Work Plan

Arizona Public Service Former Manufactured Gas Plant, Grant Street Phoenix, Arizona VRP #504477-00

Prepared for

Arizona Public Service

June 2015

CH2MHILL®

1501 West Fountainhead Parkway
Suite 401
Tempe, AZ 85282

Voluntary Remediation Program Work Plan Checklist

Complete Shaded Areas and Submit with Work Plan

Site Name:	APS Grant Street Former MGP	VRP Site Code:	504477-00
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Reference	Summary of Statutory Requirement (please review all statutes in their entirety to ensure compliance)	Page(s) Where Addressed in Work Plan (write N/A if not applicable)	VRP Use Only
§49-175A.1	Summary of existing site characterization and assessment information; information regarding any remediation previously conducted; copies of referenced reports not previously submitted;	Section 2.2, Pages 2-5 to 2-10	☐
§49-175A.2	If the site has not been characterized, a plan to conduct site characterization and a schedule for completion.	Section 3, Pages 3-1 to 3-3	☐
§49-175A.3.a	If site characterization is completed, a description of how the remediation will comply with §49-175B ("Work Plans") and how the completion of remediation will be verified. A schedule for completion must be included.	N/A	☐
§49-175A.3.b	If site characterization is completed, the work plan may provide for the remediation to be conducted in phases or tasks. A schedule for completion must be included.	N/A	☐
§49-175A.4	Schedule for submission of progress reports.	Figure 3-2 Project Schedule	☐
§49-175A.5	A proposal for community involvement as prescribed by §49-176 ("Community Involvement Requirements")	Section 5, Page 5-1	☐
§49-175A.6	If known, a list of institutional or engineering controls necessary during remediation and after completion of the proposed remediation to control exposure to contaminants.	N/A	☐
§49-175A.7	A proposal for monitoring during remediation and after the remediation if necessary to verify whether the approved remediation levels or controls have been attained and will be maintained.	N/A	☐
§49-175A.8	A list of any permits or legal requirements known to apply to the work or already performed by the applicant.	N/A	☐
§49-175A.9	If requested by the department, information regarding the financial capability of the applicant to conduct the work identified in the application. *(IF APPLICABLE)*	N/A	☐

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§49-175B	Remediation levels or controls for remediation conducted pursuant to this article shall be established in accordance with rules adopted pursuant to §49-282.06 unless one or more of the following applies: see §49-175B.1 through §49-175B.4, below.	Section 2.2, Page 2-5	☐
§49-175B.1	The applicant demonstrates that remediation levels, institutional controls, or engineering controls for remediation of contaminated soil comply with §49-152 and the rules adopted.	N/A	☐
§49-175B.2	The applicant demonstrates that remediation levels, institutional controls, or engineering controls for remediation of landfills or other facilities that contain materials that are not subject to §49-152 (i.e.: asbestos) do not exceed a cumulative excess lifetime cancer risk between $1X10^{-4}$ to $1X10^{-6}$, and a hazard index of no greater than 1.	N/A	☐
§49-175B.3	The applicant demonstrates that on achieving remediation levels or controls for a source or potential source of contamination to a navigable water, the source of contamination will not cause or contribute to an exceedance of surface water quality standards, or if a permit is required pursuant to 33 United States Code §1342 for any discharge from the source, that any discharges from the source will comply with the permit.	N/A	☐
§49-175B.4	The applicant demonstrates that, on achieving remediation levels or controls for a source of contamination to an aquifer, the source will not cause or contribute to an exceedance of aquifer water quality standards (AWQS) beyond the boundary of the facility where the source is located.	N/A	☐
§49-175C	The VRP may waive any work plan requirement under this section that it determines to be unnecessary to make any of the determinations required under §49-177. *If any waivers are requested in the Work Plan or have been previously requested and approved by the VRP, cite them in the Work Plan, including a citation of the statute for which the waiver applies.*	N/A	☐

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To support the prerequisites established by A.R.S. §49-177 and §49-180, the VRP expects certain documentation to accompany a Work Plan. The following provides a list of attachments/exhibits which are recommended for submittal with a Work Plan to provide the information required by the statutes.

Work Plan Information	Title of Figure/Table/Attachment/Exhibit Where Requested Information is Cited (write N/A if not applicable)	Figure/Table/ Attachment or Report Page Number (write N/A if not applicable)	VRP Use Only
Site Location Map *(topographic or aerial)*	Site Location Map	Figure 1-1	☐
Site Map *(to scale)*	Site Diagram	Figure 1-2	☐
Historical Sampling Data Table	Soil Sampling Locations (2-2); Summary of Historical Analytical Data for Soil, Polyaromatic Hydrocarbons (PAHs) (2-3), Petroleum Hydrocarbons (TPHs) (2-4), BTEX Compounds (2-5), Metals (2-6); Soil Vapor Survey Results (2-7)	Tables 2-2 through 2-7	☐
Historical Sample Location Map (to scale)	Former Soil Sampling Locations (2-3); Detected Polyaromatic Hydrocarbons (PAHs) in Soil M(2-4); Detected Total Petroleum Hydrocarbons (TPHs) in Soil (2-5); Detected BTEX in Soil (2-6); Soil Vapor Sampling Locations (2-7)	Figures 2-3 through 2-7	☐
Proposed Sample Location Map (to scale)	Proposed Boring Locations	Figure 3-1	☐
Sampling and Analysis Plan (includes Field Sampling Plan & Quality Assurance Plan)	4 Sampling and Analysis Plan	Section 4, Pages 4-1 through 4-8	☐
Proposed Remediation System Location Map	N/A	N/A	☐
Proposed Remediation System Layout (Design Drawings)	N/A	N/A	☐
Schedule for Implementation of Project Activities* (Gantt Style Chart)	Project Schedule	Figure 3-2	☐
*Project Activities are defined in A.R.S. §§49-175A.2 through 49-175A.4, and 49-176A.2 (Community Involvement).			
Proposed Language for Public Notification of Remediation (i.e.: example signage)	N/A	N/A	☐
Plan for Investigative Derived Waste (IDW)	4.1.5 Investigation-derived Waste	Section 4.1.5, Page 4-3	☐
Evaluation of Remedial Alternatives (i.e: for Feasibility Study Work Plan)	N/A	N/A	☐

DOES THE WORK PLAN PROPOSE IMPLEMENTING SITE-SPECIFIC REMEDIATION LEVELS?

Yes	No
	✓

DOES THE WORK PLAN PROPOSE EVALUATION OF BACKGROUND LEVELS?

Yes	No
	✓

NOTE: When reports are submitted which document any type of sampling activity, the submittal of Electronic Data per ADEQ's *Groundwater Data Submittal Guidance (V3.4)* is strongly recommended.

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Acronyms and Abbreviations

°C	degrees Celsius
µg/L	microgram per liter
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
APS	Arizona Public Service
A.R.S.	Arizona Revised Statute
AST	aboveground storage tank
Atlantic	Atlantic Environmental Services, Inc.
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
COC	contaminant of concern
CWG	carbureted water gas
EDR	Environmental Data Resource
EPA	U.S. Environmental Protection Agency
GPL	groundwater protection level
HHRA	human health risk assessment
HUD	Housing and Urban Development
IDW	investigation-derived waste
LAU	Lower Alluvial Unit
MAU	Middle Alluvial Unit
mg/kg	milligram per kilogram
MGP	Manufactured Gas Plant
MS	matrix spike
MSD	matrix spike duplicate
OU3	Operable Unit 3
PAH	polyaromatic hydrocarbon
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act of 1976
Site	331 West Grant Street Former Manufactured Gas Plant Site
SRL	soil remediation level
TCLP	Toxicity Characteristic Leaching Procedure

TPH	total petroleum hydrocarbon
UAU	Upper Alluvial Unit
UST	underground storage tank
VOC	volatile organic compound
VRP	Voluntary Remediation Program
WQARF	Water Quality Assurance Revolving Fund
WVB	West Van Buren

SECTION 1

Introduction

The Arizona Public Service (APS)-owned manufactured gas plant (MGP) was formerly located at 501/505 South 2nd Avenue (501/505 Property) in Phoenix, Arizona. Settling ponds for MGP wastes generated at the 501/505 Property were located at 331 West Grant Street (the Site) from approximately 1917 until the 1930s. The Site was formerly owned by Arizona Public Service (APS) and is currently the site of the Grant Park Apartments.

The Site occupies approximately 2 acres at the southwest corner of Grant Street and Montezuma Street and is located in Maricopa County, Section 8, Township 1 North, Range 3 East of the Phoenix, Arizona, U.S. Geological Survey 7.5-minute topographic quadrangle. The Site is bounded on the north by Grant Street, on the west by 4th Avenue, on the south by Sherman Street, and on the east by Montezuma Street.

A Site location map is presented in Figure 1-1, and the current structures at the Site are shown in Figure 1-2. As shown in Figure 1-2, the Site contains a two-story building of 52 apartments surrounding an interior courtyard. The Site is currently owned by a non-profit organization, Grant Street Apartments, which manages the Site as a low-income Housing and Urban Development (HUD) apartment complex.

1.1 Objectives

Based on the results of previous investigations, compounds related to the former MGP operations have affected subsurface soil, and the Site requires remedial activities. Additionally, other industrial activities, including wood preservation activities, have been located at the Site. The objectives of the site investigation described in this Work Plan are to:

- Characterize the vertical and lateral extent of contamination at the Site due to former industrial activities at the site prior to 1972, including MGP-related waste storage.
- Collect data to develop a Remedial Action Plan consistent with Arizona Soil Remediation Levels (SRLs) and Groundwater Protection limits (GPLs).

1.2 Organization

This Work Plan has been prepared in accordance with the Arizona Department of Environmental Quality (ADEQ) *Voluntary Remediation Program Work Plan Checklist.* A completed copy of the checklist is included in the front of this document. The Work Plan includes the following sections:

- Section 2.0, Site Background and Description, includes the Site history; summaries of previous site investigations and HHRAs; Site geology, hydrogeology, and hydrology; and the remaining data gaps that have been identified at the Site.
- Section 3.0, Proposed Investigation Activities, describes proposed soil and groundwater sampling locations and analyses. This section also includes a proposed project schedule for investigation activities.
- Section 4.0, Sampling and Analysis Plan, describes field sampling procedures and laboratory analysis, procedures for sample management and custody, and recordkeeping.
- Section 5.0, Public Notice and Public Participation, describes the procedures that will be used to meet the public notice requirements specified in Arizona Revised Statute (A.R.S.) §49-176.
- Section 6.0, References, includes the references that were used to prepare this Work Plan.

APS is conducting the activities specified in this Work Plan under ADEQ's Voluntary Remediation Program (VRP). The VRP site code for the Site is 504477-00.

SECTION 2

Site Background and Description

This section presents the history of the Site, including former operations and industrial activities, surrounding environmental issues, and a summary of previous investigations. Additionally, this section describes the geology, hydrogeology, and hydrology of the Site and data gaps that have been identified for the Site.

2.1 Site History

Historical information for the Site and nearby properties was primarily obtained from the *Addendum to the Site Investigation Work Plan* (Atlantic Environmental Services, Inc. [Atlantic], 1990) and *the Amended - Interim Remedial Action Plan at the Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona* (Brown and Caldwell, 2000). Additionally, APS requested an environmental records search, including a search for Sanborn Insurance Maps and aerial photographs from Environmental Data Resource (EDR) in December 2013 for the Site and consulted documents that were prepared for the remedial action at the 501/505 Property.

2.1.1 Site Ownership and Operational History

Information on property ownership, former industrial operations and former structures at the Site was obtained from several sources, including:

- Historical Title Search for the Site.
- Sanborn Insurance Maps, aerial photographs, and APS company records reviewed during previous investigations (Atlantic, 1990).
- Sanborn maps and aerial photographs obtained from EDR in December 2013 that are presented in Appendixes A and B, respectively, and include:
  - Sanborn Maps - 1901, 1911, 1915, 1946, 1949, and 1968.
  - Aerial Photographs – 1930, 1937, 1949, 1958, 1961, 1964, 1973, 1979, 1989, 1992, 1997, 2005, 2007, and 2010.
- Aerial photographs from 1934, 1940, and 1954 (presented in Appendix B) obtained from the *Final Focused Remedial Investigation Report, APS 501, 502 and 505 South 2nd Avenue Properties, Motorola 52nd Street Superfund Site, OU3* (AMEC, 2010).
- Information provided in the *Remedial Action Plan* (RAP) *for the APS Former Manufactured Gas Plant, 501 and 505 South 2nd Avenue, Phoenix, Arizona* (CH2M HILL, 2012a).

Table 2-1 summarizes the history of the site, including operations and former structures at the Site.

According to the Title Search, the property was acquired by Pacific Gas and Electric Company (not related to the current California company known as PG&E) in April 1917. In November 1920, Central Arizona Light and Power Company became the property owner. Central Arizona Light and Power is a predecessor company of APS.

According to APS company records, the Site was developed as a lampblack storage area in September 1917. Sanborn maps (1901, 1911, and 1915) indicate the Site was undeveloped before 1917. The Site served as a lampblack storage area until the early 1930s. Lampblack was separated and dried at the 501/505 Property. Excess lampblack was initially transported to the Site by horse and wagon from the 501/505 Property. In the early 1920s, a pipeline was constructed to carry lampblack-water slurry from the 501/505 Property to the Site. Settling ponds were constructed at the Site as slurry containment/drying areas. The settling ponds were

used until MGP processes ceased at the 501/505 Property in 1934 (Atlantic, 1990). In 1923, a 15,000-barrel (approximately 50,000-gallon) aboveground oil storage tank (AST) was constructed in the southwest corner of the Site, and a pipeline was installed to transport oil to the 501/505 Property. (Atlantic, 1990).

A 1930 aerial photograph obtained from EDR (Appendix B) indicates the outline of four to five settling basins along the east side of the Site, an excavated area or basin in the northwest corner of the Site, and a possible settling pond along the west-central side of the Site. A 1934 photograph shows apparent storage of waste material throughout the Site and the outline of the settling basins on the eastern side of the Site (AMEC, 2010). A portion of the site is visible on a 1940 photograph and shows the excavated area/basin in the northwest corner and the settling basins along the eastern side of the Site (AMEC, 2010). A 1942 aerial photograph shows the outline of the four settling ponds, an excavated area/basin in the northwest corner, the concrete foundation pad /AST in the southwest corner of the Site, and a smaller square lagoon/settling pond between the foundation pad and the excavated area/basin (Atlantic, 1990).

The 1946 Sanborn map indicates that the Site had been converted to a creosoting yard for telegraph poles and shows an AST for creosote storage located in the area of the former oil AST. A 1949 aerial photograph shows the AST has been removed, however, the excavated area/basin is still present in the northwest corner of the Site. A building is located along the eastern side of the Site. The 1949 Sanborn map identifies the excavated area/basin as a “conc vat,” and identifies the site as a pipe storage yard. Structures at the Site, based on 1954 and 1958 aerial photographs, are presented in Table 2-1.

The 1968 Sanborn map indicates the Site had been converted to a pipe yard and supply area. Onsite structures shown in the 1968 map include a repair shop, several pipe storage sheds along Montezuma Street, a storage building along West Grant Street, and a small office building. Figure 2-1 presents the approximate locations of known former structures and activities at the Site related to MGP operations or that may be related to potential former chemical use at the Site, including the creosote tank and repair shop.

APS sold the property in 1972 to a private developer, and the Grant Park Apartments were constructed in 1973. APS re-purchased the property on December 26, 2001, and subsequently donated the property to a non-profit organization, operating as Grant Street Apartments Inc., which manages the Site as a HUD Section 8 housing development serving low-income residents, including those who are elderly and/or have disabilities. The 52-unit complex is typically fully occupied.

Environmental investigations at the site, beginning in 1993, have found elevated concentrations of MGP-related contaminants at the Site, as discussed in Section 2.2.

2.1.2 Description of MGP Processes

This section presents the history of MGPs in the U.S. and describes the processes that generated the by-products placed in the settling ponds at the Site. The information in this section was obtained from the *Amended - Interim Remedial Action Plan for the Site* (Brown and Caldwell, 2000) and the RAP for the 501/505 Property (CH2M HILL, 2012a).

The first uses of manufactured gas for lighting were reported in Philadelphia in 1796 and in Richmond, Virginia, in 1803. Manufactured gas was produced by the following three primary processes:

- Coal carbonization (coal gas)
- Carbureted water gas (CWG)
- Oil gas

2.1.2.1 Coal Carbonization

The earliest MGPs used coal carbonization to produce gas. Coal gas was used exclusively from 1816 to 1875, when the CWG process was developed. Coal was used as a feedstock to produce gas in various types of retorts with coke generated as a by-product. Based on historical records, coal gas was not used at the 501/505 Property.

2.1.2.2 Carbureted Water Gas

The CWG process was used at the 501/505 Property until 1906, when the plant was converted to oil gas production. CWG involves the enhancement of water gas (blue gas) by spraying oil into the hot vessel that contains the water gas, thereby increasing the calorific value of the water gas. Blue gas was an abundant by-product of the petroleum industry, which made CWG the most important manufactured gas process in the U.S. at the time.

The CWG process is intermittent, with alternating "blows" or blast periods and "runs" or gas making periods. The typical CWG-generating equipment consisted of three brick-lined cylindrical steel vessels - the generator, the carburetor, and the superheater. During a blow, a producer gas that is high in carbon dioxide is formed in the generator by passing air through an incandescent mass of coke or anthracite. This gas is burned by secondary air. The hot products of combustion heat the carburetor checkbrick and then pass from the top of the superheater to the stack. During a run, water gas is made in the generator and then passed into the top of the carburetor, where oil is sprayed. This mixture is passed down through the carburetor and up through the superheater. As the mixture passes the hot checkbrick, the mixture is thermally cracked and fixed into gases. The carbureted water gas, a mixture of blue and oil gas, is passed from the top of the superheater through a water sealed wash box, where the gas is initially cooled and some of the heavy tars are condensed and removed.

The gas is passed through additional condensers to cool the gas to ambient temperatures. Direct contact with water cools and scrubs the gas. The gas is then sent to a relief holder, which provides constant pressure for gas outflow to the purifying systems during blows and runs. Larger plants featured tar extractors, naphthalene scrubbers, and liquid purification systems to remove the bulk of the hydrogen sulfide prior to passing the gas through the dry purification systems. After hydrogen sulfide removal at these larger plants, the gas was metered and sent to the storage holders pending distribution to the customers.

2.1.2.3 Oil Gas

The oil gas process was used at the 501/505 Property from 1906 through 1934 (CH2M HILL, 2012a) and generated waste products that were ultimately sent to the Site.

The oil gas process consists of thermocracking oil in a steam atmosphere. The generating equipment is similar to that used by CWG production: the generator was replaced by a vaporizer similar to the carburetor, filled with checkbrick, and equipped with an oil spray; the carburetor was replaced by a vaporizer followed by a superheater, as in the CWG process.

The process is cyclical and consists of blows and runs. During a blow, oil is combusted in the vaporizers, and the products of combustion heat the checkbrick of the vaporizers and superheater and pass from the top of the superheater to the stack. During a run, oil is sprayed into the vaporizer in the absence of air and in the presence of steam. As the mixture passes the hot checkbrick, it is thermally cracked and fixed into gases. During the run, the stack valve is closed and the oil gas passes to the washbox. The remainder of the process is the same as the CWG process.

2.1.3 Description of MGP Waste

The information in this section was obtained from the 1992 Site Investigation Report for the 501/505 Property (Atlantic, 1992) and from historical information regarding MGP processes.

The process of manufacturing gas resulted in the production of residuals and by-products. The residual by-products formed during the manufacture of oil gas were iron oxide purifier waste, light oils, tar, and lampblack. The light oils and tars were generally recovered during condensing or scrubbing operations.

The formation of large amounts of lampblack was unique to the oil gas processes. Lampblack resulted from the high temperature of the gas-making operation, and the amount of lampblack recovered depended on the manufacturing process used. In most plants, lampblack was regarded as a valuable by-product and was the source of additional revenue or was used as fuel. Depending on the process, approximately 20 pounds of

lampblack were formed for every 1,000 cubic feet of gas manufactured, with the majority of the lampblack removed from the gas stream in the wash box. The water from the wash box containing this lampblack in suspension passed through large overflow pipes. The chemical constituents of lampblack include carbon, polyaromatic hydrocarbons (PAHs), and heavy metals.

In addition to lampblack, the oil gas process generated tar, waste fuel oil, and iron oxide purifier waste. Based on information for the 501/505 Property and the Site, these wastes were not transported to or stored at the Site. Each of these wastes are described below:

- **Tar** – Tar was produced by oil-gas processes and consisted of complex hydrocarbons removed from the gas stream immediately after generation during cooling, condensed during gas cooling in the relief holder, or removed during secondary purification. Chemical constituents of tar include volatile aromatic hydrocarbons and PAHs. The tar was primarily reused as a supplement to boiler fuels, although a small fraction was sold.
- **Fuel Oil** – Fuel oil was used as the primary feedstock material for the oil-gas process. Oil was sprayed into the gas-generating apparatus and cracked into lighter hydrocarbon fractions during gas production. Various grades of fuel oil were likely used throughout the 501/505 MGP's history, with increased use of heavy fuel oil or residual oils during peak production years. Oil used at the 501/505 Property was stored in a tank at the Site and was piped to the 501/505 Property (Atlantic, 1990).
- **Iron Oxide Purifier Waste** – Wood chips saturated with ferric hydrate were used to remove the hydrogen sulfide from the gas during the final purification process. Some tars or lampblack may also have been removed in the purifiers. Wood chips were replaced as they became depleted or "spent." Constituents include metals, sulfur, sulfates, cyanide compounds, and PAHs.

Based on historical information and previous investigations, lampblack was the primary waste stream handled at the Site. The lampblack was initially transferred to the Site from the 501/505 Property via a horse and wagon, then as a slurry, via an underground pipeline.

2.1.4 Additional Site Industrial Activities

Based on the historical research summarized in Section 2.1.1, other industrial activities at the site under APS ownership include a creosoting yard for telegraph poles and a pipe storage yard. During operation as pipe storage yard, a repair shop was located on the eastern side of the Site.

The Site appears to have operated as a creosoting yard for the treatment and preservation of telegraph poles during the 1940s, based on Sanborn map information. The Sanborn map indicates the site was a creosoting yard, however, other forms of wood treatment and preservatives were also available and widely used during that time period. Although available information does not indicate the use of these other methods, information regarding the wood treatment processes at the Site is limited. Other types of wood treatment compounds and methods that were available in the 1940s include:

- Pentachlorophenol (PCP) in petroleum or other solvents
- Aqueous based solutions of copper, chromium, arsenic, and zinc (Freeman, et.al, 2003).

Older wood treatment processes were more likely to have used oil-based preservatives (creosote and pentachlorophenol), although the aqueous-based metal solutions were beginning to be used in the late 1940s and early 1950s (Freeman, et.al., 2003). Oil-based processes typically produced sludge wastes and significant quantities of process wastewater (EPA, 1992).

2.1.5 Surrounding Environmental Issues

2.1.5.1 Superfund and Water Quality Assurance Revolving Fund Sites

The Site is approximately ¼-mile south of Operable Unit 3 (OU3) of the Motorola 52nd Street Superfund Site and ¼-mile from the West Van Buren (WVB) Water Quality Assurance Revolving Fund (WQARF). Contaminants of concern (COCs) in these two areas are primarily chlorinated hydrocarbons, which are not

MGP-related compounds. The closed East Washington Fluff WQARF area is approximately ¾-mile southeast of the Site.

Figure 2-2 shows the surrounding Superfund and WQARF sites.

2.1.5.2 Records Search

EDR provided an environmental database search for the Site and the surrounding area. The only databases in which the Site was identified were the ADEQ VRP database and the EDR proprietary former MGP sites. However, multiple surrounding properties within 1 mile of the Site were identified in several databases. Sites identified within one-fourth mile of the Site (some were within 1/8-mile) included sites with corrective or cleanup actions, WQARF and Superfund Sites, former drycleaners, Resource Conservation and Recovery Act (RCRA) generators, leaking underground storage tanks (USTs), and registered USTs. Appendix C includes the executive summary from the EDR report.

2.2 Previous Site Investigations

Site investigations and historical research on previous activities at the Site began in 1990. These investigations were limited by the presence of the building at the Site, and samples were not collected under existing structures. Former site investigations include the following:

- From September 1993 through June 1994, Geraghty and Miller conducted a two-phase investigation at the Site. The Phase I investigation included one round of surface soil sampling and analysis, three rounds of indoor air sample collection and analysis, and a soil gas survey. Phase II of the investigation included subsurface soil sampling and analysis, four additional rounds of indoor air sample collection, soil gas surveys, and a vapor extraction pilot test. Phase I of the investigation is summarized in *Summary of Phase I Investigation of the Former Grant Street Yard Site, Phoenix, Arizona* (Geraghty and Miller, 1993). The results and conclusions from the overall investigation (Phase I and Phase II) are presented in *Site Investigation, Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona* (Geraghty and Miller, 1994).
- In May and July 1998, Brown and Caldwell conducted a two-phase site investigation that included collection of subsurface and surface soil samples in the courtyard of the site and collection of additional indoor and outdoor air quality samples. The results and conclusions from this investigation are presented in the *Site Investigation Report at the Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, Volumes I and II* (Brown and Caldwell, 1998a).

The following additional evaluations and remedial activities associated with Site have been performed:

- In 1995, Geraghty and Miller performed VLEACH modeling to estimate leaching of benzene and benzo(a)pyrene from lampblack material present in the subsurface below a portion of the Site. The results of the VLEACH modeling are presented in the *Vadose Zone Leaching Model, Former Grant Street Yard, Phoenix, Arizona* (Geraghty and Miller, 1995b).
- In 2001, Brown and Caldwell oversaw the removal of a lampblack pipeline that ran from the 501/505 Property along Grant Street to the Site. Piping and soil along the eastern half of the northern border of the Site were removed, and confirmation soil samples were collected. The removal activities and confirmation sampling are summarized in the *Lincoln Street Lampblack Pipeline Removal Construction Report, Pinnacle West Capital Corporation, Phoenix, Arizona* (Brown and Caldwell, 2002a).
- From April through August 2003, Brown and Caldwell conducted a remedial action to prevent or restrict access to the shallow soil in the courtyard of the Site by placing a cap over the affected soils. The remedial action is described in the *Former Grant Street Yard, Amended Interim Remedial Action Plan Implementation Report* (Brown and Caldwell, 2004). Site characterization samples were not collected during the remedial action.

The site investigations and associated evaluations and remedial activities included evaluating the presence and extent of MGP-related constituents in the soil and evaluating indoor and outdoor air quality to determine potential risks to residents and workers at the Site. For additional information on sampling rationales, methodologies, or results associated with the initial and additional site investigations or remedial action, refer to the original reports. The air quality investigations that were used in the HHRAs are described in Section 2.2.2.

In December 1997, Chapter 7, Article 2 of the Arizona Administrative Code was amended to establish predetermined residential and non-residential soil remediation levels (SRLs) to protect human health and the environment that were consistent with the methodology used by U.S. Environmental Protection Agency (EPA) and Region 9 EPA guidance for calculation of risk-based screening levels. ADEQ revised these SRLs, effective May 5, 2007. Some of the previous investigations occurred before SRLs were promulgated or used the 1997 SRLs for comparison during investigative activities. To ensure consistency, this section compares results of previous investigations to the 2007 SRLs. Most of the compounds identified in the 2007 SRLs as carcinogens include residential SRL values for both 1×10^{-5} and 1×10^{-6} excess lifetime cancer risks. The 1×10^{-5} risk value may be used during remediation to residential levels unless a future use of the site is a child care facility or school, where children below the age of 18 are reasonably expected to be in frequent, repeated contact with the soil. To ensure all that future uses of the Site are available, the 1×10^{-6} risk value for carcinogens was used for comparison with existing soil concentrations.

The following sections present a general overview of each investigation and the specific results with respect to the Site.

2.2.1 Soil Investigations

Soil sampling was conducted during the two prior investigations conducted by Geraghty and Miller from 1993 to 1994 and by Brown and Caldwell in 1998. Additionally, soil sampling was conducted during the lampblack pipeline removal action (Brown and Caldwell, 2002a). Table 2-2 and Figure 2-3 present the locations of surface and subsurface soil samples that were collected during the previous investigations. Tables 2-3 through 2-6 summarize the analytical results for soil sampling activities conducted during these investigations. Table 2-7 summarizes the soil vapor analytical results. Appendix D presents available soil boring logs from previous investigations.

The previous soil investigations evaluated the presence of MGP-related contaminants in soil, including PAHs; benzene, toluene, ethylbenzene, and xylenes (BTEX); and total petroleum hydrocarbons (TPH). Site activities have also included soil vapor surveys, soil vapor extraction pilot testing, surface and subsurface soil sampling, vapor diffusion modeling, and a vadose zone leaching simulation using VLEACH modeling techniques.

2.2.1.1 1993-1994 Site Investigation – Geraghty and Miller

Soil Sampling

In September 1993, eight surface samples (less than 0.5 foot below ground surface [bgs]) were collected at the Site. Additionally, two samples were collected approximately three blocks southeast and southwest respectively, of the Site to establish background concentrations. Four of the surface samples were collected within the courtyard, and four were collected around the perimeter of the Site. The location of the eight onsite samples are presented in Figure 2-3. The samples were analyzed for PAHs, volatile aromatic hydrocarbons, total cyanide, and metals. As presented in Table 2-3 and Figure 2-4, all eight of the surface soil samples collected at the Site exceeded residential SRLs for at least one PAH. PAHs that exceeded SRLs in at least one sample included benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and indeno (1,2,3-cd)pyrene. Benzo(a)pyrene was also detected above the residential SRL of 0.069 milligram per kilogram (mg/kg) in the two offsite background samples. Cyanide or BTEX compounds were not detected in the onsite samples. No metals were detected above residential SRLs.

In December 1993 and March 1994, subsurface soil samples were collected from seven soil borings in the parking lots surrounding the apartment building at depths ranging from 15 to 60 feet. Additionally, four shallow soil borings were advanced in the courtyard to a maximum depth of 7 feet bgs in December 1993. Samples were analyzed for PAHs, BTEX, TPH, metals, and total cyanide. Additional shallow subsurface soil samples were collected at depths up to 5 feet bgs in the northeastern corner of the courtyard and the northeastern portion of the Site in January 1994 and analyzed for TPH.

The results of shallow soil sampling indicated concentrations of three PAHs exceeding residential and nonresidential SRLs at sample location HA3, in the northeast corner of the courtyard, at 7 to 8 feet bgs. A sample was also collected at this location at 4 feet bgs; however, the minimum laboratory reporting limit in this sample was above the residential SRLs for PAHs.

Seven PAHs were detected above residential SRLs in three of the deep soil borings (GB3, GB4, and GB5). Two PAHs were detected above non-residential SRLs in the borings GB3 and GB4. The highest concentrations were observed in the sample collected from 5 to 7 feet bgs in GB3 in the northeast corner of the Site, an area reported to contain lampblack material (Geraghty and Miller, 1994). Additionally, the sample from GB3 at 28 feet bgs also contained benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene above residential and/or nonresidential SRLs. GB4 and GB5 are located at the north end and northwestern corner of the Site, respectively. Table 2-3 and Figure 2-4 present the PAH analytical results and the distribution of PAHs at the Site.

TPH was detected in in multiple samples collected during the site investigation from 11 locations. The maximum concentration of total TPH was 179,000 mg/kg in GB3 at 7 feet bgs. TPH was detected in GB3 at depths up to 60 feet bgs (10 mg/kg). Additionally, boring DH-5 had total TPH concentrations of 163,400 mg/kg at 5 feet bgs, and HA3 had concentrations of 14,500 mg/kg at 8 feet bgs. All three sampling locations are in the northeast portion of the site. Only HA3 is within the courtyard. There is no SRL for TPH. Table 2-4 and Figure 2-5 present the TPH analytical results and the distribution of TPH at the Site.

