

ARCO 5544
Kent
Release 591621

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Ms. Gayle Garbush
Washington State Department of Ecology
NW Regional Office
3190 160th Avenue Southeast
Bellevue, Washington 98008

ENVIRONMENTAL

Subject:

System Start-up Work Plan
Former ARCO Facility No. 5544
Ecology Facility ID: 84544811
19918 68th Avenue South
Kent, Washington 98032

Date:
October 24 2010

Dear Ms. Garbush:

Contact:
Christopher F.S.
Robinson
Phone:
206.726.4728

On behalf of BP West Coast Products, LLC. (BP), ARCADIS U.S., Inc. (ARCADIS) is pleased to submit this *System Start-up Work Plan* for the former ARCO Facility No. 5544, located at 19918 68th Avenue South, in Kent, Washington (the Site). The Site location and surrounding area are shown on **Figure 1**. Remediation equipment associated with the Site consists of six air sparge (AS) wells and six soil vapor extraction (SVE) wells.

Email:
Chris.Robinson@
ARCADIS-US.com

In order to determine if the current remediation system remains a viable method to remove dissolved phase and vapor phase hydrocarbon mass within the systems radius of influence, ARCADIS proposes to restart the system. The AS/SVE system restart will include: the redevelopment of wells to remove silt and iron fouling, cleaning the system compound to remove debris and potential fire hazards, an electrical inspection of the system to ensure proper wiring and diagnosis of the systems capability, and a pressure test of the wells.

Our ref:
GP09BPNA.WA39

Site Description

The Site is currently an active Chevron retail gasoline fueling station located on the east side of 68th Avenue (West Valley Highway) at the eastern terminus of South 199th Place, in Kent, Washington.

The surrounding area is primarily commercial retail business to the north and south, Mill Creek to the east, and 68th Avenue South to the west of the Site. Site features include a station building with mini mart and Subway Sandwich shop, four fuel

dispensers situated on four concrete dispenser islands, an oil/water separator, and a concrete swale and rock spill way in the southeast corner. The underground storage tanks (USTs) are located in a common excavation along the southern boundary of the property. A drive-up espresso stand is located along the southern property line to the west of the UST complex. The topography of the Site is generally flat, Mill Creek is located 100 feet (ft) east of the Site and is the nearest surface water body. There are a total of twelve groundwater monitoring wells located at the Site; none of which are located in the public right-of-way.

Background

In April 2003, Delta Consultants (Delta) conducted a subsurface investigation at the Site. During the investigation one boring was completed as an AS well (AS-1), and one boring was completed as a SVE well (VE-1). Analytical results of soil samples collected during well installation indicated gasoline range organics (GRO) and benzene, toluene, ethylbenzene, and total xylenes (BTEX collectively) were not detected above laboratory reporting limits (RLs) in VE-1. Soil samples collected from AS-1 at 5 ft and 7 ft bgs indicated concentrations of GRO and BTEX above Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Method A Cleanup Levels. GRO was detected in both samples collected from AS-1 at concentrations of 84.9 milligrams per kilogram (mg/kg) (5 ft) and 3,290 mg/kg (7 ft) milligrams per kilogram (mg/kg), respectively.

In April 2003, Delta conducted a pilot test to assess the effectiveness of a AS/SVE system. Pilot test results indicated the use of an AS/SVE system would provide an effective means for remediation of impacted soil and groundwater at the Site.

From September to December 2003, Delta contracted Cascade Drilling, Inc. (Cascade) and Custom Backhoe & Dumptruck Services, Inc. (Custom Backhoe) to perform the installation of an AS/SVE remediation system at the Site. Delta oversaw the installation of six AS wells (AS-2 through AS-7) and six SVE wells (SVE-2 through SVE-7). The AS wells were installed to a depth of 23 ft bgs each and the SVE wells were installed to 10 ft bgs. Custom Backhoe conducted the construction activities for the remediation system which included trenching, system piping, and remediation system equipment installation.

The AS/SVE remediation system began operation in the third quarter of 2003 and operated intermittently until the end of 2005. The system operated for approximately 9,311 hours removing approximately 6,188 pounds of Volatile Petroleum

Hydrocarbons (VPH), as reported by Delta (Delta 2005). Delta field personnel indicated poor system performance related to motor failure and potential iron fouling at AS wells.

