MONITORING WELL LOCATION
- PROPOSED AREA FOR PL2-233 WELL CLUSTER (PL2-233AR, PL2-233B, AND PL2-233C)
- AREA BOUNDARY
- PROPERTY BOUNDARY
- ONSITE BUILDING OR ROAD STRUCTURE

MAP PROJECTION: WASHINGTON STATE PLANE, NORTH ZONE, NAD 83.

0 30' 60' 120'

SCALE: 1" = 120'

PROJECT	BOEING PLANT 2		
PREPARED FOR	THE BOEING COMPANY		
LOCATION	7725 EAST MARGINAL WAY SEATTLE / TUKWILA, WASHINGTON		
SHEET 1 of 1	DRAWN BY MMH	REVIEWED BY DCK	DATE 02/26/10

ENVIRONMENTAL PARTNERS INC
295 NE Gilman Boulevard, Suite 201
Issaquah, Washington 98027

FIGURE 3
PROPOSED LOCATION FOR PL2-233 WELL CLUSTER

Attachment A

WAC 173-160-420

What are the general construction requirements for resource protection wells?

(1) No resource protection well or soil boring excavation may be used to withdraw or inject water for domestic, industrial, municipal, commercial, or agricultural purposes.

(2) No resource protection well or soil boring excavation may interconnect aquifers.

(3) Nested resource protection wells are prohibited.

(4) Cuttings, development water, and other investigation derived waste from resource protection well construction or geotechnical soil borings shall be managed in a manner consistent with the intent and purposes of the Water Pollution Control Act, chapter 90.48 RCW, the Hazardous Waste Management Act, chapter 70.105 RCW, and implementing regulations.

(5) Well tagging:

(a) It shall be the driller's responsibility to place a well identification tag with a unique identification number on every resource protection well that they construct or alter within thirty days of completion of the well. Uncased geotechnical soil borings and environmental investigation wells are exempt from the tagging requirements of this chapter.

(i) The alpha-numeric number shall be recorded on the drilling report in the space provided.

(ii) The driller shall remove the well identification tag on all resource protection wells they decommission and shall attach the tag to the decommissioning well report.

(b) It shall be the well owner's responsibility to place a well identification tag with a unique identification number on every resource protection well they own and which was completed prior to the effective date of this regulation.

(i) Upon request, the department shall furnish the well owner with a well tag and tagging instructions.

(ii) The well owner shall tag their well(s) and submit a completed tagging report to the department.

(c) The well tag shall be permanently attached to:

(i) The well casing and be visible above land surface for all wells which have been completed above land surface.

(ii) The well casing or to any permanent and protected portion of the vault for wells completed below land surface.

(iii) A prominent system component visible above land surface for ground source heat pump borings.

(d) All well identification tags shall be supplied by the department.

(e) It is unlawful for a person to tamper with or remove a well identification tag except during well alteration.

(6) All resource protection wells will be sealed in accordance with WAC 173-160-450 regardless of the method of installation. Except, resource protection wells that are properly decommissioned prior to the removal of any drilling equipment from the well location are exempted from the surface sealing requirements of this chapter. Provided the decommissioning process includes the removal of any conduit, tubing, probe, or other items inserted into the ground.

(7) All geotechnical soil borings shall be decommissioned under the terms of this chapter.

(8) Except as provided in RCW 18.104.180, all construction, alteration, reconstruction, and decommissioning of resource protection wells and geotechnical soil borings shall be done by an individual licensed under the provisions of chapter 173-162 WAC.

(9) A notice of intent to construct or decommission a resource protection well and a geotechnical soil boring shall be filed with the department a minimum of seventy-two hours prior to initiating construction or decommissioning of the well(s) or boring(s). A fee must accompany each notice of intent to construct or decommission a resource protection well.

(a) The fee for a resource protection well, except for an environmental investigation well, a ground source heat pump boring, or a grounding well, is forty dollars for each well.

(b) The fee for an environmental investigation well in which ground water is sampled or measured is forty dollars for the construction of up to four environmental investigation wells per project, and ten dollars for each additional environmental investigation well constructed on a project with more than four wells. There is no fee for soil or vapor sampling purposes.

