

CLEANUP ACTION PLAN

Bee Jay Scales
Sunnyside, Washington

Prepared by

Norm Hepner
Department of Ecology
(509) 457-7127

March 8, 2013

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	Purpose.....	1
1.2	Cleanup Action Plan Organization	1
2.0	BACKGROUND.....	3
2.1	Physiographic Setting	3
2.1.1	Site Location and Description.....	3
2.1.2	Geology.....	3
2.1.3	Hydrogeology.....	4
2.2	Previous Environmental Studies and Current Status.....	4
2.2.1	Pre-2003 Site Investigations.....	5
2.2.2	Phase I Remedial Investigation.....	5
2.2.3	Phase II Remedial Investigation.....	5
2.2.4	Phase III Remedial Investigation.....	5
2.2.5	Interim Remedial Measures.....	6
2.2.6	Down-Gradient Assessment	6
2.2.7	Human Health Risk Assessment.....	6
2.2.8	Development and Screening of Remedial Alternatives.....	6
2.2.9	Revised Feasibility Study Report.....	7
2.2.10	Groundwater Monitoring	7
2.2.11	Soil SPLP Study Results	7
2.2.12	Storm Drain Assessment.....	7
3.0	EXPOSURE ASSESSMENT	9
3.1	Human Health Assessment.....	9
3.2	Ammonia Vapor Human Health Evaluation Assessment.....	9
3.3	Surface Water Monitoring and Assessment.....	10
4.0	CLEANUP STANDARDS.....	11
4.1	Cleanup Levels.....	11
4.1.1	Groundwater.....	11
4.1.2	Surface Water.....	12
4.1.3	Soil.....	12
4.2	Points of Compliance.....	12
4.2.1	Groundwater.....	13
4.2.2	Surface Water.....	13
4.2.3	Soil.....	13
5.0	CLEANUP ACTION.....	14
5.1	Cleanup Action Evaluation.....	14
5.1.1	Groundwater.....	15
5.1.2	Soil.....	16
5.1.3	Feasibility Study Evaluation.....	16
5.2	Selected Cleanup Action.....	17
5.3	Restoration Time Frame.....	18
5.4	Completion of Cleanup.....	18
6.0	REMEDIAL ACTION DESCRIPTION	20
6.1	Draft Cleanup Alternative.....	20
6.2	Soil Removal and <i>In Situ</i> Bioremediation.....	20
6.3	Off-Property Groundwater Treatment Systems	21
6.4	Institutional Controls.....	22

6.5	Monitored Natural Attenuation.....	22
7.0	CLEANUP ACTION IMPLEMENTATION SCHEDULE.....	24
8.0	REFERENCES.....	25
9.0	FIGURES.....	26
Figure 1	General Site Location.....	27
Figure 2	Property Layout.....	28
Figure 3	Groundwater Contour Map.....	29
Figure 4	Site Map Showing Storm Drain Assessment Analytical Results.....	30
Figure 5	Nitrate Groundwater Plume	31
Figure 6	Nitrate Source Areas and Contaminant Levels	32
Figure 7	Ammonia Source Areas and Contaminant Levels.....	33

1.0 INTRODUCTION

1.1 PURPOSE

This document provides the Cleanup Action Plan (CAP) for the remediation of nitrate and pesticide contamination in soil and groundwater at the Bee-Jay Scales Site, located in Sunnyside, Washington (**Figure 1**). A public comment period on the Draft Cleanup Action Plan was conducted from January 30, 2013 thru March 4, 2013; no comments were received. The draft Cleanup Action Plan has been accepted without modification as the approved Cleanup Action Plan for the Site.

The Site is defined as the area located in the city of Sunnyside, within Yakima County, where contaminants released at the following two property parcels have come to be located: Parcel No. 22102522014 and Parcel No. 22102522015 as recorded by the Yakima County Department of Assessment. Parcel No. 22102522014 is located at 116 North 1st Street and is owned by Bee-Jay Scales, Inc. Parcel No. 22102522015 is located at 301 Warehouse Avenue and was formerly owned by Hickenbottom & Sons, Inc. For the purpose of this CAP, “the Site” is defined as the area located in the city of Sunnyside, within Yakima County, where contaminants released at the two parcels have come to be located, and “the Property” will be defined by the boundaries of the two parcels specified. However, off-Property parcels affected by on-Property source areas will also be addressed. The approximate Property boundary is shown on **Figure 2**. The Site groundwater plume for nitrate as currently known is shown in **Figure 5**.

The cleanup activities described in this document include: source removal by excavation of contaminated soil overlying groundwater, enhanced *in situ* groundwater treatment through bioremediation, monitored natural attenuation, and vertical barrier wall treatment system(s) or other treatment methods for the off-Property groundwater plume attributable to the Bee-Jay Scales Site.

This CAP has been developed in accordance with the Washington State Department of Ecology (Ecology) *Model Toxics Control Act Cleanup Regulation* (MTCA), Chapter 173-340 of the Washington Administrative Code (WAC). In accordance with WAC 173-340-360(2), the selected cleanup action, removal of contaminated soil overlying groundwater, *in situ* bioremediation (vertical barrier wall treatment system(s) construction or other treatment method for the off-Property groundwater plume attributable to the Bee-Jay Scales Site), and natural attenuation of nitrate and pesticide contamination in groundwater and within the soil will meet the threshold requirements at the defined points of compliance; protect human health and the environment; comply with remedial action levels; comply with applicable state and federal laws; provide for compliance monitoring; and provide a permanent solution to the maximum extent practicable.

1.2 CLEANUP ACTION PLAN ORGANIZATION

The CAP has been organized into the following sections:

- **Section 2.0 - Background:** Section 2.0 provides Site background information including

the location and description, geologic and hydrogeologic setting, a summary of previous subsurface assessment investigation, and RI/FS activities.

- **Section 3.0 - Exposure Assessment:** Section 3.0 provides a summary of the exposure assessment conducted during the RI/FS including a discussion of the constituents and media of potential concern, potential routes of migration, and sensitive receptors.
- **Section 4.0 - Cleanup Standards:** Cleanup levels and points of compliance are discussed in Section 4.0.
- **Section 5.0 - Cleanup Action:** Section 5.0 presents a discussion of cleanup alternatives for groundwater and soil; presents the selected cleanup alternative; and presents cleanup action levels.
- **Section 6.0 – Remedial Action Description.** Section 6.0 describes the components of the remedial action.
- **Section 7.0 – Cleanup Action Implementation & Schedule.** Section 7.0 specifies the cleanup plan implementation and schedule.
- **Section 8.0 – References**
- **Section 9.0 - Figures**

2.0 BACKGROUND

2.1 PHYSIOGRAPHIC SETTING

2.1.1 Site Location and Description

The Site is located in the city of Sunnyside, within Yakima County, and is where contaminants released at the following two parcels have come to be located: Parcel No. 22102522014 and Parcel No. 22102522015 as recorded by the Yakima County Department of Assessment. Parcel No. 22102522014 is located at 116 North 1st Street and is owned by Bee-Jay Scales, Inc. Parcel No. 22102522015 is located at 301 Warehouse Avenue and was formerly owned by Hickenbottom & Sons, Inc. The Site's general location is shown on **Figure 1**. The property layout, including buildings, monitoring well locations, and area boundaries, is shown on **Figure 2**. The property is divided into six main study areas as follows:

- Area 1 - Liquid Fertilizer Plant and Truck Wash Area
- Area 2 - Dry Fertilizer Area
- Area 3 - Drum Storage Area
- Area 4 - Suspected Historic Washdown Area
- Area 5 - North Area
- Area 6 - Hickenbottom Property

The Site is located within Yakima County, an agricultural region of Washington. The Property is bordered to the north and west by Warehouse Avenue and North First Street and to the south by active railroad tracks. Properties to the north, east, and south of the Property are used for industrial/commercial facilities involved in food processing, agricultural product storage and transfer, pipe manufacturing, warehousing, tank-cleaning services, trucking, and storage. The property immediately west of the Property across North First Street is currently vacant except for paved areas along the railroad tracks. The nearest residences to the Property are located approximately 750 feet to the southeast, 450 feet to the southwest, and 200 feet to the north.

The Site is located within the Yakima River Valley, at approximately 750 feet above mean sea level [amsl]. Snipes Mountain (1,300 feet amsl) is about 1.5 miles southwest of the Site. Rattlesnake Ridge is located approximately 5 miles north of the Site, and the Yakima River is located approximately 4.5 miles southwest of the Site. There are stormwater/irrigation drains that bisect the Property. The stormwater/irrigation drains collect and carry stormwater, irrigation return flows, and potentially infiltrating groundwater and transport the water to a joint drain (JD33.4) located approximately 1,000 feet to the southwest.

2.1.2 Geology

Three geologic units have been identified at the Site based on subsurface information derived from well-drilling logs. They are, from youngest to oldest, Quaternary Alluvium, the Ellensburg Formation, and Columbia River Basalt Group (CRBG).

The Quaternary Alluvium consists of sandy silt and extends to a depth of at least 24.5 feet

below the ground surface (bgs) at the Site (Hart Crowser, 1990). Bentley *et al* (1993) further divide the alluvium and indicate that the Site is underlain by silt, sand, and gravel deposited by tributaries of the Yakima River and that materials are dominantly of basaltic composition. The Ellensburg Formation, interbedded with silt, sand, gravel, and clay, underlies the alluvium and extends to a depth of approximately 450 feet bgs, based on logs for nearby City of Sunnyside water wells. The Ellensburg Formation is underlain by CRBG rocks to an unknown depth.

The near-surface lithology beneath the Site appears to consist of sandy silt with gravel to a depth of approximately 30 feet bgs, followed by trace clay or clayey silt to the maximum explored depth of 31.5 feet bgs (based on boring logs for monitoring wells and soil borings advanced at the Site during the Phase I RI).

2.1.3 Hydrogeology

The groundwater flow direction is generally to the northeast in the northern portion of the Property (near MW-1 and MW-7) and to the southeast throughout the remainder of the Site (**Figure 3**). In March 2011, groundwater gradients ranged from approximately 0.002 to 0.013 feet per foot, with an average hydraulic gradient of approximately 0.007 feet per foot; the depth to groundwater ranged from 5.95 to 11.21 feet below the top of casing (TOC) elevation. The flow direction and gradient measured during 2011 are generally consistent with those measured previously at the Site. Well pump tests were performed to calculate hydraulic conductivities that ranged from 2.74E-05 cm/s to 4.12E-04 cm/s. This hydraulic conductivity is characteristic of fine sands, organic and inorganic silts, and mixtures of sand, silt, and clay. The vertical permeability of the aquitard present at the Property (31.5 feet bgs) was calculated to be 5.1E-06 cm/s, which is within the typical range for a mixture of silt and clay. Manmade subsurface drains and storm water systems exist around the site (**Figure 4**).