In July 2010 ARCADIS visited the site in order to assess the current condition of the AS/SVE system. ARCADIS personnel determined that the remediation compound would need to be cleared of overgrowth and that the system should be reviewed by a repair specialist. At least one AS well appeared to have iron fouling.

On July 26, 2010, ARCADIS advanced two hand augered soil borings in the vicinity of the product distribution lines to assess current subsurface conditions. A total of four soil samples were submitted during this site assessment. Analytical reports indicate that GRO, BTEX, and MTBE were not detected above the RLs. Levels of total lead reported above the RL were below the Method A Cleanup Level. Constituents of Concern (COC) that remain in groundwater onsite include: GRO, BTEX and MTBE.

Based on the findings of the referenced reports and findings of this site assessment; soil exhibiting concentrations of COCs exceeding the Method A Cleanup Levels have naturally attenuated in this portion of the Site. Well locations and site details are shown on **Figure 2**. Historical plume concentrations are shown on **Figure 3**.

Purpose and Objective

ARCADIS plans to restart the AS/SVE system and evaluate its effectiveness at remediating remaining petroleum hydrocarbon related impacts as depicted on **Figure 4**. ARCADIS will contract a general contractor to clear the compound of overgrowth around the effluent stack. To ensure electrical connections are grounded and heater elements are in proper working condition, ARCADIS will also oversee system troubleshooting by a repair specialist. Prior to system restart, ARCADIS will test piping integrity and well effectiveness through pressure leak testing and well development.

Permitting

According to the Notice of Construction No. 8322 issued on November 4, 2003, by the Puget Sound Clean Air Agency, the permit for the site expired on November 4, 2007. ARCADIS will submit a new permit request to PSCAA. The previous PSCAA permit for the Site required that catalytic oxidizer destruction efficiency of gasoline

range organics exceeds 95 percent or that outlet concentrations are less than 50 parts per million by volume (ppmv), to be verified by monthly sampling. In addition, the permit specified air flow and operating temperature requirements. ARCADIS will prepare appropriate submittal documents for permit renewal.

System Compound Cleaning

Currently several low hanging trees and bushes surround the Catox effluent stack and present a fire hazard that will need to be removed prior to restarting the treatment system. ARCADIS will oversee the tree and brush removal to be performed by a general contractor. Once the hazard has been sufficiently removed ARCADIS will begin steps to restart the system.

System Inspection and Diagnosis

ARCADIS will contract a treatment system repair specialist in order to diagnose any potential areas of concern with the catalytic oxidizer unit. This inspection will include a detailed survey of the electrical equipment and wiring that power the system. The repair specialist will also troubleshoot any heating elements that may have been damaged by rain since the system shutdown in 2005. The SVE lines will be jetted to remove any built up residue. Upon completion of the system diagnosis ARCADIS will oversee the pressure testing of individual AS wells to determine the extent of any remaining iron fouling.

Pressure testing will be performed using a portable air compressor and pressure gauges. Individual lines will first be tested at the manifold. The portable air compressor will be connected to each sparge well with the line capped at the well head and to a maximum pressure of 15 pounds per square inch (psi) will be applied to the AS lines. A pressure gauge will be observed for five minutes to ensure that the line maintains pressure of at least 90% to verify that any leaks are minimal.

Following AS line pressure testing, individual AS wells will be tested. The portable air compressor will be connected to a well head adaptor containing a pressure gauge and pressure relief valve. The well head adaptor will be threaded onto the well head and a maximum of 25 psi will be allowed to build up within the well. If any minimal pressure builds in the wells, the well screen is clear and sparging is feasible under the current conditions. If 25 psi is allowed to build up within the well and does not drop after pressure is applied, the well screen is potentially fouled and well redevelopment will take place. Following redevelopment additional pressure testing

will occur. If wells are still blocked, chemical treatment will be used to remove iron fouling.

Well Redevelopment

To address silt deposits and iron fouling in the AS wells ARCADIS will redevelop the wells to ensure removal of fine grained sediments and potential iron deposits from the vicinity of the well screen according to the procedures defined in the attached SOP (**Attachment A**). The wells will be redeveloped by mechanically cleaning the well screens using brushing and surging techniques. If mechanical means do not adequately remove iron fouling, ARCADIS will register the well with Ecology and inject and remove a hydroxacetic acid solution. ARCADIS will then develop the wells by alternatively surging and purging water from the wells. Surging involves raising and lowering a surge block inside the well. The resulting motion forces water into the formation and loosens sediment within the well sand pack, allowing the silt to be pulled into the well and removed. Purging includes the use of a hand bailer or pump to remove water from the well. Surging and purging of the well will continue until the development water is clear and free of sediments.

