TETRA TECH

Semi-Annual Report

Former Lobell Refinery
WDEQ Orphan Site # 57.004
Casper, Wyoming

Prepared for:

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1.0 INTRODUCTION AND OBJECTIVES

Tetra Tech has prepared this report as part of site characterization activities at the former Lobell Refinery Orphan Site (the Site) in Casper, Wyoming. The site is located near downtown Casper. It is bordered by Center Street on the west, Wolcott Street on the east, Collins Drive on the south and the former Northwestern Railroad tracks (currently a pathway) on the north. A location map is attached as Figure 1.

The Wyoming Department of Environmental Quality (WDEQ) went through a process of ranking orphan sites and was subsequently allocated funds by the legislature in 2009 to be used on orphan sites. The Lobell Site was chosen for investigation because it was one of the four highest ranked orphan sites in Wyoming relative to potential risk to human health. This investigation is being conducted under the Voluntary Remediation Program (VRP) - Orphan Site Program and therefore is managed by the WDEQ.

The objectives of this project are to 1) provide a current, accurate site conceptual model defining the extent and nature of the chlorinated solvent groundwater plume identified at the Site, 2) determine if non-aqueous phase liquids (NAPL) exist at the Site and, if present, the extent and nature of the NAPL, 3) determine if vapor intrusion is impacting indoor air quality above acceptable values in any homes or buildings, and 4) determine if any risk exists to residents or occupants from use of private groundwater wells for consumption, irrigation or other uses.

1.1 Site History

As part of this work, Tetra Tech contracted Environmental Data Resources (EDR) to conduct a database search of the Site and surrounding area. The EDR work included a search for topographic maps, city directories, aerial photos, Sanborn Fire Insurance Maps and government records. The results of this search are included as Appendix A. The information obtained from this search was used to create the Site history discussed below.

The site has been occupied by a number of different businesses and companies since its development just before the turn of the century. Pennsylvania Oil and Gas Company built and operated a refinery on the Site from 1895-1903, at which point it was bought by Lobell, who operated it until 1911. Sanborn maps from that period show the location of several tanks on the site extending across Wolcott Street. Articles reviewed indicate that there was an open oil storage pit somewhere on site which was later filled in by the city because it was a public health hazard. None of the maps reviewed indicated the location of the pit. The filled in pit could be the source of the surficial hydrocarbon seeps along Wolcott reported in the URS report (described below). From 1911 forward the RFP (Request for Proposals) for the former Lobell Refinery Orphan site dated July 1, 2009 notes that the site was owned and/or occupied by many different entities including Midwest Refining Company, Stanolind Oil and Gas Company, Standard Oil Company, Chicago Northwestern Railway Company and the Goodstein Property Trust. The Sanborn maps indicate an electricity generation plant was present on the northwest corner of the Site. The plant was fueled first by coal and later by fuel oil during various phases of its existence. The plant was located at 421 South Center Street. One of the owners, Northern Utilities, also operated the building along the southern edge of the property as a warehouse. A railroad siding was located along the north side of Collins (south side of Site)

until it was removed sometime between 1961 (shown on topographic map) and 1967 (scratched out on Sanborn Map).

There was also a railroad track along the north edge of the site that is now a pathway as part of rails to trails. Railroad tracks and activities associated with loading and unloading rail cars are also a potential source of contamination.

1.2 Surrounding Area Site History

Surrounding potential sources of contamination include a dry cleaner, automobile dealership and two gas stations. The dry cleaner is located along Collins just south of the former refinery site. One gas station was located just west of the dry cleaner location on the corner of 5th, Collins and Center. The second gas station was located directly south of the first across 5th Street. The auto dealership was located on the south side of 5th Street directly south of the former refinery site.

The Casper Dry Cleaner is located directly south of the site. Based on the historical review, it has operated since the early 1900's. It is still in operation. Previously it had six 280 gallon tanks located in the street just north of their current location. These tanks may or may not still be in the ground at that location (see the Sanborn Maps included as Appendix A). In the earlier years these tanks contained gasoline. Gasoline was one of the fluids used in early dry cleaning before the invention of modern dry cleaning chemicals. However, the 1967 Sanborn map clearly shows that, at least in 1967, these tanks contained solvent. It is unknown how long after that these tanks were in use or if they were ever properly abandoned. The Sanborn Maps for the Site are presented as Appendix A.

The first gas station present at the corner of 5th, Collins and Center appears in 1918. This filling station has a 980 gallon UST associated with it. This gas station and its associated tank do not appear on the 1967 Sanborn Map.

In 1925 the second filling station appears on the Sanborn Maps just across 5th Street to the south of the first gas station mentioned above. There are four tanks shown around this station, the sizes of these tanks are not indicated but they appear smaller than those located at the first gas station. Two of the four tanks disappear in the 1948 map and the other two are present in the 1967 map, which is the most recent Sanborn available.

The auto sales and service site, Colliseum Motors, first appears on the Sanborns in 1918, and it is still present on the 1967 Sanborn. One 500 gallon gas tank is shown in association with this location on the north side of the building. This tank is not present on the 1967 Sanborn.

1.3 Previous Investigations

Several investigations have been performed at the Site. These include projects completed under the direction of WDEQ, USEPA and private entities. The following is a summary of the information gathered during those projects as taken from the RFP for this project and additional information gathered during preparation of this work plan.

- In 1995, two railroad tank car underground storage tanks beneath the northwest portion of the Site were emptied, cleaned and abandoned in place under the Wyoming Underground Storage Tank Program, WDEQ LUST Facility No. 4176.

- In 1997, URS on behalf of the USEPA investigated reports of seeps of viscous liquids rising to the ground surface, through cracks in the sidewalks along the west side of Wolcott Street, on the east side of the Site just east of the northeast corner of 334 Wolcott. This report indicated that eight polynuclear aromatic hydrocarbons (PAHs) were found in this material. The source of these seeps is unknown, but could be related to an oil pit formerly present at the site as part of the refinery operations. The USEPA issued status of No Further Remedial Action Planned (NFRAP) due to "the lack of documentation showing a release from the site to the environment." The report, URS Operating Services, Inc. (Denver, CO), November 1997: *Analytical Results Report for Focused Site Inspection, J.H. Lobell Refinery Site, Casper, Wyoming,* Cerclis ID# WY0001654391, prepared for USEPA Region VIII under Contract No. 68-W5-0031, was not found in VRP files. However, Tetra Tech obtained a copy of this report which we have included as Appendix B.