Benzene, toluene, and xylenes were detected above the residential and non-residential SRLs in the sample from 7 feet bgs in GB3. Metals did not exceed SRLs in any samples. Table 2-5 and Figure 2-6 present the BTEX results, and Table 2-6 presents the metals results for soil sampling activities.

Soil Vapor Sampling

Three soil vapor surveys were conducted at the Site (in October 1993, December 1993, and January 1994), and the results were used to evaluate the potential influence of soil vapor on indoor air quality. Soil gas sample locations are presented in Figure 2-7, and analytical results are presented in Table 2-7. During the October 1993 sampling event, 14 soil vapor samples were collected at locations throughout the Site at 3.5 feet bgs and analyzed for BTEX. None of the samples exhibited concentrations above the laboratory reporting limit of 0.5 microgram per liter (µg/L). In December 1993, 13 additional samples were collected at 3.5 feet bgs near the original locations. These samples were analyzed for benzene and toluene with a detection limit of 0.25 µg/L. None of the samples exhibited concentrations above the laboratory reporting limit. The third soil vapor survey conducted in January 1994 included 18 additional samples, primarily in the northeast corner of the Site. Samples were collected at 3 and 6 feet bgs and analyzed for BTEX with a laboratory detection limit 0.02 µg/L. Eleven of the samples had detections of BTEX compounds at concentrations up to 1,100 µg/L (benzene in SG-28).

Vapor Extraction Pilot Test

A vapor extraction pilot test was conducted during the site investigation to provide site-specific information to evaluate the need for and feasibility of implementing a full-scale soil vapor extraction system and to confirm the soil-gas results and verify that the lampblack material encountered in the subsurface did not pose a health risk to residents of the Site (Geraghty and Miller, 1994). Seven vapor extraction and monitor wells were installed adjacent to and around the northeastern portion of the existing apartment building complex. During the installation of the extraction and monitor wells, soil samples were collected from four

of the borings at depths up to 10 feet bgs and analyzed for TPH and BTEX. TPH was detected in all of the samples, with the maximum total TPH concentration of 158,000 mg/kg observed at 6.5 feet bgs in boring MP-2. Additionally, benzene was detected in the same sample at a concentration of 94 mg/kg, exceeding the residential and non-residential SRLs of 0.65 and 1.4 mg/kg, respectively. Analytical results for TPH and BTEX are provided in Tables 2-4 and 2-5, respectively. Figures 2-5 and 2-6 present the distribution of TPH and BTEX at the Site, respectively.

The soil vapor extraction pilot test indicated that the soil has low permeability, based on the low extraction flow rates and poor vacuum response. In addition, due to the presence of a high percentage of organic carbon (lampblack in the subsurface), volatile hydrocarbons such as benzene would adsorb to the organic carbon and would not readily partition into the vapor phase. Based on the poor performance of the pilot test, a full-scale soil vapor extraction system was determined to not be a viable remedial option (Geraghty and Miller, 1994).

2.2.1.2 1995 Vapor Diffusion Modeling – Geraghty and Miller

A vapor diffusion model was prepared in 1995 using the soil vapor data from the 1993-1994 site investigation. The vapor diffusion model was used to estimate the flux of vapor-phase constituents from the soil into the apartments. Based on the results of the modeling, Geraghty and Miller concluded that the former MGP by-product storage area was unlikely to have been the source of the BTEX detected in indoor air samples collected from inside several apartments (Geraghty and Miller, 1995b). Based on the analytical results of the soil vapor samples collected at 3 and 6 feet bgs (within the lampblack material) and vapor diffusion modeling, the soil vapor containing detectable concentrations of BTEX was confined to the zone approximately 6 feet bgs and did not migrate from deeper zones toward the surface (Geraghty and Miller, 1995b).

2.2.1.3 1998 Two-Phase Site Investigation – Brown and Caldwell

In May and July 1998, Brown and Caldwell conducted two phases of a site investigation that included surface and shallow subsurface soil samples (Brown and Caldwell, 1998a). This site investigation assessed shallow soil in the courtyard for PAHs and collected additional surface soil samples to assess PAH concentrations in high-use areas of the Site. Samples were collected from 47 locations at depths up to 1.5 feet bgs. Three of the samples were collected outside the courtyard area in the southwest and northeast areas of the Site. Seventy-three samples (including duplicates) exceeded residential SRLs, and 37 samples exceeded non-residential SRLs for at least one PAH compound. The six PAH compounds detected in at least one sample above residential SRLs included benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoroanthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene as presented in Table 2-3 and Figure 2-4. The two samples collected in the southwest corner of the Site (near the area of the former AST) did not exceed SRLs for any PAH compounds.

Twelve of the 20 samples analyzed for TPH exhibited detectable concentrations of total TPH as shown in Table 2-4 and Figure 2-5. The highest concentration of TPH of 18,000 mg/kg was detected in GY-14 at 0.5 foot bgs. The sample from 1.5 feet bgs from this same location did not have detectable levels of TPH. TPH analytical results and a distribution of TPH at the Site are presented in Table 2-4 and Figure 2-5. The samples were not analyzed for BTEX compounds.

2.2.1.4 2001 Lampblack Pipeline Removal – Brown and Caldwell

From March through May 2001, Brown and Caldwell removed 1,250 feet of lampblack pipeline, its contents, and surrounding soil impacted affected by lampblack material. The lampblack pipeline extended from the 501/505 Property to the Site. Approximately three verification soil samples were collected every 20 linear feet of trenching/pipeline removal and analyzed for PAHs and TPH. A total of ten verification soil samples were collected on the eastern half of the northern border of the Site during removal activities as presented in Figure 2-3. Analytical results were compared to residential SRLs in place at the time. None of the samples had detectable concentrations of PAHs or TPH, and laboratory reporting limits were below current residential SRLS as shown in Tables 2-3 and 2-4, respectively.

2.2.2 Air Quality Investigations

2.2.2.1 1993-1994 Site Investigation

Seven rounds of air sampling were conducted at the Site to investigate indoor air quality during the first site investigation. The first round of air samples were collected by Geraghty and Miller in September 1993, and subsequent air sampling events were completed by Muranko & Associates (Geraghty and Miller, 1994). Air sampling was performed as follows:

- The first round of indoor air sampling was conducted in September 1993. Air samples were collected in the six first-floor apartments. In addition, several quality control samples were collected at outdoor and offsite locations. Samples were analyzed for BTEX and PAHs.
- The second round of indoor air sampling was conducted in October 1993 to confirm the results of the first round of sampling.
- The third round of indoor air sampling was conducted in late October 1993 to further evaluate BTEX levels detected in the apartments during the two previous rounds.
- The fourth round of indoor air sampling was conducted in December 1993 to evaluate the air quality throughout the apartment complex, including second-floor apartments, and seasonal trends in air quality. Air samples were collected from 33 apartments, 11 outdoor locations onsite, and two offsite locations (St. Andrews rectory kitchen and courtyard) and analyzed for benzene and toluene.
- The fifth round of air sampling was conducted in January 1994. Air samples were collected from eight apartments, five outdoor locations onsite, and two offsite locations (St. Andrews rectory kitchen and courtyard) and analyzed for benzene and toluene.
- The sixth round of air sampling was conducted in February 1994. Air samples were collected from the same locations as the samples collected during the January sampling event (fifth round of sampling) and analyzed for benzene and toluene.
- The seventh round of air sampling was conducted in June 1994. Air samples were collected from ten apartments, four on-site outdoor locations, and one offsite outdoor location (adjacent to St. Anthony's rectory courtyard) and analyzed for benzene and toluene.

During selected sampling events, benzene, toluene, and xylenes were present in the apartments at higher concentrations than those observed in onsite and offsite outdoor samples (Geraghty and Miller, 1994). The samples collected during the first round of air sampling were also analyzed for PAHs, and all results were below the laboratory reporting limit for PAHs. However, as described in the previous section, based on the results of vapor diffusion modeling, Geraghty and Miller concluded that the former MGP by-product storage area was unlikely to have been the source of the BTEX detected in indoor air samples collected from inside several apartments (Geraghty and Miller, 1995a). For additional detail on the indoor air evaluation, see the 1994 Site Investigation Report (Geraghty and Miller, 1994).

2.2.2.2 1998 Site Investigation

Additional air samples were collected inside representative apartments throughout the complex in July 1998 by Brown and Caldwell (Brown and Caldwell, 1998a). Two outdoor air samples were also collected at the Site. Two samples were collected at each sampling location. One sample was analyzed using EPA Method TO-3 to allow comparison with previous air sampling results. The second sample was analyzed using EPA Method TO-14 to allow detection of MGP-related constituents at a lower concentration and identify other chemicals that may be present and were associated with urban environments. BTEX and 1,2,4-trimethylbenzene were identified as compounds that may be associated with MGP activities. These compounds were detected in the samples collected during sampling. However, the concentrations between indoor air samples and outdoor samples were considered to be comparable (Brown and Caldwell, 1998a). Only the samples analyzed with EPA Method TO-14 were presented because of the irregularities identified

with the TO-3 results. Additional compounds, including chlorinated hydrocarbons, were detected in the indoor and outdoor air samples; however, these compounds were not identified as potentially being associated with former MGP activities.

2.2.3 Remedial Activities

From April through August 2003, Brown and Caldwell conducted a remedial action to prevent or restrict access to the shallow soil in the courtyard of the Site (Brown and Caldwell, 2004). The remedial approach involved placing a cap over exposed soil within the courtyard area. The cap was designed to prevent human contact with native soil and enhance the appearance and livability for the apartment residents. A concrete cap was installed on the northern half of the property, and a soil cap was placed over the southern portion of the courtyard. Underground utilities (water supply and heating/cooling lines) beneath courtyard soil were rerouted onto the apartment complex roof to eliminate the need to access shallow or deeper impacted soil during maintenance activities in the courtyard. The soil cap in the southern portion of the Site was constructed by installing a geomembrane isolation barrier over the impacted soil, covered with 6 inches of clean top soil, and planted with turf. The concrete cap was used in the northern half of the courtyard to limit infiltration and provide a substantial physical barrier to areas where elevated concentrations of MGP-related constituents are present.

2.3 Human Health Risk Assessments

HHRAs conducted at the Site include:

- In 1992, Geraghty and Miller conducted a preliminary health assessment study to determine if past industrial uses pose a health risk to building residents or neighbors based on potential exposure pathways at the Site (Geraghty and Miller, 1992).
- In 1995, Geraghty and Miller performed a risk assessment to evaluate the potential threat to human health for constituents detected in soils and soil gas based on the results of the 1993 and 1994 subsurface investigations. (Geraghty and Miller, 1995a).
- In 1996, the Arizona Department of Health Services (ADHS) conducted a health assessment for the Grant Park Neighborhood in response to public health concerns from the Grant Street Neighborhood Area (ADHS, 1996).
- In 1998, Brown and Caldwell conducted an HHRA to evaluate the potential risk to apartment residents or workers from exposure to MGP-related constituents detected at the Site. The HHRA incorporated soil and soil gas data collected in 1998 at the Site (Brown and Caldwell, 1998b). An addendum to this report was prepared in March 2002 to reevaluate the impact on the 1998 risk conclusions based on a proposed revision to EPA dermal absorption levels for MGP-related chemicals (Brown and Caldwell, 2002b).
- In May 2002, Brown and Caldwell prepared a revised risk assessment report to combine the information in previous risk assessments and present additional risk estimates for potential exposures to chemicals associated with historic MGP activities at Site (Brown and Caldwell, 2002c).

The risk posed to current residents by the MGP-related constituents in the soil at the Site were evaluated in preliminary risk assessments performed by Geraghty and Miller in 1992 and 1995 and ADHS in 1996. Additionally, Brown and Caldwell performed an updated risk assessment using the 1998 soil analytical data. The results of these assessments are summarized in the Amended - Interim Remedial Action Plan for the Site (Brown and Caldwell, 2000) and presented below.

2.3.1 1992 Preliminary Health Assessment Study – Geraghty and Miller

A preliminary health assessment study was conducted in 1992 by Geraghty and Miller. At the time of the study, no environmental data had been collected at the Site. The study used data from a comparable former MGP site in the Southwestern U.S. to identify potential COCs at the Site. Based on Site observations and data from the other former MGP site, the report concluded that exposure to soil containing lampblack, oil,

or creosote would not be expected and that there were no unacceptable MGP-related risks associated with this Site under the observed conditions. In addition, possible exposure to the constituents would occur only if future subgrade construction were undertaken at the Site. Therefore, the study evaluated the potential exposure to a construction worker and concluded that the potential cancer risks and non-cancer adverse health risks were within acceptable risk levels (Geraghty and Miller, 1992).

2.3.2 1995 Risk Assessment – Geraghty and Miller

A deterministic risk assessment was conducted in 1995 using the Site investigation data generated during the site investigation. This risk assessment was prepared using the air sampling results, soil vapor surveys, and the subsurface investigations conducted at the Site from September 1993 through February 1994. Based on these data, these risk assessments concluded that no remedial action was necessary for the property's current use (Geraghty and Miller, 1995a). ADHS reviewed the risk assessment and concluded that "*The exposure assessment, toxicity assessment, and risk characterization presented in the document are generally in accordance with current risk assessment guidance. The document generally supports the conclusion that exposure to hydrocarbons in soil, soil gas, and air at the site are unlikely to result in adverse health effects."* (ADHS, 1995).

2.3.3 1996 Health Assessment - ADHS

In 1996, the ADHS conducted an epidemiologic review of mortality rates in the census track that included the Grant Park Apartments. The review was conducted based on concerns expressed by the residents of the Grant Park Apartments. The residents were concerned that the lampblack in the area and the overhead power lines adjacent to the apartment complex caused an increase in the occurrence of cancers, heart disease, congenital anomalies, leukemia, or other illnesses. The results of the study indicated there was no statistically significant increase in age-specific mortality rates when compared to similar residential areas in Maricopa County (ADHS, 1996).

2.3.4 1998 Additional Risk Assessment – Brown and Caldwell

Based on the results of the additional courtyard soil characterization, an additional risk assessment was performed using probabilistic techniques by Brown and Caldwell in 1998. The assessment focused on the risk to human health posed by exposure to soil from surface to 3 feet bgs and to soil below 3 feet bgs. Based on the results of the risk calculations for the surface to 3 feet bgs soil interval, and the assumptions for potential receptors at the Site, a resident or maintenance worker at the Grant Street Apartments has no measurably greater risk of cancer than a person who does not live at the Site. It was also determined that chronic exposure to soil below 3 feet bgs may pose a potential human health concern because of the elevated concentrations of the MGP-related constituents (Brown and Caldwell, 1998b).

2.3.5 2002 Revised Risk Assessment – Brown and Caldwell

The revised risk assessment combined the information in previous risk assessments and presented additional risk estimates for potential exposures to chemicals associated with MGP activities at the Site. The risk assessment determined that the calculation of risk for the Site and the previous risk assessments were valid and represent the most realistic evaluation of the potential risk to the residents and workers at the Site. Cumulative individual cancer risks were within the target risk range adopted by ADEQ. The risks associated with soil were calculated assuming exposure in the upper 3 feet of soil. In a memorandum to ADEQ dated June 7, 2002, ADHS approved the risk assessment and stated "*The revised risk assessment adequately quantifies environmental exposure and health risks at the site. The report is adequate for making risk management decisions at the site.*"(ADEQ, 2003)

2.4 Site Description

The Site geology, hydrogeology, and hydrology is expected to be similar to that of the 501/505 Property northeast of the Site. The information in this section was primarily obtained from the Final Focused Remedial Investigation Report for the 501/505 Property (AMEC, 2010).

2.4.1 Geology

The Site lies within the Basin and Range physiographic province in central Arizona. In this area, mountains generally composed of crystalline rock separate broad alluvial valleys. Mountains represent upthrown fault blocks from which sediments have been eroded and deposited in basins below. In the centers of these basins, depths to bedrock can exceed 10,000 feet.

The Site is located in the West Salt River Valley sub-basin of the Phoenix Active Management Area, a groundwater basin established by state statute. Subsurface geology beneath the Site is typical for the West Salt River Valley and for the Phoenix area. In the subsurface, sedimentary units that overlie the bedrock in the area of the APS Facility are the Upper Alluvial Unit (UAU), the Middle Alluvial Unit (MAU), and the Lower Alluvial Unit (LAU). These units are composed of alluvial deposits associated with surface fluvial/alluvial deposition processes. The UAU consists mostly of unconsolidated gravel, sand, and silt deposited in alluvial channel, terrace, and floodplain deposits. The MAU consists of unconsolidated to semi-consolidated clay, silt, silty sands, and gravels deposited in playa, alluvial fan, and fluvial environments. The MAU is significantly finer grained than the UAU in most areas. The LAU is below the MAU and is subdivided into two parts in the area of the APS Facility. The upper part is composed of semi-consolidated sand, gravel, and silt, and the lower part consists of evaporate deposits (gypsum and anhydrite) interbedded with sand, gravel, and basaltic rocks.

2.4.2 Hydrogeology

Before development in the general vicinity of the Site, the Salt River was a gaining perennial stream, and flow in the groundwater system was in the same general direction as surface flows, from east to west. Roosevelt Dam impounded the Salt River in 1912. Around this time, extensive groundwater development and dewatering began in central Phoenix. Seasonal irrigation and municipal groundwater pumping have resulted in seasonal declines of water levels throughout the Phoenix metropolitan area.

Since the 1900s, groundwater flows in the region have been west-southwestern according to historical water-level contour maps (Corell and Corkhill, 1994). Additional groundwater elevation data specific to the central Phoenix area also indicate groundwater has flowed to the west for the past 30 years (Weston, 2000). Based on data collected by CH2M HILL during a predesign testing investigation at the 501/505 Property (CH2M HILL, 2012a), there is no current or historical evidence that groundwater flow has ever been to the north, northeast, or east of the Site. No wells are located at the Site. However, depths to groundwater were measured approximately ¼ mile northeast at the 501/505 Property in September 2014, and ranged from approximately 99 to 103 feet bgs.

2.4.3 Hydrology

The climate of Phoenix is desert type with low annual rainfall and low relative humidity. The average Phoenix rainfall is 7.7 inches. Most of the rainfall occurs during the following two rainfall seasons: the winter months from November through March and the monsoon season, primarily July and August (National Oceanic and Atmospheric Administration [NOAA], 1996)

2.5 Data Gaps

The majority of soil samples collected and analyzed for MGP-related compounds at the Site during previous investigations were collected from surface soils and the upper 5 feet of soil. Samples from 15 feet bgs or deeper were only collected in four locations. The previous site investigations focused on the interior courtyard, with a limited number of samples collected outside the perimeter of the apartment building, with the exception of the northeast corner of the Site, an area of known MGP-related contamination near the former lampblack pipeline. Additionally, the presence of the apartment building and other structures at the Site limited the available sampling locations. No samples have been collected beneath the current structures at the Site.

Additionally, historical research conducted during the preparation of this Work Plan indicates other potential sources of contamination at the Site, including wood treatment operations, pipe storage, and a repair shop. Contaminants that could be associated with the former activities, including chlorinated VOCs, pentachlorophenol, PCBs, and dioxins and furans, have not been addressed during previous investigations. This section summarizes the additional historical information and the data gaps that have been identified for both Site characterization and development of a Remedial Action Plan.

2.5.1 Additional Historical Information

Additional investigation of historical activities during development of this Work Plan, including a review of aerial photographs for the Site that were not available during former investigations, indicate potential additional structures and storage areas that were not identified in previous investigations. Previous investigations indicated a former large oil storage tank (approximately 50,000 gallons) on the southwest corner of the Site, four settling basins along the eastern half of the Site, and one potential other settling basin in the west-central portion of the Site. However, aerial photographs obtained from 1930 and 1934 show potential lampblack storage throughout the entire Site, including an area in the northwest corner that appears to have been excavated at some time or contain a below-grade structure and was identified as a "conc. vat" on the 1949 Sanborn Map This area was visible on multiple aerial photographs through 1949, but was not identified in previous investigations. The 1930 photograph also indicates five settling ponds (not four) along the eastern half of the Site. Additionally, historical information available for the Former 501/505 Site indicates that the oil storage tank located in the southwest corner of the Site was piped to the 501/505 Property. The location of the potential pipeline is unknown. Therefore, additional characterization in the northwest corner of the Site and near the former AST must be performed to address other potential source areas.

2.5.2 Site Characterization Data Gaps

Previous investigations focused on surface soil sampling due to former MGP-related activities at the Site. Additionally, access to subsurface soils has been limited by the apartment building and other structures at the Site. Additional data must be collected throughout the Site, including the areas currently occupied by structures and at deeper locations, to evaluate the vertical extent of soil contamination and the potential impact on groundwater.

The prior investigations also focused on MGP-related contamination. Other activities at the Site, including wood treatment, pipe storage, and utility-related repair and service activities may also have impacted subsurface soils at the site. Some of the potential contaminants associated with these activities, such as PAHs, TPH, and BTEX are also MGP-related compounds. However, other compounds that could be related to other former activities, including PCBs, chlorinated VOCs, pentachlorophenol and other phenolic compounds, and dioxins and furans have not been included in previous investigations.

Additionally, groundwater samples were not collected during previous investigations and are necessary to evaluate contaminants in the groundwater related to former activities at the site, including MGP waste storage, wood treatment, and other industrial operations. Previous investigations did not provide information on the geotechnical properties off the soil and contained limited lithologic information for the soil. Therefore, to fully evaluate potential risks to groundwater and develop a plan for remedial activities at the Site, additional geotechnical and lithologic data are needed.

SECTION 3

Proposed Investigation Activities

Additional soil borings are proposed throughout the Site to characterize the vertical and lateral extent of contamination from MGP-related activities and other industrial activities, and collect information to develop a remedial action plan for the Site.

The additional investigative activities described below will be performed after the existing building is demolished to allow access throughout the site. Preparation for the demolition of the building will begin once APS obtains access to the property. This will include an assessment and abatement for asbestos-containing materials (ACM), lead-based paint (LBP) and other universal waste materials. After the abatement of these materials is complete, the building structure will be removed to the concrete slab to allow for site investigation. The demolition work will be done under a City of Phoenix permit with appropriate notifications to Maricopa County. Waste will be managed in accordance with state and federal requirements.

The types of sampling that will be performed, proposed sampling locations, and proposed analyses are presented in this section.

3.1 Soil Sampling

To further evaluate the vertical and lateral extent of contaminants in the soil from MGP-related activities and other former industrial activities at the Site, 8 deep borings advanced to the water table and 12 shallow borings (up to a depth of 30 feet bgs) will be located at the Site.

The proposed locations of the borings are presented in Figure 3-1. Figure 3-1 also shows the distribution of PAH in the soil at the site based on previous investigations. The proposed boring locations may be modified during the actual site investigation based on the locations of subsurface utilities or structures at the Site. Boring locations were selected to confirm results from previous investigations, characterize areas that have not been fully evaluated, and collect information from deeper subsurface soils. The specific objectives for each soil boring location are presented in Table 3-1.

The proposed remediation at the Site will include removal of the upper three to four feet of soil throughout the Site. Therefore, the first sample will be collected at approximately 5 feet bgs in each boring. Additional samples will be collected at 5 to 10-foot intervals.

Table 3-2 presents a sampling matrix that specifically identifies the depths at which soil samples are planned to be collected and the proposed analyses for each sample. The final depths of samples and analyses collected may be modified based on the conditions encountered during drilling. For example, if shallow soil has significant staining, odors, or other indicators of MGP-related materials such as lampblack, it will likely not be sampled and analyzed for PAHs. However, the staining will be noted on soil borings, and a deeper sample(s) will be collected. If significant indicators of potential contamination are present at the planned total depth in the shallow soil borings, drilling may continue until no indicators are present. Also, if the soil in a boring appears free of MGP-related material, the number of samples collected or analyzed could be reduced. Additional boring locations may be included in the site investigation if the initial borings do not adequately identify the vertical and lateral extent of MGP-related contamination.

The soil borings will be advanced using air-rotary methods. Samples will be obtained with a split-spoon or ring sampler or as a grab sample. When a split-spoon sampler is driven to collect samples, the blow counts will be recorded. A geologist or geotechnical engineer will be present during the soil drilling to log and collect soil samples. Logging will be performed in accordance with American Society of Testing and Materials (ASTM) D2488. The borings will be logged on standard CH2M HILL boring logs with soil descriptions from the

samples including Unified Soil Classification System group identification, color, moisture, and relative density or consistency.

In addition to field logging, selected samples will be collected for chemical and geotechnical laboratory analysis. The proposed selected analyses for each sample are presented in Tables 3-1 and 3-2 and have been selected based on former operational activities at the Site and the results of previous investigations. Additionally, specific analyses have been selected to fully characterize the waste streams that will be generated during the site investigations and ongoing remedial activities. Analyses selected for each sample may be modified based on the material encountered during drilling.

3.1.1 Chemical Analysis

The objective of chemical analysis is:

- Identify the vertical and lateral extent of MGP-related contamination
- Identify the vertical and lateral extent of contamination associated with other site historical uses.
- Identify the remedial actions, including developing site-specific groundwater protection levels (GPLs) and site-specific cleanup criteria
- Assist with waste characterization for future remedial activities

Vertical and Lateral Extent Determination

The analyses selected to evaluate vertical and lateral extent of contamination were based on the results from previous investigations and historical activities at the site. Analyses for individual depths were selected to confirm previous sampling results, further delineate the vertical extent of contamination observed during previous investigations, and to evaluate the presence of potential contaminants at varying depths in areas that have not been previously characterized. When the intent of the analyses was to evaluate the presence of potential contaminants, depths of analyses were varied between adjacent boreholes (for example, 15 and 35 feet bgs in one borehole, and 25 and 45 feet in the nearby borehole for the same analyses). The anticipated analyses for evaluating vertical and lateral extent of contamination and identifying the remedial actions and the rationale for the distribution of selected analyses include:

- PAHs (EPA Method 8310) – PAHs were identified during previous investigations at locations throughout the Site. All proposed borings will be sampled for PAHs. Proposed borings (mostly deep borings) that are located to further delineate the lateral extent of contamination at the Site due to former industrial activities will be analyzed for PAHs at multiple depths up to 75 feet bgs. Additionally, proposed borings that are located to further define the vertical extent of PAH contamination will be sampled at depths to confirm former sampling information and to evaluate the presence of PAHs at depths below the previous samples.
- TPH (ADHS Method 8015AZR1) – TPH was primarily detected in samples in the center of the Site (the courtyard) and in the northeast corner of the Site. Proposed borings (mostly deep borings) that are located to further delineate the lateral extent of contamination at the site due to former industrial activities will typically be analyzed at two to three depths to evaluate the presence of TPH in the subsurface. Proposed borings that are located in areas that have exhibited high TPH concentrations during previous investigations will be sampled at depths to confirm former sampling information and to evaluate the presence of TPH at depths below the previous samples.
- VOCs, including BTEX, (EPA Method 8260B) – VOCs, primarily BTEX, were detected above SRLs in samples in the northeast corner of the Site. However, many of the samples that have exhibited high concentrations of PAHs and TPH at the Site were not analyzed for VOCs. Additionally, only one sample from a depth of greater than 12 bgs was analyzed for VOCs during previous investigations. Proposed borings (mostly deep borings) that are located to further delineate the lateral extent of contamination at the site due to former industrial activities will be sampled at multiple depths for VOCs. Additionally,

borings in areas where high concentrations of TPH and/or PAHs have been observed will be analyzed at varying depths for VOCs to evaluate concentrations with respect to SRLs and to evaluate the vertical extent of VOC contamination. Samples analyzed for VOCs in adjacent boreholes were typically collected from different depths to evaluate the presence of VOCs at multiple depths throughout the site.

- Dioxins and Furans (EPA Method 1613A or 8290B) – Due to former wood treatment operations at the Site, dioxin and furan compounds are potential contaminants at the Site. Limited historical information related to the location of wood treatment operations at the Site indicates that activities may have been present on the western half and northwest corner of the Site, although this is not confirmed. All proposed borings will be sampled at multiple depths for dioxins and furans to evaluate the presence of the compounds throughout the Site. Samples analyzed for dioxins and furans in adjacent boreholes will typically be collected from different depths to evaluate the presence of dioxins and furans at multiple depths throughout the site.
- Semivolatile Organics - (EPA Method 8270D) – Pentachlorphenols and other phenolic compounds are associated with some types of wood treatment operations, and are potential contaminants at the Site due to former industrial activities. The rationale for analysis of semi-volatile compounds is consistent with the rationale for dioxin and furan compounds listed above.
- PCBs (EPA Method 8082) – Samples for PCBs will be collected in borings throughout the site to obtain a general evaluation of the presence of PCBSs. Approximately two samples each will be collected from selected borings throughout the Site at varying depths. Typically, PCBs analysis in adjacent boreholes were selected from different sample depths. These samples will be analyzed for PCBS to evaluate the presence of PCBs in the subsurface.
- Total RCRA Metals (EPA Method 1311/6010B/7471A) – Samples for total RCRA metals collected during previous investigations were primarily shallow samples at limited locations. Boring throughout the site will be sampled at two to three depths to evaluate and delineate the concentrations of metals in the subsurface
- Waste Characterization - Waste characterization samples will be collected at selected borings during the site investigation. Collecting waste characterization samples provides several advantages, including pre-profiling soil to allow direct haul-off during remedial activities. This saves cost by reducing double-handling, eliminating the need to construct temporary stockpiles, and reducing the chance of runoff or odor issues. The following waste characterization analyses are proposed:
    - PAHs (EPA Method 8310)
    - TCLP RCRA 8 metals (EPA Method 1311/6010B/7471A)
    - Total VOCs (EPA Method 8260B)
    - TPH (ADHS Method 8015 AZR1)
    - PCBs (EPA Method 8082)
    - TCLP VOCs (EPA Method 1311/8260)
    - Paint filter (EPA Method 9095 [for liquid/saturated samples])
    - Ignitability
    - pH (EPA Method 9045B ([for liquid samples])
    - Total cyanide (EPA Method 9014)

3.1.2 Geotechnical Analysis

Geotechnical data are needed for the site-specific GPL model and to evaluate support systems for deep excavations and excavations near Site structures. The GPL model is used to determining site-specific GPLs and for determination offsite remediation goals. The following geotechnical data are required to support the remediation design and the GPL modeling:

- Moisture content
- Sieve analysis with percent passing the No. 200
- Atterberg limit
- Dry bulk density
- Porosity
- Fractional organic carbon
- In situ density
- Consolidated, undrained shear strength with pore pressure
- Standard penetration test N-values

Sample locations for geotechnical analysis were throughout the site at multiple depths to obtain a thorough understanding of subsurface conditions and were also concentrated in areas expected to receive additional remedial activities based on historical activities.

3.2 Groundwater Evaluation

The eight deep soil borings will be advanced to the water table. If possible, groundwater grab samples will be collected from four of these borings using HydroPunch™ sampling methods. Groundwater samples will be analyzed for the following constituents:

- PAHs (EPA Method 8310)
- TPH (ADHS 8015AZR1)
- BTEX (EPA Method 8221B)
- Metals (EPA Method 200.7)
- Semivolatile Organics (EPA Method 8270D)
- Total VOCs (EPA Method 8260B)

3.3 Utility and Subsurface Structure Evaluation

The objective of the utility evaluation is to identify underground utilities and remnants of former MGP-related subsurface structures onsite. Prior to the start of intrusive investigation, known subsurface utilities will be identified by Arizona 811 (formerly Arizona Blue Stake). A third party utility locating firm will further designate the utility locations using signal line generators and ferrous magnetic locator methods. This firm will also attempt to locate abandoned utilities and subsurface structures. The areas for the soil borings will be cleared by using nondestructive air lance methods before drilling to verify no utilities are present at the boring location. The utility locations will be surveyed and added to the overall Site plans Project Schedule.