2.2 PREVIOUS ENVIRONMENTAL STUDIES AND CURRENT STATUS

Significant investigations have been conducted at the Site. These investigations include:

- Pre-2003 Site Investigations
- *Bee-Jay Scales Site Phase I Remedial Investigation Report* (SECOR, 2003);
- *Phase II Remedial Investigation Report for the Bee-Jay Scales Site* (SECOR, 2005a);
- *Phase III Remedial Investigation Report for the Bee-Jay Scales Site* (SECOR, 2007a);
- *2006 Interim Remedial Measures Completion Report for the Bee-Jay Scales Site* (SECOR, 2007b);
- *Down-Gradient Assessment Documentation Report for the Bee-Jay Scales Site* (SECOR, 2008);
- *Human Health Risk Assessment* (Stantec, 2008); and
- *Development and Screening of Remedial Alternatives* (Stantec, 2009).
- *Revised Feasibility Study Report* (Stantec, 2009)
- *Groundwater Monitoring (2003-2012)*
- *SPLP Study* (Stantec, 2011)
- *Storm Drain Assessment* (Stantec, 2012)

The following subsections summarize from the record findings of each investigation and evaluation along with the groundwater monitoring that has occurred at the Site since 2003.

2.2.1 Pre-2003 Site Investigations

Four studies were completed prior to the 2003 Phase I Remedial Investigation. These studies included Phase I and II environmental site assessments completed by Hart Crowser; Phase II Environmental Site Assessment conducted by White Shield, Inc; Leaking Underground Storage tank assessment and cleanup by PLSA Engineering and Surveying; and environmental media sampling by the Washington State Department of Ecology. The actions and findings from these studies have been considered in subsequent post-2003 investigations.

2.2.2 Phase I Remedial Investigation

The Phase I remedial investigation (RI) activities were conducted in July 2003 and consisted of soil and groundwater investigations. SECOR collected soil samples from borings completed to depths of up to 11 feet below ground surface (bgs) throughout the Property. The soil data suggested an above-ground source of stored fertilizer that had leached nitrogen compounds to the soil. The major nitrogen source area appeared to be directly east of the Dry Fertilizer Manufacturing Building in Area 2, and two source areas appeared to be located adjacent to the lagoon.

2.2.3 Phase II Remedial Investigation

The Phase II RI included soil, groundwater, and surface water/sediment investigations and pump testing for hydraulic conductivity. SECOR conducted the Phase II soil investigation in May 2004. A treatability investigation, including both a bench-scale study and field pilot study (consisting of *in situ* injection of sodium acetate into four injection wells installed around well MW-4), was conducted as part of the Phase II RI to guide potential nitrate and herbicide remediation activities. The treatability study determined the most effective treatment was denitrification using acetate as an electron donor with a radius of influence of approximately 10 feet.

2.2.4 Phase III Remedial Investigation

The Phase III RI was conducted in 2007 and included additional soil and groundwater investigation to include evaluating horizontal and vertical extent of off-Property nitrate impacts down-gradient of the Bee-Jay Scales property. Based on the study, the nitrate plume extends off-Property with a probable second source of nitrate and ammonia contamination encountered off-Property. A BIOSCREEN model developed following the Phase II RI was re-calibrated using Phase III RI data and showed the effective groundwater flow velocity to be approximately 8 to 9 feet per year, and nitrate in groundwater moves approximately 15 to 16 feet per year with dispersion. Based on the BIOSCREEN model, the high concentrations of nitrate observed 600 to 800 feet down-gradient of the Property likely results from a second source.

2.2.5 Interim Remedial Measures

In 2006, SECOR conducted interim remedial measures including: 1) lagoon closure activities; and 2) treatment of petroleum hydrocarbon impacts using persulfate injections. The former lagoon was removed as a potential source and safety hazard, and calcium acetate was placed into the excavation to mitigate any residual impacts remaining in the soil. *In situ* injection of sodium persulfate into four injection wells was conducted for the treatment of petroleum hydrocarbons, and favorable geochemical conditions were observed in the injection wells during and immediately after injection. Groundwater samples collected from nearby well MW-10 three months after injection showed an average percent (%) reduction in petroleum hydrocarbon concentrations of over 78%.

2.2.6 Down-Gradient Assessment

SECOR conducted a down-gradient assessment in March 2008 to further evaluate: 1) the off-Property extent of nitrate concentrations down-gradient of the Property; and 2) a potential separate off-Property source of nitrate concentrations. The report concluded that the nitrate plume extends off-Property and a second nitrate source exists down-gradient of the Property.

2.2.7 Human Health Risk Assessment

A *Human Health Risk Assessment* (HHRA) was completed to quantify risks associated with chemicals in the soil and groundwater at the Site (Stantec, 2008). The HHRA indicated that the groundwater ingestion exposure pathway for nitrate is potentially complete for off-Property receptors due to the lack of regulatory restrictions on installing water wells. Based on current land use (including locations of existing buildings on-Property), risks to current on-Property exposure populations are within acceptable limits. However, for hypothetical future commercial or residential land use on-Property, ingestion of groundwater containing nitrate and indoor inhalation of vapors containing 1,2,4-trimethylbenzene (from soil) and 1,2-dichloropropane (from groundwater) could result in risk that exceeds acceptable limits.

2.2.8 Development and Screening of Remedial Alternatives

A *Development and Screening of Remedial Alternatives* (DSRA) was completed to determine an appropriate range of remedial alternatives warranting more detailed analysis in the FS (Stantec, 2009). In this report, remedial action objectives (RAOs) were developed for the Site to prevent unacceptable risk to current receptors (i.e., ingestion of groundwater containing nitrate in excess of the Federal MCL by off-Property residential receptors) as identified in the HHRA. The recommended RAO for soil was as follows: for the protection of human health, prevent leaching of nitrate from soil to groundwater by reducing soil concentrations at the Property to a cleanup level of 452 milligrams per kilogram (mg/kg) or otherwise preventing leaching to groundwater in excess of the Federal MCL of 10 milligrams per liter (mg/L). The recommended RAO for groundwater was as follows: for the protection of human health, prevent ingestion of groundwater with nitrate in excess of the Federal MCL of 10 mg/L by residential receptors.

2.2.9 Revised Feasibility Study Report

Stantec Consulting Services Inc. (Stantec; formerly SECOR) evaluated remedial alternatives to address soil and groundwater concentrations of indicator hazardous substances (IHSs) above specified cleanup levels (CULs) at the Bee-Jay Scales Site. The remedial alternatives were evaluated with respect to threshold criteria that must be met for all cleanup actions conducted under Ecology's authority. The threshold criteria include overall protection of human health and the environment, compliance with applicable or relevant and appropriate requirements (ARARs), and opportunity for compliance monitoring. Remedial alternatives that met the threshold criteria were also evaluated for effectiveness (reasonable restoration timeframe, long-term effectiveness and permanence, short-term effectiveness), implementability (technical and administrative implementability, state and community acceptance), and cost.

2.2.10 Groundwater Monitoring

Groundwater monitoring has been conducted at the Site since July 2003. Groundwater is typically encountered between approximately 6 and 10 feet bgs, and a clay aquitard exists at approximately 30 feet bgs. The groundwater flow direction is generally to the northeast in the northern portion of the Property (near MW-1 and MW-7) and to the southeast throughout the rest of the Site, with a groundwater flow divide observed at the southern edge of Area 5 on the Property. The groundwater contour map from the August 2012 groundwater monitoring event is presented as **Figure 3**. Currently, the following monitoring wells are sampled on a semi-annual basis: MW-1, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, and MW-13.

Groundwater monitoring continues to be conducted at the Site. Based on an external technical review of the historical groundwater data, additional groundwater investigations are being conducted to better delineate and define the extent of the nitrate plume directly attributable to sources from the Property. It is anticipated that the results of these further investigations will be available in the 2013 timeframe and used for final engineering of the groundwater remedial action.

2.2.11 Soil SPLP Study Results

A nitrate synthetic precipitation leaching procedure (SPLP) shallow soil assessment was conducted in spring 2011 at the Bee-Jay Scales Site to determine the likely nitrate soil concentration that has the potential to contaminate groundwater above the nitrate groundwater cleanup standard (10 mg/L). Over 88 sample pair results demonstrated that the nitrate soil concentration that corresponds to a nitrate SPLP concentration of 10 mg/L is 220 mg/kg.

2.2.12 Storm Drain Assessment (Stantec, 2012)

A storm drain assessment completed in 2012 concluded that any groundwater impacts originating from the Site are not adversely affecting the storm/irrigation drain network in the vicinity of the Site as the storm/irrigation drains in this area are impacted by other sources. The

assessment was not able to determine if contaminated groundwater is entering the storm/irrigation drain system above surface water cleanup standards. The 2012 storm water assessment indicated that nitrate concentrations in manholes down-gradient of the Site are similar to the nitrate concentrations in manholes up-gradient of the Site, as shown on **Figure 4**. It was also noted that the concentrations in the manholes are generally at least one to two orders of magnitude less than the nitrate and ammonia concentrations observed in the Site wells (MW-4, MW-9, MW-12, and MW-13) sampled for comparison purposes. There were no exceedances of cleanup levels or water quality standards in manhole M-21, which is the furthest down-gradient manhole.

3.0 EXPOSURE ASSESSMENT

3.1 Human Health Risk Assessment

In 2008, a human health risk assessment was conducted on soil and groundwater at the Bee-Jay Scales Site. In accordance with MTCA, potential IHS were evaluated for risks to current and reasonable future exposure populations, in this case, commercial workers, residents and construction workers.

The 2008 HHRA determined that the current exposure population (commercial workers) is not exposed to unacceptable risks by IHSs in soil and groundwater via inhalation of ambient air. Additionally, the risks to future residential receptors by this pathway were also below the levels of concern. The HHRA determined that since this is a "worst-case" scenario, it is expected that construction workers, who are exposed for a much shorter frequency and duration than commercial workers or residents, would also be protected. Therefore, no further risk analysis for construction workers was required.