(c) The fee for a ground source heat pump boring or a grounding well is forty dollars for construction of up to four ground source heat pump borings or grounding wells per project and ten dollars for each additional ground source heat pump boring or grounding well constructed on a project with more than four wells.

(d) The fee to decommission a resource protection well, except for an environmental investigation well, is twenty dollars per well. There is no fee to decommission an environmental investigation well or a geotechnical soil boring.

(e) The fee to decommission a ground source heat pump boring or a grounding well is twenty dollars per well.

(f) Under some circumstances, it may be necessary to construct more resource protection wells or geotechnical soil borings than originally anticipated. When additional resource protection wells are constructed on a site for which a notice of intent and fee were submitted, a second notice and fee shall be submitted within twenty-four hours after all wells have been completed or as soon as the final number of wells to be constructed is determined, whichever is sooner. When additional geotechnical soil borings are needed, the borings may be completed. A follow-up notice of intent shall be submitted to the department within twenty-four hours after all borings are constructed. Notification to construct multiple wells or geotechnical soil borings within the same quarter/quarter section, township, and range may be submitted on one notice form.

(10) Resource protection well reports.

(a) Anyone who constructs or decommissions a well is required to submit a complete well report on the construction or decommissioning of all resource protection wells and geotechnical soil borings. Reports must be submitted to the water resources program within thirty days after completion of construction or decommissioning. Submission of a well report to consulting firms does not meet the requirement of this section. The report must be an accurate summation of data collected in the field taken from field notes written as the well was constructed or decommissioned. Field notes must be available at all times during construction or decommissioning for review by state and local inspectors and kept until the well report is submitted.

(b) The resource protection well report must be made on a form provided by the department, or a reasonable facsimile of the form, as approved by the department.

(c) Where applicable the report shall include the following information:

(i) Owner's name; operator/trainee name; operator/trainee license number; contractor registration number, drilling company name;

(ii) Tax parcel number;

(iii) Well location address;

(iv) Location of the well to at least 1/4, 1/4 section or smallest legal subdivision;

(v) Unique well identification tag number;

(vi) Construction date;

(vii) Start notification number;

(viii) Intended use of well;

(ix) The well depth, diameter, and general specifications of each well;

(x) Total depth of casing;

(xi) Well head elevation;

(xii) Drilling method;

(xiii) Seal material, seal location and type of placement used;

(xiv) Filter pack location; filter pack material used;

(xv) The thickness and character of each bed, stratum or formation penetrated by each well including identification of each water bearing zone;

(xvi) Casing gauge, diameter, stickup, type of material, and length, also of each screened interval or perforated zone in the casing;

(xvii) The depth to the static water level, as measured below the land surface; and

(xviii) Such additional factual information as may be required by the department.

(d) The well report must include one of the following:

(i) The license number and signature of the person who constructed or decommissioned the well;

(ii) The license number and signature of the trainee and the licensed operator under chapter 18.104 RCW; or

(iii) The license number and signature of an exempted individual as defined under RCW 18.104.180(3).

(e) This rule shall allow an individual to submit electronic reports in accordance with department procedures. The use of a digital signature in the electronic reports will be authorized as a substitute for an original signature under (d) of this subsection.

What are the surface protection requirements?

(11) All resource protection wells shall be capped and protected using one of the following methods:

(a) If the well is cased with metal and completed above the ground surface, you must attach a watertight cap with a lock to the top of the casing.

(b) If the well is not cased with metal and completed above the land surface, you must install a protective metal casing over and around the well. The protective casing shall extend at least six

inches above the top of the well casing and be cemented at least two feet into the ground. A cap with lock shall be attached to the top of the protective casing.

(12) You shall protect the well(s) completed above ground from damage by:

(a) Cementing three metal posts, at least three inches in diameter, in a triangular array around the casing and at least two feet from it. Each post shall extend at least three feet above and below the land surface.

(b) A reinforced concrete pad may be installed to protect against and prevent frost heave. If installed, the concrete pad shall extend to a depth equal to anticipated frost depth. When a concrete pad is used, the well seal may be part of the concrete pad.