The current project schedule for the field investigation is presented in Figure 3-2.

SECTION 4

Sampling and Analysis Plan

This section describes the soil and groundwater sampling procedures. Also included are procedures for equipment decontamination and investigation-derived-waste disposal.

4.1 Field Sampling Procedures

4.1.1 Soil Borings

Soil borings will be advanced using air rotary methods. Samples will be collected at approximately 5 to 10 foot intervals by driving Standard Penetration Test (SPT) split-spoon samplers or ring samplers. The samplers will be driven in general accordance with American Society for Testing and Materials (ASTM) method D 1586.

Prior to drilling a deep borehole the drilling subcontractor will file a Notice of Intent (NOI) to drill a monitor well with the Arizona Department of Water Resources (ADWR). This NOI is necessary for the borings that will be advanced to the groundwater table.

Lithologic observations will be recorded on CH2M HILL's standard boring log form or using P-log software on hand-held data acquisition devices. The field engineer/scientist will note soil attributes such as color, particle size, consistency, moisture content, structure, plasticity, odor (if obvious) and organic content. Soil cuttings will be described using the Uniform Soil Classification System and ASTM Standard Procedure D 2488.

At the completion of the borehole installation and sample collection, the borehole will be abandoned in accordance with ADWR Guidelines. The borehole will be filled with cement-bentonite grout using a tremie to place the grout from the bottom of the borehole.

4.1.2 Soil Sample Collection Activities

The SPT split-spoon or ring samplers will be used for collecting soil samples at depths of 5 feet and greater. The following procedure will be used when soil samples are collected from borings during drilling activities:

1. Where geotechnical and environmental soil samples are collected from borings at the same depth, they will be collected simultaneously. The geotechnical samples will be collected in rings or brass sleeves that will be placed in the bottom of the sampler. Environmental samples will be collected in containers noted in Table 4-1 and will be taken from the top of the sampler.
2. A decontaminated sampler will be opened, and decontaminated sample collection sleeves or rings will be inserted.
3. The sampler will be closed.
4. The sample will be collected from the soil boring in general accordance with ASTM Method D 1586.
5. The sample collection will be verified by looking into the sampler drive shoe. If no sample is retrieved, a second attempt will be made to retrieve the sample. If a second sample cannot be obtained, the boring will be advanced to the next sampling depth and sampling retried.
6. If a sample is collected, the drive shoe will be removed, and the sample collection sleeves or rings will be removed.
7. If required, methanol extractions will be performed. The fixed-base laboratory will supply amber jars that contain a measured volume of methanol. The jar will be weighed on a portable scale to establish an initial mass. The lid will be removed from the jar and the appropriate amount of soil (approximately

10 grams) will be placed in the jar, using the scale to measure the increase in mass. The lid will be replaced, the total weight of the jar with the soil will be noted, and the jar will be shaken gently back and forth for approximately 5 to 10 seconds.

8. For other analyses, use disposable scoops to transfer soil from the sleeves to glass jars.
9. Each sample will be labeled, logged into a chain-of-custody form, and placed in a sample box or cooler maintained at 4 degrees Celsius (°C) to be submitted to a laboratory for analysis.

The use of En Core™ Samplers may be used in place of the methanol extraction for collection for samples for VOC analysis. Standard procedure for soil collection using these samplers is provided in Appendix E.

4.1.3 Groundwater Sample Collection Activities

Groundwater samples will be collected from four deep boreholes using the Hydropunch system. The following procedure will be used:

1. The drilling subcontractor will advance the borehole to appropriately 2 feet below the encountered groundwater depth.
2. Measure the static water level below top of drill casing with an electronic water-level indicator. Record the depth to water and distance from top of casing to ground surface.
3. The drilling subcontractor will prepare the HydroPunch™ sampling device according to the manufacturer's instructions and lower the device to the bottom of the borehole. Drill rod will be sealed with built in gaskets, Teflon tape, or an equivalent sealing method.
4. The drilling subcontractor will drive the sampling device to the proper sampling depth into undisturbed materials below the borehole bottom.
5. The drilling subcontractor will withdraw the rod to expose the screen of the sampling device in accordance with manufacturer's instructions.
6. After waiting a sufficient time to allow the sampler to fill with water, collect a groundwater sample by lowering the bailer through the rods and body of the sampler.
7. Groundwater from the bailer will be placed into appropriate sample containers.
8. Each sample will be labeled, logged into a chain-of-custody form, and placed in a sample box or cooler maintained at 4 degrees Celsius (°C) to be submitted to a laboratory for analysis.

4.1.4 Decontamination Procedures

Equipment decontamination procedures will be used as part of the site investigation activities. Non-dedicated or non-disposable field equipment used during sampling will be decontaminated prior to drilling or groundwater sampling, in between borings, and again after the sampling event has been completed to prevent cross-contamination between sampling locations. Decontamination procedures for field personnel are described in the site Health and Safety Plan.

Contamination at the Site is principally associated with PAHs, TPH, and BTEX; therefore, pressurized hot water cleaning to remove soil and contaminants will be the primary feature of the non-disposable equipment decontamination process. Two levels of non-disposable equipment decontamination will be implemented. The first level (Level 1) will be a general decontamination process that applies to onsite non-disposable equipment used during soil drilling and excavation. The second level (Level 2) of equipment decontamination will be a specific decontamination process applied to non-disposable sampling equipment, tools, utensils, and other equipment that might contact soil samples. This decontamination protocol is based on information presented by EPA in *Protocol for Groundwater Evaluation*, OSWER DIR 9080.0-1. Section 4.1.4.3 describes the decontamination procedures for groundwater sampling.

4.1.4.1 Level 1 – General Equipment Decontamination

Non-dedicated or non-disposable equipment, including support and ancillary equipment, vehicles, and tools, will go through the following general decontamination process before site entry:

- Removal of all loose dirt
- Thorough cleaning with high pressure hot water and Alconox or equivalent laboratory-grade detergent and, if necessary, scrub until all visible dirt, grime, grease, oil, loose paint, and rust flakes, have been removed.
- Rinse with potable water

Non-disposable sampling equipment will be put in a plastic-lined "dirty equipment" area for decontamination after each sampling event.

Use of disposable sampling equipment such as Teflon® tubing and plastic scoops is preferred where appropriate. Disposable sampling equipment will be disposed of properly after the equipment has been used to collect a sample or has come in contact with soil or groundwater.

4.1.4.2 Level 2 – Sampling Equipment Decontamination

Non-disposable sampling equipment, such as split spoons and other items that might come in contact with soil samples, will go through the following decontamination procedure:

- Removal of all loose dirt.
- Scrub with Alconox or equivalent laboratory-grade detergent and water.
- Rinse with potable water.
- Rinse with distilled deionized water.
- Rinse with pesticide-grade hexane.
- Air dry on a clean surface or rack, such as Teflon®, stainless steel, or oil-free aluminum, elevated at least 2 feet above ground.

4.1.4.3 Groundwater Sampling Equipment Decontamination

Non-disposable sampling equipment used for groundwater sampling will go through the following decontamination procedure:

- Scrub with Alconox or equivalent laboratory-grade detergent and water.
- Rinse with potable water.
- Rinse with distilled deionized water.
- Rinse with pesticide-grade hexane.
- Air dry on a clean surface or rack, such as Teflon®, stainless steel, or oil-free aluminum, elevated at least 2 feet above ground.

4.1.5 Investigation-derived Waste

Waste soil from soil borings will be placed in lined roll-off bins and remain onsite pending analytical results of a waste characterization soil sample from the roll-off bin. A single composite sample will be taken of each roll-off bin. The roll-off bins will have "Special Waste" labels that identify the contents and date of generation. After results are received, the soil will be appropriately disposed of at a licensed facility that is an approved for disposal by APS.

Investigation-derived waste (IDW) decontamination water will be stored in a portable container. The containers will be labeled with contents and date of generation. Water from IDW will be transported offsite where Liquid Environmental Solutions will sample, analyze, and dispose of wastewater.

Used and disposable personal protective equipment and used disposable equipment will be double-bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill.

4.2 Laboratory Analysis

The Quality Assurance Project Plan (QAPP), for APS's MGP sites was last reviewed by ADEQ in October 2012 with the latest revision dated November 2014 (CH2M HILL, 2014). The QAPP was developed as specified in *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA, 2001). The QAPP describes the analytical methods to be used, the applicable laboratory Practical Quantitation Limits for each analytical method, and sample handling and storing procedures.

APS uses Locus Technologies database to manage environmental samples collected at its facilities. The CH2M HILL project chemist and database manager will submit all analytical data to the APS Locus Technologies database, as required by APS. Additionally, the Site information and specific field event information will comply with Locus database requirements.

4.2.1 Field Samples

Soil samples, waste characterization, and groundwater samples will be analyzed for the geotechnical or chemical constituents depending on the sample purpose and matrix. Table 4-1 provides details for method, container type, and preservatives for each analysis.

4.2.2 Field Quality Control Samples

The purpose of the field quality assurance/quality control (QA/QC) program is to provide a measure of data quality. Field duplicates indicate the precision of the overall sampling and analysis event. Equipment and field blanks monitor contaminants that might be introduced by the sampling equipment.

The following quality assurance samples will be collected as part of the soil and groundwater sampling effort:

- **Field Duplicates.** Field duplicates will be collected at a frequency of 1 per 10 confirmation soil samples designated for offsite analysis**.** Field duplicates will be identified in the field and blind-coded on the sample chain-of-custody**.** The duplicate will be analyzed for the same parameters as the original sample. A single groundwater duplicate sample will be collected.
- **Equipment Blanks.** If non-dedicated sampling equipment (e.g., hand towel, portable pump) is used, equipment blanks will be collected at a frequency of at least one per sampling event. After decontamination procedures have been performed on the sampling equipment, deionized water will be poured over the sampling equipment, collected in the proper sampling bottles, and submitted for analysis. The equipment blank will be analyzed for the same chemical parameters as the samples being collected (TPH, PAHs, BTEX, metals, etc.).
- **Trip Blanks.** Trip blanks provided by the laboratory will accompany each shipment of soil and groundwater samples collected for VOCs. Trip blanks will be prepared in the laboratory using deionized water and shipped to the site in sealed sample containers. They will remain capped in the field prior to shipment and will be submitted for analysis with the regular soil samples. One trip blank will be included with each shipment of VOC samples to the offsite laboratory.
- **Matrix Spike/Matrix Spike Duplicates (MS/MSD).** MS/MSD samples will be collected at a frequency of 1 per 20 for both groundwater and soil samples that will be submitted to the laboratory for analytical analysis. MS/MSD samples will be identified in the field and identified on the sample chain-of-custody. The MS/MSD sample will be analyzed for the same parameters as the original sample. For soil, the MS/MSD can be collected from the brass sleeve or jar at the laboratory. Additional soil volume is not required. For groundwater, the sample volume will be collected in triplicate for each analysis required

(i.e., three sets of bottles). VOC vials will be filled first, amber bottles will be filled second, and polypropylene bottles will be filled last.

4.2.3 Quality Control Data Packages

A Level II quality control laboratory data package will be required for all laboratory analysis. A Level II package includes documentation included in the QAPP. The Level II QA/QC packages will be evaluated as outlined in the project QAPP (CH2M HILL, 2012b).

4.3 Sample Packaging and Shipment

Most samples will be delivered to a local laboratory. For local deliveries, samples will be placed on ice in a cooler and transported to the laboratory.

All soil and groundwater sample containers will be placed in a strong-outside shipping container (a steel-belted or hard-plastic cooler). The following outlines the packaging procedures that will be followed when samples are shipped to a laboratory:

1. When ice is used, secure the drain plug of the cooler with tape to prevent melting ice from leaking out of the cooler and double bag all ice.
2. Line the bottom of the cooler with bubble wrap to prevent breakage during shipment.
3. Secure bottle/container tops with custody seals.
4. Wrap all glass sample containers in bubble wrap to prevent breakage.
5. Seal all sample containers in plastic zip-lock bags.

All samples will be placed in coolers with the appropriate chain-of-custody forms. All forms will be enclosed in a large plastic bag and affixed to the underside of the cooler lid. Empty space in the cooler will be filled with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment. Vermiculite may also be placed in the cooler to absorb spills if they occur. Ice used to cool samples will be double sealed in two zip-closure plastic bags and placed on top and around the samples to chill them to the correct temperature. Each ice chest will be securely taped shut with nylon strapping tape, and custody seals will be affixed to the front, right, and back of each cooler. Analytical data will be managed as described in the APS QAPP.

4.4 Sample Documentation

A systematic Field Sample Identification (ID) nomenclature has been developed for APS samples collected across APS sites that collect environmental data. Consistent nomenclature has been designed to facilitate entry, management, reporting and manipulation of field and analytical data for APS and as required in the APS EIM™ database system.

The Field Sample ID nomenclature will vary depending on the sampling purpose. Each field sample ID generated must be unique for each environmental sample collected. The field sample ID is limited to 25 characters. Two main sampling purposes have been identified below.

4.4.1.1 Regular Field Sample Id

The nomenclature to use for regular field samples collected is:

[Site Code]-[Location ID]-[Sample Date]-[Letter Code (optional)]

Where:

Site Code = two digit site code given for each site managed by APS. The Site Code for Grant Street is “GS”.

Location ID = Location that is being sampled and pre-determined before sampling in the field and depth of sample (i.e. 1D05)

Sample Date = Sample collection date in format of "MMYY"

Letter Code = this is optional and only to be used if you are taking multiple regular samples from the same location for example when collecting samples from multiple depths but the same location, use alphabetical letter starting with A to make each sample collected unique

Example 1: GS-1D05-010115 (Arizona Public Service – Grant Street, field investigation sample taken from soil boring 1D at a depth of 5 feet bgs) on January 1, 2015.

Example 2: GS-5S10-011515 (Arizona Public Service – Grant Street, field investigation sample taken from soil boring 5S at a depth of 10 feet bgs on January 15, 2015

Samples selected for an MS/MSD will be identified on the chain-of-custody form. The sample will be identified using the station code and depth or date as identified above. In addition to the sample ID, the acronym "MS/MSD" will be written in the comments field of the chain-of-custody form to identify that the sample has been selected as an MS/MSD.

4.4.1.2 Quality Assurance/Quality Control Samples

Field quality control samples can include field duplicates, equipment blanks, field blanks, ambient blanks, trip blanks and any other type of field QC samples that may be required for sampling. The field sample ID nomenclature to use would be:

[Site Code]-[QC Type Code]##-[Sample Date]

Where:

Site Code = two digit site code given for each site managed by APS. The Site Code for Grant Street is "GS".

Field QC Type = two digit code given for each type of field QC sample that could be collected. Valid values are provided in Table 4-2. This code is followed by a two digit sequential number starting with 01 to accommodate multiple samples collected on the same day of the same field QC type.

Sample Date = Sample collection date in format of "MMDDYY"

Example 1: GS-SS01-011515 (Arizona Public Service – Grant Street, Split Sample #1 collected on January 15, 2015)

Example 2: GS-EB02-011515 (Arizona Public Service, Grant Street, equipment blank #2 collected on January 15, 2015)

4.5 Field Documentation

4.5.1 Field Log Books

Field log books will be used to document where, when, how, and from whom any vital project information was obtained. Log book entries will be complete and accurate enough to permit reconstruction of field activities. Log books are to be bound with consecutively numbered pages. Each page will be dated and the time of entry noted in military time. All entries will be legible, written in black or blue ink, and signed by the individual making the entries. Language will be factual, objective, and free of personal opinions or other terminology that might prove inappropriate.

At a minimum, the following information will be recorded during the collection of each sample:

- Sample location and description
- Site sketch showing sample location and measured distances, if not otherwise clear
- Sampler's name(s)
- Date and time of sample collection
- Designation of sample as composite or grab
- Type of sample (i.e., matrix)
- Type of sampling equipment used
- Onsite measurement data (e.g., temperature, pH, conductivity) (may be collected in a separate field sampling diary)
- Field observations and details important to analysis or integrity of samples (e.g., heavy rains, odors, colors)
- Preliminary sample descriptions (e.g., for soils: clay loam, very wet; for groundwater: clear water with no petroleum-like odor)
- Type(s) of preservation used or present in sample container
- Instrument reading and units of measurement (e.g., pH units, µS/cm, NTU)
- Lot numbers of the sample containers, sample tag numbers, chain-of-custody form numbers, and chain-of-custody seal numbers
- Shipping arrangements (overnight air bill number)
- Recipient laboratory

In addition to the sampling information, the following specifics will be recorded in the field log book for each day of sampling:

- Team members and their responsibilities
- Time of site arrival/entry onsite and time of site departure
- Other personnel onsite
- A summary of any meetings or discussions with APS employees
- Deviations from sampling plans, site safety plans, and QAPP procedures
- Changes in personnel and responsibilities as well as reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

4.5.2 Chain-of-Custody Records

Chain-of-custody records are used to document sample collection and shipment to the laboratory for analysis. All sample shipments will be accompanied by a chain-of-custody record. Form(s) will be completed and sent with the samples for each laboratory and each shipment (i.e., each day). If multiple coolers are sent to a single laboratory on a single day, form(s) will be completed and sent with the samples for each cooler.

The chain-of-custody record will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized

personnel. The site leader or designee will sign the chain-of-custody record. The site leader or designee will sign the “relinquished by” box and note date, time, and air bill number (if samples are shipped).

4.5.3 Photographs

Photographs will be taken at various sample locations and at other areas of interest onsite. They will serve to verify information entered in the field log book. When a photograph is taken, the following information will be written in the log book or will be recorded in a separate field photography log:

- Photograph number
- Time, date, location, and, if appropriate, weather conditions
- Description of the subject photographed
- Name of person taking the photograph

SECTION 5

Public Notice and Public Participation

APS has a community relations and ongoing public involvement program planned for the Site. APS will perform the ADEQ-required public notice, as specified in A.R.S. §49-176, and other proactive public participation activities. APS will prepare Site status newsletters in both English and Spanish. The newsletters will be distributed to the neighboring residents, businesses, and community leaders. APS will brief its employees, community leaders, and City staff. A mailing list will be developed to include community leaders, media outlets, neighboring businesses and residents, and interested community members.

As part of APS's continuing public involvement program, once the Work Plan is approved by ADEQ, additional outreach measures will be taken, including the following:

- Develop a specific community relations program to include state and local participants.
- Update the newsletter to include Site Investigation information and distribute to interested parties.
- Continue community leader briefing.
- Post a sign at the Site with the name and telephone number of a person who may be contacted for information regarding the field work in accordance with A.R.S. § 49-176(A)(2)(a).
- Provide construction updates to the community once the work at the Site has begun.
- Prior to the remediation, APS will hold a public open house. Notice of the Open House will be advertised in the Arizona Republic once a week for 2 weeks.

SECTION 6

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Tables

TABLE 2-1
Summary of Operational History
APS Grant Street Former MGP Site, Phoenix, Arizona

Year	Site Structure[1]	Site Activities[2]
1901	Site is vacant and undeveloped	No structures or activities
1906	Site is vacant and undeveloped	Coal Gas process, which creates lampblack waste, begins on 501/505 Property
1917	No Sanborn maps or aerial photographs available.	Site begins operation as a lampblack storage area for dry lampblack waste transferred from 501/505 Property via horse and wagon Site is acquired by Pacific Gas and Electric Company
1920	Not available	Site is acquired by Central Arizona Light and Power, a predecessor company of APS
Early 1920s	Settling ponds	Settling ponds constructed at the Site as slurry containment/drying areas. Lampblack begins being transferred to site as a slurry from 501/505 Property via underground pipeline.
1923	Oil storage tank and settling basins	50,000-gallon oil tank constructed on southwest corner of Site. Oil storage tank installed and settling basins located on-site for storage of lampblack slurry.
1934	Oil storage tank, four to five settling basins on east side of Site, excavated area or basin in northwest corner, possible basin between tank and excavated area on west side.	MGP production ceases at 501/505 Property. Transfer of lampblack waste to Site ceases.
1942	Settling basins, an excavated area in the northwest corner, and the concrete foundation pad for the AST located on-site (Atlantic, 1990).	No information on facility activities
1946	AST for creosote storage located on foundation pad in southwest corner of Site.	Site operating as a creosoting yard
1949	Building along eastern edge of Site and excavated area/basin located in northwest corner of Site. AST has been removed.	No information available on operations, area in northwest corner identified as “conc. vat.”
1954	Building along eastern edge and small building in southeast corner. Excavated area/basin no longer visible in northwest corner. Central area of Site appears to be parking/driving area.	No information available on operations, appears to be a service yard for APS operations
1958	Building along eastern edge, building on northern end, and two buildings in southeast corner of Site.	No information available on operations, appears to be a service yard for APS operations
1968	Repair shop, several pipe storage sheds on eastern half of Site, storage building north end of Site, and a small office building.	Site is a pipe yard and supply area.
1971	Aerial photo not available.	Site ownership is transferred from APS to National Housing Industries, Inc.,

TABLE 2-1

Summary of Operational History

APS Grant Street Former MGP Site, Phoenix, Arizona

Year	Site Structure[1]	Site Activities[2]
1972	Aerial photo not available	Site ownership is transferred to Grant Street Properties
1973	Apartment building	Apartment building constructed on-site
2001	Apartment building	APS re-purchases property and subsequently donates to a non-profit entity, Grant Street Apartments, Inc.
2003	Apartment building	Subsurface utilities (water lines) rerouted to aboveground (building roof) in April/May 2003. Geomembrane and soil cap installed in south portion of the Courtyard and concrete cap in north portion of the Courtyard in June-August 2003.

Notes:

1. Based on available Sanborn maps and aerial photographs. Additional information based on a review of APS historical records (Atlantic Environmental, 1990), information provided by EDR, and the AMEC FRI for the 501/505 Property (AMEC, 2010).
2. Based on available Sanborn maps and APS historical records (Atlantic, 1990).

TABLE 2-2

Soil Sampling Locations

APS Grant Street Former MGP Site, Phoenix, Arizona

Location ID	Sample Type	Total Depth of Boring	Sample Location	Date	Reference/Site Investigation
SS-1	Surface Soil Sample	Not Applicable	Onsite (West section of property)	9/29/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
SS-2	Surface Soil Sample	Not Applicable	Onsite (Southwest section of property)	9/29/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
SS-3	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	9/29/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
SS-4	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	9/29/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
SS-5	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	9/29/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
SS-6	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	9/29/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
SS-7	Surface Soil Sample	Not Applicable	Site Perimeter (North of property)	9/29/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
SS-8	Surface Soil Sample	Not Applicable	Site Perimeter (East of property)	9/29/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
SS-9	Surface Soil Sample	Not Applicable	Offsite background sample	9/29/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
SS-10	Surface Soil Sample	Not Applicable	Offsite background sample	9/29/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
GB1	Soil Boring	15	Onsite (Southeast section of property)	12/21/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
GB2	Soil Boring	20	Onsite (Southeast section of property)	12/21/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
GB3	Soil Boring	60	Onsite (Northwest section of property)	12/21/1993 and 3/25/94	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
HA1	Hand Auger Soil Boring	5	Onsite (Courtyard)	12/22/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
HA2	Hand Auger Soil Boring	5	Onsite (Courtyard)	12/22/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
HA3	Hand Auger Soil Boring	7	Onsite (Courtyard)	12/22/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
HA4	Hand Auger Soil Boring	5	Onsite (Courtyard)	12/22/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
GB4	Soil Boring	20	Onsite (North section of property)	12/23/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.

TABLE 2-2

Soil Sampling Locations

APS Grant Street Former MGP Site, Phoenix, Arizona

Location ID	Sample Type	Total Depth of Boring	Sample Location	Date	Reference/Site Investigation
GB5	Soil Boring	32	Onsite (Northwest section of property)	12/23/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
GB6	Soil Boring	20	Onsite (West section of property)	12/23/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
GB7	Soil Boring	21	Onsite (Southwest section of property)	12/23/1993	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
DH-1	Shallow Hand Auger/Soil Boring	4.5	Onsite (Northeast section of property)	1/20/1994	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
DH-2	Shallow Hand Auger/Soil Boring	4.5	Onsite (Northeast section of property)	1/20/1994	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
DH-3	Shallow Hand Auger/Soil Boring	4.5	Onsite (Northeast section of property)	1/20/1994	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
DH-4	Shallow Hand Auger/Soil Boring	4.5	Onsite (Northeast section of property)	1/20/1994	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
DH-5	Shallow Hand Auger/Soil Boring	5.0	Onsite (Northeast section of property)	1/20/1994	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
DH-6	Shallow Hand Auger/Soil Boring	4.5	Onsite (Northeast section of property)	1/20/1994	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
DH-7	Shallow Hand Auger/Soil Boring	4.5	Onsite (Northeast section of property)	1/20/1994	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
DH-8	Shallow Hand Auger/Soil Boring	5.0	Onsite (Northeast section of property)	1/20/1994	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
DH-9	Shallow Hand Auger/Soil Boring	2.5	Onsite (Northeast section of property)	1/20/1994	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
HA-3B	Shallow Hand Auger/Soil Boring	5	Onsite (Courtyard)	1/20/1994	Geraghty and Miller, Inc., 1994. Site Investigation Former Grant Street Yard, 331 West Grant Street, Phoenix, Arizona, September 6.
EW-3	Extraction Well	10	Onsite (Northeast section of property)	5/9/1994	Geraghty and Miller, Inc., 1994. Results and Findings, Vapor Extraction Pilot Test, Former Grant Street Yard Site, Phoenix, Arizona, June 29.
EW-4	Extraction Well	10	Onsite (Northeast section of property)	5/9/1994	Geraghty and Miller, Inc., 1994. Results and Findings, Vapor Extraction Pilot Test, Former Grant Street Yard Site, Phoenix, Arizona, June 29.
EW-5	Extraction Well	10	Onsite (Northeast section of property)	5/9/1994	Geraghty and Miller, Inc., 1994. Results and Findings, Vapor Extraction Pilot Test, Former Grant Street Yard Site, Phoenix, Arizona, June 29.

TABLE 2-2

Soil Sampling Locations

APS Grant Street Former MGP Site, Phoenix, Arizona

Location ID	Sample Type	Total Depth of Boring	Sample Location	Date	Reference/Site Investigation
MP-2	Monitoring Point	6.5	Onsite (Northeast section of property)	5/9/1994	Geraghty and Miller, Inc., 1994. Results and Findings, Vapor Extraction Pilot Test, Former Grant Street Yard Site, Phoenix, Arizona, June 29.
GY1	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY2	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY3	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY4	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY5	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY6	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY7	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY8	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY9	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY10	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY21	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.

TABLE 2-2

Soil Sampling Locations

APS Grant Street Former MGP Site, Phoenix, Arizona

Location ID	Sample Type	Total Depth of Boring	Sample Location	Date	Reference/Site Investigation
GY22	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY23	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/26/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY11	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/27/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY12	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/27/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY13	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/27/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY14	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/27/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY15	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/27/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY16	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/27/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY17	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/27/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY18	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/27/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY19	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/27/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
GY20	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/27/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.

TABLE 2-2

Soil Sampling Locations

APS Grant Street Former MGP Site, Phoenix, Arizona

Location ID	Sample Type	Total Depth of Boring	Sample Location	Date	Reference/Site Investigation
GY24	Shallow Soil Boring	1.5	Onsite (Courtyard)	5/27/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
BC-1	Surface Soil Sample	Not Applicable	Onsite (Southwest section of property)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
BC-2	Surface Soil Sample	Not Applicable	Onsite (Southwest section of property)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
BP-1	Surface Soil Sample	Not Applicable	Onsite (Northwest Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
BP-2	Surface Soil Sample	Not Applicable	Onsite (Northwest Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
BP-3	Surface Soil Sample	Not Applicable	Onsite (Northwest Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
BP-4	Surface Soil Sample	Not Applicable	Onsite (Northwest Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
DS-1	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
DS-2	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
DS-3	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
DS-4	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
DS-5	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.

TABLE 2-2

Soil Sampling Locations

APS Grant Street Former MGP Site, Phoenix, Arizona

Location ID	Sample Type	Total Depth of Boring	Sample Location	Date	Reference/Site Investigation
DS-6	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
NE-1	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
NE-3	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
PT-1	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
PT-2	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
PT-3	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
PT-4	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
SE-1	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
SE-2	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
SSB	Surface Soil Sample	Not Applicable	Onsite (Northeast section of property)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
SW-1	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
SW-2	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.

TABLE 2-2

Soil Sampling Locations

APS Grant Street Former MGP Site, Phoenix, Arizona

Location ID	Sample Type	Total Depth of Boring	Sample Location	Date	Reference/Site Investigation
TS-1	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
TS-2	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
TS-3	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
TS-4	Surface Soil Sample	Not Applicable	Onsite (Courtyard)	7/13/1998	Brown and Caldwell, 1998. Site Investigation Report at the Former Grant Street Yard Site, 331 West Grant Street, Phoenix, Arizona, October 1.
TB-22	Lampblack Pipeline Removal, Soil Sample	5.1	West Grant Street (Trench Bottom)	4/3/2001	Brown and Caldwell, 2002. Lincoln Street Lampblack Pipeline Removal Construction Report, February 4.
TB-24	Lampblack Pipeline Removal, Soil Sample	5.6	West Grant Street (Trench Bottom)	4/3/2001	Brown and Caldwell, 2002. Lincoln Street Lampblack Pipeline Removal Construction Report, February 4.
TS-23	Lampblack Pipeline Removal, Soil Sample	4	West Grant Street (Trench Side Wall)	4/3/2001	Brown and Caldwell, 2002. Lincoln Street Lampblack Pipeline Removal Construction Report, February 4.
TS-25	Lampblack Pipeline Removal, Soil Sample	4.4	West Grant Street (Trench Side Wall)	4/3/2001	Brown and Caldwell, 2002. Lincoln Street Lampblack Pipeline Removal Construction Report, February 4.
TB-41	Lampblack Pipeline Removal, Soil Sample	6.6	West Grant Street (Trench Bottom)	4/10/2001	Brown and Caldwell, 2002. Lincoln Street Lampblack Pipeline Removal Construction Report, February 4.
TS-40	Lampblack Pipeline Removal, Soil Sample	4	West Grant Street (Trench Side Wall)	4/10/2001	Brown and Caldwell, 2002. Lincoln Street Lampblack Pipeline Removal Construction Report, February 4.
TS-42	Lampblack Pipeline Removal, Soil Sample	4	West Grant Street (Trench Side Wall)	4/11/2001	Brown and Caldwell, 2002. Lincoln Street Lampblack Pipeline Removal Construction Report, February 4.
TB-55	Lampblack Pipeline Removal, Soil Sample	5.9	West Grant Street (Trench Bottom)	5/3/2001	Brown and Caldwell, 2002. Lincoln Street Lampblack Pipeline Removal Construction Report, February 4.

TABLE 2-2

Soil Sampling Locations

APS Grant Street Former MGP Site, Phoenix, Arizona

Location ID	Sample Type	Total Depth of Boring	Sample Location	Date	Reference/Site Investigation
TB-57	Lampblack Pipeline Removal, Soil Sample	6.4	West Grant Street (Trench Bottom)	5/3/2001	Brown and Caldwell, 2002. Lincoln Street Lampblack Pipeline Removal Construction Report, February 4.
TS-56	Lampblack Pipeline Removal, Soil Sample	3.5	West Grant Street (Trench Side Wall)	5/3/2001	Brown and Caldwell, 2002. Lincoln Street Lampblack Pipeline Removal Construction Report, February 4.