The vapor intrusion evaluation was conducted for hypothetical future residential or commercial structures above the impacted soil (Area 3) and groundwater (Areas 1, 3, and 6 and off-Property to well MW-9). The results showed that there may be unacceptable risks resulting from 1,2,4-trimethylbenzene in soil and 1,2-dichloropropane in groundwater. However, it is expected that quantities of these Volatile Organic Compounds (VOCs) will continue to decline over time via natural attenuation and will eventually reach concentrations below MTCA Method B CULs. Additionally, the cumulative vapor intrusion risks resulting from VOCs in groundwater were below the MTCA target Excess Carcinogenic Risk (ECR) and Hazard Index (HI). The cumulative risks to off-Property future residents and current commercial workers via indoor inhalation of fugitive emissions from VOCs in groundwater were less than the MTCA target levels.

Impacts to potable water resources by on-Property groundwater are not expected; however, there are currently no regulatory restrictions on where private wells can be installed. The IHS concentrations in groundwater currently exceed Method B CULs and in some cases Federal MCLs. The potential risks related to exposure to chemicals in tap water were not quantified as the MCL will be used as the remediation goal, which will be protective of all receptors.

Since a change in land use is not anticipated for the foreseeable future, the HHRA determined that risks to exposure populations at the Bee-Jay Scales Site are within acceptable limits. However, because there are currently no regulatory restrictions on where private wells can be installed, the groundwater exposure pathways must be considered potentially complete and will be addressed as provided in this cleanup action plan.

3.2 Ammonia Vapor Human Health Evaluation Assessment

A qualitative human health evaluation for ammonia vapor was completed during the development of the Cleanup Action Plan. Based on Ecology research, ammonia vapor may likely pose a greater acute risk to construction workers than the 'worst-case' commercial worker

studied in the 2008 HHRA. Precautions to prevent unacceptable worker exposure during construction activities during and following the cleanup may be required to protect human health.

3.3 Surface Water Monitoring and Assessment

Based on a 2012 assessment of storm/irrigation drains in the vicinity of the site, there is no evidence that impacted groundwater is infiltrating the storm/irrigation drain; however, the assessment was unable to affirmatively prove that there was zero infiltration of impacted groundwater into the storm/irrigation drain. The groundwater treatment system will be designed, to the extent practicable; to reduce the potential for infiltration of impacted groundwater into storm/irrigation drains that may eventually discharge to surface waters. If during the compliance monitoring period, it is determined that contaminated groundwater above cleanup levels is infiltrating the storm/irrigation drain and adversely affecting surface water quality, Ecology and the PLPs will determine the most effective way to address the water quality impacts. This method shall prevent or remove contamination so that surface water cleanup standards are met. Potential methods may include adding wells to intercept contaminants or treating or removing the mass of contaminants contributed to the storm/irrigation drain system from the Site prior to the discharge from the Sunnyside Valley Irrigation System discharge monitoring point located near the Holaday Road bridge and known as the USBR hydromet station 'SUCW'.

4.0 CLEANUP STANDARDS

Cleanup standards, as defined in WAC 173-340-700, for the Site include establishing cleanup levels and points of compliance at which the cleanup levels will be attained for the Site. The cleanup standards have been established for the Site in accordance with MTCA (WAC 173-340-700 through WAC 173-340-760).

4.1 CLEANUP LEVELS

Cleanup levels have been developed for the soil direct contact, soil protection of groundwater, groundwater ingestion, and vapor pathways protective of human health. Because a completed pathway between impacted groundwater and surface water has not been established, surface water cleanup standards have not been established for this Site. The groundwater treatment system, which is intended to treat groundwater to be protective of human health will be designed, to the extent practicable, to reduce the potential for groundwater infiltration of storm/irrigation drains that may eventually discharge to surface waters. If during the compliance monitoring period, it is determined that contaminated groundwater above cleanup levels is infiltrating the storm/irrigation drain and adversely affecting surface water quality, Ecology and the PLPs will determine the most effective way to address the water quality impacts. This method shall prevent or remove contamination so that surface water cleanup standards are met. Potential methods may include adding wells to intercept contaminants or treating or removing the mass of contaminants contributed to the storm/irrigation drain system from the Site prior to the discharge from the Sunnyside Valley Irrigation System discharge monitoring point located near the Holaday Road bridge and known as the USBR hydromet station 'SUCW'.

4.1.1 Groundwater

Site-specific CULs for groundwater have been developed from a combination of primary MCLs, standard MTCA Method A CULs, and standard and modified MTCA Method B CULs. Primary MCLs are set as the CUL for constituents for which they have been developed. If no MCL has been established, modified MTCA Method B CULs are generally used. In cases where modified MTCA Method B CULs have not been developed, standard MTCA Method A or Method B CULs are used.

A list of groundwater CULs, and the basis for the CUL, is provided below for each constituent. IHSs are shown in bold text and will be used to evaluate the effectiveness of the implemented remedial alternatives during groundwater monitoring.

Analyte*	Groundwater Cleanup Level (mg/L)	Source
1,2,3-Trichloropropane	0.00001	Modified MTCA Method B
1,2,4-Trimethylbenzene	0.4	Modified MTCA Method B
1,2-Dichloropropane	0.005	Primary MCL
1,3,5-Trimethylbenzene	0.4	Modified MTCA Method B
2-Methylnaphthalene	0.032	Modified MTCA Method B
2,4,5-T	0.16	Modified MTCA Method B

2,4,5-TP	0.05	Primary MCL
2,4-D	0.07	Primary MCL
2,4-DB	0.128	Modified MTCA Method B
Arsenic	0.01	Primary MCL
Benzene	0.005	Primary MCL
Chlorobenzene	0.1	Primary MCL
Dicamba	0.48	Modified MTCA Method B
Dinoseb	0.007	Primary MCL
Ethylbenzene	0.7	Primary MCL
Iron	11.2	Modified MTCA Method B
Manganese	2.2	Standard MTCA Method B
Naphthalene	0.16	Modified MTCA Method B
Nitrate Nitrogen	10	Primary MCL
Nitrite Nitrogen	1	Primary MCL
Pentachlorophenol	0.001	Primary MCL
Toluene	1	Primary MCL
TPH-Gx	0.8	Standard MTCA Method A
Xylenes	10	Primary MCL

Notes:

2,4,5-T = 2,4,5-Trichlorophenoxyacetic acid
2,4-D = 2,4-Dichlorophenoxyacetic acid
2,4-DB = 4-(2,4-Dichlorophenoxy)butyric acid
mg/L = milligrams per liter

4.1.2 Surface Water

No surface water impacts are anticipated during this cleanup action provided construction stormwater runoff associated with remedial actions being performed pursuant to this CAP is retained on-Property. Any construction stormwater runoff associated with remedial actions being performed pursuant to this CAP discharged from the Property will be sampled and treated, as required, to comply with storm water rules.

4.1.3 Soil

The cleanup levels for soil throughout the Property are based on the protection of groundwater and the prevention of the leaching of contaminants from soil to groundwater by reducing soil concentrations or otherwise preventing leaching to off-Property groundwater in excess of the groundwater CULs.

The nitrate soil CUL is 220 mg/kg; this soil CUL is based on the MTCA Method B CUL for the protection of groundwater. The ammonia soil CUL is 385 mg/kg; this soil CUL is based on the MTCA Method B CUL for protection against the acute vapor health effects for a construction worker.

4.2 POINTS OF COMPLIANCE

This CAP has established points of compliance for groundwater [WAC 173-340-720] and soil [WAC 173-340-740(6)] at the Site. The points of compliance, have been established pursuant to WAC 173-340-410(1)(b) to confirm that the cleanup action has obtained the cleanup standards defined for the Site and meets the performance standards set for the operation of the cleanup action.

4.2.1 Groundwater

A point of compliance has been defined to confirm that the cleanup standards have been met at the Site. Monitoring wells presently existing onsite and identified as MW-4, MW-5, MW-6, and MW-12 and all monitoring wells, including those to be constructed as part of the remedial action, that are located down-gradient of MW-4, MW-5, MW-6, and MW-12 shall be defined as the points of compliance. The point of compliance shall be attained in all ground waters from the point of compliance to the outer boundary of the Bee-Jay Scales plume, to be further defined by additional groundwater assessment. The selected wells are representative of Site groundwater throughout and bound the Bee-Jay Scales plume. If statistically valid analysis of groundwater in the boundary wells shows that concentrations of nitrate exceed the cleanup levels, additional groundwater monitoring wells will be constructed to bound the Bee-Jay Scales plume and sampling will be conducted as guided by a contingency plan developed as required by this CAP. The contingency plan will discuss options available to augment or increase remediation efforts, monitor natural attenuation, verify compliance, and detail a schedule for implementing the Ecology-approved contingency measures.

4.2.2 Surface Water

No surface water impacts are anticipated during this cleanup action provided construction stormwater runoff associated with remedial actions being performed pursuant to this CAP is retained on-Property. Any construction stormwater runoff associated with remedial actions being performed pursuant to this CAP discharged from the Property will be sampled and treated, as required, to comply with storm water rules.

4.2.3 Soil

The RI/FS studies indicate that the extent of concentrations of contaminants above the cleanup levels in soil exists on portions of the Property. The point of compliance defined for soil is the soil overlying groundwater throughout the Property. The soil will be considered clean if the cleanup level is met in the soil overlying groundwater (point of compliance) in accordance with the criteria set forth in WAC 173-340-740(6)(b). The cleanup levels for soil defined in Section 4.1 of this CAP will be met at the point of compliance.

5.0 CLEANUP ACTION

The FS included a detailed analysis of alternative cleanup actions for the Site. The objectives of the cleanup action at the Bee-Jay Scales Site are to:

1. Prevent leaching of nitrate from soil to groundwater by reducing soil concentrations at the Property to the cleanup level of 220 mg/kg thereby preventing leaching to off-Property groundwater in excess of the Federal MCL of 10 mg/L.
2. Prevent ingestion of groundwater with nitrate in excess of the Federal MCL of 10 mg/L by on-Property and off-Property receptors by reducing nitrate concentrations in groundwater to less than 10 mg/L.
3. Prevent vaporization of ammonia from soil by reducing soil concentration at the Site to 385 mg/kg thereby protecting construction workers from ammonia vapor inhalation.
4. Design the groundwater treatment system, to the extent practicable, to reduce the potential for impacted groundwater to infiltrate storm/irrigation drains that may eventually discharge to a surface water. If during the compliance monitoring period, it is determined that contaminated groundwater above cleanup levels is infiltrating the storm/irrigation drain and adversely affecting surface water quality, Ecology and the PLPs will determine the most effective way to address the water quality impacts. This method shall prevent or remove contamination so that surface water cleanup standards are met. Potential methods may include adding wells to intercept contaminants or treating or removing the mass of contaminants contributed to the storm/irrigation drain system from the Site prior to the discharge from the Sunnyside Valley Irrigation System discharge monitoring point located near the Holaday Road bridge and known as the USBR hydromet station 'SUCW'.