- A limited environmental site assessment, *Subsurface Exploration Service, 421 South Center Street Property, Casper Wyoming,* conducted in 2003 by Inberg Miller Engineers (IME), indicated the presence of diesel range organics (DRO) in both shallow and deep soils in the eastern portions of the Site. DRO and chlorinated hydrocarbons were also found in groundwater samples taken from temporary monitoring wells at the site.

- In 2004, additional site assessment was performed and a letter report submitted by Gene R. George & Associates, Inc. (GRGA) on behalf of a VRP Volunteer (Goodstein Trust). Activities included surface and subsurface soil borings, and limited groundwater sampling. Results confirmed the presence of chlorinated solvents above applicable cleanup levels in groundwater, and surface and subsurface areas of weathered DRO above VRP soil cleanup levels (2410 mg/kg to 8200 mg/kg) in the soils. The source of the weathered hydrocarbons is believed to be the former refinery operations of over 100 years ago. The origin of the chlorinated hydrocarbons is unknown. Levels of Tetrachloroethylene (PCE) in groundwater range from 1.4 ug/L to 340 ug/L. Levels of Trichloroethylene (TCE) range from 4.6 ug/L to 16ug/L and low level of cis 1,2 DCE in groundwater were also found at the Site. Dissolved phase hydrocarbons above applicable cleanup levels were not documented in the previous sampling events described above.

2.0 WORK COMPLETED

2.1 Soil Borings

Eight soil borings were completed at the site, the locations of these borings can be found on Figure 2. Soil borings were drilled using 4 ¼ inch inside diameter hollow stem augers and a CME 55 ATV mounted drill rig operated by Tetra Tech personnel. Samples were collected at five foot intervals using a split spoon from ground surface to total depth drilled. Soil head space samples were collected and analyzed in the field using a flame ionization detector (FID). The borings were logged by a Tetra Tech Scientist; boring logs are located in Appendix B. The soil sample exhibiting the highest FID reading or, if no reading higher than 10 was observed, the sample at the top of the water table was packaged and sent to Test America Laboratories and analyzed for volatile organic compounds (VOCs) by EPA method 8260B, semi-volatile organic compounds (SVOCs) by EPA method 8270C, and for diesel range organics (DRO) by EPA method 8015C. All sampling equipment was decontaminated between each sample using a

liquinox and tap water solution and subsequently rinsing with tap water. The augers were decontaminated using a hot water pressure washer before being used on the project and between borings. All soils were drummed and subsequently disposed of at the Casper Landfill after proper testing had been completed.

During drilling of MW-5 an onlooker who was familiar with former construction activities at the site cautioned us that we were dealing with very acidic soils. After he explained that there multiple indications of the presence of strong acid including laboratory data it was decided that pH should be added to the list of analytes for that sample.

Two borings, BH-3 and BH-4, were not converted into wells and were abandoned using 3/8 bentonite chips hydrated with 5 gallons of water per each 50 pound sack placed in the boring. The chips extended from the bottom of the boring to eight inches below ground surface. An 8 inch thick concrete cap was placed at the surface.

2.2 Well Installation

Six of the borings were converted into wells, the locations of these wells can be found on Figure 2. The wells were constructed using 10 feet of two inch, 0.010" factory slotted, threaded, schedule 40 PVC screen at the bottom with two inch, threaded, schedule 40 PVC riser extending to the surface. A threaded PVC flush cap was placed on the bottom and an expansion cap at the top. The bottom of the screen was placed approximately 6 feet into the water table. Ten/twenty silica sand was placed from the bottom of the borehole to two feet above the screen. Three eighths inch bentonite chips was placed on top of the sand and hydrated with five gallons of water per 50 pound bag. The chips were placed to one foot below ground surface (bgs) where a 7 inch flush mount protector was concreted into place. The screen, riser, sand and bentonite will be placed through the hollow stem augers. Well completion diagrams can be found in Appendix C.

Once installed, the wells were developed using a development pump. The wells were developed until reasonably clear. All development water was drummed for future disposal.

2.3 Vapor Points

Five vapor monitoring points were installed during the initial field effort in late February, 2010. These points were installed to 5' bgs using a CME 55 ATV mounted drill rig and direct push methods. Glass beads were used to pack the area around the six-inch length of vapor screen. The annulus around the point was sealed with hydrated granular bentonite. A flush mount protector was installed and concreted in place over each of the permanent monitoring points.

Six additional soil vapor monitoring points were installed in May in an effort to delineate elevated soil organic vapors at the site. These points were installed using a truck mounted geoprobe and direct push methods. The points were installed to a depth of eight feet bgs to correspond with the depth of building basements, where present, using the same completion method stated above. The locations of the points are shown on Figure 2.

Immediately following the installation of each vapor monitoring point a field screening sample was collected. The results of the field screening sample were used to determine the need to adjust the location of subsequent soil vapor monitoring points. The monitoring points were purged using a vacuum pump (five tubing volumes) and then a sample was immediately

collected using a hand pump equipped with a tetrachloroethene gas detector tube. The detector tube sample was collected in accordance with manufacturer specifications.

2.4 Groundwater Sampling

Two rounds of groundwater sampling have been conducted at the site, one in March and one in June. Samples were collected using a peristaltic pump and low flow sampling methods. All sample tubing used was dedicated tubing which was disposed of after each use. These samples were then sent to Test America Laboratories in Nashville, TN and analyzed for VOCs by EPA method 8260B, SVOCs by EPA method 8270C, and for DRO by EPA method 8015C. After reviewing the initial samples, the second round of samples were only analyzed for VOCs. MW-5 was not sampled during the June event because free product, or Light Non Aqueous Phase Liquid (LNAPL) was present in the well.

2.5 Vapor Monitoring

In March laboratory samples were collected from the first five vapor points. Laboratory samples were also collected from vapor points VP-6 tVP-11 and MW-2 in May. At each location at least three tubing volumes or casing volumes were purged using a vacuum pump prior to the collection of the laboratory samples. Laboratory samples were collected using Summa canisters and a helium filled vapor shroud. Summa canister contents were analyzed for volatile organic compounds using Method TO-15. Helium was added as an additional analyte to evaluate the collection integrity of the vapor samples.