TABLE 2-3

Summary of Historical Analytical Data for Soil, Polyaromatic Hydrocarbons (PAHs)

APS Grant Street Former MGP Site, Phoenix, Arizona

Location	Sample ID	Sample Date	Depth (ft bgs)[1]	Units[2]	1-Methyl naphthalene	2-Methyl naphthalene	Acenaphthene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
Residential SRL[3,4]					**NE[6]**	**NE**	**3700**	**22000**	**0.69**	**0.069**	**0.69**	**NE**	**6.9**	**68**	**0.069**	**2300**	**2700**	**0.69**	**56**	**NE**	**2300**
Non-Residential SRL[5]					**NE**	**NE**	**29000**	**240000**	**21**	**2.1**	**21**	**NE**	**210**	**2000**	**2.1**	**22000**	**26000**	**21**	**190**	**NE**	**29000**
SS-1	SS-1	9/29/93	Surface	mg/kg	0.05U	0.05U	0.85U	0.0415U	0.085U	0.13	0.1	0.18	0.085U	0.092	0.17U	0.2	0.085U	0.16	0.415U	0.067	0.2
SS-2	SS-2	9/29/93	Surface	mg/kg	0.05U	0.05U	0.85U	0.0415U	0.088	0.19	0.14	0.31	0.085U	0.12	0.17U	0.29	0.085U	0.28	0.415U	0.1	0.34
SS-3	SS-3	9/29/93	Surface	mg/kg	0.2U	0.2U	3.4U	0.166U	0.34U	0.41	0.34U	0.52	0.34U	0.34	0.68U	0.74	0.34U	0.45	1.66U	0.26	1
SS-4	SS-4	9/29/93	Surface	mg/kg	0.2U	0.2U	3.4U	0.166U	0.34U	0.48	0.39	0.56	0.34U	0.34U	0.68U	0.67	0.34U	0.52	1.66U	0.35	0.67
SS-5	SS-5	9/29/93	Surface	mg/kg	1U	1U	17U	0.83U	2.4	4.5	2.4	4.6	1.7	1.7	3.4U	7.1	1.7U	4.9	8.3U	3.7	8.9
SS-6	SS-6	9/29/93	Surface	mg/kg	0.05U	0.05U	0.85U	0.0415U	0.091	0.13	0.1	0.18	0.088	0.085U	0.17U	0.21	0.085U	0.15	0.415U	0.1	0.22
SS-6	SS-11	9/29/93	Surface	mg/kg	0.05U	0.05U	0.85U	0.0415U	0.091	0.14	0.1	0.16	0.085U	0.085U	0.17U	0.22	0.085U	0.15	0.415U	0.13	0.2
SS-7	SS-7	9/29/93	Surface	mg/kg	1U	1U	17U	0.83U	1.7U	1.7U	1.7U	1.8	1.7U	1.7U	3.4U	2.6	1.7U	1.7	8.3U	1.3	2.7
SS-8	SS-8	9/29/93	Surface	mg/kg	0.5U	0.5U	8.5U	0.415U	0.85U	0.99	0.85	1.6	0.85U	0.85U	1.7U	2.2	0.85U	1.4	4.15U	0.8	2.3
SS-9 Offsite	SS-9	9/29/93	Surface	mg/kg	0.05U	0.05U	0.85U	0.85U	0.088	0.12	0.1	0.14	0.085U	0.085U	0.170U	0.25	0.085U	0.15	0.415U	0.10	0.23
SS-10 Offsite	SS-10	9/29/93	Surface	mg/kg	0.05U	0.05U	0.85U	0.85U	0.088	0.11	0.11	0.13	0.085U	0.12	0.170U	0.24	0.085U	0.14	0.415U	0.075	0.22
GB1	GB1 10-12.5	12/21/93	10-12.5	mg/kg[3]	0.01U	0.01U	0.17U	0.0083U	0.017U	0.017U	0.017U	0.017U	0.017U	0.017U	0.034U	0.017U	0.017U	0.017U	0.083U	0.0083U	0.017U
GB2	GB2 8-10	12/21/93	8-10	mg/kg	0.01U	0.01U	0.17U	0.0083U	0.017U	0.017U	0.017U	0.017U	0.017U	0.017U	0.034U	0.017U	0.017U	0.017U	0.083U	0.0083U	0.017U
GB3	GB3 5-7	12/21/93	5-7	mg/kg	1500U	1500U	26000U	840J	2600U	2600U	2600U	2600U	2600U	2600U	5100U	3600	2600U	2600U	9700J	6000	4000
GB3	GB3 7-9	12/21/93	7-9	mg/kg	0.5U	0.5U	8.5U	0.415U	0.85U	6.6	4.2U	6.6	4.2U	0.85U	1.7U	0.85U	0.85U	11	4.15U	0.415U	1.7
GB3	GB3 13-15	12/21/93	13-15	mg/kg	0.5U	0.5U	8.5U	0.415U	0.85U	2.3	1.5	2.4	0.85U	0.85U	1.7U	0.92	0.85U	3.7	4.15U	0.36J	1
GB3	GB3 19-20	12/21/93	19-20	mg/kg	5U	5U	85U	4.15U	8.5U	6.9J	8.5U	7.2J	8.5U	8.5U	17U	13	8.5U	6.1J	41.5U	19	15
GB3	GB3 28	12/21/93	28	mg/kg	2.5U	2.5U	42.5U	2.07U	4.25U	6.7	3J	11	4.25U	4.25U	8.5U	4.5	4.25U	7.6	20.75U	4.6	7.9
GB4	GB4 5-6.5	12/23/93	5-6.5	mg/kg	2.5U	2.5U	42.5U	2.07U	5.6	18	7.9	25	4.3	6.8	8.5U	22	4.25U	18	20.75U	16	34
GB4	GB4 8-10	12/23/93	8-10	mg/kg	0.01U	0.01U	0.17U	0.0083U	0.017U	0.017U	0.017U	0.017U	0.017U	0.017U	0.034U	0.017U	0.017U	0.017U	0.083U	0.0083U	0.017U
GB5	GB5 7-9	12/22/93	7-9	mg/kg	0.1U	0.1U	1.7U	0.13	0.18	0.27	0.11J	0.24	0.17U	0.18	0.34U	0.81	0.17	0.2	0.83U	1.2	0.89
GB5	GB5 16-17	12/22/93	16-17	mg/kg	0.5U	0.5U	8.5U	0.78	0.9	1.3	0.65J	1.1	0.85U	1	1.7U	4.4	1.2	0.92	4.15U	5.8	4.5
GB5	GB5 25-26	12/22/93	25-26	mg/kg	0.1U	0.1U	1.7U	0.051J	0.1J	0.15J	0.17U	0.12J	0.17U	0.13J	0.34U	0.39	0.17U	0.1J	0.83U	0.5	0.48
GB5	GB5 31-32	12/22/93	31-32	mg/kg	0.05U	0.05U	0.85U	0.0415U	0.085U	0.085U	0.085U	0.085U	0.085U	0.085U	0.17U	0.13	0.085U	0.085U	0.415U	0.13	0.097
GB6	GB6 10-12	12/22/93	10-12	mg/kg	0.01U	0.01U	0.17U	0.0083U	0.017U	0.017U	0.017U	0.017U	0.017U	0.017U	0.034U	0.017U	0.017U	0.017U	0.083U	0.0083U	0.017U
GB7	GB7 8.5-10	12/22/93	8.5-10	mg/kg	0.01U	0.01U	0.17U	0.0083U	0.012J	0.014J	0.012J	0.021	0.017U	0.017U	0.034U	0.032	0.017U	0.016J	0.083U	0.018	0.027
GB7	GB7 20-21	12/22/93	20-21	mg/kg	0.01U	0.01U	0.17U	0.0083U	0.017U	0.017U	0.017U	0.017U	0.017U	0.017U	0.034U	0.017U	0.017U	0.017U	0.083U	0.009	0.017U
HA1	HA1-5	12/22/93	5-5.5	mg/kg	0.01U	0.01U	0.17U	0.0083U	0.017U	0.017U	0.017U	0.017U	0.017U	0.017U	0.034U	0.017U	0.017U	0.017U	0.083U	0.0083U	0.017U
HA2	HA2-5	12/22/93	5-5.5	mg/kg	0.01U	0.01U	0.17U	0.0083U	0.017U	0.017U	0.017U	0.017U	0.017U	0.017U	0.034U	0.017U	0.017U	0.017U	0.083U	0.0083U	0.017U
HA3	HA3 3.5-4	12/22/93	3.5-4	mg/kg	50U	50U	850U	41.5U	85U	85U	85U	85U	85U	85U	170U	240	85U	85U	415U	260	180
HA3	HA3 7-8	12/22/93	7-8	mg/kg	10U	10U	170U	8.3U	17U	82	31	90	12J	17U	34U	22	17U	92	83U	8.3U	17U
HA4	HA4-5	12/22/93	5-5.5	mg/kg	0.1U	0.1U	1.7U	0.083U	0.14J	0.17U	0.17U	0.21	0.17U	0.15J	0.34U	0.29	0.17U	0.22	0.83U	0.083U	0.4
GY1	GY-1-0.5	5/26/98	0.5	mg/kg	--[7]	--	0.1U	0.004U	0.015	0.021	0.01	0.01U	0.0082	0.022	0.011	0.035	0.04U	0.017	0.04U	0.02	0.035
GY1	GY-1-1.5	5/26/98	1.5	mg/kg	--	--	0.05U	0.002U	0.002U	0.002U	0.002U	0.005U	0.002U	0.005U	0.005U	0.005U	0.02U	0.005U	0.038	0.005U	0.005U
GY2	GY-2-0.5	5/26/98	0.5	mg/kg	--	--	0.2U	0.008U	0.008U	0.008U	0.008U	0.027	0.008U	0.02U	0.02	0.02U	0.08U	0.02U	0.08U	0.02U	0.02U
GY2	GY-2-1.5	5/26/98	1.5	mg/kg	--	--	100U	4U	5.2	21	7.7	19	6	12	10U	22	40U	14	40U	10U	68
GY3	GY-3-0.5	5/26/98	0.5	mg/kg	--	--	10U	0.4U	1.3	2	0.85	1U	0.76	2	2.1	3.9	4U	1.5	4U	2.7	3.3
GY3	GY-3-1.5	5/26/98	1.5	mg/kg	--	--	5U	0.2U	0.45	0.73	0.39	0.5U	0.31	0.66	0.57	1	2U	0.78	2U	0.55	1.1
GY4	GY-4-0.5	5/26/98	0.5	mg/kg	--	--	5U	0.2U	0.26	0.41	0.2U	0.5U	0.2U	0.5U	0.5U	0.75	2U	0.5U	2U	0.5U	0.86
GY4	GY-4-1.5	5/26/98	1.5	mg/kg	--	--	50U	5.2	13	15	7	12	6.6	22	22	41	20U	11	20U	26	29
GY5	GY-5-0.5	5/26/98	0.5	mg/kg	--	--	50U	2U	12	4.1	2U	5.8	2U	5U	7.7	8.3	20U	5U	20U	5.2	11
GY5	GY-5-1.5	5/26/98	1.5	mg/kg	--	--	2.5U	0.1U	0.1U	0.25	0.1U	0.43	0.1U	0.25U	0.53	0.25U	1U	0.29	1U	0.25U	0.32
GY6	GY-6-0.5	5/26/98	0.5	mg/kg	--	--	0.5U	0.02U	0.035	0.088	0.031	0.13	0.026	0.052	0.16	0.11	0.2U	0.11	0.2U	0.12	0.18
GY6	GY-6-1.5	5/26/98	1.5	mg/kg	--	--	5U	0.2U	0.21	0.56	0.24	1	0.2U	0.5U	1.7	0.84	2U	0.63	2U	0.5U	0.87
GY7	GY-7-0.5	5/26/98	0.5	mg/kg	--	--	50U	2U	2U	4.2	2U	5.4	2U	5U	6.2	7.9	20U	5U	20U	5.5	11

See last page for notes.

TABLE 2-3

Summary of Historical Analytical Data for Soil, Polyaromatic Hydrocarbons (PAHs)

APS Grant Street Former MGP Site, Phoenix, Arizona

Location	Sample ID	Sample Date	Depth (ft bgs)[1]	Units[2]	1-Methyl naphthalene	2-Methyl naphthalene	Acenaphthene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
GY7	GY-7-1.5	5/26/98	1.5	mg/kg	--	--	50U	2U	2U	6.4	2.3	6.4	2	5	8.5	12	20U	5U	20U	8.8	16
GY8	GY-8-0.5	5/26/98	0.5	mg/kg	--	--	0.05U	0.002U	0.0033	0.0039UJ	0.0023	0.006UJ	0.0021	0.005U	0.007	0.005U	0.02U	0.005U	0.02U	0.005U	0.0053UJ
GY8	GY-8-1.5	5/26/98	1.5	mg/kg	--	--	0.2U	0.008U	0.016	0.039	0.016	0.054	0.012	0.032	0.067	0.06	0.08U	0.041	0.08U	0.034	0.075
GY9	GY-9-0.5	5/26/98	0.5	mg/kg	--	--	50U	2U	9.1	14	6	14	4.5	13	5U	44	20U	11	20U	31	50
GY9	GY-9-0.5	5/26/98	0.5	mg/kg	--	--	50U	2.8	9.9	17	7	22	5.8	15	10	34	20U	17	20U	21	37
GY9	GY-9-1.5	5/26/98	1.5	mg/kg	--	--	0.05U	0.002U	0.0087	0.0028UJ	0.002U	0.005U	0.002U	0.005U	0.005U	0.005U	0.02U	0.005U	0.02U	0.005U	0.005U
GY9	GY-9-1.5	5/26/98	1.5	mg/kg	--	--	0.5U	0.02U	0.022	0.1	0.032	0.14	0.026	0.05U	0.21	0.05U	0.2U	0.12	0.2U	0.05U	0.084
GY10	GY-10-0.5	5/26/98	0.5	mg/kg	--	--	25U	1U	1U	1.4	1U	2.5U	1U	2.5U	2.5U	2.9	10U	2.5U	10U	2.5U	3.2
GY10	GY-10-1.5	5/26/98	1.5	mg/kg	--	--	50U	2U	4.5	10	3.9	20	2.9	5U	5U	20	20U	9.9	20U	11	26
GY11	GY-11-0.5	5/27/98	0.5	mg/kg	--	--	50U	2U	6.7	11	3.4	13	3.2	5U	15	12	20U	12	20U	5.8	9.3
GY11	GY-11-1.5	5/27/98	1.5	mg/kg	--	--	25U	1U	1U	1.7	1U	4.1	1U	2.5U	3.9	2.5	10U	2.5U	10U	2.5U	2.5
GY12	GY-12-0.5	5/27/98	0.5	mg/kg	--	--	50U	2U	4.3	8.5	2.7	11	2.6	5U	18	6.7	20U	7.2	20U	5U	5.1
GY12	GY-12-1.5	5/27/98	1.5	mg/kg	--	--	10U	0.4U	2	2	1.1	2.1	0.95	3	3	5.2	4U	1.8	4U	1.4	3.9
GY12	GY-12S	5/27/98	Surface	mg/kg	--	--	50U	2U	2U	3.1	2U	7.8	2U	5U	5.1	7.3	20U	5U	20U	5	8.2
GY13	GY-13-0.5	5/27/98	0.5	mg/kg	--	--	0.05U	0.002U	0.002U	0.0021	0.0032	0.0086	0.002U	0.005U	0.011	0.005U	0.02U	0.005U	0.02U	0.005U	0.005U
GY13	GY-13-1.5	5/27/98	1.5	mg/kg	--	--	5U	0.2U	0.6	0.7	0.3	0.75	0.27	0.7	1.1	1.3	2U	0.5U	2U	0.86	1.6
GY14	GY-14-0.5	5/27/98	0.5	mg/kg	--	--	100U	7.5	28	27	12	25	11	35	10U	82	40U	16	40U	43	56
GY14	GY-14-0.5	5/27/98	0.5	mg/kg	--	--	10U	0.4U	1.1	1.1	0.61	1.4	0.53	1.3	1.8	2.2	4U	1U	4U	1U	1.4
GY14	GY-14-1.5	5/27/98	1.5	mg/kg	--	--	0.05U	0.0054	0.012	0.011	0.0056	0.011	0.0049	0.0058	0.019	0.037	0.02U	0.0075	0.02U	0.031	0.029
GY14	GY-14-1.5	5/27/98	1.5	mg/kg	--	--	0.2U	0.008U	0.008U	0.019	0.0084	0.026	0.008U	0.036	0.037	0.02U	0.08U	0.02U	0.08U	0.02U	0.026
GY15	GY-15-0.5	5/27/98	0.5	mg/kg	--	--	50U	2U	2.2	6.8	2.1	11	2	5U	15	7	20U	8.2	20U	5U	10
GY15	GY-15-0.5	5/27/98	0.5	mg/kg	--	--	100U	4.5	14	22	5.9	20	6.2	17	45	42	40U	14	40U	41	32
GY15	GY-15-1.5	5/27/98	1.5	mg/kg	--	--	50U	2U	2.6	2.5	2U	5U	2U	13	5U	5.7	20U	5U	20U	5U	5U
GY15	GY-15-1.5	5/27/98	1.5	mg/kg	--	--	10U	0.4U	0.4U	0.7	0.4U	1.9	0.4U	1U	2.6	1U	4U	1.3	4U	1U	1U
GY16	GY-16-0.5	5/27/98	0.5	mg/kg	--	--	50U	2U	2.1	4.9	2U	7	2U	5U	5U	8.1	20U	5U	20U	5U	8
GY16	GY-16-1.5	5/27/98	1.5	mg/kg	--	--	50U	2U	3.1	8.6	2.6	10	2.4	5U	5U	12	20U	6.6	20U	5U	20
GY17	GY-17-0.5	5/27/98	0.5	mg/kg	--	--	5U	0.2U	0.2U	0.39	0.2U	0.64	0.2U	0.5U	0.73	0.68	2U	0.5U	2U	0.5U	0.73
GY17	GY-17-1.5	5/27/98	1.5	mg/kg	--	--	10U	0.4U	0.97	1.6	0.82	2.7	0.67	1.4	3.9	3.4	4U	2.4	4U	2.5	4.5
GY18	GY-18-0.5	5/27/98	0.5	mg/kg	--	--	5U	0.2U	0.25	0.82	0.28	1.5	0.23	0.5U	1.8	1.3	2U	0.98	2U	0.87	1.3
GY18	GY-18-1.5	5/27/98	1.5	mg/kg	--	--	50U	2U	2.9	4.2	2	6.3	2U	5U	5U	11	20U	5U	20U	5.8	11
GY19	GY-19-0.5	5/27/98	0.5	mg/kg	--	--	50U	2U	2U	2.8	2U	5U	2U	5U	5U	6.5	20U	5U	20U	5U	7.2
GY19	GY-19-1.5	5/27/98	1.5	mg/kg	--	--	10U	0.4U	1.1	2.1	0.74	2.5	0.68	1.6	3.5	4.5	4U	1.8	4U	2.8	4.7
GY20	GY-20-0.5	5/27/98	0.5	mg/kg	--	--	50U	5.1	13	11	5.1	10	5.2	17	14	35	20U	9	20U	26	24
GY20	GY-20-0.5	5/27/98	0.5	mg/kg	--	--	10U	0.4U	1.2	1.8	0.66	1.8	0.62	1.6	2.5	4	4U	1.3	4U	2	4.1
GY20	GY-20-1.5	5/27/98	1.5	mg/kg	--	--	50U	2U	5.1	14	4.3	17	4	8.2	5U	23	20U	14	20U	23	27
GY20	GY-20-1.5	5/27/98	1.5	mg/kg	--	--	50U	2U	2.5	11	2.9	13	2.8	5U	18	8.8	20U	10	20U	5.8	12
GY21	GY-21-0.5	5/26/98	0.5	mg/kg	--	--	5U	0.4	0.96	1.1	0.52	0.5U	0.51	1.6	1.9	2	2U	0.74	2U	2.1	1.7
GY21	GY-21-1.5	5/26/98	1.5	mg/kg	--	--	25U	1U	5.8	5.5	3.5	2.5U	3.1	6.4	3.7	7.6	10U	2.5U	10U	3.5	8.5
GY22	GY-22-0.5	5/26/98	0.5	mg/kg	--	--	10U	0.64	1.9	2.2	1.2	2	1	3.1	3.8	5.4	4U	1.5	4U	3.4	4
GY22	GY-22-1.5	5/26/98	1.5	mg/kg	--	--	5U	0.2U	0.47	0.57	0.29	0.75	0.27	0.55	1.5	0.74	2U	0.5U	2U	0.91	0.66
GY23	GY-23-0.5	5/26/98	0.5	mg/kg	--	--	5U	0.2U	0.43	1.1	1.6	1.6	0.37	0.5U	2.1	1.3	2U	0.5U	2U	0.5U	1.8
GY23	GY-23-1.5	5/26/98	1.5	mg/kg	--	--	10U	0.4U	16	2.4	1.3	3.4	1	2.3	4.6	4.3	4U	3.1	4U	2.8	4.7
GY24	GY-24-0.5	5/27/98	0.5	mg/kg	--	--	0.5U	0.02U	0.033	0.094	0.033	0.15	0.029	0.057	0.19	0.13	0.2U	0.12	0.2U	0.067	0.18
GY24	GY-24-1.5	5/27/98	1.5	mg/kg	--	--	0.5U	0.02U	0.024	0.06	0.022	0.082	0.02U	0.05U	0.12	0.086	0.2U	0.06	0.2U	0.05U	0.12
BC-1	GY-BC-1	7/13/98	Surface	mg/kg	--	--	1.3U	0.05U	0.05U	0.051	0.057	0.13U	0.05U	0.13U	0.16	0.13U	0.5U	0.13U	0.5U	0.13U	0.13U
BC-2	GY-BC-2	7/13/98	Surface	mg/kg	--	--	0.05U	0.002U	0.002U	0.0028	0.0038	0.005U	0.002U	0.005U	0.012	0.0078	0.02U	0.005U	0.023	0.0072	0.0052
BP-1	GY-BP-1	7/13/98	Surface	mg/kg	--	--	0.05U	0.002U	0.0034	0.0058	0.0068	0.011	0.0034	0.0088	0.01	0.018	0.02U	0.0076	0.02U	0.0099	0.013
BP-2	GY-BP-2	7/13/98	Surface	mg/kg	--	--	0.5U	0.02U	0.025	0.033	0.033	0.054	0.02U	0.05U	0.074	0.068	0.2U	0.05U	0.2U	0.05U	0.073

See last page for notes.

TABLE 2-3

Summary of Historical Analytical Data for Soil, Polyaromatic Hydrocarbons (PAHs)

APS Grant Street Former MGP Site, Phoenix, Arizona

Location	Sample ID	Sample Date	Depth (ft bgs)[1]	Units[2]	1-Methyl naphthalene	2-Methyl naphthalene	Acenaphthene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
BP-3	GY-BP-3	7/13/98	Surface	mg/kg	--	--	1.3U	0.05U	0.079	0.13	0.11	0.21	0.059	0.13U	0.29	0.27	0.5U	0.15	0.5U	0.14	0.27
BP-4	GY-BP-4	7/13/98	Surface	mg/kg	--	--	5U	0.2U	0.2U	0.29	0.25	0.5	0.2U	0.5U	0.67	0.82	2U	0.5U	2U	0.73	0.86
DS-1	GY-DS-1	7/13/98	Surface	mg/kg	--	--	1.3U	0.05U	0.093	0.12	0.1	0.16	0.058	0.13U	0.21	0.3	0.5U	0.13U	0.5U	0.15	0.27
DS-2	GY-DS-2	7/13/98	Surface	mg/kg	--	--	25U	0.23J	0.74J	2.3	1.5	3.3	0.83J	1.2J	4.7	2J	10U	2.2J	10U	1J	2.4J
DS-3	GY-DS-3	7/13/98	Surface	mg/kg	--	--	25U	0.28J	0.74J	2	1.4	3.1	0.78J	1.1J	4.5	1.8J	10U	2.1J	10U	1.1J	1.6J
DS-3	GY-DS-3	7/13/98	Surface	mg/kg	--	--	5U	0.2U	0.23	1.9	1.3	3.5	0.56	0.5U	4.2	0.64	2U	2.9	2U	0.5U	1
DS-4	GY-DS-4	7/13/98	Surface	mg/kg	--	--	10U	0.4U	0.97	1	0.76	1U	0.47	1.1	1.4	2	4U	1U	4U	1.4	1.6
DS-5	GY-DS-5	7/13/98	Surface	mg/kg	--	--	0.05U	0.002U	0.0069	0.013	0.011	0.02	0.005	0.013	0.061	0.021	0.02U	0.0089	0.02U	0.011	0.021
DS-6	GY-DS-6	7/13/98	Surface	mg/kg	--	--	1.3U	0.05U	0.12	0.17	0.14	0.22	0.074	0.15	0.25	0.37	0.5U	0.15	0.5U	0.18	0.35
DW-2	GY-SW-2	7/13/98	Surface	mg/kg	--	--	0.2U	0.008U	0.012	0.023	0.025	0.02U	0.011	0.02U	0.042	0.044	0.08U	0.02U	0.08U	0.02U	0.039
NE-1	GY-NE-1	7/13/98	Surface	mg/kg	--	--	1.3U	0.05U	0.12	0.2	0.16	0.33	0.08	0.16	0.44	0.48	0.5U	0.26	0.5U	0.28	0.56
NE-1	GY-NE-1	7/13/98	Surface	mg/kg	--	--	1.3U	0.05U	0.059	0.12	0.1	0.23	0.05	0.13U	0.29	0.23	0.5U	0.15	0.5U	0.13U	0.29
NE-3	GY-NE-3	7/13/98	Surface	mg/kg	--	--	5U	0.2U	0.2U	0.26	0.22	0.5U	0.2U	0.5U	0.5U	0.61	2U	0.5U	2U	0.5U	0.53
PT-1	GY-PT-1	7/13/98	Surface	mg/kg	--	--	0.5U	0.033	0.12	0.18	0.14	0.2	0.069	0.17	0.28	0.33	0.2U	0.14	0.2U	0.19	0.3
PT-2	GY-PT-2	7/13/98	Surface	mg/kg	--	--	1.3U	0.05	0.25	0.36	0.27	0.42	0.14	0.34	0.59	0.76	0.5U	0.34	0.5U	0.49	0.78
PT-3	GY-PT-3	7/13/98	Surface	mg/kg	--	--	0.5U	0.02U	0.068	0.1	0.075	0.13	0.043	0.1	0.18	0.17	0.2U	0.11	0.2U	0.085	0.16
PT-4	GY-PT-4	7/13/98	Surface	mg/kg	--	--	1.3U	0.05U	0.1	0.13	0.11	0.17	0.063	0.15	0.25	0.25	0.5U	0.13U	0.5U	0.14	0.24
SE-1	GY-SE-1	7/13/98	Surface	mg/kg	--	--	25U	2.4	6	6	4.9	6.8	3.1	7.1	0.89	16	10U	5.3	10U	11	13
SE-2	GY-SE-2	7/13/98	Surface	mg/kg	--	--	0.5U	0.02U	0.07	0.13	0.079	0.15	0.045	0.058	0.17	0.18	0.2U	0.09	0.2U	0.08	0.19
SSB	GY-SSB-0.2	7/13/98	Surface	mg/kg	--	--	1.3U	0.05U	0.067	0.13	0.12	0.29	0.055	0.13U	0.3	0.26	0.5U	0.19	0.5U	0.13U	0.27
SW-1	GY-SW-1	7/13/98	Surface	mg/kg	--	--	1.3U	0.05U	0.05U	0.1	0.093	0.19	0.05U	0.13U	0.25	0.14	0.5U	0.13	0.5U	0.13U	0.14
TS-1	GY-TS-1	7/13/98	Surface	mg/kg	--	--	1.3U	0.05U	0.073	0.14	0.11	0.13U	0.059	0.13U	0.31	0.24	0.5U	0.13U	0.5U	0.13U	0.28
TS-2	GY-TS-2	7/13/98	Surface	mg/kg	--	--	1.3U	0.073	0.34	0.34	0.27	0.41	0.17	0.41	0.51	0.84	0.5U	0.31	0.5U	0.42	0.76
TS-3	GY-TS-3	7/13/98	Surface	mg/kg	--	--	25U	0.06J	0.5J	1.2	1	3	0.51J	0.79J	3.1	2.5U	10U	1.9J	10U	0.76J	2.7
TS-4	GY-TS-4	7/13/98	Surface	mg/kg	--	--	1.3U	0.05U	0.056	0.072	0.067	0.13U	0.05U	0.13U	0.15	0.14	0.5U	0.13U	0.5U	0.13U	0.14
TB-22	TB-22	4/2/01	5.1	mg/Kg	--	--	0.1U	0.01U	0.01U	0.005U	0.01U	0.01U	0.01U	0.01U	0.02U	0.01U	0.01U	0.01U	0.1U	0.005U	0.01U
TB-24	TB-24	4/3/01	5.6	mg/Kg	--	--	0.1U	0.01U	0.01U	0.005U	0.01U	0.01U	0.01U	0.01U	0.02U	0.01U	0.01U	0.01U	0.1U	0.005UJ	0.01U
TB-41	TB-41	4/10/01	6.6	mg/Kg	--	--	0.1UJ	0.01UJ	0.01UJ	0.005UJ	0.01UJ	0.01J	0.01UJ	0.01UJ	0.02UJ	0.01UJ	0.01UJ	0.01J	0.1UJ	0.005UJ	0.01UJ
TB-55	TB-55	5/3/01	5.9	mg/Kg	--	--	0.1UJ	0.01UJ	0.01UJ	0.005UJ	0.01UJ	0.01UJ	0.01UJ	0.01UJ	0.02UJ	0.01UJ	0.01UJ	0.01UJ	0.1UJ	0.005UJ	0.01UJ
TB-57	TB-57	5/3/01	6.4	mg/Kg	--	--	0.1UJ	0.01UJ	0.01UJ	0.005UJ	0.01UJ	0.01UJ	0.01UJ	0.01UJ	0.02UJ	0.01UJ	0.01UJ	0.01UJ	0.1UJ	0.005UJ	0.01UJ
TS-23	TS-23	4/3/01	4	mg/Kg	--	--	0.1U	0.01U	0.01U	0.005U	0.01U	0.01U	0.01U	0.01U	0.02U	0.01U	0.01U	0.01U	0.1U	0.005UJ	0.01U
TS-25	TS-25	4/3/01	4.4	mg/Kg	--	--	0.1U	0.01U	0.01U	0.005U	0.01U	0.01U	0.01U	0.01U	0.02U	0.01U	0.01U	0.01U	0.1U	0.005UJ	0.01U
TS-40	TS-40	4/10/01	4	mg/Kg	--	--	0.1UJ	0.01UJ	0.01UJ	0.005UJ	0.01UJ	0.01UJ	0.01UJ	0.01UJ	0.02UJ	0.01UJ	0.01UJ	0.01UJ	0.1UJ	0.005UJ	0.01UJ
TS-42	TS-42	4/11/01	4	mg/Kg	--	--	0.1U	0.01U	0.01U	0.005UJ	0.01U	0.01U	0.01U	0.01U	0.02U	0.01U	0.01U	0.01U	0.1U	0.005UJ	0.01U
TS-56	TS-56	5/3/01	3.5	mg/Kg	--	--	0.1UJ	0.01UJ	0.01UJ	0.005UJ	0.01UJ	0.01UJ	0.01UJ	0.01UJ	0.02UJ	0.01UJ	0.01UJ	0.01UJ	0.1UJ	0.005UJ	0.01UJ

Notes:

1. ft bgs = feet below ground surface
2. mg/kg = milligram per kilogram
3. Residential SRLs represent the value for 10^{-6} carcinogenic risk for compounds identified as carcinogens in Appendix A of Title 18, Chapter 7.
4. Cells highlighted in yellow indicate that the compound exceeded the 2007 residential soil remediation level.
5. Cells highlighted in **red** indicate the compound exceeded the 2007 non-residential SRL.
6. NE = Standard not established
7. -- = Sample not analyzed for this compound

U = The analyte was analyzed for but was not detected above the reported sample quantitation limit

UJ = The analyte was analyzed for but was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sampl

See last page for notes.