The alternative identified in the FS as the most technically feasible option includes removal and treatment of soil on the Property and natural attenuation of the groundwater plume attributable to the Bee-Jay Scales Site with institutional controls restricting the drilling of water wells in the area. In this draft Cleanup Action Plan, Ecology is proposing to select an alternative cleanup action for the Site.

In this section of the draft Cleanup Action Plan, Ecology identifies in more detail the components of the cleanup action and explains why this action is being selected. Cleanup levels for groundwater will be met at the defined points of compliance by source removal, treatment, and/or monitored natural attenuation. Institutional controls will be implemented to protect people from contact with impacted soil and ingestion of nitrate contaminated groundwater attributable to the Bee-Jay Scales Site.

5.1 CLEANUP ACTION EVALUATION

Regulatory requirements (WAC 173-340-360) for selection of cleanup actions at contaminated sites require the following: the protection of public health and the environment through

compliance with cleanup standards established in WAC 173-340-700 through WAC 173-340-760; compliance with applicable state and federal laws; and the implementation of compliance monitoring. Also, the remediation method must provide for a reasonable restoration time frame, take into consideration any concerns raised during public comment on the draft CAP, and that permanent remediation solutions be considered and implemented to the maximum extent practicable.

WAC 173-340-370 expects that natural attenuation of hazardous substances may be appropriate where source control has been conducted to the maximum extent practicable and where there is evidence that natural biodegradation or chemical degradation is occurring and will continue to occur at a reasonable rate at the site.

5.1.1 Groundwater

On-Property groundwater cleanup alternatives evaluated in the Feasibility Study included:

- Institutional controls (government controls, proprietary controls, and site inspection);
- Containment (hydraulic [extraction wells and extraction trenches] and vertical barriers);
- Removal (evapotranspiration, extraction wells, and extraction trenches);
- *ex situ* Treatment (biological treatment, electro dialysis, ion exchange, and reverse osmosis);
- *in situ* Treatment (bioremediation, electrokinetics, flushing, natural attenuation, permeable reactive barrier [PRB], and phytoremediation); and
- Discharge (beneficial re-use, injection or infiltration, National Pollutant Discharge Elimination System [NPDES] permit, and Publicly Owned Treatment Works [POTW]).

Remedial technologies and associated process options were screened in the Feasibility Study based on technological effectiveness with respect to addressing nitrates in groundwater (on-Property and off-Property). Process options removed from further consideration in the FS included evapotranspiration for groundwater due to the depth of impacted groundwater and the expected low removal rate via this method, and injection/infiltration for groundwater due to the potentially large volumes of groundwater and moderately low soil permeability.

Most of the process options for on-Property groundwater were screened out in the FS due to a variety of reasons including low effectiveness, implementability issues, and cost. However, the screening process presumed that the remaining option could meet the MTCA cleanup selection criteria. The FS presented monitored natural attenuation and institutional controls as the preferred alternative for the Bee-Jay Scales Site off-Property groundwater plume remediation based on a reasonable restoration timeframe. During Ecology's review, it became apparent that no technical basis existed for the restoration timeframe presented in the FS, and that, Ecology's own groundwater modeling concluded that monitored natural attenuation and institutional controls could not provide for a reasonable restoration timeframe.

Ecology reevaluated the existing reviews of technologies in the FS and evaluated an option using monitored natural attenuation, institutional controls, and vertical barrier groundwater treatment systems to effectively remediate the off property groundwater contamination plume with a

defined reasonable restoration timeframe of 30 - 40 years. The FS basis for screening out the vertical barrier/permeable reactive barrier alternative was based on the administrative complexity of acquiring access agreements and the lack of effectiveness to protect potential wells within the Bee-Jay Scales plume. The lack of effectiveness in protecting potential wells during the defined reasonable restoration timeframe can be supplemented with institutional controls to ensure protection of the public. Additionally, the administrative complexity to acquire access agreements can best be mitigated and addressed during the alternative's engineering design to limit the number of parcels and focus on those parcel owners most amenable to allowing access.

5.1.2 Soil

On-Property soil remedial alternatives technologies evaluated in combination with others in the FS included:

- Containment/Capping;
- Electrokinetics and Flushing;
- *in situ* Phytoremediation; and
- Soil excavation with off-site disposal and/or *ex situ* biological treatment.

Several process options for on-Property soil were screened out due to implementability issues associated with the current and anticipated use of the Property and cost:

- Implementing *in situ* phytoremediation for soil at the source areas would affect a large area, and therefore would impede current commercial activities.
- Excavation of Soil Area B, which is adjacent to and partially beneath the Dry Fertilizer Manufacturing Building in Area 2, would not be possible; therefore, options requiring removal (i.e., off-site disposal and *ex situ* treatment options) were screened out.
- High costs and low probability of success associated with the *in situ* treatment options of electrokinetics and flushing screened out these process options from further consideration.

5.1.3 Feasibility Study Evaluation

Remedial technologies and associated process options were screened based on technological effectiveness. The FS concluded that two options for on-Property soil and groundwater remediation met the criteria for selection of cleanup actions in WAC 173-340-360. These options are:

1. Permeable Reactive Barrier, Groundwater Monitoring, Natural Attenuation and Capping of Soil, and Institutional Controls (On-site Remedial Alternative #3) is the most costly on-Property alternative. It only partially meets the criteria for reasonable restoration timeframe and long-term effectiveness and permanence because of the passive treatment nature of PRBs and the fact that on-Property source areas would not be directly targeted for treatment.

2. *In Situ* Bioremediation, Groundwater Monitoring, Soil Excavation with Off-site Disposal and/or *Ex Situ* Biological Treatment, Institutional Controls (On-site Remedial Alternative #4) is the least costly on-Property alternative and would be designed to target areas of high soil and groundwater nitrate concentrations on-Property via a combination of *in situ* bioremediation (injection wells for delivery of sodium acetate and borings completed to the surface containing calcium acetate) and limited excavation of shallow, unsaturated residual soil source areas. Previous pilot testing of *in situ* bioremediation at the Property has demonstrated success in remediating nitrate concentrations in groundwater to below cleanup levels and reducing nitrate concentrations in saturated soils. Although there is the possibility of increased arsenic concentrations in groundwater in the short-term, pilot study results suggest that arsenic concentrations would decrease after oxidized redox conditions return. Additionally, this option would allow the most flexibility and control during design and implementation since there are several methods of delivering electron donor to the subsurface (injection wells and borings), and multiple application rounds may be implemented as needed to achieve the RAOs.

5.2 SELECTED CLEANUP ACTION

The proposed cleanup action includes a combination of shallow soil excavation, *in situ* bioremediation injection wells/borings (for delivery of a sodium acetate solution or calcium acetate), institutional controls, natural attenuation, and construction of vertical barrier wall treatment system(s) or other Ecology-approved treatment method following public comment for the off-Property groundwater plume attributable to the Bee-Jay Scales Site. The cleanup action meets the threshold requirement of WAC 173-340-360 [2.a]:

- (i) Protect human health and the environment;
- (ii) Comply with cleanup standards;
- (iii) Comply with applicable state and federal laws; and
- (iv) Provide for compliance monitoring

The proposed cleanup action also meets the regulatory requirements for a "permanent solution to the maximum extent practicable" (WAC 173-340-360[2.b.i]). Specifically, the proposed cleanup action includes the following components, which together meet the MTCA standard: (1) removal of the source through shallow excavation and *in situ* treatment; (2) minimization of the potential for ingestion of groundwater by institutional controls; and (3) elimination of greater overall threat to human health and the environment by treatment of impacted groundwater.

The proposed cleanup action also meets the regulatory requirements for a "permanent solution to the maximum extent practicable" (WAC 173-340-360[2.b.i]): (1) it protects human health and the environment; (2) it provides for long-term and short-term remediation effectiveness; (3) it permanently reduces the mobility and volume of hazardous substances; (4) can be implemented with consideration given to the restrictions imposed by existing structures and subsurface conditions; and (5) is practicable. The selected alternative has incorporated prevention or minimization of present or future releases by removing and treating the contaminant source in soil and groundwater, treating impacted groundwater, and monitoring the effectiveness of natural attenuation on the remaining impacted soil and groundwater.

5.3 RESTORATION TIME FRAME

As required by WAC 173-340-360(2.b.ii), a cleanup shall provide for a reasonable restoration time frame by considering the following factors [WAC 173-340-360(4.b)]:

- (i) Potential risks posed by the site;
- (ii) Practicability of achieving shorter restorations time frame;
- (iii) Current uses of the site;
- (iv) Potential future uses of the site;
- (v) Availability of alternative water supplies;
- (vi) Effectiveness and reliability of institutional controls;
- (vii) Ability to control and monitor migration of contamination;
- (viii) Toxicity of the hazardous substances; and
- (ix) Natural processes which reduce concentrations of the hazardous substances.

The proposed cleanup takes into consideration all of the factors listed above. Any potential risk has been addressed through the use of institutional controls to prevent ingestion of groundwater during the reasonable restoration timeframe, which has been defined as 30 to 40 years. There is no practical remediation option which would result in a shorter timeframe. The effectiveness of the institutional controls in the CAP will be evaluated, at minimum, every 5 years. A long-term monitoring plan will be developed to monitor the migration of contamination and demonstrate the effectiveness of bioremediation, natural attenuation, and vertical barrier wall treatment system(s) or other treatment method for the off-Property groundwater plume attributable to the Bee-Jay Scales Site. To evaluate the effectiveness of institutional controls, a well survey of the Site and surrounding vicinity will be conducted every 5 years to confirm the proper construction of any new well in the vicinity of the Site. The survey will be conducted using Ecology's database of well logs (<http://apps.ecy.wa.gov/welllog/>). Monitoring and evaluation of the effectiveness of institutional controls will cease when sampling results demonstrate nitrate concentrations are below the groundwater cleanup level of 10 mg/L. The toxicity of nitrate contamination is well understood, treatment system processes are effective, and combined with monitored natural attenuation will be effective in reducing concentrations of nitrate in groundwater to meet the cleanup levels.