Indoor Air sampling was also conducted at both the Salvation Army Building and Lisa Burridge Real Estate Office. Three samples were collected in the basement of the Salvation Army and one on the ground floor of the real estate office at the locations shown on Figure 2. The samples from the Salvation Army were in three distinct locations across the basement floor and taken over an approximately 24 hour period beginning on April 29. The sample from the real estate office was taken on the main floor as there is no basement; it was taken over an approximately 8 hour period during the day on April 30.

2.6 Tank Survey

Historical information indicates that two batteries of underground storage tanks (USTs) and a single UST were present at the Casper Dry Cleaners building. One grouping of USTs was located along East Collins Drive and the second grouping was located along East 5th Street (Figure 2). The single UST was located near the intersection of East Collins Drive and East 5th Street. The USTs along East Collins Drive were originally for gasoline and then subsequently solvent. The USTs along East 5th Street were reportedly for gasoline. No historical information was discovered that indicated if the USTs were removed. Vent lines are still present for the USTs along East Collins Drive. In addition, Tetra Tech believed that a buried pit from the former refinery could potentially be located in Wolcott Street.

Due to the close proximity of the buildings, overhead power lines and potential numerous ferrous objects in the subsurface, ground penetrating radar (GPR) was used to survey the areas where the USTs may be located.

A Noggin Smart Cart configuration GPR was used to survey the potential UST areas. A tight grid pattern (approximately 1-foot) was established at each UST area that provided data

sufficient for three dimensional graphing of the USTs, if present. The collected data was analyzed by using Sensors and Software, Inc. proprietary software for the Noggin GPR system. The grids completed are shown on Figure 3.

2.7 Seep Sampling

Tetra Tech sampled the material coming from one of the seeps in front of Joshua's Storehouse. This material was taken from the surface at the active portion of the seep during temperatures warm enough that the seep was viscous. This material was taken to Energy Laboratories in Casper and analyzed for Eight RCRA metals as totals, density, flash point, pH, DRO and polynuclear aromatic hydrocarbons (PAHs).

3.0 RESULTS

3.1 Soil

The soils at the site were generally sands and gravels; which is consistent with the alluvial quaternary deposits that were expected. Bedrock was not encountered during drilling and is therefore likely greater than 30 bgs across the site. The bedrock is believed to be Cody Shale.

Only two borings exhibited shallow soil contamination that was significant enough to warrant laboratory testing. These were at BH-3 2-3 feet and MW-5 2-4 feet. BH-3 is located on the northern portion of the site and, according to Sanborn maps is approximately drilled through an old railroad siding. A railroad track stake was brought to the surface with the shallow cuttings from this boring. A sample from the black layer existing in the first three feet was analyzed by the laboratory. Several PAHs were detected in this sample and a high level of DRO, the constituents of which were generally higher boiling point hydrocarbons. The soil from 1-4 feet in MW-5 exhibited similar black staining. This sample exhibited only one PAH, chrysene, but did exhibit a similarly high DRO, which was also largely higher boiling point hydrocarbons.

Only two borings (MW-1 and MW-5) exhibited deep soil hydrocarbon contamination. This contamination was noted during drilling in both locations. At MW-1 there was odor in the saturated zone but no obvious staining; laboratory results indicated the presence of DRO at 2240 parts per million (PPM) which is consistent with earlier investigations that found DRO contamination in the same area. Contamination was first noted at MW-5 at 10 feet bgs, suggesting it was at or near a source. As free product was noted in the saturated split spoon sample in this boring no soil sample was collected.

Three boreholes at the site exhibited detectable concentrations of PCE. The residential soil cleanup standard for PCE is 0.57 ppm. The concentration at MW-1 was the only one to exceed this standard with 0.635 ppm. MW-4 and 6 had concentrations of 0.0134 and 0.0108 respectively. These samples were all taken from soils at the groundwater interface; MW-2, MW-3 and BH-4 were also analyzed from this zone but did not contain detectable concentrations of PCE. Soils at that depth were not analyzed from MW-5 or BH-3. The laboratory analytical report is presented in Appendix D; there is a sample labeled BH-2 in the laboratory data which was later renamed MW-5 when the proposed boring was converted into a monitor well.

3.2 Groundwater

3.2.1 Groundwater Flow

Groundwater is present approximately 20-24 feet bgs across the site. Two rounds of water level measurements have been completed at the site. Potentiometric surface maps have been created for each round. They are presented as Figures 4 and 5. The groundwater flow direction is generally northeast with a gradient of 0.1-0.2%.

3.2.2 Groundwater Chemistry

Two rounds of groundwater sampling have been conducted at the site. Groundwater at the site was found to contain detectable amounts of PCE and daughter products, and DRO. The second round was only tested for VOCs and exhibited PCE and TCE. The tables below summarize the data. No significant concentrations of non-PCE related VOCs were detected in the samples.

Table 1- First Round Groundwater Analytical Summary

Well	PCE	TCE	DRO
MW-1	4.65	ND	611
MW-2	ND	ND	ND
MW-3	ND	ND	ND
MW-4	**1840**	**56.2**	211
MW-5	ND	ND	512
MW-6	**1800**	**296**	176

*all concentrations in ppb
** Cleanup Level taken from VRP Fact Sheet 13
Bold indicates value exceeds regulatory cleanup level
Cleanup level for PCE and TCE is 5 ppb. Cleanup level for DRO is 1,100

Table 2-Second Round Groundwater Analytical Summary

Well	PCE	TCE
MW-1	**13**	ND
MW-2	**44**	ND
MW-3	ND	ND
MW-4	**1470**	**33.7**
MW-6	**1700**	**44.8**

*all concentrations in ppb
** Cleanup Level taken from VRP Fact Sheet 13
Bold indicates value exceeds regulatory cleanup level
Cleanup level for PCE and TCE is 5 ppb.

The groundwater at the site is contaminated with chlorinated solvents at levels above cleanup standard. There are also significant DRO concentrations at the site including 0.04 inches of free product (LNAPL) at MW-5. The extent of both the elevated groundwater DRO and chlorinated solvent plumes are not defined. These two contaminants do not appear to be from the same source. The Laboratory analytical report is presented in Appendix E.