(13) If the well is completed below land surface, a watertight cap with a lock shall be attached to the top of the well casing. A metal monument or equivalent shall be installed over and around the well. The monument shall serve as a protective cover and be installed level with the land surface and be equipped with a waterproof seal to prevent the inflow of any water or contaminants. Drains will be provided, when feasible, to keep water out of the well and below the well cap. The cover must be designed to withstand the maximum expected loading.

(14) The protective measures may be waived or modified upon written approval from the department (a variance).

(15) If the well is damaged, the well protection measures and casing shall be repaired to meet the requirements of this chapter. If the well is damaged beyond repair, it shall be decommissioned in accordance with WAC 173-160-460.

WAC 173-160-460

What is the decommissioning process for resource protection wells?

(1) For resource protection wells and geotechnical soil borings that were not constructed in accordance with these regulations, or for which a drilling report required under this section is missing, remove all debris, accumulated sediment, equipment and obstructions from the well casing, except well screens and packers, and decommission in one of the following ways:

(a) Perforate the casing from the bottom to land surface and pressure grout the casing.

(i) Perforations shall be at least four equidistant cuts per row, and one row per foot. Each cut shall be at least one and one-half inches long.

(ii) Apply enough pressure to force the sealing material through the perforations, filling any voids on the outside of the casing.

(iii) The remainder of the casing shall be filled with neat cement grout, neat cement, or bentonite slurry; or

(b) Withdraw the casing and fill the bore hole with neat cement grout, neat cement, bentonite or bentonite slurry as the casing is being withdrawn.

(2) For resource protection wells and geotechnical soil borings that were constructed in accordance with these regulations, remove all debris, accumulated sediment, equipment and obstructions from the well casing, except well screens and packers and then decommission in one of the following ways:

(a) Wells with an inside casing diameter equal to or greater than one inch and constructed in accordance with these regulations as verified through a field examination and review of the drilling report shall be decommissioned by filling the casing from bottom to land surface with bentonite, bentonite slurry, neat cement grout, or neat cement.

(b) Wells with an inside casing diameter less than one inch shall be decommissioned by pressure grouting the entire casing length with bentonite slurry, neat cement grout, or neat cement.

(c) Vibrating wire piezometers installed to meet or exceed the sealing requirements of WAC 173-160-450, 173-160-457, and 173-160-458 are exempt from the decommissioning procedures and decommissioning reporting requirements provided here.

(d) Direct push wells shall be decommissioned in accordance with this section.

(e) Geotechnical soil borings, or boring, shall be decommissioned by sealing from bottom to land surface with bentonite, bentonite slurry, neat cement grout, or neat cement. Sealing material placed below the static water level shall be piped directly to the point of application or placed by means of a dump bailer or pumped through a tremie tube. If bentonite slurry, neat cement grout

or neat cement is used to seal below the water level in the well, the material shall be placed from the bottom up by methods that avoid segregation or dilution of the material. When used to place bentonite slurry, neat cement or neat cement grout, the discharge end of the tremie tube shall be submerged in the bentonite slurry, neat cement or neat cement grout to avoid breaking the seal while filling the annular space. Provided the material does not dilute or segregate and the resulting seal is free of voids, sealing material may be hand poured above the static water level.

Attachment B

Well Decommissioning Log - Boeing Plant 2

Well Number			
	Northing	Easting	
Well Location			
Start (date and time)			
End (date and time)			
Installation Method			
Total Well Depth		feet bgs	
Well Diameter		inches	
Type of Casing (circle)	PVC	Stainless Steel	Other_____
Type of Well Screen	PVC	Stainless Steel	Other_____
Depth of Screened Interval (ft. bgs)		feet bgs	
Decommissioning Procedure (circle)	WAC 173-160-460(1) *perforate or overdrill then grout*		
	WAC 173-160-460(2) *grout in place*		
Type of Grout			
Grout Volume		Gallons	
Surface Completion			
Drilling Contractor			
License Number			
Signature (Driller)			
Signature (Engineer or Geologist)			
Additional Information:			