Based on evaluation of these factors, and the specific subsurface soil and groundwater conditions existing at the Site, a combination of soil excavation, *in situ* bioremediation injection wells/borings (for delivery of a sodium acetate solution or calcium acetate), institutional controls, natural attenuation, and construction of vertical barrier wall treatment system(s) or other treatment method for the off-Property groundwater plume attributable to the Bee-Jay Scales Site is the remediation alternative which is the most permanent to the maximum extent practicable.

5.4 COMPLETION OF CLEANUP

This cleanup will be deemed complete when all components of the remedy, including institutional controls, are implemented and compliance with the cleanup levels have been achieved [including the monitoring of any increased arsenic concentrations to below the arsenic MCL; refer to Section 5.1.3] with a minimum of three years of confirmation samples demonstrating attainment and maintenance of selected cleanup standards at the points of compliance. Following completion of the cleanup, Ecology shall provide public notice and an

opportunity for public comment prior to removing the site from the Hazardous Sites List in accordance with WAC 173-340-330 (4), unless Ecology becomes aware of circumstances at the Site that present a previously unknown threat to human health and the environment.

6.0 REMEDIAL ACTION DESCRIPTION

6.1 Draft Cleanup Alternative

The draft cleanup alternative includes a combination of soil excavation, *in situ* bioremediation injection wells/borings (for delivering sodium acetate solution or calcium acetate), institutional controls, monitored natural attenuation, and construction of vertical barrier wall treatment system or other Ecology-approved treatment method following public comment for the off-Property groundwater plume attributable to the Bee-Jay Scales Site. Additional details regarding the design and schedule of the draft cleanup alternative are presented in the following sections. The purpose of these systems is to remove the source material that is continuing to contribute to groundwater contamination; treat the existing nitrate groundwater plume attributable to the Bee-Jay Scales Site to prevent its continued expansion and to reduce the potential for a discharge to storm/irrigation drains that may eventually discharge to surface waters; and provide for an estimated 30-40 year groundwater restoration timeframe.

6.2 Soil Removal and *In Situ* Bioremediation

The on-Property soils are contaminated with nitrate, ammonia, and other IHSs. Soil nitrate and ammonia concentrations exceed the soil cleanup level of 220 mg/kg and 385 mg/kg, respectively, at the Property [Figures 6 and 7]. Soil removal and *in situ* bioremediation will both be used to effectively treat Property soils to residual levels that are protective of groundwater. The quantity of soil excavation and *in situ* bioremediation will be detailed in the cleanup action engineering design following additional on-site assessment to delineate soil excavation boundaries. Generally, soil with average nitrate and ammonia contaminant levels above 220 mg/kg and 385 mg/kg, respectively, will be excavated and removed from the Property and/or treated.

Soil excavation is described as simple excavation and removal of contaminated soil from the site. Soil excavation will be performed where soil is accessible, and safe construction practices must be considered when determining areas of excavation. The soils will be either disposed or reused at agronomic rates as fertilizer, if no other contaminants are present precluding its use as fertilizer.

In situ bioremediation involves stimulating the natural denitrification process by introducing electron donor into the subsurface through the use of closely spaced injection wells or borings to target a particular source area. With stimulation, indigenous microorganisms transform nitrate into nitrogen gas in the multi-step denitrification process below. Microorganisms utilize the nitrate ion (NO_3^-) as an electron acceptor and a carbon source as an electron donor during anaerobic respiration. The NO_3^- is converted to a nitrite ion (NO_2^-), whereby anaerobic respiration continues with the formation of innocuous nitric oxide gas [$\text{NO}(\text{g})$], nitrous oxide (N_2O), and, finally, nitrogen gas [$\text{N}_2(\text{g})$]. Typical carbon sources for stimulation of denitrification in groundwater include acetate, ethanol, and sugar (sucrose).



A treatability investigation, including both a bench-scale study and field pilot study (consisting of *in situ* injection of sodium acetate into four injection wells on the Property), was conducted as part of the Phase II RI to guide potential nitrate and herbicide remediation activities. The treatability study determined the most effective treatment was denitrification using acetate as an electron donor. The pilot study demonstrated that injection of acetate was successful in remediating nitrate and nitrite concentrations to below detectable limits in groundwater within a 10-foot radius of the affected well for the duration of the monitoring period and reducing concentrations of those constituents in saturated soils.

A potential consequence of creating anaerobic, reduced redox conditions in the aquifer to promote denitrification is increased dissolved arsenic, iron, and manganese concentrations in groundwater. Reduced redox conditions in the aquifer may result in enhanced solubility and resulting dissolution of ferric iron oxyhydroxide minerals that contain adsorbed arsenic, iron, and manganese. As the minerals dissolve, arsenic, iron, and manganese are released to the groundwater, resulting in elevated dissolved arsenic, iron, and manganese concentrations. However, dissolved arsenic, iron, and manganese concentrations should decrease after oxidized redox conditions return.

Application of *in situ* bioremediation at the Property would involve a combination of temporary injection wells and large diameter (e.g., 12-inch) borings to target areas of high soil and groundwater nitrate concentrations. The injection wells would deliver a sodium acetate solution through one or more rounds of injections as necessary to reduce concentrations of nitrate in on-Property groundwater to below the Federal MCL of 10 mg/L. The borings would be backfilled with a mixture of calcium acetate, which quickly dissolves into groundwater, and pea gravel, which provides structural support of the boring and prevents settling as the salt dissolves.

6.3 Off-Property Groundwater Treatment Systems

The cleanup action involves constructing vertical barrier wall treatment system(s) consisting of a PRB wall (described below) and/or a series of wells/borings, backfilled with calcium acetate or injected with sodium acetate (as described above), or other Ecology-approved treatment methods following public comment. The technologies used in the vertical barrier wall treatment system(s) would rely on *in situ* bioremediation of the nitrate groundwater contamination.

PRBs are vertical barriers containing a particular type of media that remediates contaminants in groundwater as the groundwater flows through the PRB under the natural hydraulic gradient and flow direction. For application to the Site, a biologically operated PRB consisting of sand mixed with phosphate and some type of organic material (mulch, compost, wood chips) would be appropriate. The organic material would provide a source of carbon (electron donor) to stimulate the denitrification process within the PRB. As groundwater moves through the PRB and dissolves the media, an extended treatment zone will develop directly down-gradient of the PRB over time. It would be keyed into the clay aquitard located at approximately 30 feet bgs. Bench-scale testing would be required prior to implementation of this remedial alternative to determine the necessary design parameters for the PRB.

An alternative to PRBs is installation of temporary injection wells and/or large diameter (e.g., 12-inch) borings to bisect the off-Property groundwater plume attributable to the Bee-Jay Scales Site and target areas of high groundwater nitrate concentrations. The mechanisms for in situ bioremediation are discussed in Section 6.2.

Once the Bee-Jay Scales off-Property groundwater plume has been further defined, the most effective treatment method described above will be selected for that portion/area of the plume. The specific length and location of the vertical barrier wall treatment system(s), spacing and screen interval of potential injection wells, and any other design parameters will be determined during engineering design following additional nitrate groundwater investigations into the plume delineation and extent.

6.4 Institutional Controls

Ingestion of groundwater from the shallow aquifer has the potential to cause harm and require that institutional controls be established in accordance with WAC 173-340-440 to protect the public. These controls include making good faith efforts to cause restrictive covenants to be recorded with the office of the Yakima County Auditor by the current owners of properties within the Site to notify future property owners of the presence of subsurface contamination and notifying City and County planning departments and the local health department of groundwater contamination.

NOTE: Should a good faith effort to obtain restrictive covenants fail, the PLP's will be required to provide an annual educational mailing notifying affected property owners of the contaminated groundwater plume attributable to the Bee-Jay Scales Site and update them on the most recent groundwater monitoring and treatment effectiveness until cleanup levels for groundwater are achieved.

For areas of the Site impacted by the groundwater plume attributable to Bee-Jay Scales, the restrictive covenant will provide for a restriction on installing municipal or domestic drinking water wells in the shallow aquifer at the Site while nitrate concentrations in groundwater exceed the Federal MCL of 10 mg/L.

For areas at the Property where soil contamination remains in-place, a restrictive covenant will provide for a restriction on construction or relocation of buildings on-Property that would prevent proper monitoring of soil and groundwater concentrations or result in unacceptable risks from inhalation of vapors containing 1,2,4-trimethylbenzene (from soil) and 1,2-dichloropropane (from groundwater).

6.5 Monitored Natural Attenuation

Natural attenuation processes will be used to remediate the nitrate and ammonia groundwater plume attributable to the Bee-Jay Scales Site through biological degradation. A sampling program will be conducted to evaluate the performance of the natural attenuation processes using the following criteria:

- Demonstrate that natural attenuation is occurring as expected;
- Identify and monitor potential products (arsenic) resulting from biodegradation;
- Document changes in plume geometry;
- Monitor groundwater;
- Demonstrate the efficiency of institutional controls in protecting potential receptors;
- Detect changes in environmental conditions which may adversely affect the efficacy of the natural attenuation process;
- Verify that cleanup levels have been met.

7.0 CLEANUP ACTION IMPLEMENTATION SCHEDULE

The cleanup action shall be implemented in accordance with WAC 173-340-400. An implementation schedule showing significant milestones shall be submitted to the Department within 60 days from the effective date of the consent decree. At minimum, the implementation schedule shall include dates for document submittals to Ecology for the following: Engineering Design Report, Construction Plans and Specifications, Operations & Maintenance Plan, Compliance Monitoring Plan, Safety and Health Plan, and As-built Reports.

A draft Engineering Design Report and Construction Plans and Specifications shall be submitted for Ecology review for source removal on the Property within 3 months from the effective date of the consent decree. Construction of the source removal remedial action shall commence within 6 months of Ecology's approval of the Construction Plans and Specifications for the project and be completed no later than 12 months after Ecology's approval of the Construction Plans and Specifications for the project.

It is understood that delineation of the groundwater plume around and near the railroad may be delayed until access agreements are acquired. Delineation of the groundwater around and near the railroad is required to be completed within 12 months following the receipt of access agreements. Construction of the groundwater remedial action shall be completed no later than 3 years from the effective date of the consent decree, except for those areas in which off-Property access is unreasonably denied or not provided in a timely manner.