TABLE 2-4

Summary of Historical Analytical Data for Soil, Petroleum Hydrocarbons (TPH)

APS Grant Street Former MGP Site, Phoenix, Arizona

Location	Sample Name	Sample Depth (ft bgs)[1]	Sample Date	Units[2]	Total TPH[3]	Extractable Fuel Hydro-carbons (C10-C32)	TPH Diesel Range (C10-C22)	TPH Oil Range (C22-C32)[4]	Extractable Fuel Hydrocarbons (C6-C10)	Total Petroleum Hydrocarbons	TRPH (EPA Method 418.1)[5]
GB1	GB1 10-12.5	10-12.5	12/21/93	mg/kg	--	--	--	--	--	--	20U
GB2	GB2 8-10	8-10	12/22/93	mg/kg	--	--	--	--	--	--	20U
GB3	GB3 5-7	5-7	12/21/93	mg/kg	179000	--	140000	25000	14000	--	130000
GB3	GB3 7-9	7-9	12/21/93	mg/kg	1150	--	630	520	10U	--	380
GB3	GB3 13-15	13-15	12/21/93	mg/kg	220	--	100	120	5U	--	170
GB3	GB3 19-20	19-20	12/21/93	mg/kg	1500	--	1200	300	25U	--	--
GB3	GB3 40	40	03/25/94	mg/kg	20	--	8	12	5U	--	--
GB3	GB3 50	50	03/25/94	mg/kg	24	--	10	14	5U	--	--
GB3	GB3 60	60	03/25/94	mg/kg	10	--	5U	10	5U	--	--
GB4	GB4 5-6.5	5-6.5	12/23/93	mg/kg	3400	--	1300	2100	25U	--	370
GB4	GB4 8-10	8-10	12/23/93	mg/kg	--	--	--	--	--	--	20U
GB5	GB5 16-17	16-17	12/22/93	mg/kg	132	--	95	37	5U	--	--
GB5	GB5 25-26	25-26	12/22/93	mg/kg	--	--	--	--	--	--	25
GB5	GB5 31-32	31-32	12/22/93	mg/kg	--	--	--	--	--	--	20U
GB6	GB6 10-12	10-12	12/22/93	mg/kg	--	--	--	--	--	--	20U
GB6	GB6 20-22	20-22	12/22/93	mg/kg	--	--	--	--	--	--	20U
GB7	GB7 8.5-10	8.5-10	12/22/93	mg/kg	9		5U	9	5U	--	290
GB7	GB7 20-21	20-21	12/22/93	mg/kg	--	--	--	--	--	--	80
HA3	HA3 3.5-4	3.5-4	12/22/93	mg/kg	17150	--	8100	8900	150	--	2100
HA3	HA3 7-8	7-8	12/22/93	mg/kg	14500	--	10000	4500	100U	--	2900
HA3B	HA-3B-3	3	01/20/94	mg/kg	1780	--	480	1300	50U	--	--
HA3B	HA-3B-5	5	01/20/94	mg/kg	5U	--	5U	5U	5U	--	--
DH-1	DH-1	4.5	01/20/94	mg/kg	2050	--	950	1100	25U	--	--
DH-2	DH-2	4.5	01/20/94	mg/kg	5U	--	5U	5U	5U	--	--
DH-3	DH-3	4.5	01/20/94	mg/kg	45	--	8	37	5U	--	--
DH-4	DH-4	4.5	01/20/94	mg/kg	5U	--	5U	5U	5U	--	--
DH-5	DH-5	5.0	01/20/94	mg/kg	163400	--	140000	20000	3400	--	--
DH-6	DH-6	4.5	01/20/94	mg/kg	5U	--	5U	5U	5U	--	--
DH-7	DH-7	4.5	01/20/94	mg/kg	5U	--	5U	5U	5U	--	--
DH-8	DH-8	5	01/20/94	mg/kg	5	--	5	5U	5U	--	--
DH-9	DH-9	2.5	01/20/94	mg/kg	1180	--	290	890	50U	--	--
EW-3	EW-3 5-6	5-6	05/09/94	mg/kg	500	--	240	260	10U	--	--
EW-4	EW-4 5-6	5-6	05/09/94	mg/kg	499	--	99	400	10U	--	--
EW-4	EW-4 6-7	6-7	05/09/94	mg/kg	2560	--	860	1700	100U	--	--
EW-5	EW-5 5	5	05/09/94	mg/kg	2940	--	940	2000	100U	--	--
EW-5	EW-5 10	10	05/09/94	mg/kg	20	--	6	14	5U	--	--
MP-2	MP-2 5-6.5	5-6.5	05/09/94	mg/kg	158000	--	130000	28000	5000U	--	--
GY-9	GY-9-0.5	0.5	05/26/98	mg/kg	1100	1100	450	690	--	20U	--
GY-9	GY-9A-0.5	0.5	05/26/98	mg/kg	2800	2800	950	1800	--	20U	--
GY-10	GY-10-0.5	0.5	05/26/98	mg/kg	12000	12000	3800	7900	--	20U	--
GY-12	GY-12-0.5	0.5	05/27/98	mg/kg	3600	3600	30U	3600	--	20U	--
GY-14	GY-14-0.5	0.5	05/27/98	mg/kg	18000	18000	6600	11000	--	20U	--
GY-14	GY-14-1.5	1.5	05/27/98	mg/kg	80U	80U	30U	50U	--	20U	--
GY-15	GY-15-0.5	0.5	05/27/98	mg/kg	1300	1300	450	810	--	20U	--
GY-15	GY-15-1.5	1.5	05/27/98	mg/kg	530	530	180	350	--	20U	--
GY-20	GY-20-0.5	0.5	05/27/98	mg/kg	2300	2300	870	1400	--	20U	--
GY-20	GY-20-1.5	1.5	05/27/98	mg/kg	5200	5200	2300	2900	--	20U	--
GY-24	GY-24-0.5	0.5	05/27/98	mg/kg	80U	80U	30U	50U	--	20U	--
GY-24	GY-24-1.5	1.5	05/27/98	mg/kg	80U	80U	30U	50U	--	20U	--

See last page for notes.

TABLE 2-4

Summary of Historical Analytical Data for Soil, Petroleum Hydrocarbons (TPH)

APS Grant Street Former MGP Site, Phoenix, Arizona

Location	Sample Name	Sample Depth (ft bgs)[1]	Sample Date	Units[2]	Total TPH[3]	Extractable Fuel Hydro-carbons (C10-C32)	TPH Diesel Range (C10-C22)	TPH Oil Range (C22-C32)[4]	Extractable Fuel Hydrocarbons (C6-C10)	Total Petroleum Hydrocarbons	TRPH (EPA Method 418.1)[5]
BC-2	GY-BC-2	Surface	07/13/98	mg/kg	80U	80U	30U	50U	--[6]	20U	--
BP-4	GY-BP-4	Surface	07/13/98	mg/kg	80U	80U	30U	50U	--	20U	--
DS-3	GY-DS-3	Surface	07/13/98	mg/kg	190	190	58	130	--	20U	--
NE-1	GY-NE-1	Surface	07/13/98	mg/kg	80U	80U	30U	50U	--	20U	--
NE-1	GY-NE-2	Surface	07/13/98	mg/kg	130	130	30U	130	--	20U	--
PT-1	GY-PT-1	Surface	07/13/98	mg/kg	80U	80U	30U	69	--	20U	--
SE-2	GY-SE-2	Surface	07/13/98	mg/kg	80U	80U	30U	50U	--	20U	--
SSB	GY-SSB-0.2	Surface	07/13/98	mg/kg	190	190	30U	190	--	--	--
SW-2	GY-SW-2	Surface	07/13/98	mg/kg	80U	80U	30U	50U	--	20U	--
TS-4	GY-TS-4	Surface	07/13/98	mg/kg	80U	80U	30U	50U	--	20U	--
TB-22	TB-22	5.1	04/02/01	mg/kg	130U	130U	30U	100U	--	--	--
TB-24	TB-24	5.6	04/03/01	mg/kg	130U	130U	30U	100U	--	--	--
TS-23	TS-23	4	04/03/01	mg/kg	130U	130U	30U	100U	--	--	--
TS-25	TS-25	4.4	04/03/01	mg/kg	130U	130U	30U	100U	--	--	--
TB-41	TB-41	6.6	04/10/01	mg/kg	130U	130U	30U	100U	--	--	--
TS-40	TS-40	4	04/10/01	mg/kg	130U	130U	30U	100U	--	--	--
TS-42	TS-42	4	04/11/01	mg/kg	130U	130U	30U	100U	--	--	--
TB-55	TB-55	5.9	05/03/01	mg/kg	130U	130U	30U	100U	--	--	--
TB-57	TB-57	6.4	05/03/01	mg/kg	130U	130U	30U	100U	--	--	--
TS-56	TS-56	3.5	05/03/01	mg/kg	130U	130U	30U	100U	--	--	--

Notes:

1. ft bgs = feet below ground surface
2. mg/kg = milligram per kilogram
3. Total TPH results from December 1993 and January 1994 include C6-C36. All other total TPH results only reported as C10-C32 or C10-C323
4. TPH Oil Range results from December 1993 and January 1994 reported as C22-C36.
5. Total recoverable petroleum hydrocarbons analyzed with EPA Method 418.1. All other TPH results used a modified 8015 method for analysis.
6. -- = Sample not analyzed for this compound

U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.

UJ = The analyte was analyzed for but was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

TABLE 2-5

Summary of Historical Analytical Data for Soil, BTEX Compounds

APS Grant Street Former MGP Site, Phoenix, Arizona

Location	Sample Name	Depth (ft bgs)[1]	Sample Date	Units[2]	Benzene	Ethylbenzene	Toluene	Xylenes, total
Residential SRL[3]				**mg/kg**	**0.65**	**400**	**650**	**270**
Non Residential SRL[4]				**mg/kg**	**1.4**	**400**	**650**	**420**
SS-1	SS-1	Surface	9/29/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
SS-2	SS-2	Surface	9/29/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
SS-3	SS-3	Surface	9/29/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
SS-4	SS-4	Surface	9/29/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
SS-5	SS-5	Surface	9/29/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
SS-6	SS-6	Surface	9/29/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
SS-6	SS-11	Surface	9/29/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
SS-7	SS-7	Surface	9/29/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
SS-8	SS-8	Surface	9/29/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
SS-9 Offsite	SS-9	Surface	9/29/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
SS-10 Offsite	SS-10	Surface	9/29/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
GB1	GB1 10-12.5	10-12.5	12/21/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
GB2	GB2 8-10	8-10	12/21/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
GB3	GB3 7-9	7-9	12/21/93	mg/Kg	0.025U	0.025U	0.025U	0.04
GB3	GB3 13-15	13-15	12/21/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
GB3	GB3 5-7	5-7	12/21/93	mg/Kg	650	300	650	460
GB3	GB3 19-20	19-20	12/21/93	mg/Kg	0.025U	0.11	0.04	0.37
GB3	GB3 28	28	12/21/93	mg/Kg	0.025U	0.09	0.03	0.08
GB4	GB4 5-6.5	5-6.5	12/23/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
GB4	GB4 8-10	8-10	12/23/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
GB5	GB5 7-9	7-9	12/22/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
GB5	GB5 16-17	16-17	12/22/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
GB5	GB5 25-26	25-26	12/22/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
GB5	GB5 31-32	31-32	12/22/93	mg/Kg	0.025U	0.025U	0.025U	0.04
GB6	GB6 10-12	10-12	12/22/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
GB7	GB7 8.5-10	8.5-10	12/22/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
HA1	HA1-5	5-5.5	12/22/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
HA2	HA2-5	5-5.5	12/22/93	mg/Kg	0.025U	0.025U	0.025U	0.19
HA3	HA3 3.5-4	3.5-4	12/22/93	mg/Kg	0.06	0.025U	0.025U	0.13
HA3	HA3 7-8	7-8	12/22/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
HA4	HA4-5	5-5.5	12/22/93	mg/Kg	0.025U	0.025U	0.025U	0.025U
EW-3	EW3 5-6	5-6	5/9/94	mg/Kg	0.025U	0.025U	0.025U	0.025U
EW-4	EW4 5-6	5-6	5/9/94	mg/Kg	0.025U	0.025U	0.025U	0.025U
EW-4	EW4 6-7	6-7	5/9/94	mg/Kg	0.025U	0.025U	0.03	0.025U
EW-5	EW5 5	5	5/9/94	mg/Kg	0.04	0.025U	0.04	0.03
EW-5	EW5 10	10	5/9/94	mg/Kg	0.025U	0.025U	0.04	0.025U
MP-2	MP2 5-6.5	5-6.5	5/9/94	mg/Kg	94	50	120	220
SSB	GY-SSB-0.2	Surface	7/13/98	mg/Kg	0.05U	0.05U	0.05U	0.15U

Notes:

1. ft bgs = feet below ground surface
2. mg/kg = milligram per kilogram
3. Cells highlighted in yellow indicate that the compound exceeded the 2007 residential soil remediation level.
4. Cells highlighted in **red** indicate the compound exceeded the 2007 non-residential SRL.

U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.

UJ = The analyte was analyzed for but was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

TABLE 2-6

Summary of Historical Analytical Data for Soil, Metals

APS Grant Street Former MGP Site, Phoenix, Arizona

Location	Sample Name	Depth (ft bgs)[1]	Sample Date	Units[2]	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Cyanide
Residential SRLs[3]				**mg/Kg**	**10**	**15000**	**39**	**120000**	**400**	**23**	**390**	**390**	**1200**
Non-Residential SRLs[4]				**mg/Kg**	**10**	**170000**	**510**	**1000000**	**800**	**310**	**5100**	**5100**	**12000**
SS-1	SS-1	Surface	9/29/93	mg/Kg	5U	--[5]	0.3	15.8	55	0.1U	5U	0.5U	0.5U
SS-2	SS-2	Surface	9/29/93	mg/Kg	5U	--	0.3U	14.4	75	0.1U	5U	0.5U	0.5U
SS-3	SS-3	Surface	9/29/93	mg/Kg	5U	--	0.3U	17.1	9	0.1U	5U	0.5U	0.5U
SS-4	SS-4	Surface	9/29/93	mg/Kg	5	--	0.5	17.6	27	0.2	5U	2.2	0.5U
SS-5	SS-5	Surface	9/29/93	mg/Kg	5U	--	0.3	12.1	28	0.1U	5U	0.5U	0.5U
SS-6	SS-11	Surface	9/29/93	mg/Kg	6	--	0.3U	11.2	20	0.1U	5U	0.5U	0.5U
SS-6	SS-6	Surface	9/29/93	mg/Kg	6	--	0.3	11	20	0.1U	5U	0.5U	0.5U
SS-7	SS-7	Surface	9/29/93	mg/Kg	5U	--	0.3	13.6	24	0.1U	5U	0.5U	0.5U
SS-8	SS-8	Surface	9/29/93	mg/Kg	5U	--	0.3U	15.3	35	0.1U	5U	0.5U	0.5U
SS-9 Offsite	SS-9	Surface	9/29/93	mg/Kg	6	--	0.4	21.3	117	0.1U	5U	0.5U	0.6
SS-10 Offsite	SS-10	Surface	9/29/93	mg/Kg	5U	--	0.5	12.4	111	0.1U	5U	0.5U	0.6
GB1	GB1 10-12.5	10-12.5	12/21/93	mg/Kg	7	75.2	0.3U	18.5	8	0.1U	5U	0.5U	0.5U
GB2	GB2 8-10	8-10	12/21/93	mg/Kg	5U	80.2	0.3U	19	8	0.1U	5U	0.5U	0.5U
GB3	GB3 5-7	5-7	12/21/93	mg/Kg	5U	4.6	0.3U	1.3	10	0.1U	5U	0.5U	1.2
GB4	GB4 5-6.5	5-6.5	12/23/93	mg/Kg	5	86.9	0.4	7.8	231	0.9	5U	0.5U	0.5U
GB5	GB5 7-9	7-9	12/22/93	mg/Kg	8	83.2	0.3U	17.7	6	0.1U	5U	0.5U	0.5U
GB5	GB5 16-17	16-17	12/22/93	mg/Kg	6	87.1	0.3U	19.3	9	0.1U	5U	0.5U	0.5U
GB6	GB6 10-12	10-12	12/22/93	mg/Kg	5	99.4	0.3U	19.3	6	0.1U	5U	0.5U	0.5U
GB7	GB7 8.5-10	8.5-10	12/22/93	mg/Kg	6	87.3	0.3U	20.3	19	0.1U	5U	0.5U	0.5U
HA1	HA1-5	5-5.5	12/22/93	mg/Kg	6	136	0.3U	23.6	12	0.1U	5U	0.5U	0.5U
HA2	HA2-5	5-5.5	12/22/93	mg/Kg	7	145	0.3U	20.9	12	0.1U	5U	0.5U	0.5U
HA3	HA3 3.5-4	3.5-4	12/22/93	mg/Kg	5U	69.8	0.3U	11.8	34	0.1U	5U	0.5U	0.5U
HA3	HA3 7-8	7-8	12/22/93	mg/Kg	5U	73.6	0.3U	10.8	32	0.1U	5U	0.5U	0.5U
HA4	HA4-5	5-5.5	12/22/93	mg/Kg	6	124	0.3U	22.7	12	0.1U	5U	0.5U	0.5U

Notes:

1. ft bgs = feet below ground surface
2. mg/kg = milligram per kilogram
3. Cells highlighted in yellow indicate that the compound exceeded the 2007 residential soil remediation level.
4. Cells highlighted in **red** indicate the compound exceeded the 2007 non-residential SRL.
5. -- = Sample not analyzed for this compound.

U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.

UJ = The analyte was analyzed for but was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

TABLE 2-7

Soil Vapor Survey Results

APS Grant Street Former MGP Site, Phoenix, Arizona

		October 13, 1993				December 21-22, 1993				January 20, 1994			
Sample Location	**Depth (ft)**	**B**	**T**	**E**	**X**	**B**	**T**	**E**	**X**	**B**	**T**	**E**	**X**
SG-1	3	NS	NS	NS	NS	NS	NS	NS	NS	<0.02	<0.03	<0.05	<0.07
SG-1	3.5	<.50	<.50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-1	6	NS	NS	NS	NS	NS	NS	NS	NS	<0.02	0.03	<0.05	<0.07
SG-2	3.5	<.50	<.50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-3	3.5	<.50	<.50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-4	3.5	<.50	<50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-5	3.5	<.50	<.50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-6	3.5	<.50	<.50	<.50	<.50	NS	NS	NS	NS	NS	NS	NS	NS
SG-7	3.5	<.50	<.50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-8	3.5	<.50	<.50	<.50	<.50	NS	NS	NS	NS	NS	. NS	NS	NS
SG-9	3.5	<.50	<.50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-10	3.5	<.50	<.50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-11	3.5	<.50	<50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-12	3.5	<.50	<.50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-13	3	NS	NS	NS	NS	NS	NS	NS	NS	<0.02	<0.03	<0.05	<0.07
SG-13	3.5	<.50	<.50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-14	3.5	<.50	<.50	<.50	<.50	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-15	3	NS	NS	NS	NS	NS	NS	NS	NS	0.1	<0.03	<0.05	<0.07
SG-15	3.5	NS	NS	NS	NS	<.25	<.25	NS	NS	NS	NS	NS	NS
SG-15	6	NS	NS	NS	NS	NS	NS	NS	NS	0.5	1	0.1	5
SG-17	2.5	NS	NS	NS	NS	NS	NS	NS	NS	0.02	0.1	<0.05	<0.07
SG-18	2.5	NS	NS	NS	NS	NS	NS	NS	NS	<0.02	<0.03	<0.05	<0.07
SG-19	2.5	NS	NS	NS	NS	NS	NS	NS	NS	<0.02	<0.03	<0.05	<0.07
SG-20	6	NS	NS	NS	NS	NS	NS	NS	NS	0.06	<0.03	<0.05	<0.07
SG-21	6	NS	NS	NS	NS	NS	NS	NS	NS	<0.02	<0.03	<0.05	<0.07
SG-22	6	NS	NS	NS	NS	NS	NS	NS	NS	31	13	3	5
SG-23	3	NS	NS	NS	NS	NS	NS	NS	NS	330	100	59	70
SG-24	6	NS	NS	NS	NS	NS	NS	NS	NS	<0.2	<0.3	<0.5	<0.7
SG-25	6	NS	NS	NS	NS	NS	NS	NS	NS	0.03	<0.03	<0.05	<0.07
SG-26	2	NS	NS	NS	NS	NS	NS	NS	NS	0.04	0.06	<0.05	<0.07
SG-27	6	NS	NS	NS	NS	NS	NS	NS	NS	<0.02	<0.03	<0.05	<0.07
SG-28	6	NS	NS	NS	NS	NS	NS	NS	NS	1100	460	170	210
SG-29	6	NS	NS	NS	NS	NS	NS	NS	NS	0.3	0.3	<0.5	0.7
SG-30	3	NS	NS	NS	NS	NS	NS	NS	NS	0.2	0.1	<0.05	<0.07
Ambient Air		NS	NS	NS	NS	NS	NS	NS	NS	0.07	0.1	<0.05	<0.07

ft = feet

NS = Not Sampled

Concentrations in µg/L

TABLE 3-1
Proposed Boring Locations and Rationale
APS Grant Street MGP Site, Phoenix, Arizona

Boring Location	Rationale/Data Gap	Sample Type
1D	Define western extent of PAH, VOCs, and lampblack. Evaluate potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in west. Characterize downgradient groundwater conditions.	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs, Geotechnical, Waste characterization (at 10 feet bgs)
2D	Define southwestern extent of PAH, VOCs, and lampblack near underground structure. Evaluate the presence of VOCs and potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in southwest. Characterize downgradient groundwater conditions.	PAH, VOCS, Dioxin/Furans, Semi-Volatiles, PCBs, Total Metals, Geotechnical
3D	Define southwestern extent of VOCS, PAH and lampblack near tank location. Evaluate potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in southwest. Characterize downgradient groundwater conditions.	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs, Geotechnical, Waste characterization (at 10 feet bgs)
4D	Define southern extent of PAH, VOCs, and lampblack south of GY-23, SE-1&2. Evaluate potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in south.	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs, Geotechnical
5D	Define extent of PAH, VOCs, and lampblack southeast of GY-23, SE-1&2. Evaluate potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in southeast.	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs, Geotechnical
6D	Define eastern extent of PAH and lampblack east of HA-3. Evaluate potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in southeast. Characterize upgradient groundwater conditions.	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs, Geotechnical
7D	Define vertically under building PAH and lampblack below shallow hotspot. Evaluate potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in center of site. Characterize groundwater conditions	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs, Geotechnical
8D	Define eastern extent of VOCS, PAH and lampblack east of GB-3. Evaluate potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in east. Characterize upgradient groundwater conditions.	PAH, VOCS, TPH, Dioxin/Furans, Semi-Volatiles, PCBs, Total Metals, Geotechnical, Waste characterization (at 10 feet bgs)
	Shallow Borings	
9S	Confirm shallow extent of PAH and lampblack near GB-5. Evaluate the presence of VOCs and potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in northwest corner.	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs, Waste characterization (at 3 feet bgs)
10S	Define southwestern extent of PAH, VOCs, and lampblack near underground structure. Extend lithologic/stratigraphic characterization in southwest. Evaluate the presence of VOCs and potential contamination from non-MGP related activities.	PAH, VOCS, TPH, Dioxin/Furans, Semi-Volatiles
11S	Define southwestern extent of PAH, VOCs, and lampblack near former structure. Extend lithologic/stratigraphic characterization in southwest.	PAH, VOCS, TPH, Dioxin/Furans, Semi-Volatiles

TABLE 3-1
Proposed Boring Locations and Rationale
APS Grant Street MGP Site, Phoenix, Arizona

Boring Location	Rationale/Data Gap	Sample Type
12S	Define vertical extent of PAH near courtyard surface hotspot and beyond HA-3. Extend lithologic/stratigraphic characterization in central part of site	PAH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs, Waste Characterization (at 3 feet bgs).
13S	Define extent of PAH under building southeast of HA-3 and surface hotspot near GY-15, 19&21. Extend lithologic/stratigraphic characterization in central part of Site.	PAH, Dioxin/Furans, Semi-Volatiles
14S	Define eastern extent of PAH and VOCs in eastern portion of the Site. Evaluate the presence and/or concentrations of PCBs and metals at the Site. Extend lithologic/stratigraphic characterization in eastern part of site	PAH, VOCs, PCBs, Dioxin/Furans, Semi-Volatiles, Total Metals Waste Characterization (at 3 feet bgs).
15S	Define vertical extent of PAH near courtyard surface hotspot and beyond HA-3. Evaluate the presence of VOCs and potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in central part of site	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs
16S	Define extent of PAH, VOCs, and lampblack under building west of HA-3 and surface hotspot. Evaluate the presence of VOCs and potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in central part of site	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs
17S	Define extent of PAH and lampblack under building west of HA-3 and surface hotspot. Evaluate the presence of VOCs and potential contamination from non-MGP related activities. Extend lithologic/stratigraphic characterization in central part of site	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs
18S	Define extent of PAH and lampblack beyond GB-4. Extend lithologic/stratigraphic characterization in north part of site	PAH, TPH, Dioxin/Furans, Semi-Volatiles, Waste characterization (at 3 feet bgs)
19S	Define lateral extent near PAH and VOCS hotspot near GB-3. Extend lithologic/stratigraphic characterization in northeast part of site	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles,
20S	Define lateral extent of PAH, VOCs, and lampblack in southeastern area of Site, east of GY-23 and SE-1. . Extend lithologic/stratigraphic characterization in southeast part of site	PAH, VOCs, TPH, Dioxin/Furans, Semi-Volatiles, Total Metals, PCBs

Table 3-2

Summary of Sample Locations and Analysis

APS Grant Street Former MGP Site, Phoenix, Arizona

Location	Depth	Geotechnical Testing								Soil Chemical							Groundwater			
	feet (bgs)	Moisture Content (D2216)	Percent Passing No. 200 Sieve (D422)	Atterberg Limits (D4318)	Dry Bulk Density (C128)	Porosity	Fractional Organic Carbon	In-situ Density (D2937)	CU Triaxial Shear	PAHs (EPA 8310)	TPH (ADHS 8015/AZ1)	VOCs (EPA 8260B)	Dioxin/Furans (1613A or 8290B)	Semi-Volatiles (8270D)	Total Metals (1311/6010B/7471A)	PCBs (8082)	PAH (EPA 8310)	TPH (ADHS 8015/AZ1)	Metals (EPA 8221B)	Total VOCs (EPA 8260B)
1D	5	X		X						X		X	X	X						
	10*									X	X					X				
	15	X	X		X	X	X	X	X	X	X	X	X	X	X					
	25									X										
	35	X	X	X	X	X	X	X		X	X	X	X	X		X				
	45																			
	55	X	X	X	X	X	X			X	X	X	X	X	X					
	65																			
	75	X	X	X			X			X	X						X	X	X	X
2D	5									X		X			X	X				
	15									X										
	25	X	X		X	X	X			X	X	X	X	X	X	X				
	35																			
	45	X	X		X	X	X			X	X	X	X	X						
	55																			
	65	X	X		X	X	X			X	X	X	X	X	X					
	75																			
3D	5									X		X			X					
	10*									X	X					X				
	15	X	X	X			X	X		X	X	X	X	X	X					
	25																			
	35									X	X	X	X	X	X	X				
	45																			
	55	X	X		X	X	X			X		X		X						
	65																			
	75		X		X	X	X			X	X	X					X	X	X	X
4D	5									X	X	X	X	X	X	X				
	10	X	X	X	X	X	X	X	X	X										
	20	X						X		X	X	X	X	X	X	X				
	30									X										
	40	X	X	X	X	X	X	X												
	50									X	X	X	X	X	X					
	60	X	X	X	X	X	X	X												
	70									X		X								
5D	5	X						X		X	X	X	X	X	X	X				
	15	X		X				X		X										
	25	X	X	X	X	X	X	X		X	X	X	X	X						
	35																			
	45									X	X	X	X	X	X	X				
	55	X	X	X	X	X	X	X												
	65									X		X			X					
	75																X	X	X	X

Table 3-2

Summary of Sample Locations and Analysis

APS Grant Street Former MGP Site, Phoenix, Arizona

Location	Depth	Geotechnical Testing								Soil Chemical							Groundwater			
	feet (bgs)	Moisture Content (D2216)	Percent Passing No. 200 Sieve (D422)	Atterberg Limits (D4318)	Dry Bulk Density (C128)	Porosity	Fractional Organic Carbon	In-situ Density (D2937)	CU Triaxial Shear	PAHs (EPA 8310)	TPH (ADHS 8015/AZ1)	VOCs (EPA 8260B)	Dioxin/Furans (1613A or 8290B)	Semi-Volatiles (8270D)	Total Metals (1311/6010B/7471A)	PCBs (8082)	PAH (EPA 8310)	TPH (ADHS 8015/AZ1)	Metals (EPA 8221B)	Total VOCs (EPA 8260B)
6D	5	X						X		X	X	X	X	X	X	X				
	10	X						X		X		X								
	20									X	X	X	X	X	X	X				
	30	X	X	X	X	X	X	X		X		X								
	40																			
	50									X		X	X	X	X					
	60																			
	70									X		X			X					
7D	5	X						X		X	X	X			X	X				
	15	X	X	X	X	X	X	X	X											
	25									X	X	X	X	X	X	X				
	35	X	X		X	X	X													
	45									X	X	X	X	X	X					
	55																			
	65	X	X		X	X	X			X	X	X	X	X	X					
	75																			
8D	5	X		X				X		X	X	X			X					
	10*	X						X		X	X	X	X	X	X	X				
	20	X	X				X	X		X	X	X								
	30																			
	40									X		X	X	X	X	X				
	50	X	X		X	X	X													
	60																			
	70									X		X					X	X	X	X
9S	3*									X		X	X	X	X	X				
	10									X	X	X	X	X						
	15																			
	20									X	X	X	X	X	X	X				
	30																			
10S	5																			
	10									X	X	X	X	X						
	15									X		X								
	20									X		X	X	X						
	30									X		X								
11S	5									X		X								
	10									X	X	X	X	X						
	15									X										
	20									X	X	X	X	X						
	30																			
12S	3*									X	X	X				X				
	10									X										
	15												X	X	X	X				
	20									X										
	30									X			X	X	X	X				