System Restart

Once the system has been brought back to operational status, ARCADIS will continue operating AS/SVE and will conduct monthly effluent sampling in accordance with the PSCAA permit. Additionally ARCADIS will conduct quarterly influent sampling. System influent vapor samples will be collected from each monitoring well and at the pre-treatment effluent sample port. Vapor samples will be collected in tedlar bags and submitted to a Washington State-certified laboratory for the following chemical analyses:

- Gasoline range organics (GRO) according to Environmental Protection Agency (EPA) Method TO3
- BTEX according to EPA Method TO3, and
- CO₂ and O₂ by ASTM Method D1946

Vapor concentrations will be monitored from the effluent stack with a photo-ionization detector (PID) on a monthly basis. Analytical data and PID readings will be used to

determine mass removal rates from the vadose zone and from phase transfer to the vapor phase from the saturated zone via sparging activity.

Waste Management

Redevelopment water and solids, water from jetting and decontamination water and any solids generated during field activities will be contained in Department of Transportation (DOT)-approved 55-gallon steel drums. These drums will be appropriately labeled and temporarily stored on-site pending analytical results. Upon receipt of appropriate analytical results, the drums will be removed from the Site and transported to an off-Site disposal facility.

Electronic Information Management

ARCADIS understands that Ecology requires submittal of environmental data in electronic format prior to issuance of formal correspondence. ARCADIS will upload applicable information to the Ecology Electronic Information Management (EIM) database upon receipt. ARCADIS will coordinate with representatives of Ecology to confirm successful upload of applicable data upon completion.

If you have questions or comments regarding this Work Plan, please contact Chris Robinson at 206.726.4728 or by email at chris.robinson@arcadis-us.com.

Sincerely,

ARCADIS, U.S., Inc.




Christopher F.S. Robinson
Senior Environmental Scientist



Peter Campbell, P.E.
Project Engineer

Copies:

Hadi Karewala



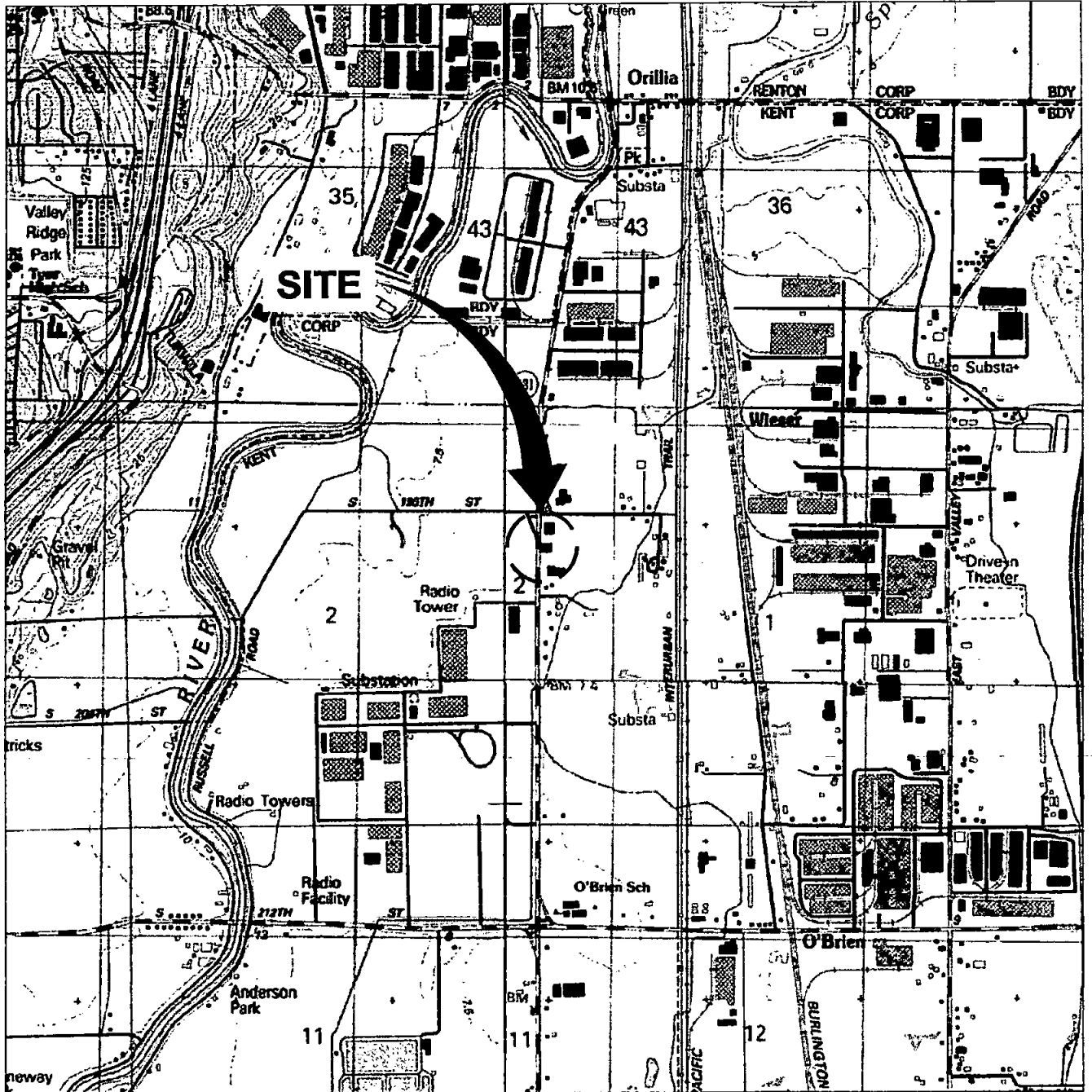
Rebecca Andresen, P.G.
Principal Geologist