8.0 REFERENCES

CH2M Hill, 2003. *Remedial Investigation/Feasibility Study Work Plan*, Bee-Jay Scales Site, Sunnyside, WA, February.

SECOR, 2003. *Bee-Jay Scales Site Phase I Remedial Investigation Report*, Sunnyside, Washington, Chevron Environmental Management Company (ChevronTexaco) and BP America, Incorporated (BP), October.

SECOR, 2005a. *Phase II Remedial Investigation Report for the Bee-Jay Scales Site*, Chevron Environmental Management Company and BP America, Inc., May 10.

SECOR, 2005b. *Preliminary Screening of Remedial Alternatives Technical Memorandum for the Bee-Jay Scales Site*, November 18.

SECOR, 2007a. *Phase III Remedial Investigation Report for the Bee-Jay Scales Site*, Chevron Environmental Management Company and BP America, Inc., October 26.

SECOR, 2007b. *2006 Interim Remedial Measures Completion Report for the Bee-Jay Scales Site*, Chevron Environmental Management Company and BP America, Inc, December 14.

SECOR, 2008. *Down-Gradient Assessment Documentation Report for the Bee-Jay Scales Site*, Chevron Environmental Management Company and BP America, Inc., May 9.

Stantec, 2008. *Human Health Risk Assessment*, Bee-Jay Scales Site, Chevron Environmental Management Company and Atlantic Richfield Company, December 12.

Stantec, 2009. *Development and Screening of Remedial Alternatives*, Bee-Jay Scales Site, Chevron Environmental Management Company and Atlantic Richfield Company, March 27.

Stantec, 2009. *Revised Feasibility Study Report*, Bee-Jay Scales Site, October 16.

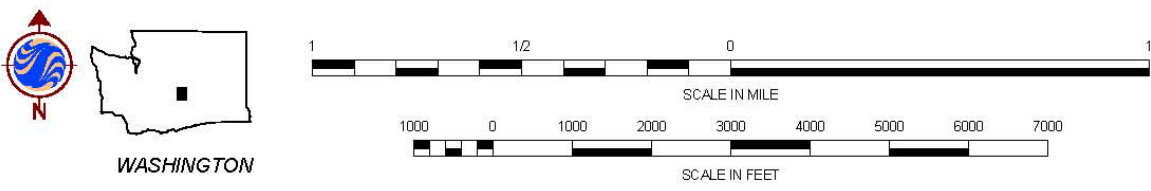
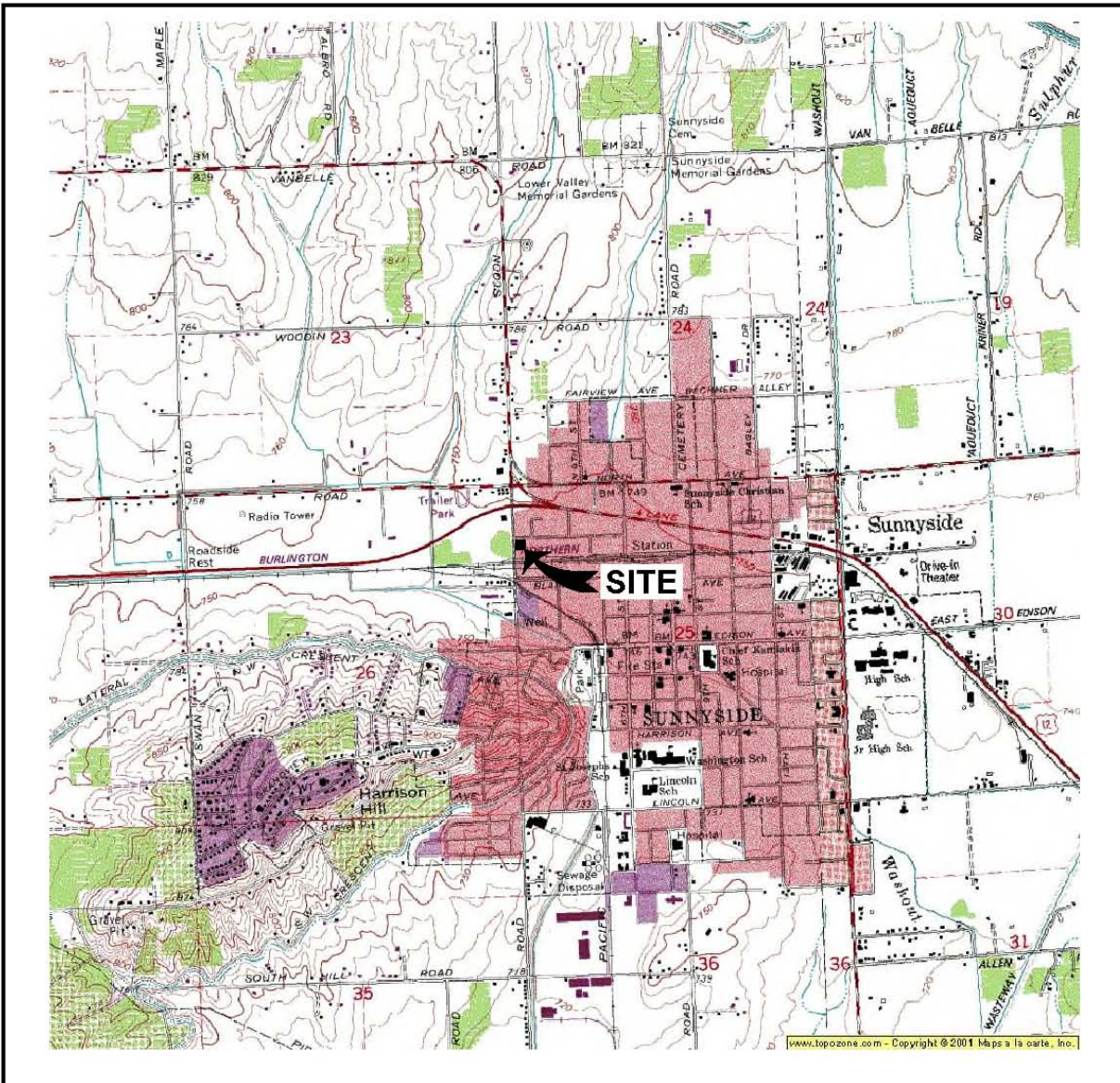
Stantec, 2011, *Nitrate Synthetic Precipitation Leaching Procedure Shallow Soil Assessment Results*, May 13.

Stantec, 2012, *Storm Drain Assessment Results for the Bee-Jay Scales Site*, July 17.

Stantec, various dates, *Groundwater Monitoring and Sampling Reports*

9.0 FIGURES

FIGURE 1: General Site Location



SOURCE: USGS 7.5 MINUTE QUADRANGLE; SUNNYSIDE, WASHINGTON; 1975

 2321 CLUB MERIDIAN DR. SUITE E OKEMOS, MI PHONE: (517) 349-9499 FAX: (517) 349-6863	FOR:	SITE LOCATION MAP		FIGURE
	BEE-JAY SCALES SITE SUNNYSIDE, WASHINGTON			1
JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
213201072	KAM	HMS	MRP	5/19/09