Table 3-2

Summary of Sample Locations and Analysis

APS Grant Street Former MGP Site, Phoenix, Arizona

Location	Depth	Geotechnical Testing								Soil Chemical							Groundwater			
	feet (bgs)	Moisture Content (D2216)	Percent Passing No. 200 Sieve (D422)	Atterberg Limits (D4318)	Dry Bulk Density (C128)	Porosity	Fractional Organic Carbon	In-situ Density (D2937)	CU Triaxial Shear	PAHs (EPA 8310)	TPH (ADHS 8015/AZ1)	VOCs (EPA 8260B)	Dioxin/Furans (1613A or 8290B)	Semi-Volatiles (8270D)	Total Metals (1311/6010B/7471A)	PCBs (8082)	PAH (EPA 8310)	TPH (ADHS 8015/AZ1)	Metals (EPA 8221B)	Total VOCs (EPA 8260B)
13S	5									X										
	10									X			X	X						
	15																			
	20									X			X	X						
	30																			
14S	3*									X	X	X			X	X				
	10									X										
	15									X		X	X	X	X	X				
	20									X										
	30									X		X	X	X	X					
15S	5									X		X			X	X				
	10									X			X	X						
	15									X		X			X	X				
	20												X	X						
	30									X		X			X					
16S	5									X	X	X	X	X	X	X				
	10																			
	15									X	X	X	X	X	X	X				
	20																			
	30									X		X	X	X						
17S	5																			
	10									X	X	X	X	X	X	X				
	15																			
	20									X	X	X	X	X	X	X				
	30									X										
18S	3*									X	X	X				X				
	10									X			X	X						
	15									X	X									
	20									X			X	X						
	30									X										
19S	5									X	X	X								
	10									X										
	15									X	X	X	X	X						
	20																			
	30									X			X	X						
20S	5									X		X				X				
	10																			
	15									X	X	X	X	X	X	X				
	20																			
	30									X	X	X	X	X	X					

*Samples will be analyzed for waste characterization. Analyses will also include TCLP Metals, TCLP VOCs, Paint filter, and Ignitability

TABLE 4-1
Summary of Sample Handling Requirements
APS Grant Street Former MGP Site, Phoenix, Arizona

Analyte	Method	Matrix	Container Type	Preservative
Soil Analyses				
		Chemical Analysis		
TPH-Gas, Diesel, Oil	ADHS 8015AZR1	Soil	1-8 oz glass jar or brass sleeve	4°C
PAH	EPA 8310	Soil	1-8 oz glass jar or brass sleeve	4°C
Total VOCs	EPA 8260B	Soil	Methanol Kit (10 g soil/10 ml MeOH) or Encore	Methanol/4°C
RCRA 8 Total Metals	EPA 6010B/7471A	Soil	1-8 oz glass jar or brass sleeve	4°C
Total Cyanide	EPA 9013/9014	Soil	1-8 oz glass jar or brass sleeve	4°C
Fraction Organic Carbon	ASTM D4129-05	Soil	1-8 oz glass jar or brass sleeve	4°C
Semi-Volatile Organics	EPA 8270D	Soil	1-8 oz glass jar or brass sleeve	4°C
Dioxins and Furans	EPA 8290A	Soil	1-8 oz glass jar or brass sleeve	4°C
PCBs	EPA 8082	Solid	1-8 oz glass jar or brass sleeve	4°C
		Geotechnical Analysis		
Moisture Content		Soil	Brass sleeve or Grab	None
% Passing 200 sieve		Soil	Brass sleeve or Grab	None
Atterberg Limit		Soil	Brass sleeve or Grab	None
In-Situ Density		Soil	Brass sleeve	None
Sheer Strength		Soil	Brass sleeve	None
Dry Bulk Density		Soil	Brass sleeve	None
		Waste Characterization and Investigation Derived Waste (IDW) Analyses		
Total TPH-Gas, Diesel, Oil	ADHS 8015AZR1	Solid	Brass sleeve	4°C
		*Liquid	Three 40-ml VOA vials (TPH-G)	HCL
		*Liquid	Two 500-ml amber glass jars (TPH-D, -O)	4°C
PAH	EPA 8310	Solid	1-8 oz glass jar or brass sleeve	4°C
		*Liquid	Two 500-ml amber glass jars	4°C
Total Cyanide	EPA 9013/9014	Solid	1-8 oz glass jar or brass sleeve	4°C
PCB	EPA 8082	Solid	1-8 oz glass jar or brass sleeve	4°C
Total VOCs	EPA 8260B	Soil	Methanol Kit (10 g soil/10 ml MeOH) or Encore	Methanol/4°C
		*Liquid	Three 40-ml VOA vials	HCL/4°C
TCLP RCRA 8 Metals	EPA 1311/6010B/7471A	Solid	1-8 oz glass jar or brass sleeve	4°C
TCLP VOCs	EPA1311/8021B	Solid	Methanol Kit (10 g soil/10 ml MeOH) or Encore	Methanol/4°C
Corrosivity by pH	EPA 9045B	Solid	1-8 oz glass jar or brass sleeve	4°C
		*Liquid	1-500ml poly	4°C
Paint Filter	EPA 9095	Solid	1-8 oz glass jar or brass sleeve	4°C
Ignitability	SW846 Article 7.1.2	Solid	1-8 oz glass jar or brass sleeve	4°C
		*Liquid	Three 40-ml VOA vials	4°C
		*Liquid Environmental Solutions will sample and analyze IDW water		

TABLE 4-1
Summary of Sample Handling Requirements
APS Grant Street Former MGP Site, Phoenix, Arizona

Analyte	Method	Matrix	Container Type	Preservative

Notes:
ml = milliliter
oz = ounce
VOA = volatile organic analysis
HCL = hydrochloric acid
HNO3 = Nitric Acid
NaOH = sodium hydroxide
MeOH = methanol

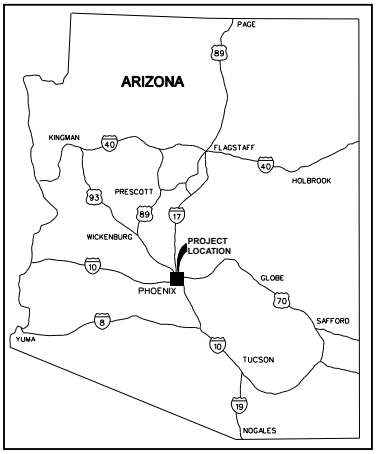
TABLE 4-2

Quality Control Sample Type Abbreviations

APS Grant Street Former MGP Site, Phoenix, AZ

Field QC Type Name	QC Type Code
Field Duplicate	FD
Trip Blank	TB
Field Blank	FB
Ambient Blank	AB
Equipment Blank	EB
Split Sample	SS
Field Spike	FS

Figures



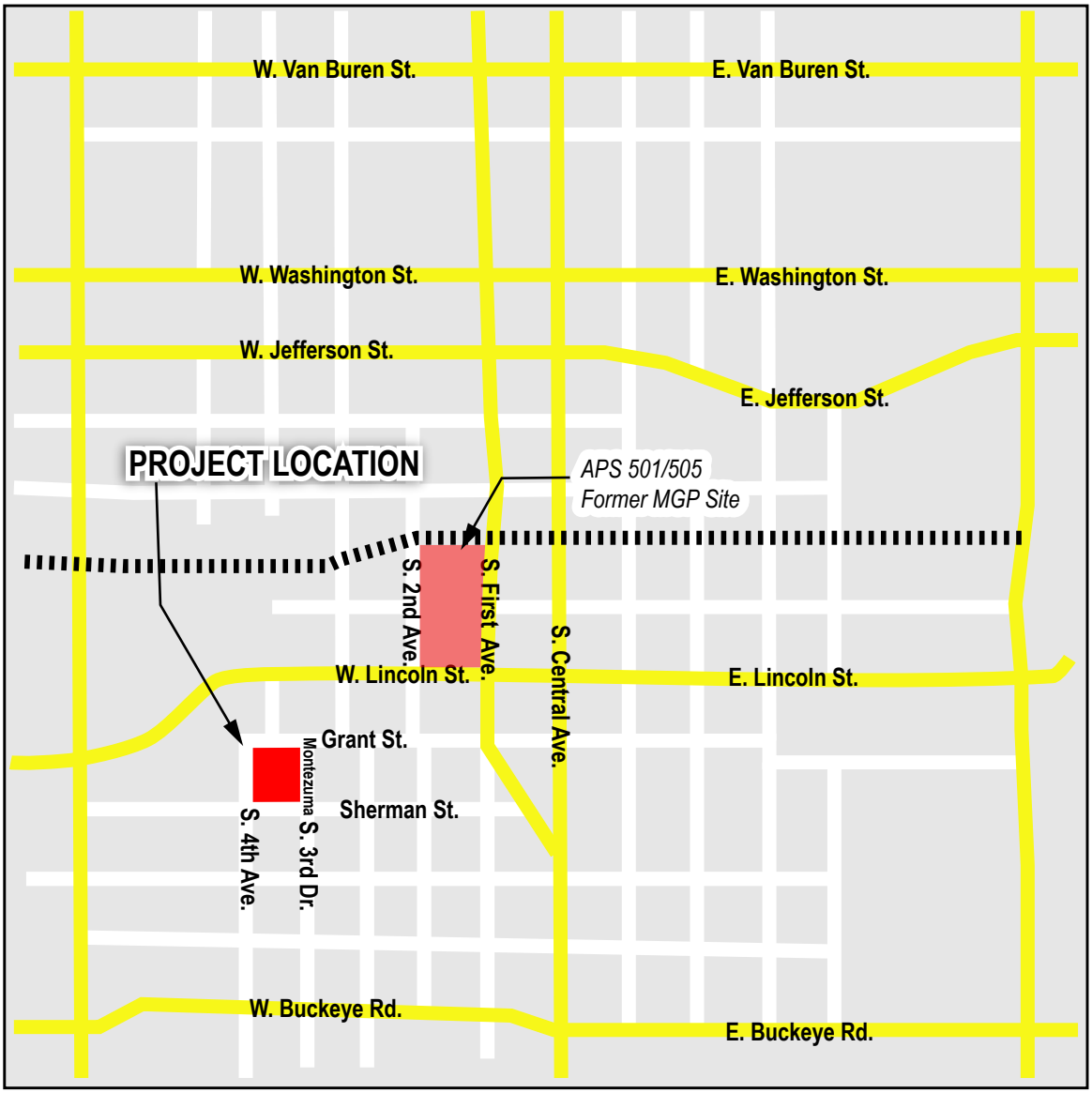
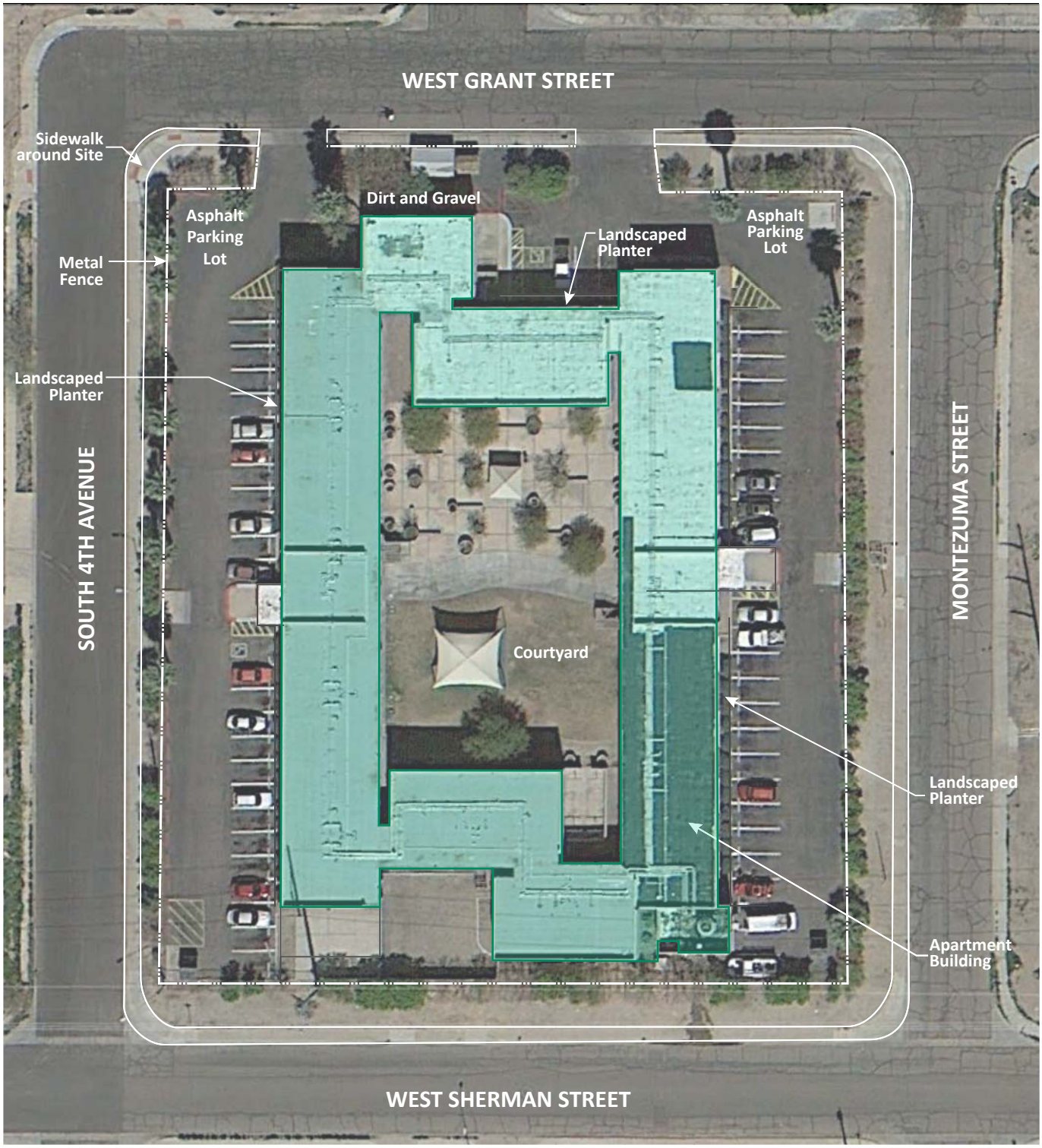


FIGURE 1-1
Site Location Map
APS Grant Street Former MGP Site
Phoenix, Arizona



Aerial image © Google Earth, 2013. Annotation by CH2M HILL, 2013.

North

0 25 50

Approximate scale in feet

LEGEND

Current Apartment Building

FIGURE 1-2
Site Diagram
APS Grant Street Former MGP Site
Phoenix, Arizona

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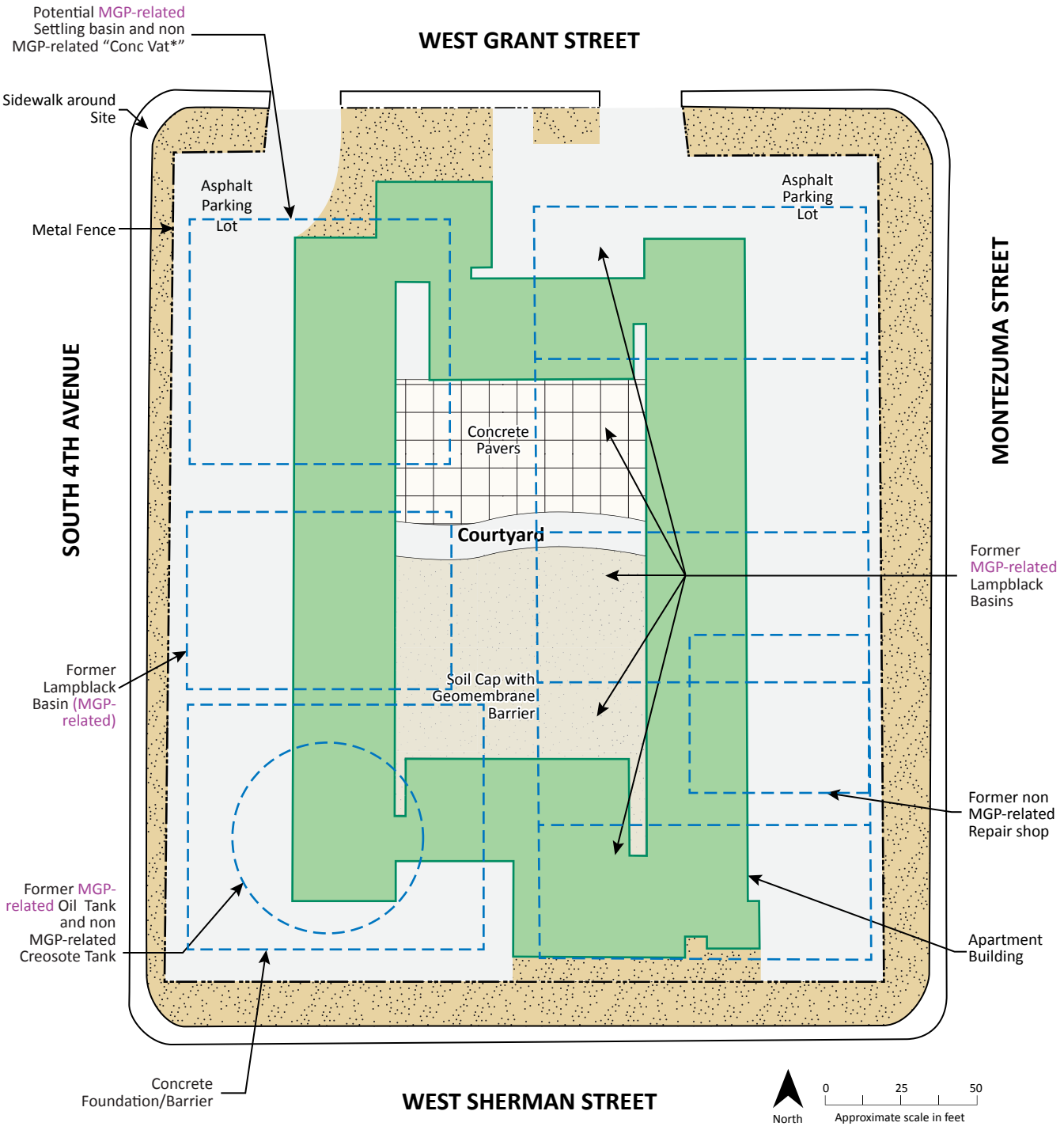

LEGEND

- Current Apartment Building
- Former Structures
- Asphalt
- Gravel and Planters
- Concrete Pavers
- Soil Cap with Geomembrane Barrier

* Area identified as "Conc Vat" on 1949 Sanborn Map

FIGURE 2-1
Former Structures
APS Grant Street Former MGP Site
Phoenix, Arizona

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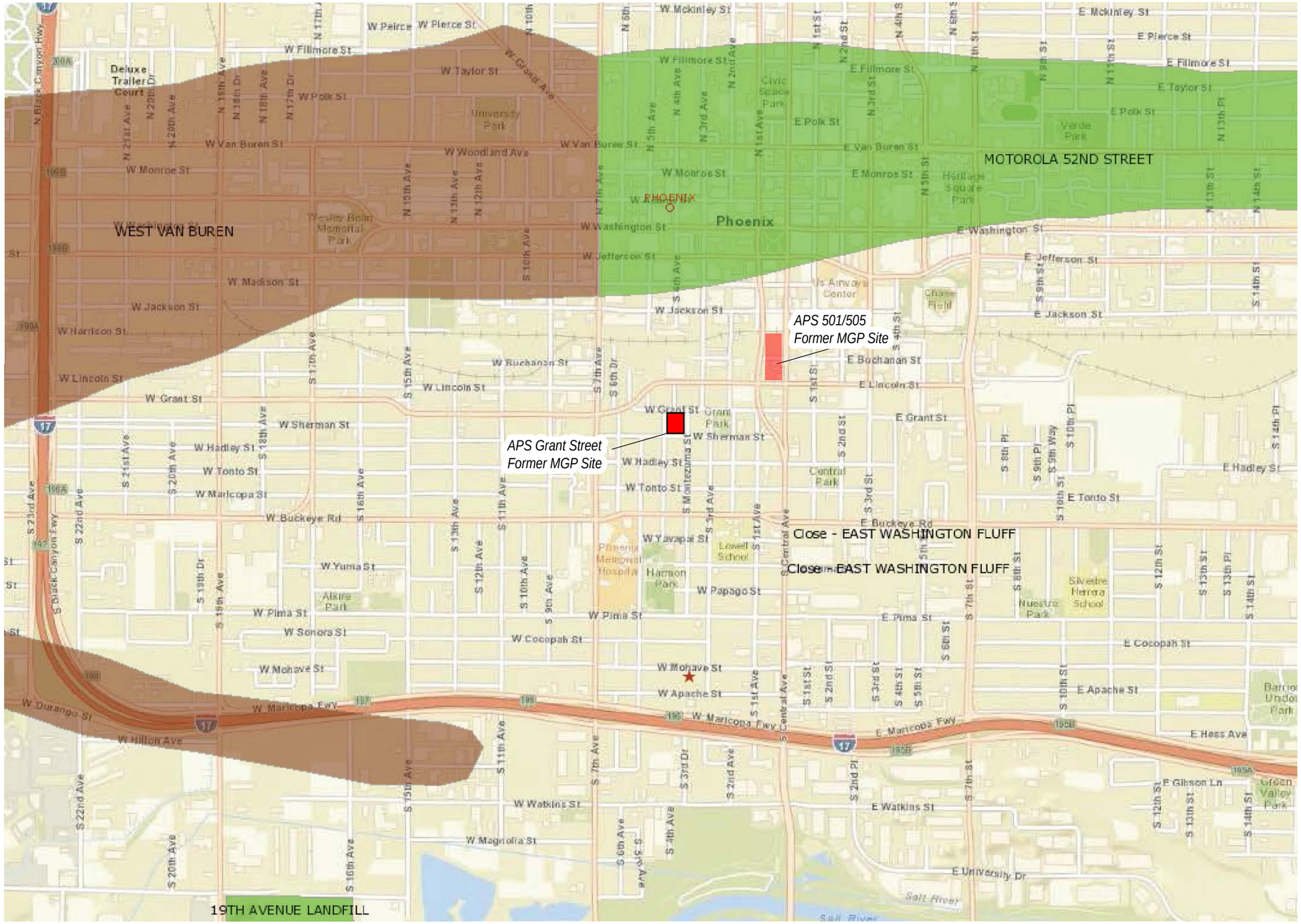
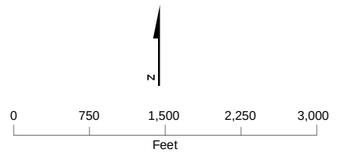


VICINITY MAP



Source: ADEQ eMaps, January 2014.

FIGURE 2-2
Nearby WQARF and Superfund Sites
APS Grant Street Former MGP Site
Phoenix, Arizona

4TH AVENUE

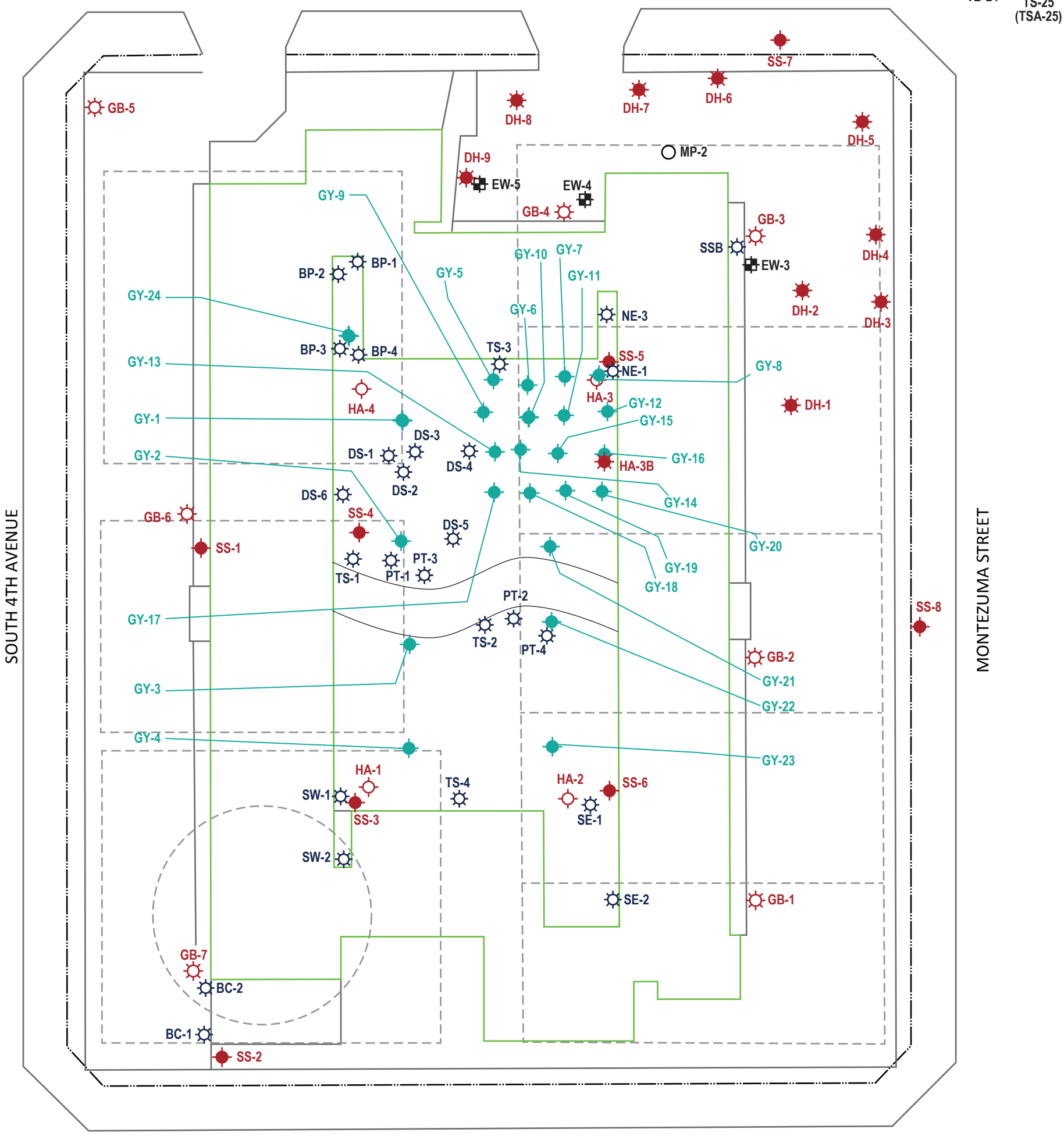
WEST GRANT STREET

TB-57 TS-56 TB-55 TS-42 TB-41 TS-40 TB-22 TS-23 TB-24 TS-25 (TSA-25)

SOUTH 4TH AVENUE

MONTEZUMA STREET

WEST SHERMAN STREET



LEGEND

- Current Apartment Building
- Former MGP-related Structures
- SS-2 — Surface sample collected 1993.
- GB-7 — Soil Boring. Sampling conducted 1993.
- HA-7 — Hand Auger Soil Borings. Sampling 1993.
- DH-1 — Shallow Hand Auger/Soil Borings. Sampling conducted 1994.
- Shallow soil samples collected 1998.
- BC-1 — Surface soil samples 1998.
- Sample taken during Lampblack pipeline removal from trench bottom 2001.
- Sample taken during Lampblack pipeline removal from trench sidewall 2001.
- Extraction Well Location. Collected during vapor extraction pilot test 1994.
- Monitoring Point Location. Soil sample collected during vapor extraction pilot test 1994.

FIGURE 2-3
Former Soil Sampling Locations
APS Grant Street Former MGP Site
Phoenix, Arizona

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Boring	Depth Sampled (ft bgs)
BP-1	Surface
BC-2	Surface
DS-5	Surface
DW-2	Surface
GB1	10-12.5
GB2	8-10
GB6	10-12
GB7	8.5-10, 20-21
GY1	0.5, 1.5
GY8	0.5, 1.5
HA1	5-5.5
HA2	5-5.5
HA4	5-5.5
TB-22	5.1
TB-24	5.6
TB-41	6.6
TB-55	5.9
TB-57	6.4
TS-23	4
TS-25	4.4
TS-40	4
TS-42	4
TS-56	3.5

Only borings and depths sampled and analyzed for PAHs with results below SRLs are presented in this table.