3.3 Air

3.3.1 Soil Vapor

Detectable vapor concentrations of PCE and TCE in soil vapor at the site ranged from 4 to 189,908 ug/m^3 and <1 to 591 ug/m^3 respectively. An iso-concentration map is presented as Figure 6. This figure presents a general picture of the PCE soil vapor concentrations at the Site, however, further sampling points would be needed to better define the extent of the PCE plume. The seals on the vapor points appear to be working as no Helium was detected in the samples for which it was analyzed. The following table summarizes the soil vapor concentrations found at the site.

Table 3. Chlorinated Solvent Concentrations in Soil Vapor

Location	Date	PCE (ug/m^3)	TCE (ug/m^3)
VP-1	3/18/2010	**27,130**	**107J**
VP-2	3/18/2010	1,356D	26
VP-3	3/18/2010	115	<1
VP-4	3/18/2010	271	**91**
VP-5	3/18/2010	4	<1
VP-6	5/24/2010	814	8
VP-7	5/24/2010	**189,908D**	**591J**
VP-8	5/24/2010	265	<1
VP-9	5/24/2010	18	<1
VP-10	5/24/2010	**27,130**	24J
VP-11	5/24/2010	**12,887**	**54**
MW-2	5/24/2010	**128,866**	**279J**

*J indicates that the value is estimated because it was below practical quantification limits
*D indicates the result was obtained from the analysis of a dilution
***Bold** indicate the level exceeds WDEQ Soil Vapor Standards for Commercial areas
Commercial Screening level for PCE is 2,720 ug/m^3 and for TCE is 42 ug/m^3

Laboratory analytical results were produced in ppb (volume/volume). These results were converted by Tetra Tech using a gas constant of 24.45 L/mol. This gas constant was taken from Test America's SOP No. KNOX-MS-001 Revision No. 10. As demonstrated by the table above several of the locations exhibit concentrations of PCE and TCE above screening levels. The Laboratory analytical report is presented in Appendix F. The full extent of the vapor contamination is not known.

3.3.2 Indoor Air

Detectable concentrations of PCE and TCE in indoor air at the Site ranged from 10 to 1,628 ug/m^3 and <1 to 64 ug/m^3 respectively. The following table summarizes the indoor air analysis completed at the Site.

Table 4. Chlorinated Solvent Concentrations in Indoor Air

Location	Date	PCE(ug/m3)	TCE(ug/m3)
Salvation Army 1	4/30/2010	**217**	**64J**
Salvation Army 2	4/30/2010	**1628D**	**13**
Salvation Army 3	4/30/2010	**122**	<1
Lisa Burridge Real Estate	4/30/2010	10	<1

*J indicates that the value is estimated because it was below practical quantification limits
*D indicates the result was obtained from the analysis of a dilution
***Bold** indicate the level exceeds WDEQ Indoor Air Standards for Commercial areas
Commercial Screening level for indoor air for PCE is 27.2 ug/m^3 and for TCE is 4.2 ug/m^3.

Laboratory analytical data were produced in ppb (volume/volume). These results were converted in the same manner as the soil vapor results. The laboratory analytical report is presented in Appendix F.

All of the samples from the Salvation Army building are above screening levels. These levels were developed for the orphan sites by the VRP using risk based calculations. These screening levels are designed to protect individuals from developing cancer over a 30 year period of exposure in a commercial setting.

3.4 Tank Survey

The GPR survey indicated that there are some areas of likely disturbed soil; however, no obvious indications of intact metal tanks were found from the survey. There are disturbances noted in the GPR survey which could represent the presence of tank remnants located in the suspected location of the former dry cleaner tanks; however, the presence or absence of tank remnants at the site cannot be conclusively identified from the GPR data. No indication of a former pit in Wolcott Street was noted from the GPR data. The data is attached as Appendix G.

3.5 Seeps

The seep sample exhibited high levels of DRO (40,600) although none of the PAHs tested for were present. The pH of the sample was 1.16. This is supported by pH paper analysis performed in the field that also yielded a pH of approximately 1. The flash point was greater than 200 degrees Fahrenheit. This sample was also tested for metals; the results are presented in Table 5 below. The full laboratory analytical report can be found in Appendix H.

Table 5. RCRA Metal Concentrations in ppm as Totals

Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
18.8	40.9	ND	2.9	111	.06	ND	ND

***Bold**- indicates and exceedance of the WDEQ VRP Fact sheet 12 soil cleanup standards for residential soil
*ND is non-detect

4.0 DATA QUALITY EVALUTATION

The data was evaluated for precision, accuracy, representativeness, completeness and comparability in accordance with the Quality Assurance Project Plan (QAPP). The data presented in this report met the project objectives and are therefore usable without qualifications other than those qualifiers assigned by the laboratory in the laboratory reports.

5.0 CONCLUSIONS

The work completed during this investigation has partially addressed the objectives for this project and identified a new objective that warrants further investigation. This new objective is to determine the source and mechanism of the seeps in Wolcott and along its sidewalk. This objective was born out of initial concerns about the pH of the material seeping out of the street and the subsequent substantiation of those concerns by laboratory and field analysis.

The seeps in Wolcott are a potential threat to human health. The test results demonstrate that the substance oozing out of the seeps is extremely corrosive and could potentially cause damage to people who came into contact with the substance.

This investigation has also discovered the presence of Light Non Aqueous Phase Liquid (LNAPL) at the site. The LNAPL was discovered in one well on the Site located in Wolcott. There is not currently enough information to determine the extent or source of the LNAPL. Based on the groundwater flow the LNAPL is moving generally northeast.

The former refinery activities are likely responsible for the areas of shallow soil contamination at the site. It is also possible that these activities are also responsible for the seeps in Wolcott; although due to the complex nature of the contaminant migration in this area there is not currently enough information to determine the exact source of the seeps.

This work has produced better understanding of the PCE plume at the site. A basic site conceptual model now exists for the PCE plume, although future work will be necessary to refine and complete this site conceptual model and provide data for the determination of remedial options. This model shows that the PCE and TCE vapor concentrations in a fairly substantial area are above WDEQ soli vapor standards for commercial areas. This investigation has also shown that the PCE and TCE concentrations inside the Salvation Army building are significantly above WDEQ indoor air standards for commercial buildings. The vapors present in the Salvation Army building should be mitigated to reduce user exposure.