FIGURE 2: Property Layout

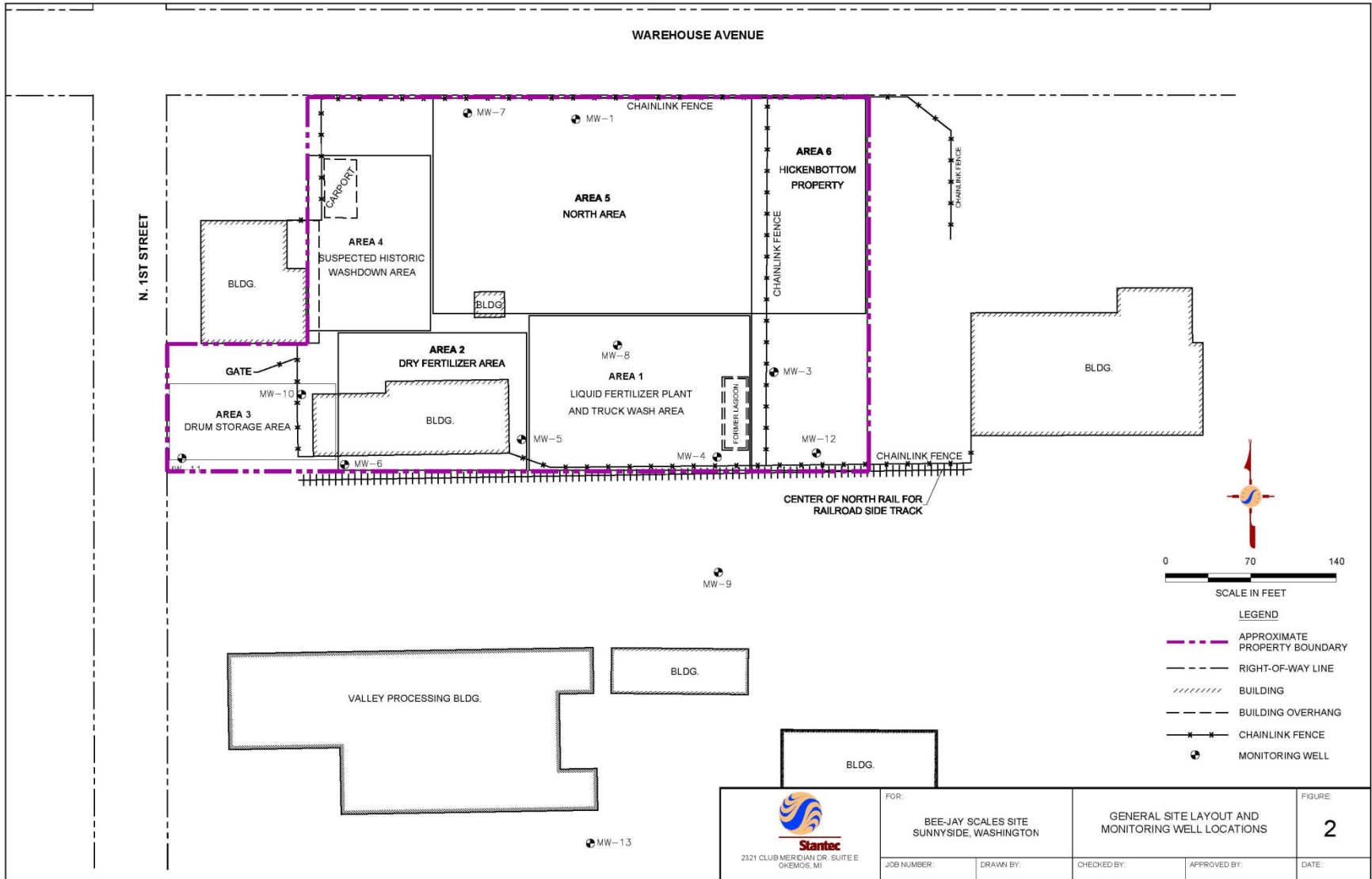
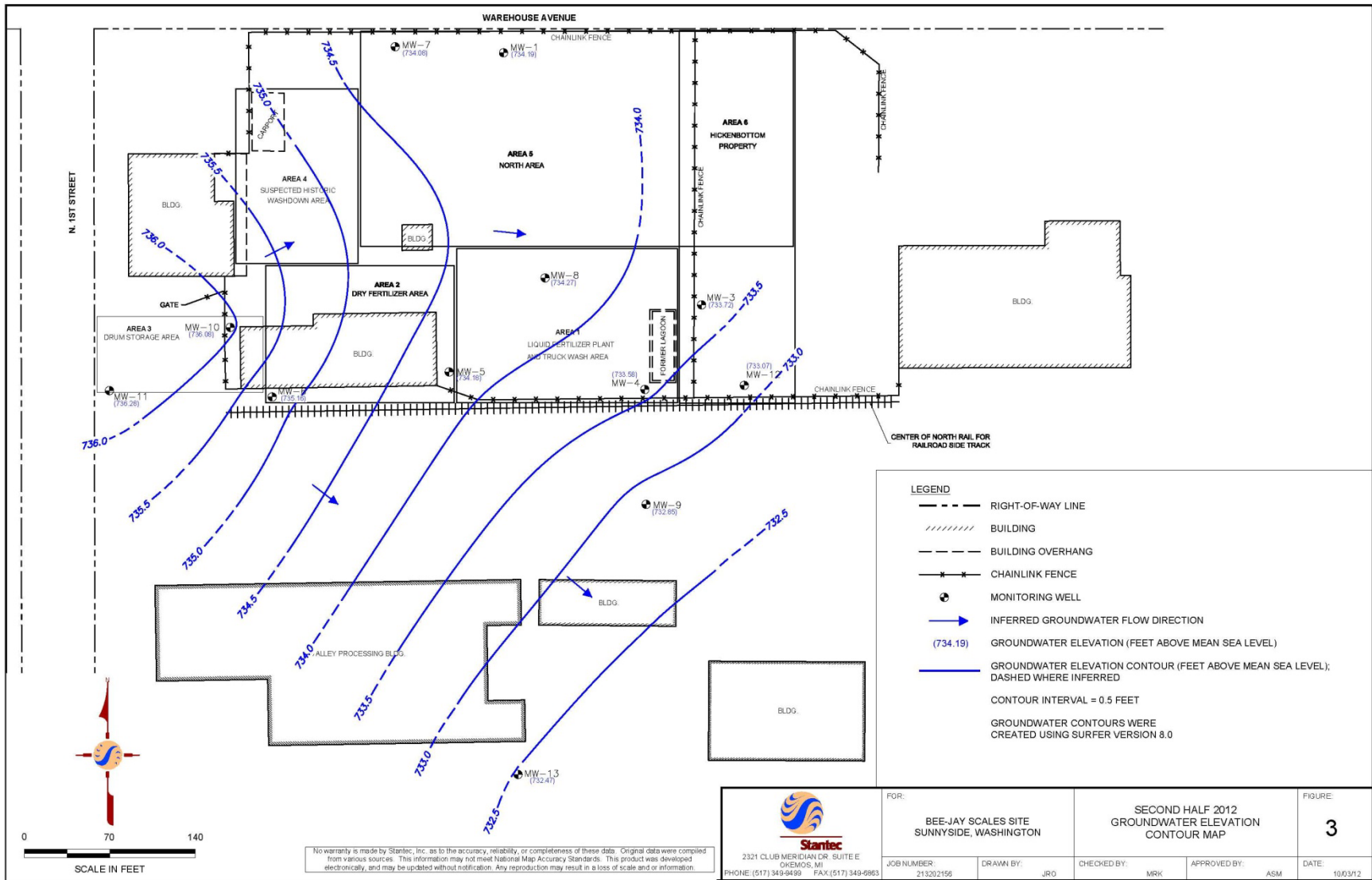


FIGURE 3: Groundwater Contour Map



FILEPATH P:\Chevron\Bee-Jay Scales\05_reports\Groundwater Monitoring\Drawings\ATCH-67201-2\CONT_v4.dwg(jpo\leokopsan)\0-d_05_2012 at 9:55\layout_2H.12