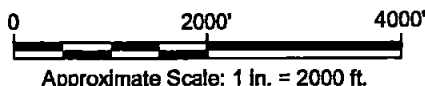
Rebecca K. Andresen

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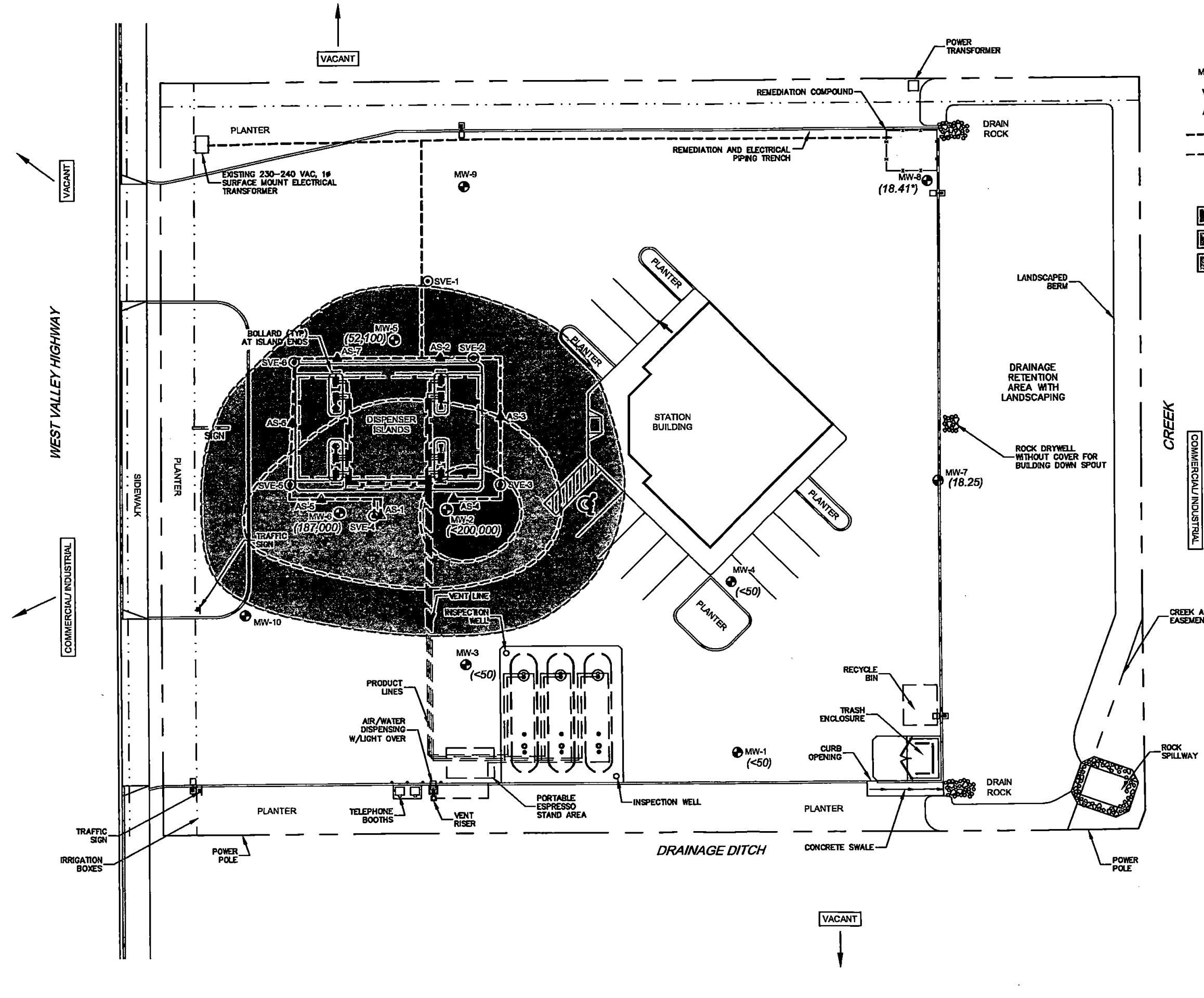
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BP WEST COAST PRODUCTS, LLC.
 FORMER ARCO FACILITY No. 5544
 19918 68TH AVENUE SOUTH, KENT, WASHINGTON
SYSTEM STARTUP WORK PLAN