DS-4 (Surface)	
Depth (ft bgs)	Surface
Benz(a)anthracene	0.97
Benzo(a)pyrene	1
Benzo(b)fluoranthene	0.76
Dibenz(a,h)anthracene	1.4

BP-2 (Surface)	
Depth (ft bgs)	Surface
Dibenz(a,h)anthracene	0.074

GB-5 (9, 17, 26, 32)				
Depth (ft bgs)	9	17	26	32
Benzo(a)anthracene	0.18	0.9	0.1J	0.085U
Benzo(a)pyrene	0.27	1.3	0.15J	0.085U
Indeno(1,2,3-cd)pyrene	0.2	0.92	0.1J	0.085U

GY-24 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)pyrene	0.094	0.06
Dibenz(a,h)anthracene	0.19	0.12

DS-3 (Surface)		
Depth (ft bgs)	Surface	Surface
Benzo(a)anthracene	0.74J	0.23
Benzo(a)pyrene	2	1.9
Benzo(b)fluoranthene	1.4	1.3
Dibenz(a,h)anthracene	4.5	4.2
Indeno(1,2,3-cd)pyrene	2.1J	2.9

BP-4 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.29
Dibenz(a,h)anthracene	0.67

BP-3 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.13
Dibenz(a,h)anthracene	0.29

DS-1 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.12
Dibenz(a,h)anthracene	0.21

DS-2 (Surface)	
Depth (ft bgs)	Surface
Benz(a)anthracene	0.74J
Benzo(a)pyrene	2.3
Benzo(b)fluoranthene	1.5
Dibenz(a,h)anthracene	4.7
Indeno(1,2,3-cd)pyrene	2.2J

GY-2 (0.5, 1.5)	
Depth (ft bgs)	1.5
Benz(a)anthracene	5.2
Benzo(a)pyrene	21
Benzo(b)fluoranthene	7.7
Indeno(1,2,3-cd)pyrene	14

DS-6 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.17
Dibenz(a,h)anthracene	0.25

SS-4 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.48

SS-1 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.13

TS-1 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.14
Dibenz(a,h)anthracene	0.31

PT-1 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.18
Dibenz(a,h)anthracene	0.28

PT-3 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.1
Dibenz(a,h)anthracene	0.18

GY-4 (0.5, 1.5)	
Depth (ft bgs)	1.5
Benz(a)anthracene	13
Benzo(a)pyrene	15
Benzo(b)fluoranthene	7
Dibenz(a,h)anthracene	22
Indeno(1,2,3-cd)pyrene	11

SW-1 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.1
Dibenz(a,h)anthracene	0.25

SS-3 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.41

TS-4 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.072
Dibenz(a,h)anthracene	0.15

GY-13 (0.5, 1.5)	
Depth (ft bgs)	1.5
Benzo(a)pyrene	0.7
Dibenz(a,h)anthracene	1.1

GY-9 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	9.9	0.022
Benzo(a)pyrene	17	0.1
Benzo(b)fluoranthene	7	0.032
Dibenz(a,h)anthracene	10	0.21
Indeno(1,2,3-cd)pyrene	17	0.12

GY-5 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benz(a)anthracene	12	0.1U
Benzo(a)pyrene	4.1	0.25
Dibenz(a,h)anthracene	7.7	0.53

TS-3 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	1.2
Benzo(b)fluoranthene	1
Dibenz(a,h)anthracene	3.1
Indeno(1,2,3-cd)pyrene	1.9J

GY-6 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)pyrene	0.088	0.56
Dibenz(a,h)anthracene	0.16	1.7

GB-4 (6.5, 10)		
Depth (ft bgs)	6.5	10
Benzo(a)anthracene	5.6	0.017U
Benzo(a)pyrene	18	0.017U
Benzo(b)fluoranthene	7.9	0.017U
Indeno(1,2,3-cd)pyrene	18	0.017U

SS-7 (Surface)	
Depth (ft bgs)	Surface
Indeno(1,2,3-cd)pyrene	1.7

GY-10 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	1U	4.5
Benzo(a)pyrene	1.4	10
Benzo(b)fluoranthene	1U	3.9
Indeno(1,2,3-cd)pyrene	2.5U	9.9

GY-7 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)pyrene	4.2	6.4
Benzo(b)fluoranthene	2U	2.3
Dibenz(a,h)anthracene	6.2	8.5

NE-3 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.26

SSB (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.13
Dibenz(a,h)anthracene	0.3

GB-3 (7, 9, 15, 20, 28)					
Depth (ft bgs)	7	9	15	20	28
Benzo(a)pyrene	2600U	6.6	2.3	6.9J	6.7
Benzo(b)fluoranthene	2600U	4.2U	1.5	8.5U	3J
Fluoranthene	3600	0.85U	0.92	13	4.5
Indeno(1,2,3-cd)pyrene	2600U	11	3.7	6.1J	7.6
Naphthalene	9700J	4.15U	4.15U	41.5U	20.75U
Pyrene	4000	1.7	1	15	7.9

SS-5 (Surface)	
Depth (ft bgs)	Surface
Benz(a)anthracene	2.4
Benzo(a)pyrene	4.5
Benzo(b)fluoranthene	2.4
Indeno(1,2,3-cd)pyrene	4.9

NE-1 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.2
Dibenz(a,h)anthracene	0.44

GY-12 (Surface, 0.5, 1.5)			
Depth (ft bgs)	Surface	0.5	1.5
Benz(a)anthracene	2U	4.3	2
Benzo(a)pyrene	3.1	8.5	2
Benzo(b)fluoranthene	2U	2.7	1.1
Dibenz(a,h)anthracene	5.1	18	3
Indeno(1,2,3-cd)pyrene	5U	7.2	1.8

HA3 (4, 8)	
Depth (ft bgs)	8
Benzo(a)pyrene	82
Benzo(b)fluoranthene	31
Indeno(1,2,3-cd)pyrene	92

GY-14 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	28	0.012
Benzo(a)pyrene	27	0.019
Benzo(b)fluoranthene	12	0.0084
Benzo(k)fluoranthene	11	0.0049
Dibenz(a,h)anthracene	1.8	0.037
Indeno(1,2,3-cd)pyrene	16	0.02U

GY-11 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	6.7	1U
Benzo(a)pyrene	11	1.7
Benzo(b)fluoranthene	3.4	1U
Dibenz(a,h)anthracene	15	3.9
Indeno(1,2,3-cd)pyrene	12	2.5U

GY-15 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	14	2.6
Benzo(a)pyrene	22	2.5
Benzo(b)fluoranthene	5.9	2U
Dibenz(a,h)anthracene	45	2.6
Indeno(1,2,3-cd)pyrene	14	1.3

GY-16 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	2.1	3.1
Benzo(a)pyrene	4.9	8.6
Benzo(b)fluoranthene	2U	2.6
Indeno(1,2,3-cd)pyrene	5U	6.6

GY-19 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	2U	1.1
Benzo(a)pyrene	2.8	2.1
Benzo(b)fluoranthene	2U	0.74
Dibenz(a,h)anthracene	5U	3.5
Indeno(1,2,3-cd)pyrene	5U	1.8

GY-20 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	13	5.1
Benzo(a)pyrene	11	14
Benzo(b)fluoranthene	5.1	4.3
Dibenz(a,h)anthracene	14	18
Indeno(1,2,3-cd)pyrene	9	14

GY-3 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	1.3	0.45
Benzo(a)pyrene	2	0.73
Benzo(b)fluoranthene	0.85	0.39
Dibenz(a,h)anthracene	2.1	0.57
Indeno(1,2,3-cd)pyrene	1.5	0.78

GY-21 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	0.96	5.8
Benzo(a)pyrene	1.1	5.5
Benzo(b)fluoranthene	0.52	3.5
Dibenz(a,h)anthracene	1.9	3.7
Indeno(1,2,3-cd)pyrene	0.74	2.5U

GY-18 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	0.25	2.9
Benzo(a)pyrene	0.82	4.2
Benzo(b)fluoranthene	0.28	2
Dibenz(a,h)anthracene	1.8	5U
Indeno(1,2,3-cd)pyrene	0.98	5U

SS-8 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.99
Benzo(b)fluoranthene	0.85
Indeno(1,2,3-cd)pyrene	1.4

PT-4 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.13
Dibenz(a,h)anthracene	0.25

GY-22 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	1.9	0.47
Benzo(a)pyrene	2.2	0.57
Benzo(b)fluoranthene	1.2	0.29
Dibenz(a,h)anthracene	3.8	1.5
Indeno(1,2,3-cd)pyrene	1.5	0.5U

GY-17 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	0.2U	0.97
Benzo(a)pyrene	0.39	1.6
Benzo(b)fluoranthene	0.2U	0.82
Dibenz(a,h)anthracene	0.73	3.9
Indeno(1,2,3-cd)pyrene	0.5U	2.4

SS-6 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.14

SE-1 (Surface)	
Depth (ft bgs)	Surface
Benz(a)anthracene	6
Benzo(a)pyrene	6
Benzo(b)fluoranthene	4.9
Dibenz(a,h)anthracene	0.89
Indeno(1,2,3-cd)pyrene	5.3

PT-2 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.36
Dibenz(a,h)anthracene	0.59

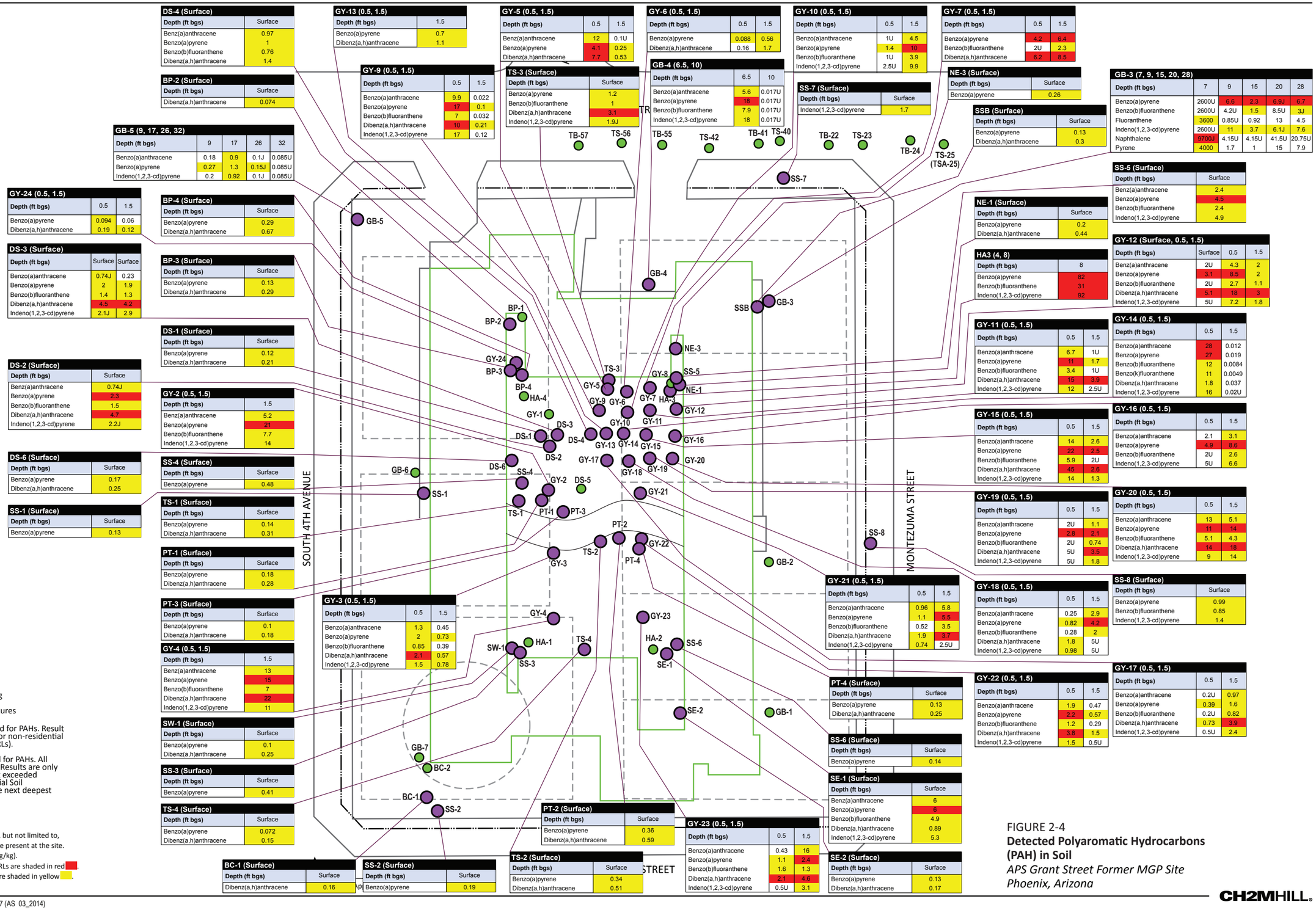
GY-23 (0.5, 1.5)		
Depth (ft bgs)	0.5	1.5
Benzo(a)anthracene	0.43	16
Benzo(a)pyrene	1.1	2.4
Benzo(b)fluoranthene	1.6	1.3
Dibenz(a,h)anthracene	2.1	4.6
Indeno(1,2,3-cd)pyrene	0.5U	3.1

TS-2 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.34
Dibenz(a,h)anthracene	0.51

BC-1 (Surface)	
Depth (ft bgs)	Surface
Dibenz(a,h)anthracene	0.16

SS-2 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.19

SE-2 (Surface)	
Depth (ft bgs)	Surface
Benzo(a)pyrene	0.13
Dibenz(a,h)anthracene	0.17



LEGEND

- Current Apartment Building
- Former MGP-related Structures
- Sampling locations analyzed for PAHs. Result did not exceed residential or non-residential Soil Remediation Limits (SRLs).
- Sampling location analyzed for PAHs. All depths sampled are listed. Results are only presented for samples that exceeded residential or non-residential Soil Remediation Limits and the next deepest sample, if available.

Notes:

1. Portions of former structures, including, but not limited to, foundations and/or footings, may still be present at the site.
2. All results in milligrams per kilogram (mg/kg).
3. Concentrations above non-residential SRLs are shaded in red. Concentrations above residential SRLs are shaded in yellow.

FIGURE 2-4
Detected Polyaromatic Hydrocarbons (PAH) in Soil
APS Grant Street Former MGP Site
Phoenix, Arizona

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Boring	Depth Sampled (ft bgs)
BC-2	Surface
BP-4	Surface
DH-2	4.5
DH-4	4.5
DH-6	4.5
DH-7	4.5
GB1	10-12.5
GB2	8-10
GB6	10-12, 20-22
GY-24	0.5, 1.5
SE-2	Surface
SW-2	Surface
TB-22	5.1
TB-24	5.6
TB-41	6.6
TB-55	5.9
TB-57	6.4
TS-23	4
TS-25	4.4
TS-4	Surface
TS-40	4
TS-42	4
TS-56	3.5

Only borings and depths sampled and analyzed for TPH with results below detection limit are presented in this table.

EW-5 (5, 10)

Depth (feet bgs)	5	10
TPH Diesel Range (C10-C22)	940	6
TPH Oil range (C22-C32)	2000	14
Total TPH	2940	20

DH-8 (5)

Depth (feet bgs)	5
TPH Diesel Range (C10-C22)	5
TPH Oil range (C22-C32)	5U
Total TPH	5

GY-14 (0.5, 1.5)

Depth (feet bgs)	0.5	1.5
TPH Diesel Range (C10-C22)	6600	30U
TPH Oil range (C22-C32)	11000	50U
Total TPH	18000	80U

GB-4 (6.5, 10)

Depth (feet bgs)	6.5	10
TPH Diesel Range (C10-C22)	1300	NA
TPH Oil range (C22-C32)	2100	NA
TRPH (EPA Method 418.1)	370	20U
Total TPH	3400	NA

EW-4 (6, 7)

Depth (feet bgs)	6	7
TPH Diesel Range (C10-C22)	99	860
TPH Oil range (C22-C32)	400	1700
Total TPH	499	2560

MP-2 (6.5)

Depth (feet bgs)	6.5
TPH Diesel Range (C10-C22)	130000
TPH Oil range (C22-C32)	28000
Total TPH	158000

DH-9 (2.5)

Depth (feet bgs)	2.5
TPH Diesel Range (C10-C22)	290
TPH Oil range (C22-C32)	890
Total TPH	1180

SSB (Surface)

Depth (feet bgs)	Surface
TPH Diesel Range (C10-C22)	30U
TPH Oil range (C22-C32)	190
Total TPH	190

GB-5 (17, 26, 32)

Depth (feet bgs)	17	26	32
TPH Diesel Range (C10-C22)	95	NA	NA
TPH Oil range (C22-C32)	32	NA	NA
TRPH (EPA Method 418.1)	NA	25	NA
Total TPH	132	NA	20U

DH-5 (5)

Depth (feet bgs)	5.0
TPH Diesel Range (C10-C22)	140000
TPH Oil range (C22-C32)	20000
Total TPH	163400

GB-3 (7, 9, 15, 20, 40, 50, 60)

Depth (feet bgs)	7	9	15	20	40	50	60
TPH Diesel Range (C10-C22)	140000	630	100	1200	8	10	5U
TPH Oil range (C22-C32)	25000	520	120	300	12	14	10
TRPH (EPA Method 418.1)	130000	380	170	NA	NA	NA	NA
Total TPH	179000	1150	220	1500	20	24	10

GY-10 (0.5)

Depth (feet bgs)	0.5
TPH Diesel Range (C10-C22)	3800
TPH Oil range (C22-C32)	7900
Total TPH	12000

EW-3 (6)

Depth (feet bgs)	6
TPH Diesel Range (C10-C22)	440
TPH Oil range (C22-C32)	260
Total TPH	500

GY-9 (0.5, 0.5)

Depth (feet bgs)	0.5	0.5
TPH Diesel Range (C10-C22)	450	950
TPH Oil range (C22-C32)	690	1800
Total TPH	1100	2800

DH-3 (4.5)

Depth (feet bgs)	4.5
TPH Diesel Range (C10-C22)	8
TPH Oil range (C22-C32)	37
Total TPH	45

DS-3 (Surface)

Depth (feet bgs)	Surface
TPH Diesel Range (C10-C22)	58
TPH Oil range (C22-C32)	130
Total TPH	190

NE-1 (Surface)

Depth (feet bgs)	Surface
TPH Diesel Range (C10-C22)	30U
TPH Oil range (C22-C32)	130
Total TPH	130

PT-1 (Surface)

Depth (feet bgs)	Surface
TPH Diesel Range (C10-C22)	30U
TPH Oil range (C22-C32)	69
Total TPH	80U

DH-1 (4.5)

Depth (feet bgs)	4.5
TPH Diesel Range (C10-C22)	950
TPH Oil range (C22-C32)	1100
Total TPH	2050

GY-15 (0.5, 1.5)

Depth (feet bgs)	0.5	1.5
TPH Diesel Range (C10-C22)	450	180
TPH Oil range (C22-C32)	810	350
Total TPH	1300	530

HA-3 (4, 8)

Depth (feet bgs)	4	8
TPH Diesel Range (C10-C22)	8100	10000
TPH Oil range (C22-C32)	8900	4500
TRPH (EPA Method 418.1)	2100	2900
Total TPH	17150	14500

GY-20 (0.5, 1.5)

Depth (feet bgs)	0.5	1.5
TPH Diesel Range (C10-C22)	870	2300
TPH Oil range (C22-C32)	1400	2900
Total TPH	2300	5200

GY-12 (0.5)

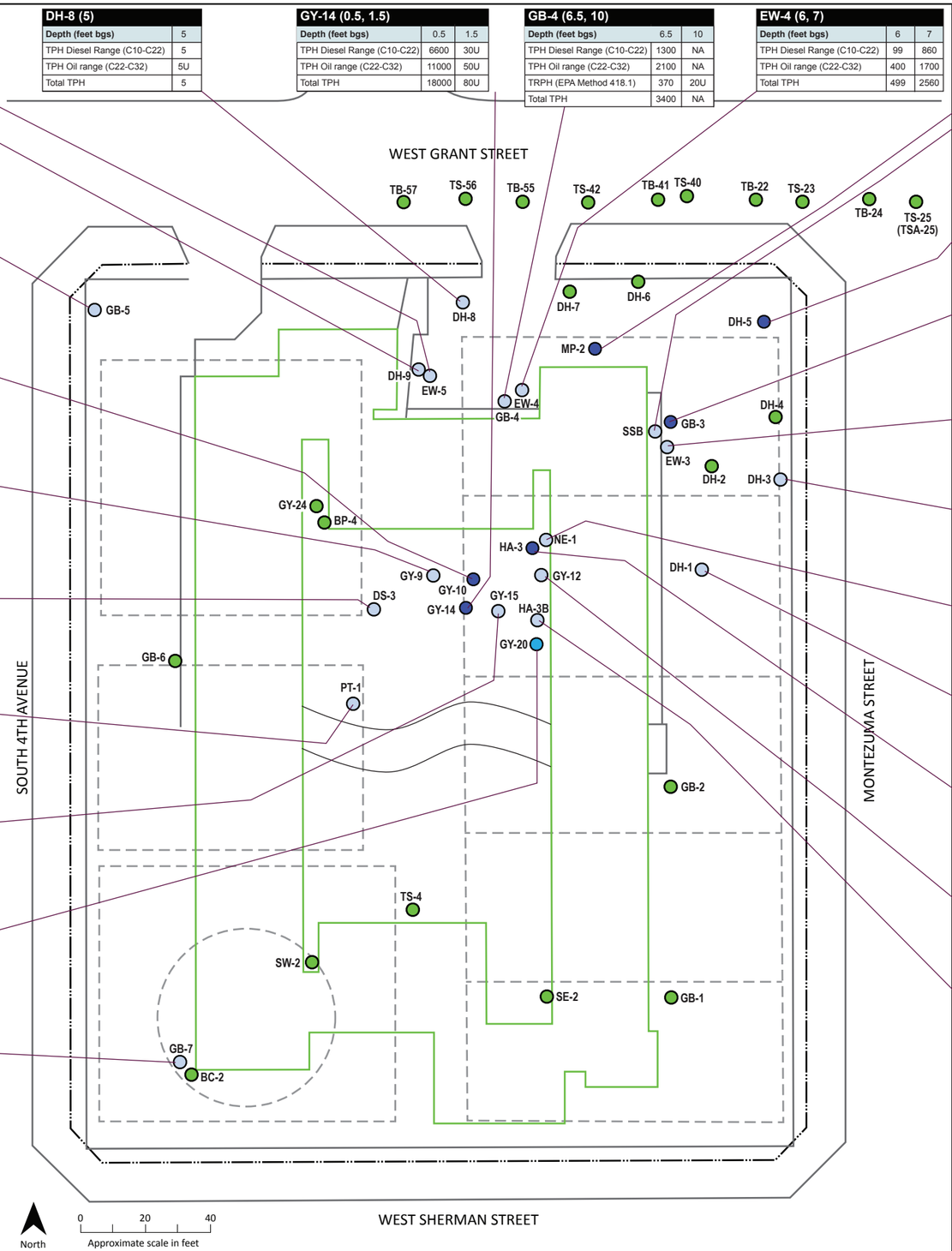
Depth (feet bgs)	0.5
TPH Diesel Range (C10-C22)	30U
TPH Oil range (C22-C32)	3600
Total TPH	3600

GB-7 (10, 21)

Depth (feet bgs)	10	21
TPH Diesel Range (C10-C22)	5U	NA
TPH Oil range (C22-C32)	9	NA
TRPH (EPA Method 418.1)	290	80
Total TPH	9	NA

HA-3B (3, 5)

Depth (feet bgs)	3	5
TPH Diesel Range (C10-C22)	480	5U
TPH Oil range (C22-C32)	1300	5U
Total TPH	1780	5U



LEGEND

- Current Apartment Building
- Former MGP-related Structures
- Concentration of TPH > 10,000 mg/kg
- Concentration of TPH 4,100 - 10,000 mg/kg
- Concentration of TPH between ND - 4,100 mg/kg
- Sample location analyzed for TPH with no detection of TPH

All depths sampled are listed. Results are only presented for samples with detectable levels of TPH and the next deepest sample, if available.

Notes:

1) Total Oil TPH Results from December 1993 and January 1994 reported as C22-C36.
2) Total TPH Results from December 1993 and January 1994 reported include C6-C36, Other results only reported as C10-C32.
3) Portions of former structures, including, but not limited to, foundations and/or footings, may still be present at the site.
4) All results in milligrams per kilogram (mg/kg).
5) NA - Not analyzed.

FIGURE 2-5
Detected Total Petroleum Hydrocarbons (TPHs) in Soil
APS Grant Street Former MGP Site
Phoenix, Arizona

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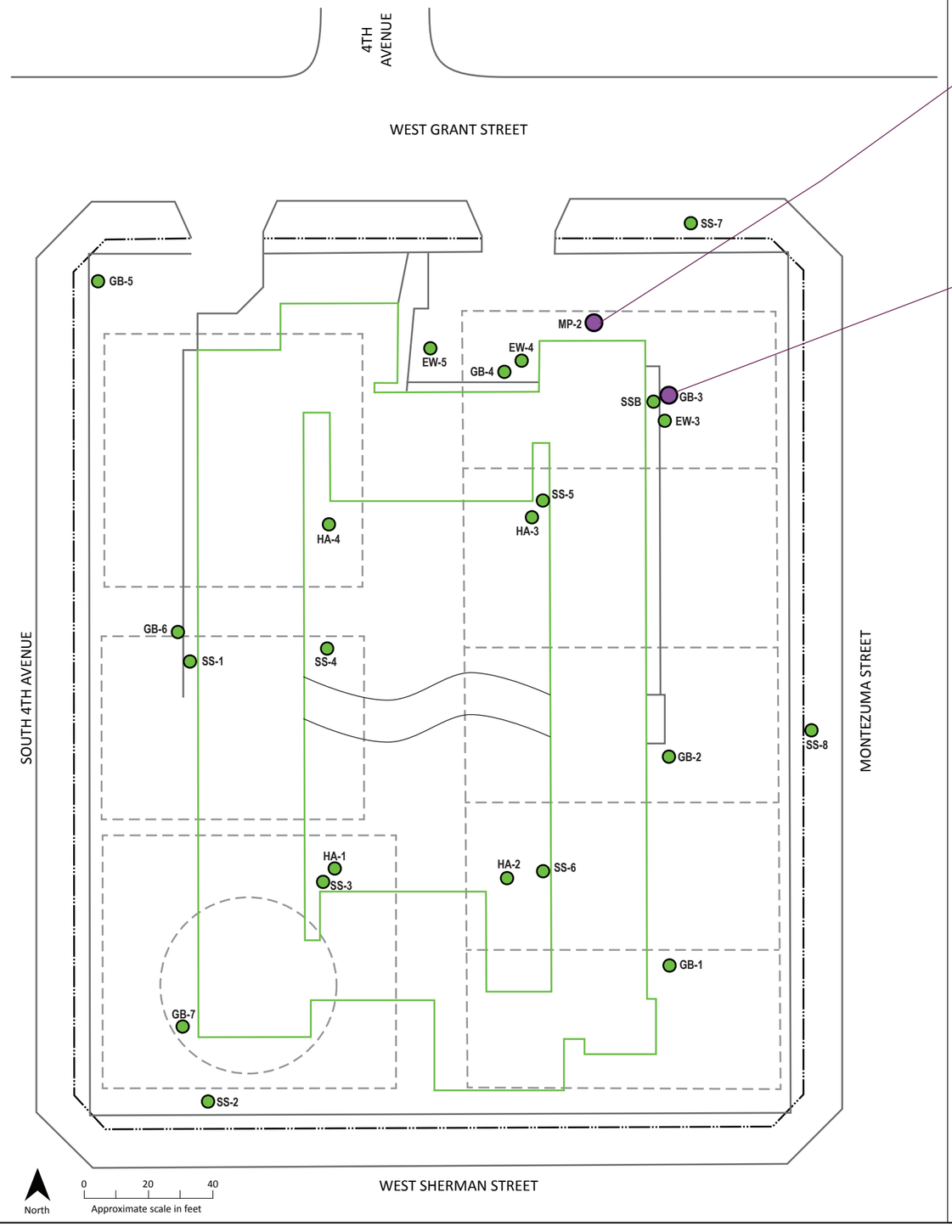
Boring	Depth Sampled (ft bgs)
EW-3	5-6
EW-4	6, 7
EW-5	5, 10
GB1	12.5
GB2	10
GB4	6.5, 10
GB5	9, 17, 26, 32
GB6	12
GB7	10
HA1	5.5
HA2	5.5
HA3	4, 8
HA4	5.5
SS-1	Surface
SS-2	Surface
SS-3	Surface
SS-4	Surface
SS-5	Surface
SS-6	Surface
SS-7	Surface
SS-8	Surface
SSB	Surface

Only borings and depths sampled and analyzed for BTEX with results BELOW SRLs are presented in this table.



MP-2 (6.5)	
Depth (ft bgs)	7
Benzene	94

GB-3 (7, 9, 15, 20, 28)		
Depth (ft bgs)	7	9
Benzene	650	0.025U
Toluene	650	0.025U
Total Xylenes	460	0.025U

LEGEND

- Current Apartment Building
- Former MGP-related Structures
- Sample location analyzed for BTEX. Results did not exceed residential or non-residential Soil Remediation Limits (SRLs).
- Sample location analyzed for BTEX. All depths sampled are listed. Results are only presented for samples that exceeded residential or non-residential Soil Remediation Limits and the next deepest sample, if available.

Notes:
1) Portions of former structures, including, but not limited to, foundations and/or footings, may still be present at the site.
2) All results in milligrams per kilogram (mg/kg)

FIGURE 2-6
Detected BTEX in Soil
APS Grant Street Former MGP Site
Phoenix, Arizona

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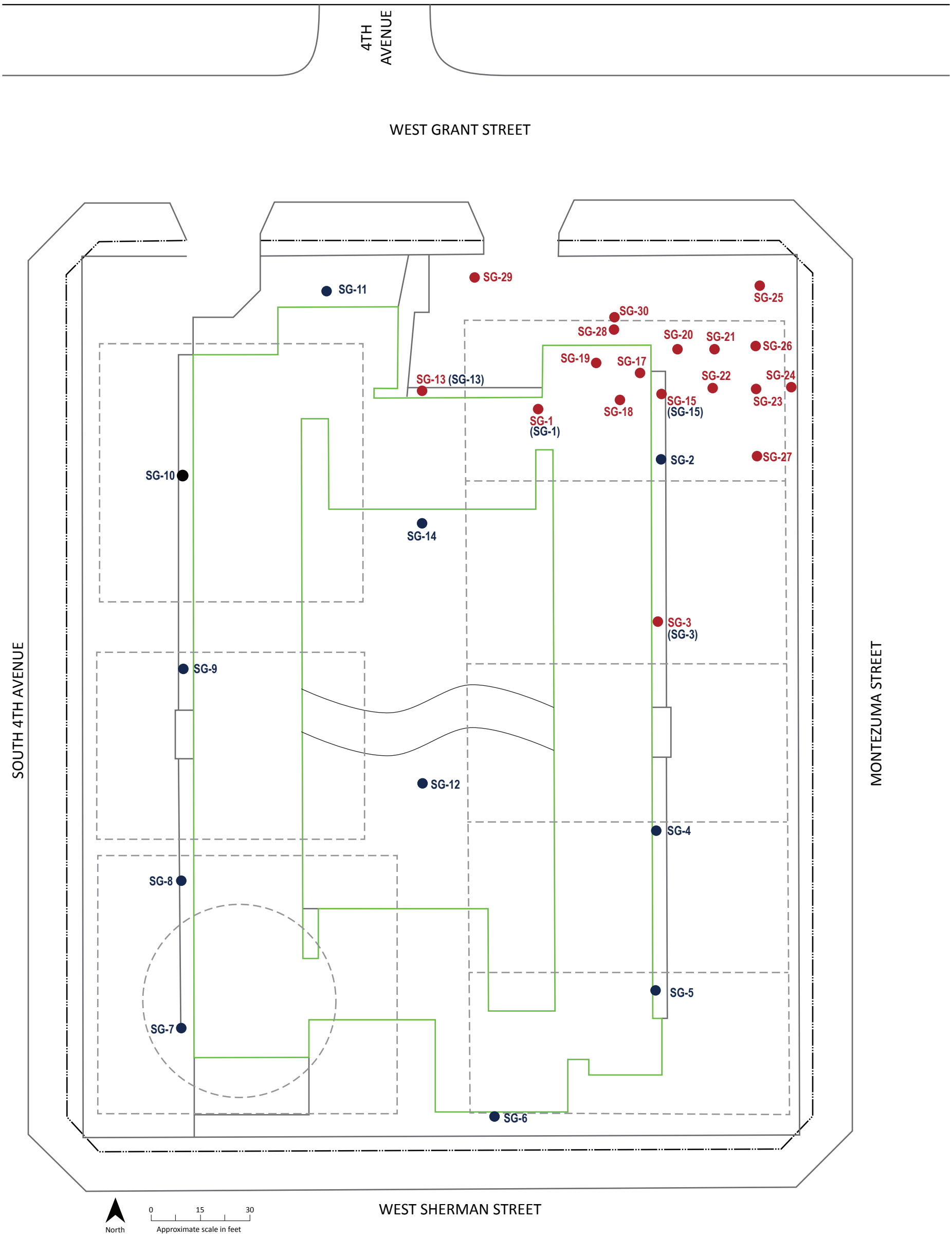

LEGEND

- Current Apartment Building
- Former MGP-related Structures
- SG-6 — Soil Gas Samples collected by Geraghty and Miller. Samples collected 1993.
- SG-29 — Soil Gas Samples collected by Geraghty and Miller. Samples collected 1994.