FIGURE 4: Site Map Showing Storm Drain Assessment Analytical Results

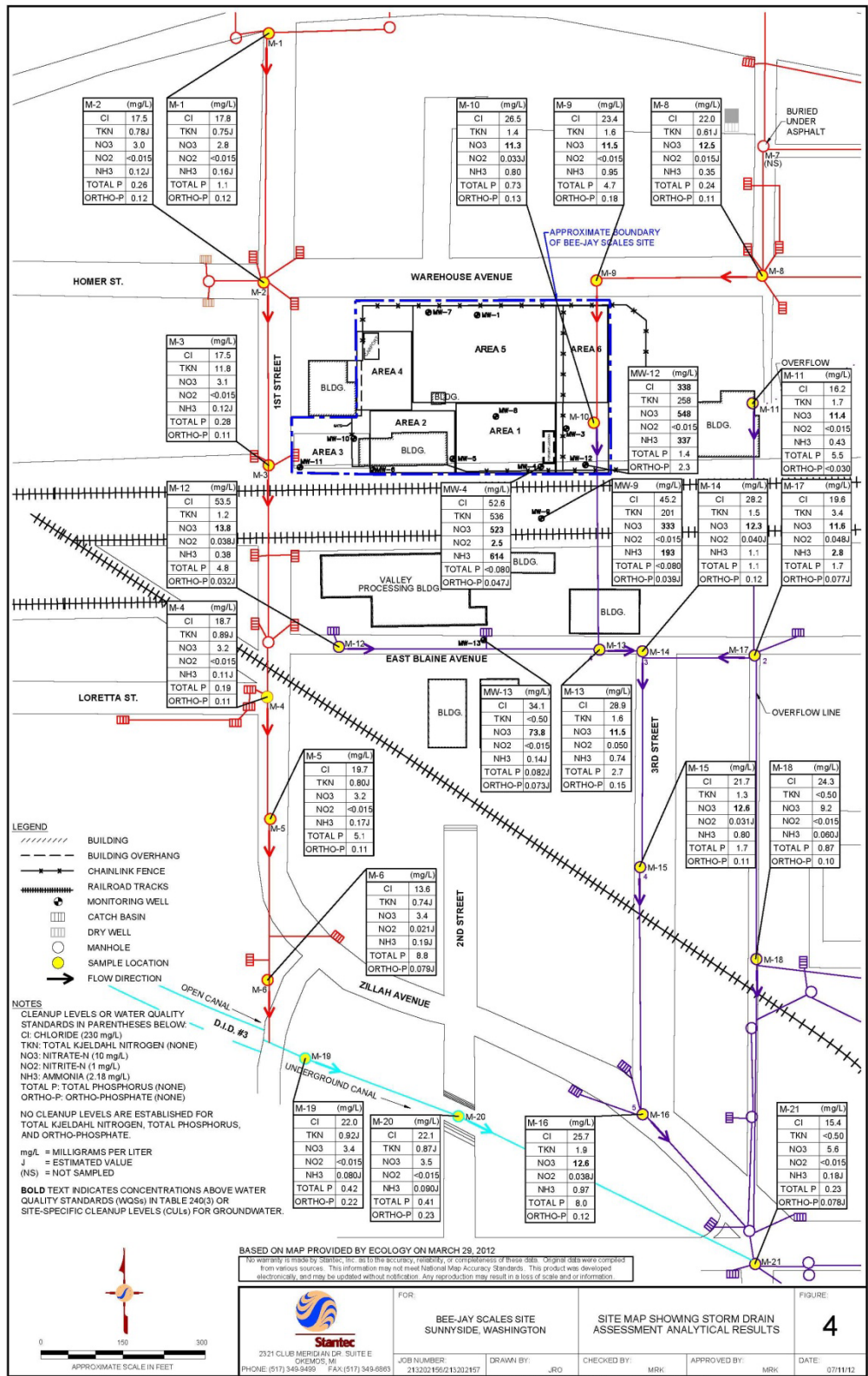


FIGURE 5: Preliminary Estimate of Nitrate Groundwater Plume

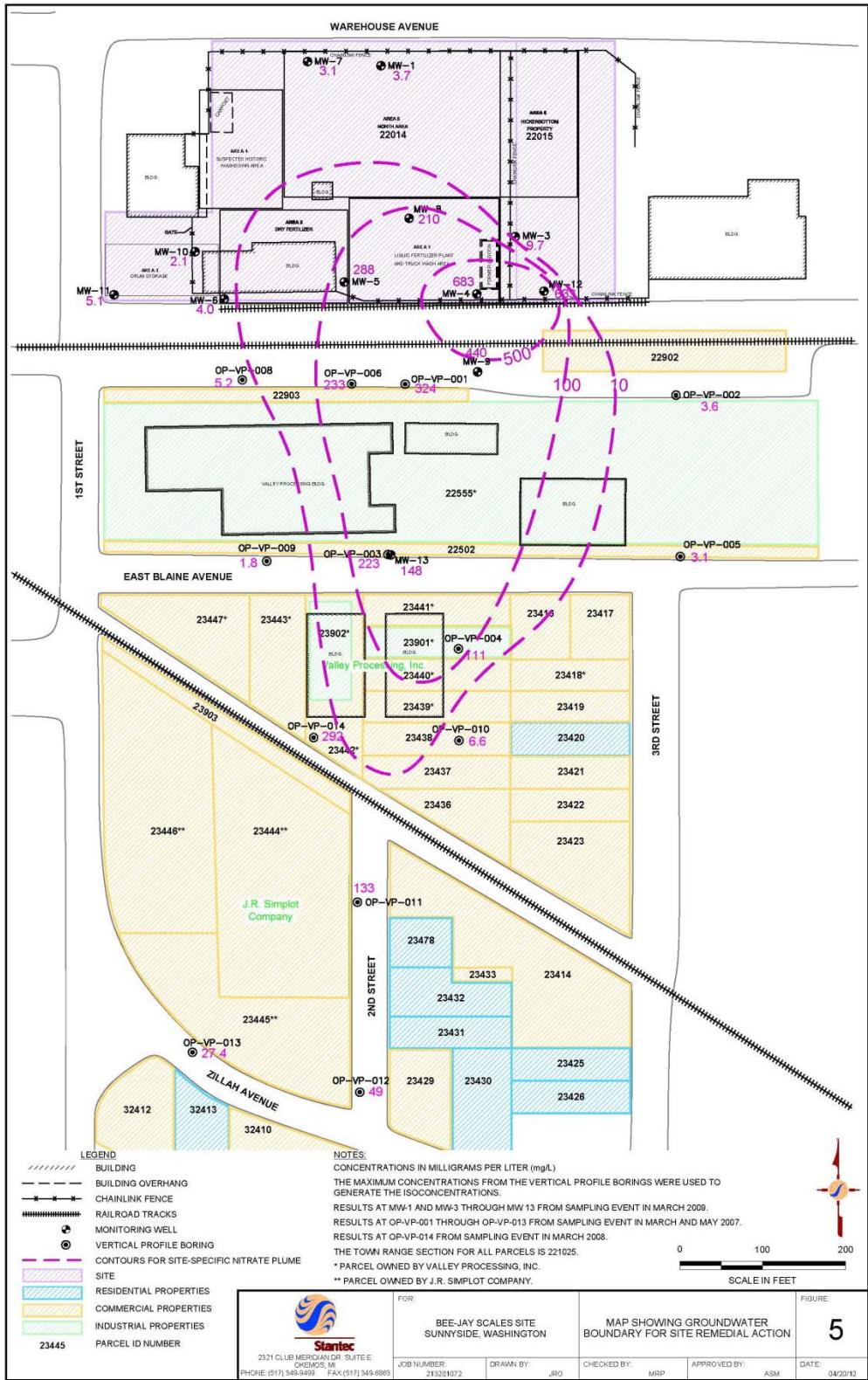
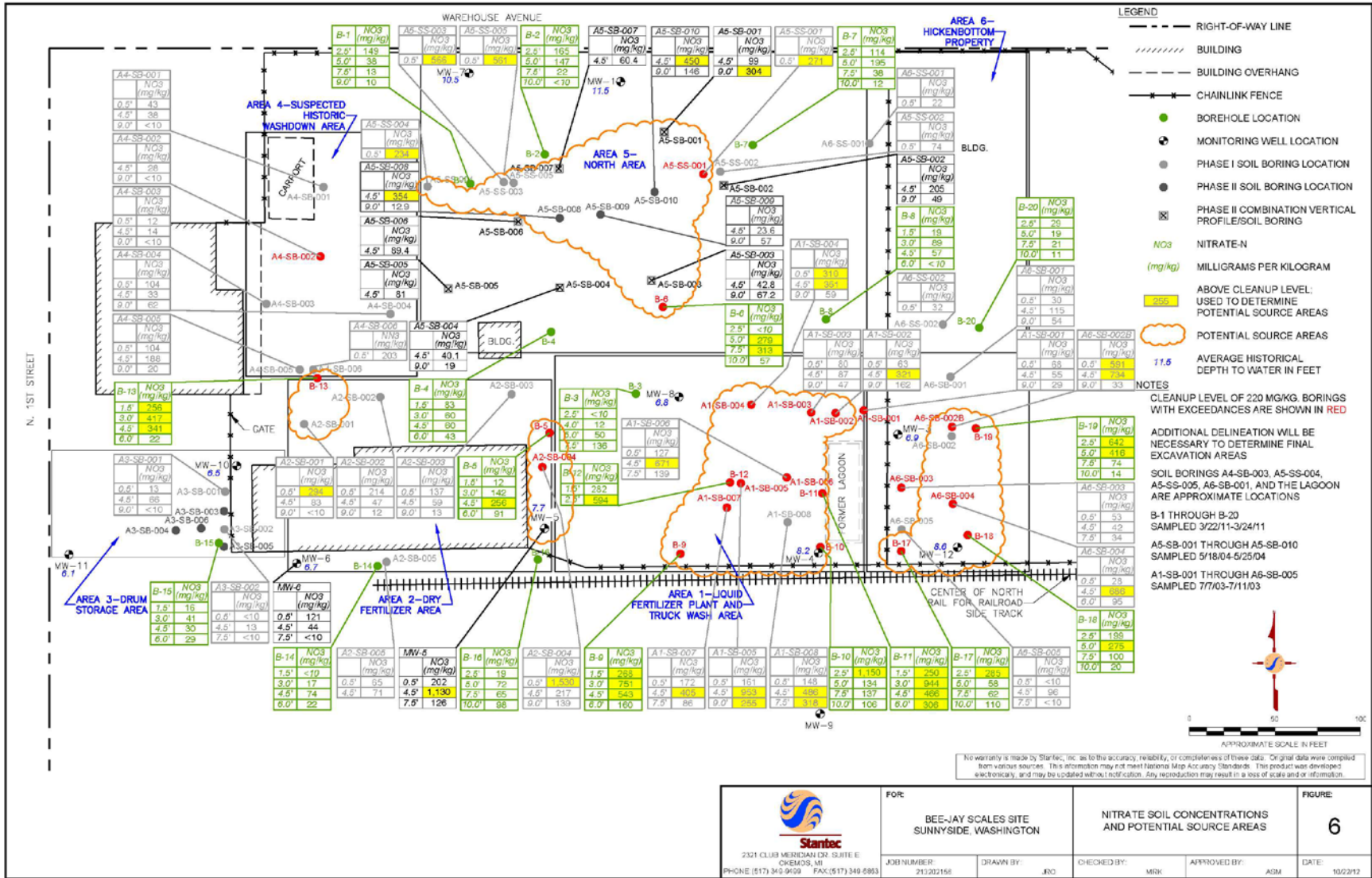
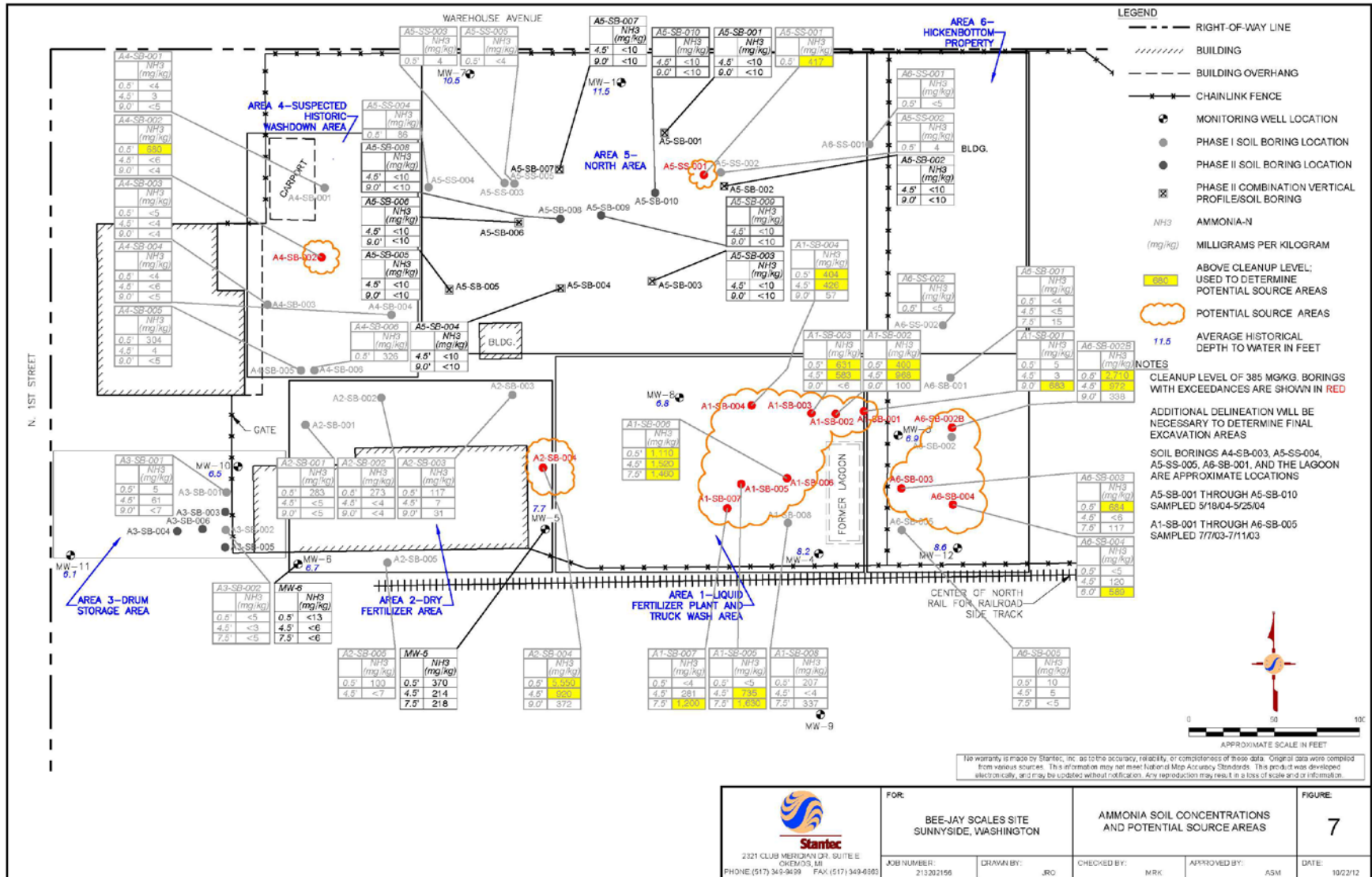


FIGURE 6: Nitrate Source Areas and Contaminant Levels



FILEPATH: \\chem\Bee-Jay Scales\05_reports\GIS\low Soil S/PLP Assessment\Figures\2012_BaseMap.dwg\palek\palek\Oct_22_2012 at 12:05 Layout: Fig 6_S/PLP.dwg

FIGURE 7: Ammonia Source Areas and Contaminant Levels



FILEPATH: \\P:\Chevron\Bee-Jay Scales\05_report\Shallow Soil SPLP Assessment\figures\2012_BaseMap\owj\palekopsah\Oct 22, 2012 at 12:04\Layout_Fig 7_SPLP_NC