This investigation did not find any evidence of private wells of any kind in use on the Site.

6.0 UPCOMING WORK ALREADY APPROVED

In order to better understand the mechanism and source of the seeps in Wolcott Tetra Tech will use geoprobe direct push methods to complete numerous shallow borings. These will also help to define the area in which this material is located. Once that is complete, locations will be identified for test pits. The test pits will be used to see the vertical profile and help to determine the mechanism of the seeps.

The southern edge of the PCE contamination is not well defined. More wells and vapors points will be installed to better define the southern end of the PCE plume in both vapor and groundwater.

A product sample will also be collected from MW-5 in Wolcott Street and a product ID will be performed by Energy Laboratories in Casper. Identification of the LNAPL constituents will aid in determination of the source.

Once all the wells referenced above have been completed another round of groundwater samples will be collected from all wells installed to date. This should provide a considerably clearer picture of both the chlorinated solvent and hydrocarbon plumes.

7.0 SIGNATURES

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8.0 REFERENCES

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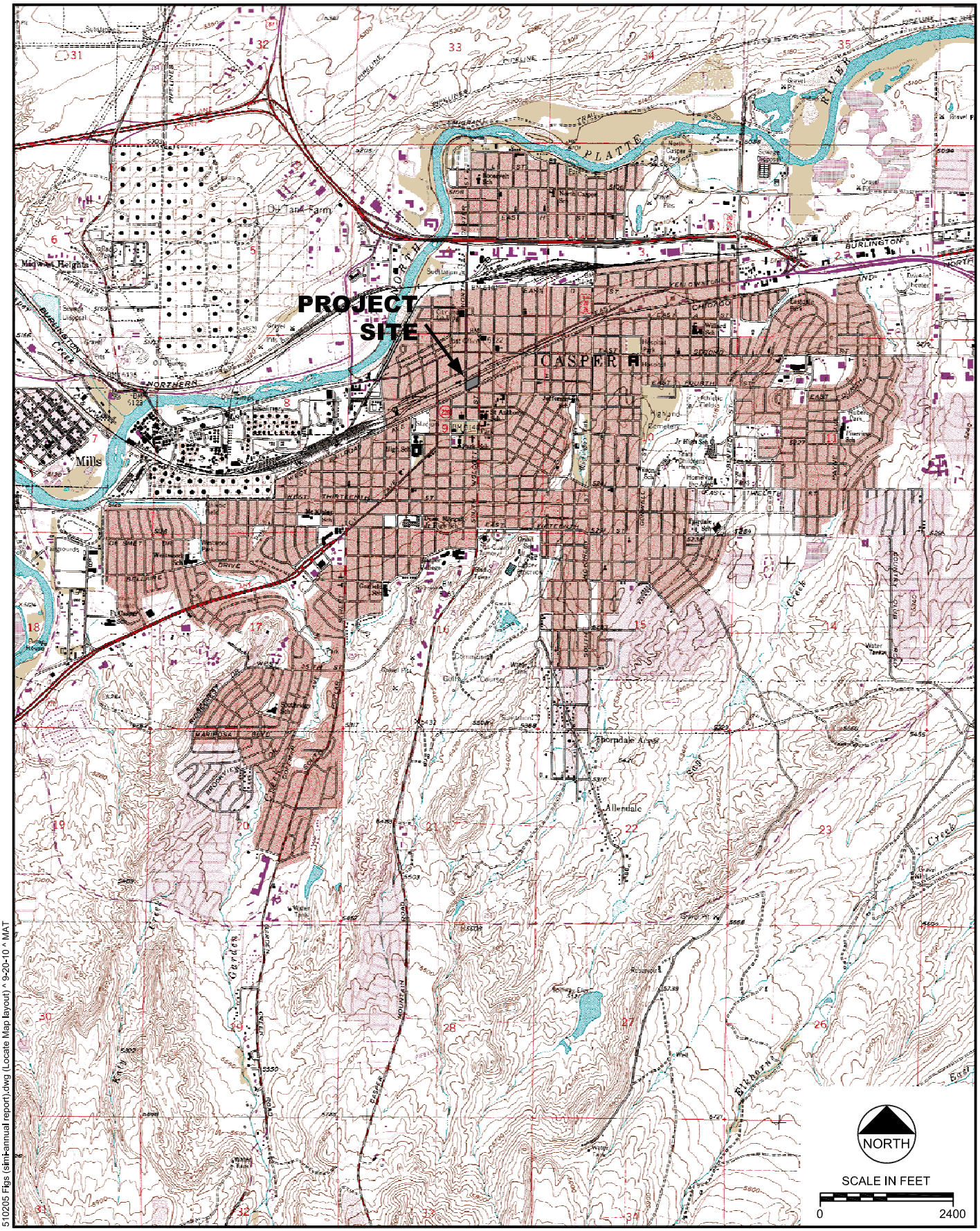