SITE LOCATION MAP

CITY:\Redd\DIV\GROUP\Redd\DB\Redd\LD\Opt\PIC\Opt\PM\Redd\TM\Opt\LY\Opt\ON\OFF\REF\G\EN\CAD\EM\my\m\act\G\G\BP\NA\3\3\2000\System\StartUp\W\F\F\G3\5544-GRD\ISO\ISO\0202.dwg LAYOUT: 3 SAVED: 10/21/2010 2:10 PM ACADVER: 18.08 (LMS TECH) PAGESETUP: PLOTSTYLETABLE: ARCADIS.CTB PLOTTER: 10/21/2010 2:11 PM BY: REYES, ALEC

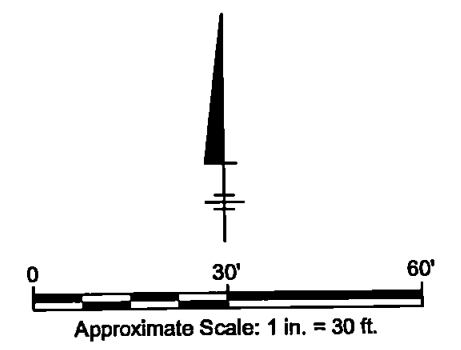


LEGEND:

- MW-1 ● MONITORING WELL LOCATION
- VE-1 ○ VAPOR EXTRACTION WELL LOCATION
- AS-1 ▲ AIR SPARGE WELL LOCATION
- REMEDIATION AND ELECTRICAL PIPING TRENCH
- - - ISOCONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)

NOTES:
ALL CONCENTRATIONS ARE IN MICROGRAMS PER LITER (µg/L)

- [Dark Stippled Box] >200,000
- [Medium Stippled Box] >100,000
- [Light Stippled Box] >10,000



BP WEST COAST PRODUCTS, LLC.
FORMER ARCO FACILITY No. 5544
19918 68TH AVENUE SOUTH, KENT, WASHINGTON
SYSTEM STARTUP WORK PLAN

**GRO ISOCONCENTRATION
CONTOUR MAP
FIRST QUARTER 2002**

ARCADIS | FIGURE 3

Monitoring Well Development

Rev. #: 2.2

Rev. Date: March 22, 2010

Approval Signatures

Prepared by: *Dmitri A. Lipov* Date: 03/22/2010

Reviewed by: *Michael J. Hill* Date: 03/22/2010
(Technical Expert)