510205 Figs (sim-annual report).dwg (Locate Map layout) ^ 9-20-10 ^ MAT

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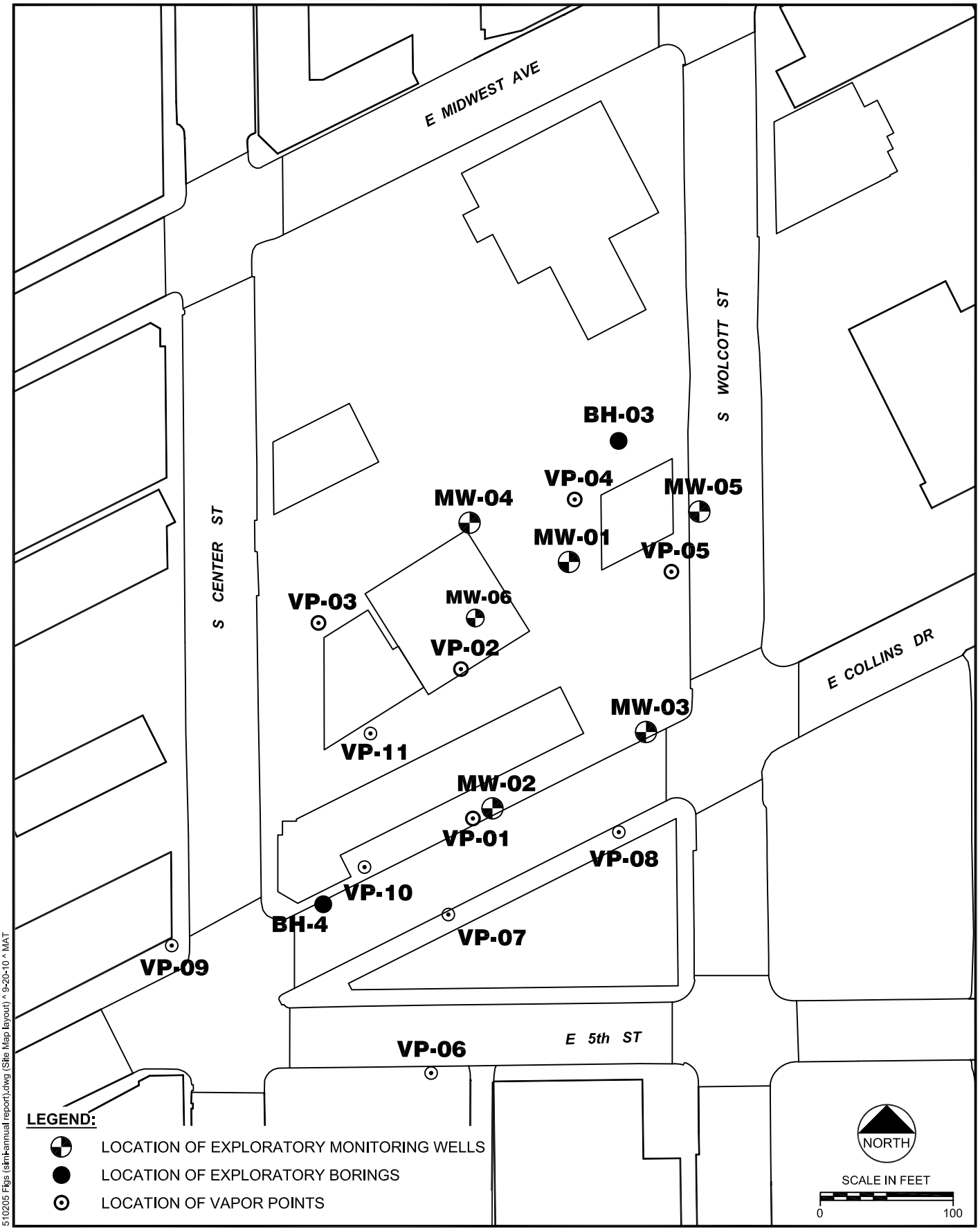
Figure 1
SITE VICINITY MAP
WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming



510205 Figs (sim-annual report).dwg (Site Map layout) ^ 9-20-10 ^ MAT

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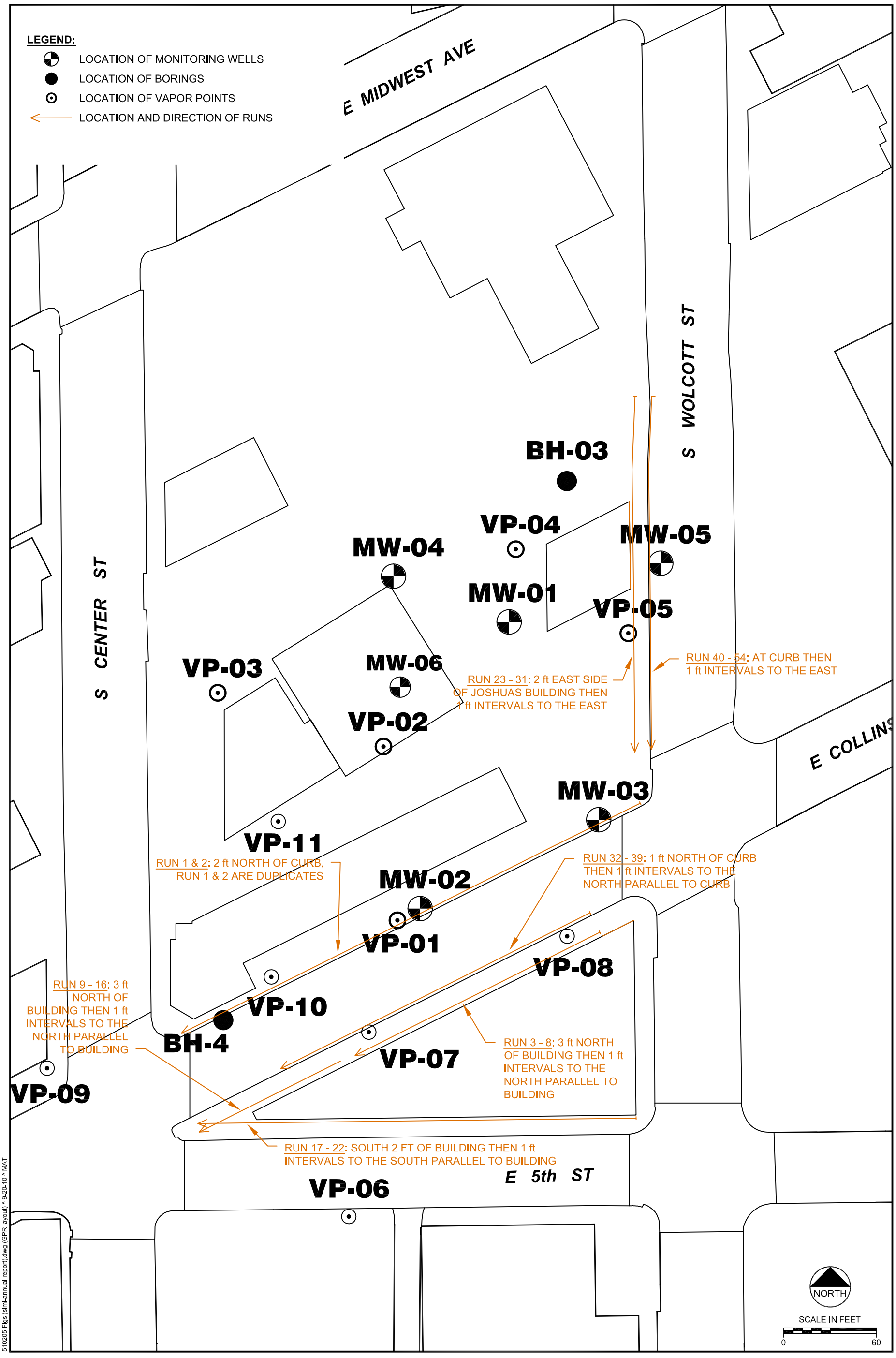
September 2009