I. Scope and Application

Monitoring wells (or piezometers, well points, or micro-wells) will be developed to clear them of fine-grained sediment to enhance the hydraulic connection between the well and the surrounding geologic formation. Development will be accomplished by evacuating well water by either pumping or bailing. Prior to pumping or bailing, the screened interval will be gently surged using a surge block, bailer, or inertia pump with optional surgeblock fitting as appropriate. Accumulated sediment in the bottom of the well (if present) will be removed by bailing with a bottom-loading bailer or via pumping using a submersible or inertia pump with optional surge-block fitting. Wells will also be gently brushed with a weighted brush to assist in removing loose debris, silt or flock attached to the inside of the well riser and/or screen prior to development. Pumping methods will be selected based on site-specific geologic conditions, anticipated well yield, water table depth, and groundwater monitoring objectives, and may include one or more of the following:

- submersible pump
- inertial pump (Waterra™ pump or equivalent)
- bladder pump
- peristaltic pump
- centrifugal pump

When developing a well using the pumping method, the pump (or, with inertial pumps, the tubing) is lowered to the screened portion of the well. During purging, the pump or tubing is moved up and down the screened interval until the well yields relatively clear water.

Submersible pumps have a motor-driven impeller that pushes the groundwater through discharge tubing to the ground surface. Inertial pumps have a check valve at the bottom of stiff tubing which, when operated up and down, lifts water to the ground surface. Bladder pumps have a bottom check valve and a flexible internal bladder that fills from below and is then compressed using pressurized air to force water out the top of the bladder through the discharge tubing to the ground surface. These three types of pumps have a wide range of applicability in terms of well depth and water depth.

Centrifugal and peristaltic pumps use atmospheric pressure to lift water from the well, and therefore can only be practically used where the depth to water is less than 25 feet.

II. Personnel Qualifications

Monitoring well development activities will be performed by persons who have been trained in proper well development procedures under the guidance of an experienced field geologist, engineer, or technician.

III. Equipment List

Materials for monitoring well development using a pump include the following:

- health and safety equipment, as required by the site Health and Safety Plan (HASP):
- cleaning equipment
- photoionization detector (PID) to measure headspace vapors
- pump
- polyethylene pump discharge tubing
- plastic sheeting
- power source (generator or battery)
- field notebook and/or personal digital assistant (PDA)
- graduated pails
- appropriate containers

- monitoring well keys
- water level indicator

Materials for monitoring well development using a bailer include the following:

- personal protective equipment (PPE) as required by the HASP
- cleaning equipment
- PID to measure headspace vapors
- bottom-loading bailer, sand bailer
- polypropylene or nylon rope
- plastic sheeting
- graduated pails
- appropriate containers
- keys to wells
- field notebook and/or PDA
- water level indicator
- weighted brush for well brushing

IV. Cautions

Where surging is performed to assist in removing fine-grained material from the sand pack, surging must be performed in a gentle manner. Excessive suction could promote fine-grained sediment entry into the outside of the sand pack from the formation.

Avoid using development fluids or materials that could impact groundwater or soil quality, or could be incompatible with the subsurface conditions.

In some cases it may be necessary to add potable water to a well to allow surging and development, especially for new monitoring wells installed in low permeability formations. Before adding potable water to a well, the Project Manager (PM) must be notified and the PM shall make the decision regarding the appropriateness and applicability of adding potable water to a well during well development procedures. If potable water is to be added to a well as part of development, the potable water source should be sampled and analyzed for constituents of concern, and the results evaluated by the PM prior to adding the potable water to the well. If potable water is added to a well for development purposes, at the end of development the well will be purged dry to remove the potable water, or if the well no longer goes dry then the well will be purged to remove at least three times the volume of potable water that was added.

V. Health and Safety Considerations

Field activities associated with monitoring well development will be performed in accordance with a site-specific HASP, a copy of which will be present on site during such activities.

VI. Procedure

The procedures for monitoring well development are described below. (Note: Steps 7, 8, and 10 can be performed at the same time using an inertial pump with a surge-block fitting.)

1. Don appropriate PPE (as required by the HASP).
2. Place plastic sheeting around the well.
3. Clean all equipment entering each monitoring well, except for new, disposable materials that have not been previously used.

X. References

Not applicable.