Figure 2
SITE MAP
WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming



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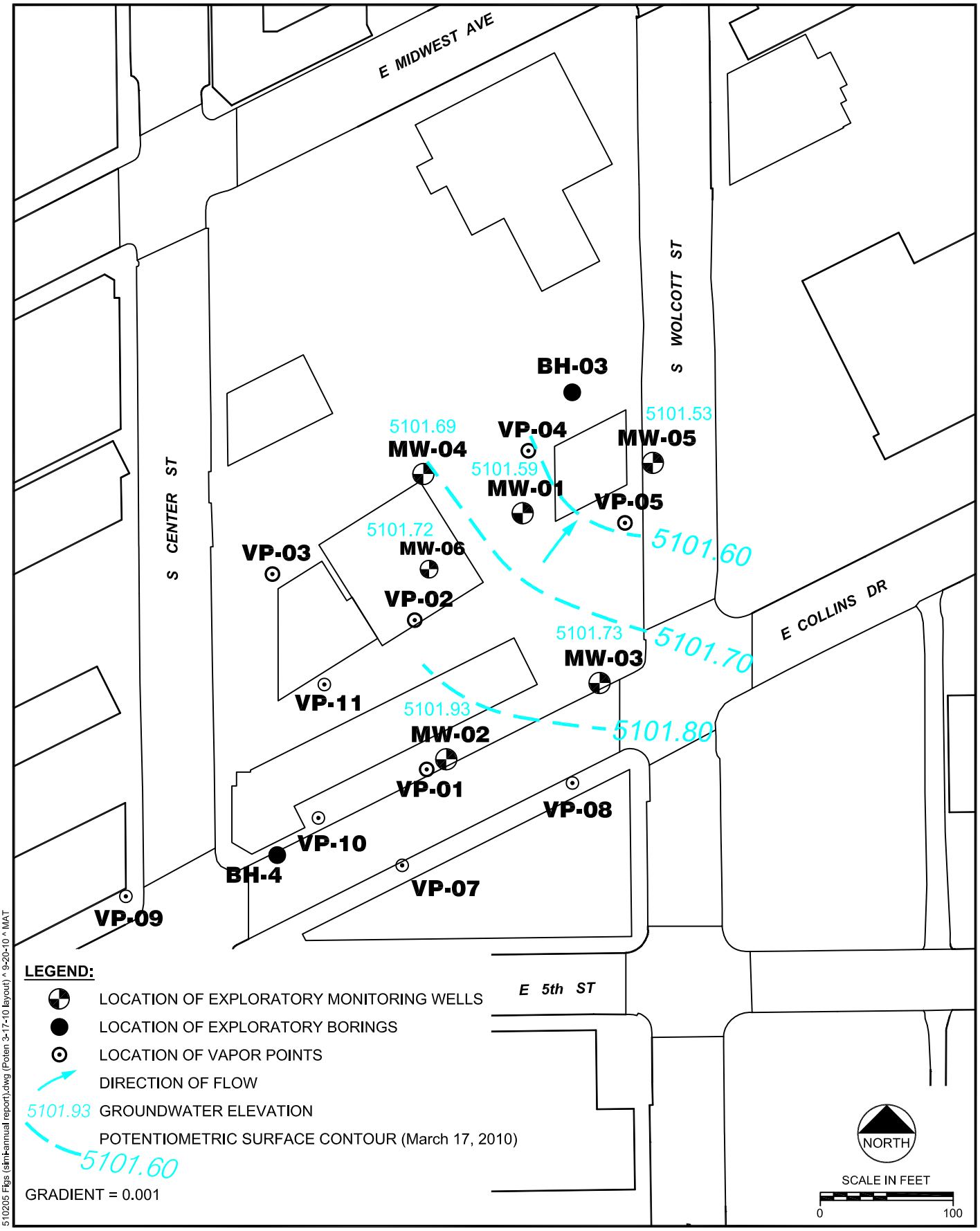
September 2010

Figure 3
GPR SURVEY RUN LOCATIONS
WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming



510205 Figs (sim-annual report).dwg (Poten 3-17-10 layout) * 9-20-10 * MAT

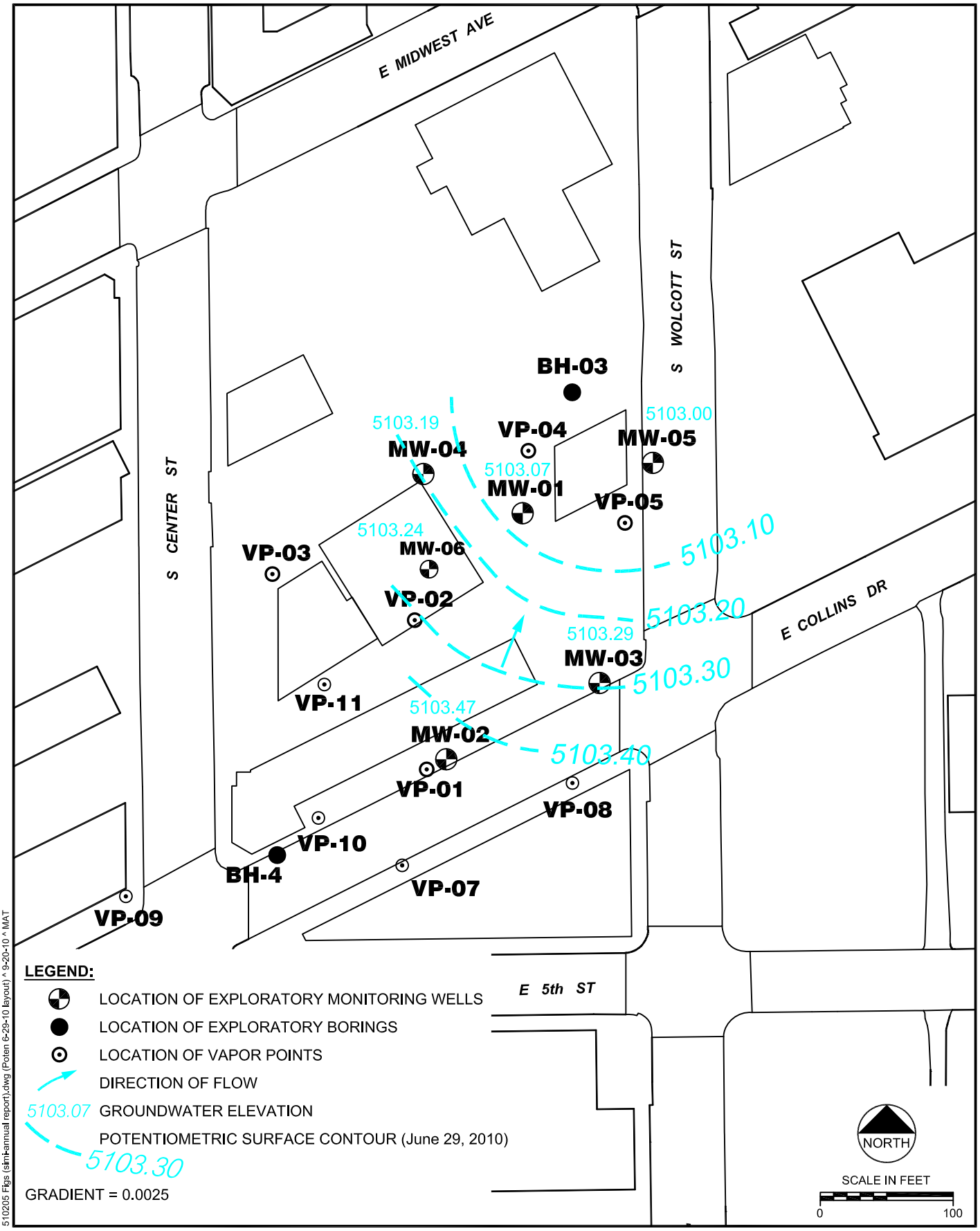
Project Number: 114-510205

September 2010

Figure 4

GROUNDWATER POTENTIOMETRIC SURFACE MAP (March 17, 2010)

WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming



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September 2010

Figure 5
GROUNDWATER POTENTIOMETRIC SURFACE MAP (June 29, 2010)
WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming

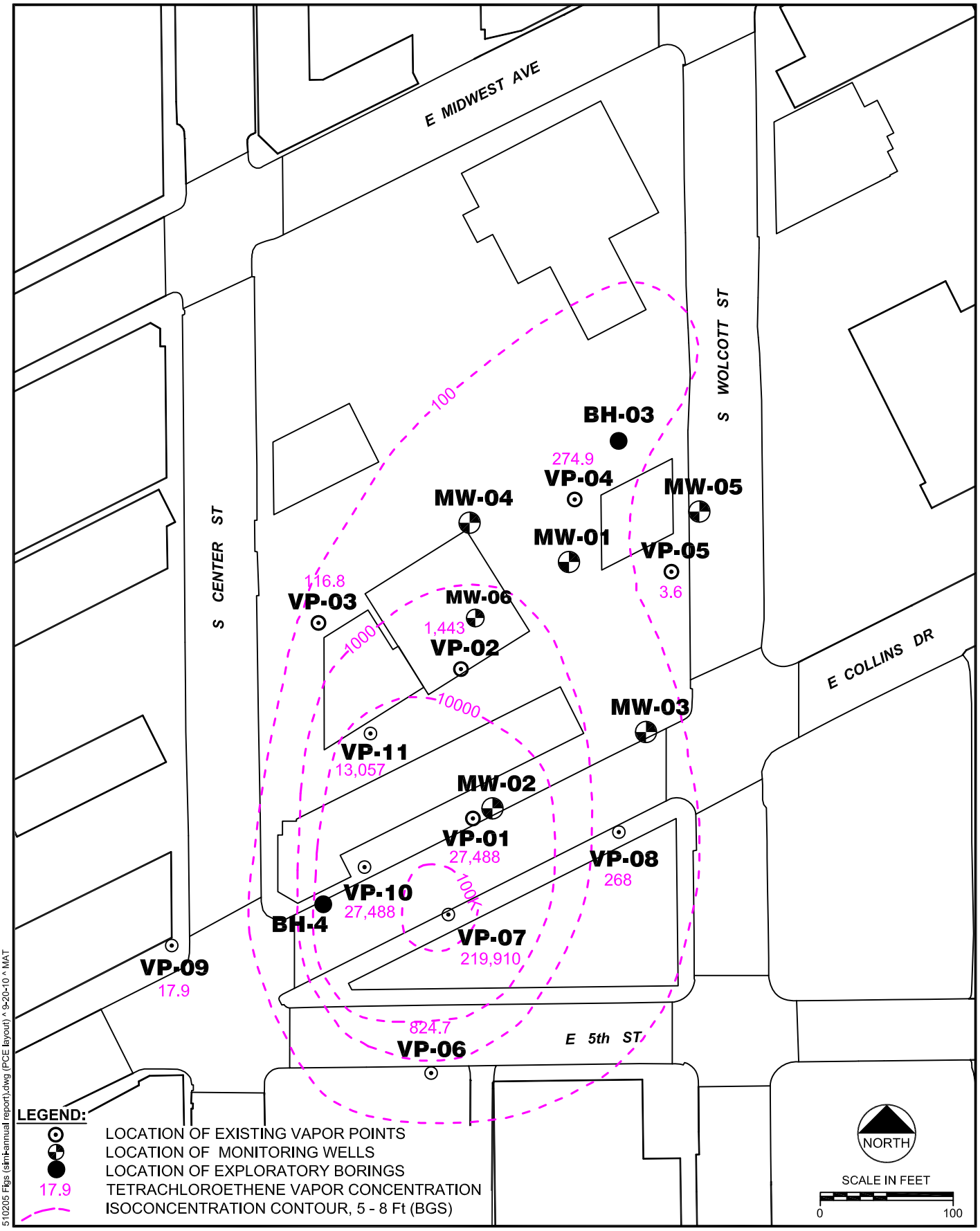

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Figure 6

TETRACHLORIDE SOIL VAPOR CONCENTRATIONS (ug/m^3)

WDEQ VPR - Site Characterization - Former Lobell Refinery -Casper, Wyoming