FIGURE 2-7
Soil Vapor Sampling Locations
APS Grant Street Former MGP Site
Phoenix, Arizona

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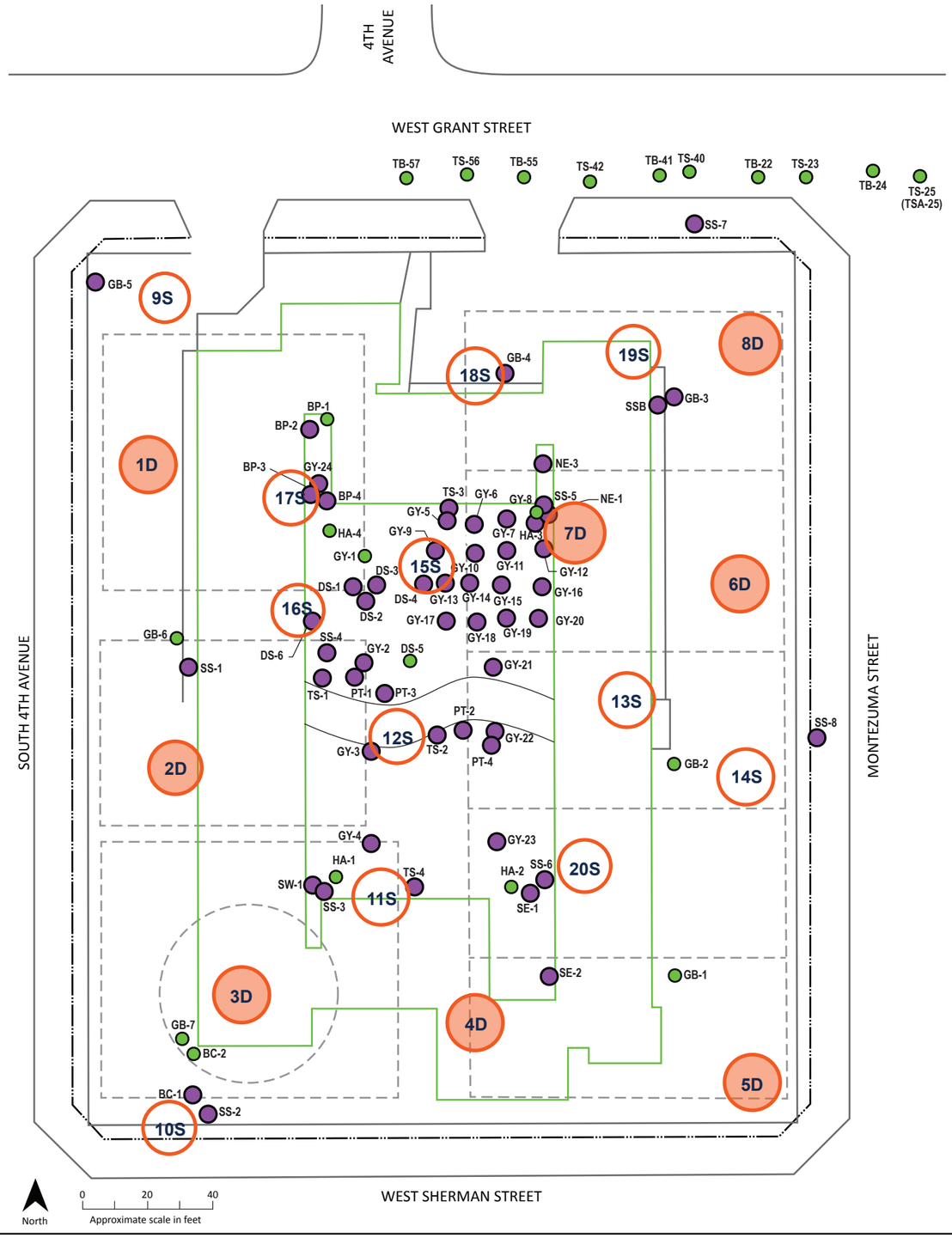


LEGEND

- Current Apartment Building
- Former MGP-related Structures
- Sampling locations analyzed for PAHs. Result did not exceed residential or non-residential Soil Remediation Limits (SRLs).
- Sampling locations where PAH concentrations exceeded residential and/or non-residential SRLs. Figure 2-4 provides additional information on concentrations of PAHs in the subsurface.
- 4D — Deep Soil Boring for Site Characterization
- 9S — Shallow Soil Boring for Site Characterization

Notes:

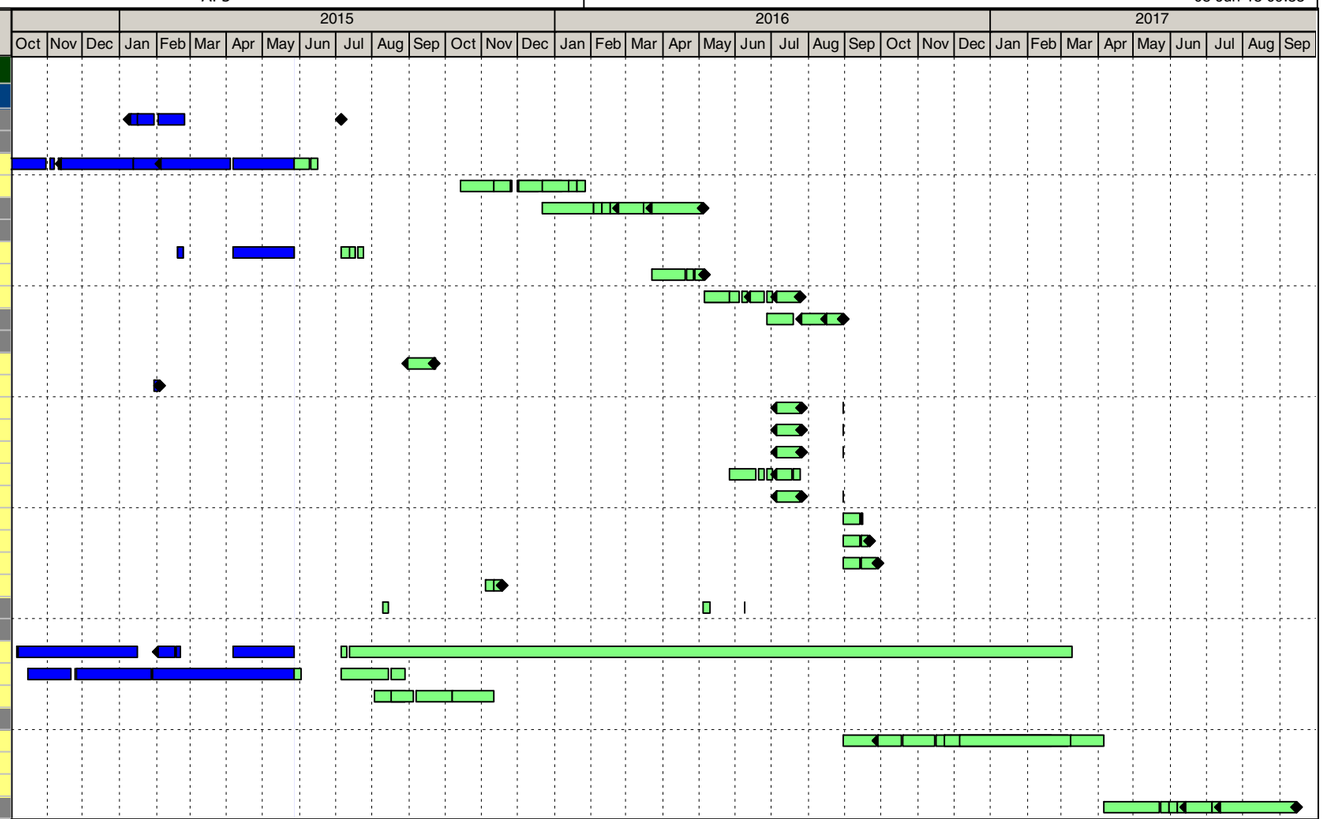
1. Portions of former structures, including, but not limited to, foundations and/or footings, may still be present at the site.

FIGURE 3-1
Detected Polyaromatic Hydrocarbons (PAH) in Soil and Proposed Boring Locations
APS Grant Street Former MGP Site
Phoenix, Arizona

CH2MHILL

DATA DATE 27-May-15 | APS | 08-Jun-15 09:33

Activity ID	Activity Name	Start	Finish	Remaining Duration	Activity Status
Total		29-Sep-14 A	15-Sep-17	586	
650207	**APS - Grant**	29-Sep-14 A	15-Sep-17	586	
650207.1	Property Acquisition	09-Jan-15 A	06-Jul-15	0	
650207.01	Field Investigation	29-Sep-14 A	26-Jan-16	175	
650207.01.1	Work Plan	29-Sep-14 A	16-Jun-15	15	
650207.01.3	Implementation	14-Oct-15	26-Jan-16	71	
650207.02	Remedial Action Plan	21-Dec-15	04-May-16	95	
650207.03	Remedial Design	19-Feb-15 A	25-Jul-16	269	
650207.03.1	Pre-Design Activities	19-Feb-15 A	24-Jul-15	15	
650207.03.2	Draft Design (50%)	23-Mar-16	06-May-16	32	
650207.03.3	Final Design (100%)	06-May-16	25-Jul-16	55	
650207.04	Remediation Contractor Procurement	27-Jun-16	30-Aug-16	46	
650207.05	Permitting	30-Jan-15 A	28-Sep-16	282	
650207.05.1	COP Demolition Permit	31-Aug-15	22-Sep-15	16	
650207.05.11	COP Fence Permit	30-Jan-15 A	04-Feb-15 A	0	
650207.05.4.1	COP Haul Permit	05-Jul-16	30-Aug-16	41	
650207.05.4.2	COP Grading and Drainage Permit	05-Jul-16	30-Aug-16	41	
650207.05.4.3	COP Storm Water Management Plan	05-Jul-16	30-Aug-16	41	
650207.05.4.4	Storm Water Pollution Prevention Plan	27-May-16	25-Jul-16	40	
650207.05.4.6	Plant Inventory/Salvage Plan	05-Jul-16	30-Aug-16	41	
650207.05.4.7	AZPDES General Premit	30-Aug-16	15-Sep-16	12	
650207.05.4.8	Maricopa County Dust Control Permit	30-Aug-16	21-Sep-16	15	
650207.05.4.9	Maricopa County NESHAP Permit	30-Aug-16	28-Sep-16	20	
650207.05.4.10	ADWR NOI to Drill and Abandon Wells	04-Nov-15	18-Nov-15	10	
650207.06	Community Involvement	10-Aug-15	08-Jun-16	218	
650207.07	Grant St Building Removal	07-Oct-14 A	10-Mar-17	455	
650207.07.1	Building Security	07-Oct-14 A	10-Mar-17	440	
650207.07.2	ACM LBP Assessment	16-Oct-14 A	28-Aug-15	68	
650207.07.3	Building Demolition	03-Aug-15	10-Nov-15	71	
650207.08	Site Remediation	30-Aug-16	05-Apr-17	152	
650207.08.1	Grant MGP Remediation	30-Aug-16	05-Apr-17	152	
650207.08.3	Grant MGP Post-Closure GW Monitoring			0	
650207.08.4	Milestones			0	
650207.09	Grant MGP Closure Reports	06-Apr-17	15-Sep-17	113	



Actual Work
Remaining Work
Critical Remaining Work
Milestone

Resposibility Key:
APS=APS, CON-Contractor, CH=CH2MHill, CoP=City of Phoenix, ADEQ=ADEQ, MC=Maricopa County, DEV=Devloper, COM=Community

FIGURE 3-2
Project Schedule
APS Grant Street Former MGP Site
Phoenix, Arizona

Appendix A
Sanborn Maps

Grant Street Apartments
331 W. Grant Street
Phoenix, AZ 85003

Inquiry Number: 3814645.3
December 18, 2013

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

12/18/13

Site Name:
Grant Street Apartments
331 W. Grant Street
Phoenix, AZ 85003

EDR Inquiry # 3814645.3

Client Name:
CH2M Hill, Inc.
2625 South Plaza
Tempe, AZ 85282

Contact: Lara Pollitt

EDR® Environmental Data Resources Inc

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Certified Sanborn Results:

Site Name: Grant Street Apartments
Address: 331 W. Grant Street
City, State, Zip: Phoenix, AZ 85003
Cross Street:
P.O. # 478447.MG.GS.01
Project: Grant Street Apartments
Certification # F3E0-455B-97BA

Maps Provided:

1968
1949
1946
1915
1911
1901

Sanborn® Library search results
Certification # F3E0-455B-97BA

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- ☑ University Publications of America
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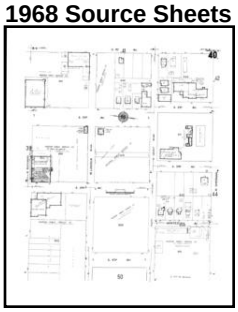
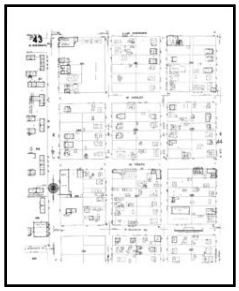
Sanborn Sheet Thumbnails

This Certified Sanborn Map Report is based upon the following Sanborn Fire Insurance map sheets.

1968 Source Sheets

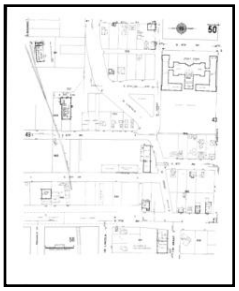


Volume 1, Sheet 40



Volume 1, Sheet 43

Volume 1, Sheet 44



Volume 1, Sheet 50

1949 Source Sheets

Volume 1, Sheet 40

Volume 1, Sheet 43

Volume 1, Sheet 44

Volume 1, Sheet 50

1946 Source Sheets

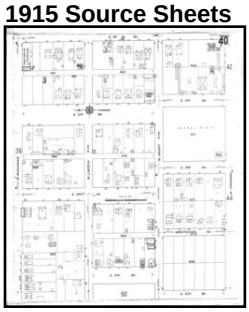
Volume 1, Sheet 40

Volume 1, Sheet 43

Volume 1, Sheet 44

Volume 1, Sheet 50

1915 Source Sheets



Volume 1, Sheet 40

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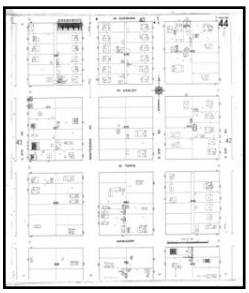

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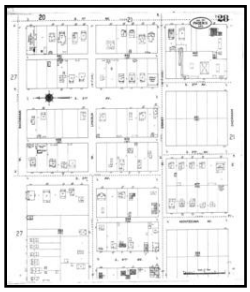
1911 Source Sheets

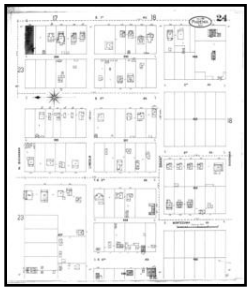
Volume 1, Sheet 21



Volume 1, Sheet 28

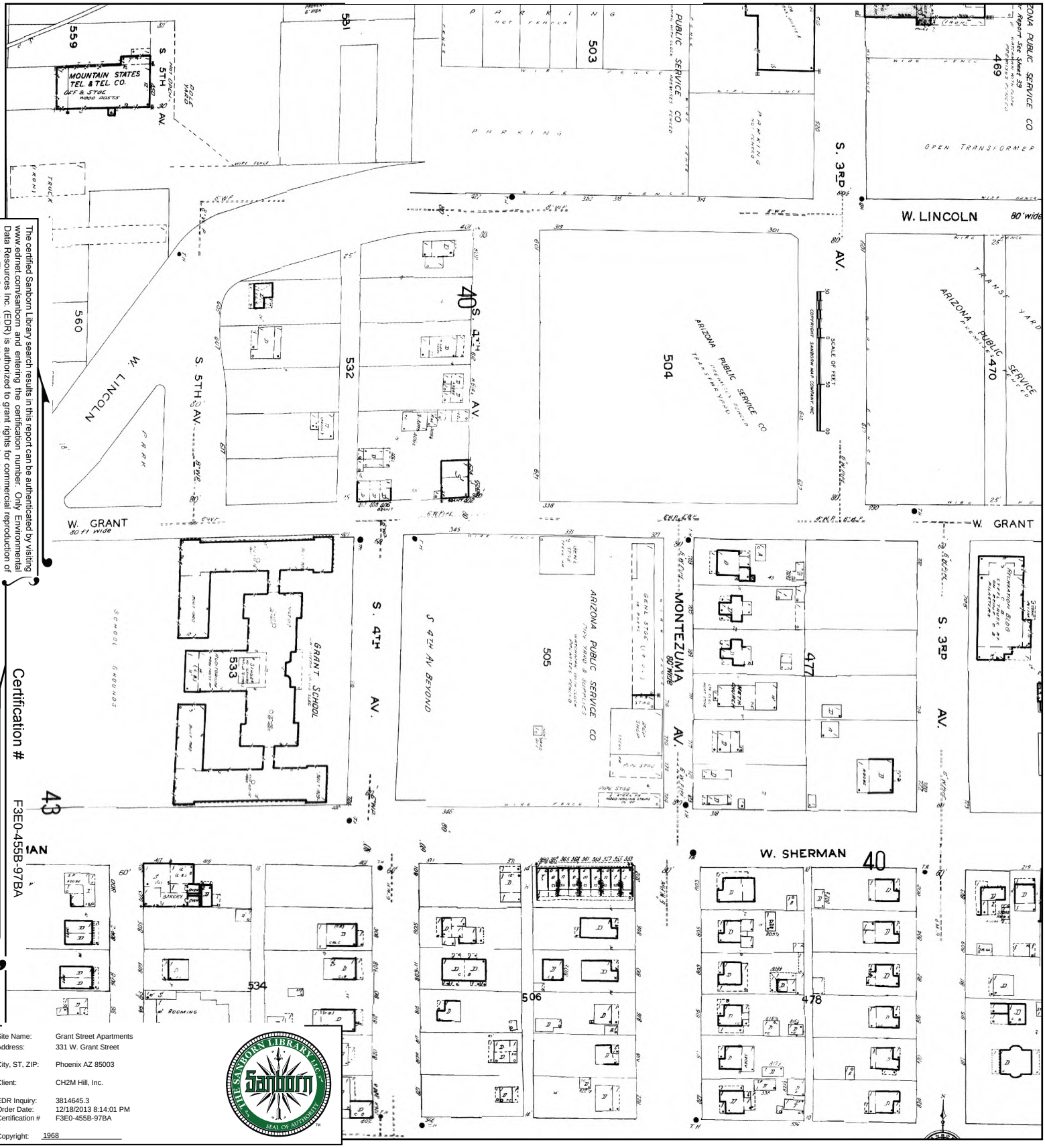
1901 Source Sheets

Volume 1, Sheet 18



Volume 1, Sheet 24

1968 Certified Sanborn Map



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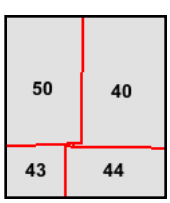
Certification # F3E0-455B-97BA

Site Name:	Grant Street Apartments
Address:	331 W. Grant Street
City, ST, ZIP:	Phoenix AZ 85003
Client:	CH2M Hill, Inc.
EDR Inquiry:	3814645.3
Order Date:	12/18/2013 8:14:01 PM
Certification #	F3E0-455B-97BA
Copyright:	1968

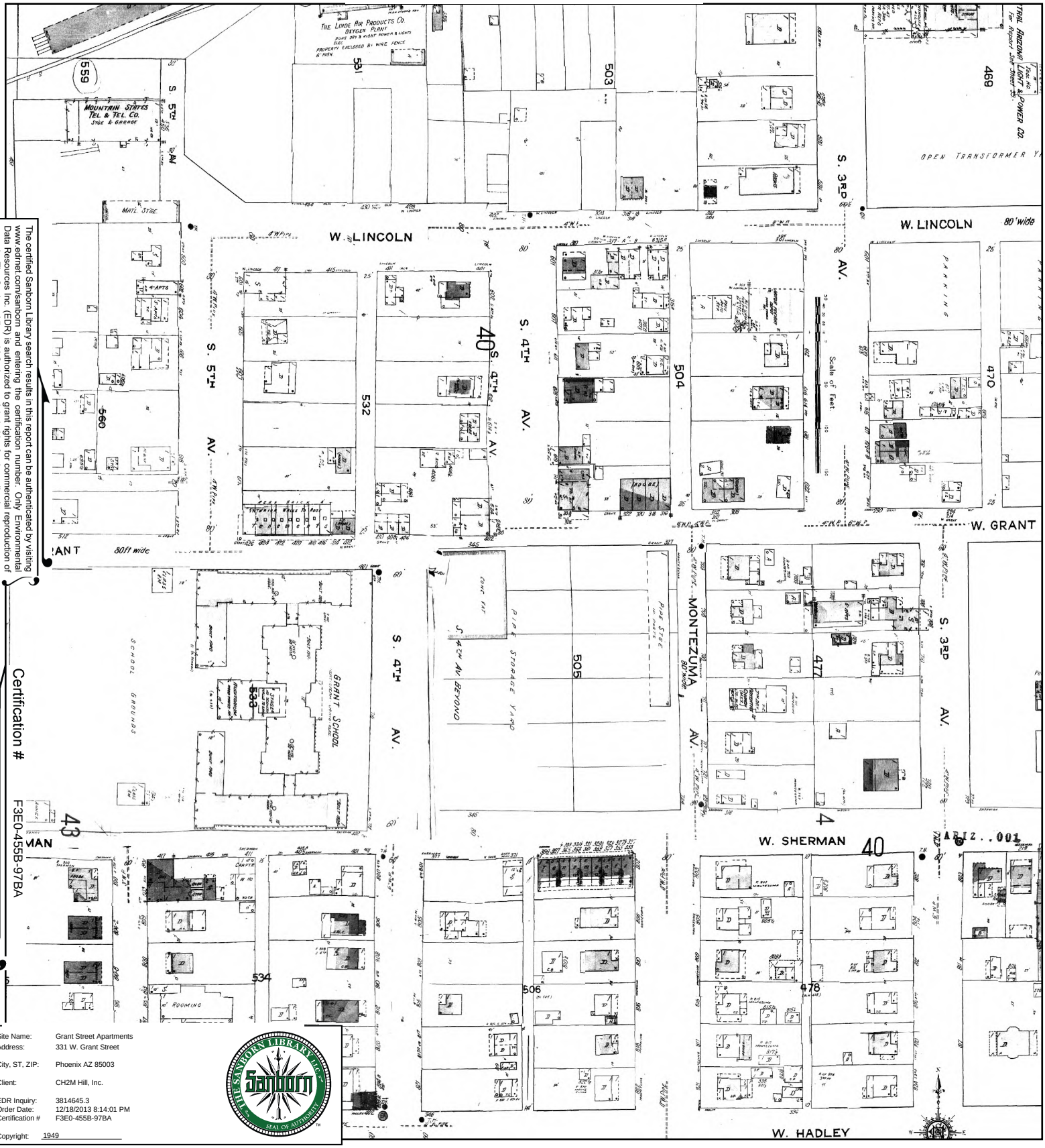
This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.



Volume 1, Sheet 40
Volume 1, Sheet 43
Volume 1, Sheet 44
Volume 1, Sheet 50

0 Feet 150 300 600

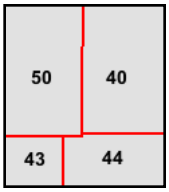
1949 Certified Sanborn Map



Certification # F3E0-455B-97BA

Site Name:	Grant Street Apartments
Address:	331 W. Grant Street
City, ST, ZIP:	Phoenix AZ 85003
Client:	CH2M Hill, Inc.
EDR Inquiry:	3814645.3
Order Date:	12/18/2013 8:14:01 PM
Certification #	F3E0-455B-97BA
Copyright:	1949

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

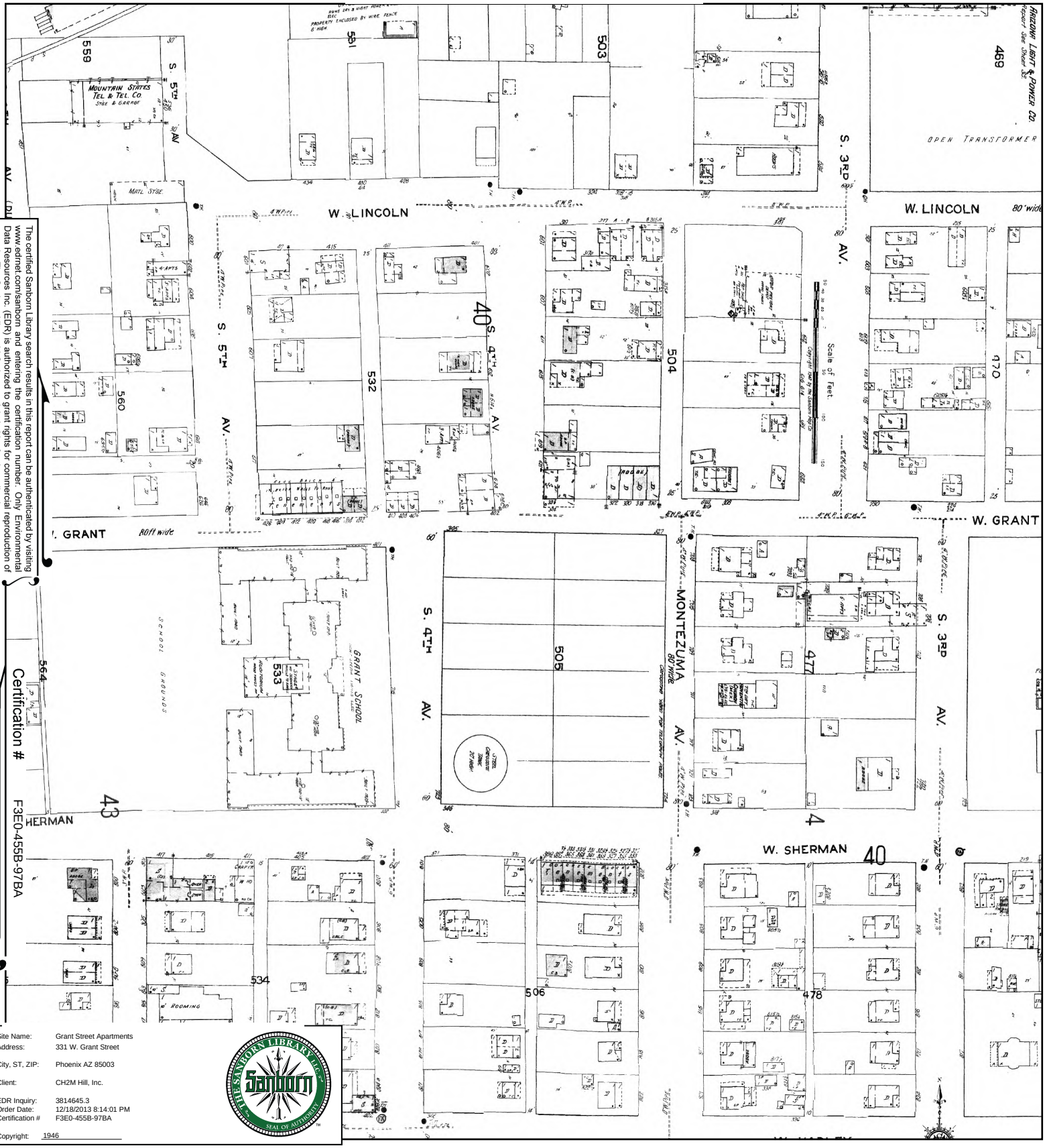


Volume 1, Sheet 40
Volume 1, Sheet 43
Volume 1, Sheet 44
Volume 1, Sheet 50

0 Feet 150 300 600

N

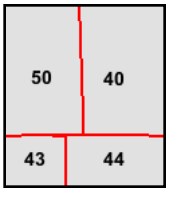
1946 Certified Sanborn Map



Certification # F3E0-455B-97BA

Site Name:	Grant Street Apartments
Address:	331 W. Grant Street
City, ST, ZIP:	Phoenix AZ 85003
Client:	CH2M Hill, Inc.
EDR Inquiry:	3814645.3
Order Date:	12/18/2013 8:14:01 PM
Certification #	F3E0-455B-97BA
Copyright:	1946

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.



Volume 1, Sheet 40
Volume 1, Sheet 43
Volume 1, Sheet 44
Volume 1, Sheet 50

0 Feet 150 300 600

N

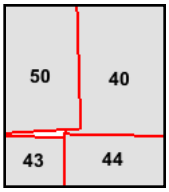
1915 Certified Sanborn Map

Certification # F3E0-455B-97BA

Site Name:	Grant Street Apartments
Address:	331 W. Grant Street
City, ST, ZIP:	Phoenix AZ 85003
Client:	CH2M Hill, Inc.
EDR Inquiry:	3814645.3
Order Date:	12/18/2013 8:14:01 PM
Certification #	F3E0-455B-97BA
Copyright:	1915

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

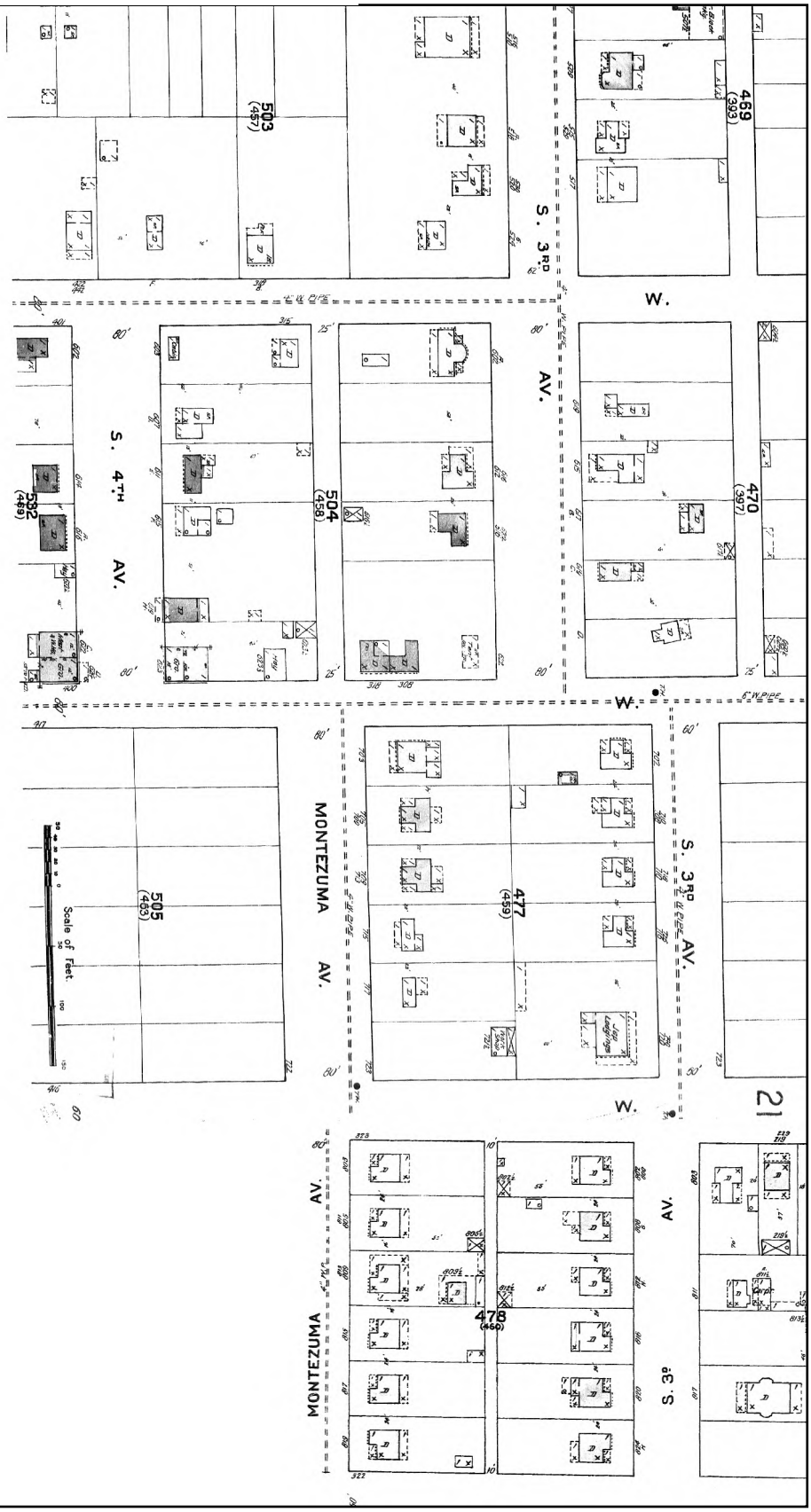
0 Feet 150 300 600



Volume 1, Sheet 40
Volume 1, Sheet 43
Volume 1, Sheet 44
Volume 1, Sheet 50

N

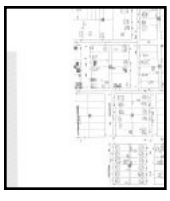
1911 Certified Sanborn Map

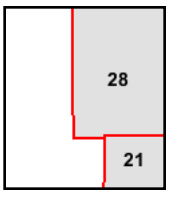


Certification # F3E0-455B-97BA

Site Name: Grant Street Apartments
Address: 331 W. Grant Street
City, ST, ZIP: Phoenix AZ 85003
Client: CH2M Hill, Inc.
EDR Inquiry: 3814645.3
Order Date: 12/18/2013 8:14:01 PM
Certification # F3E0-455B-97BA
Copyright: 1911

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.





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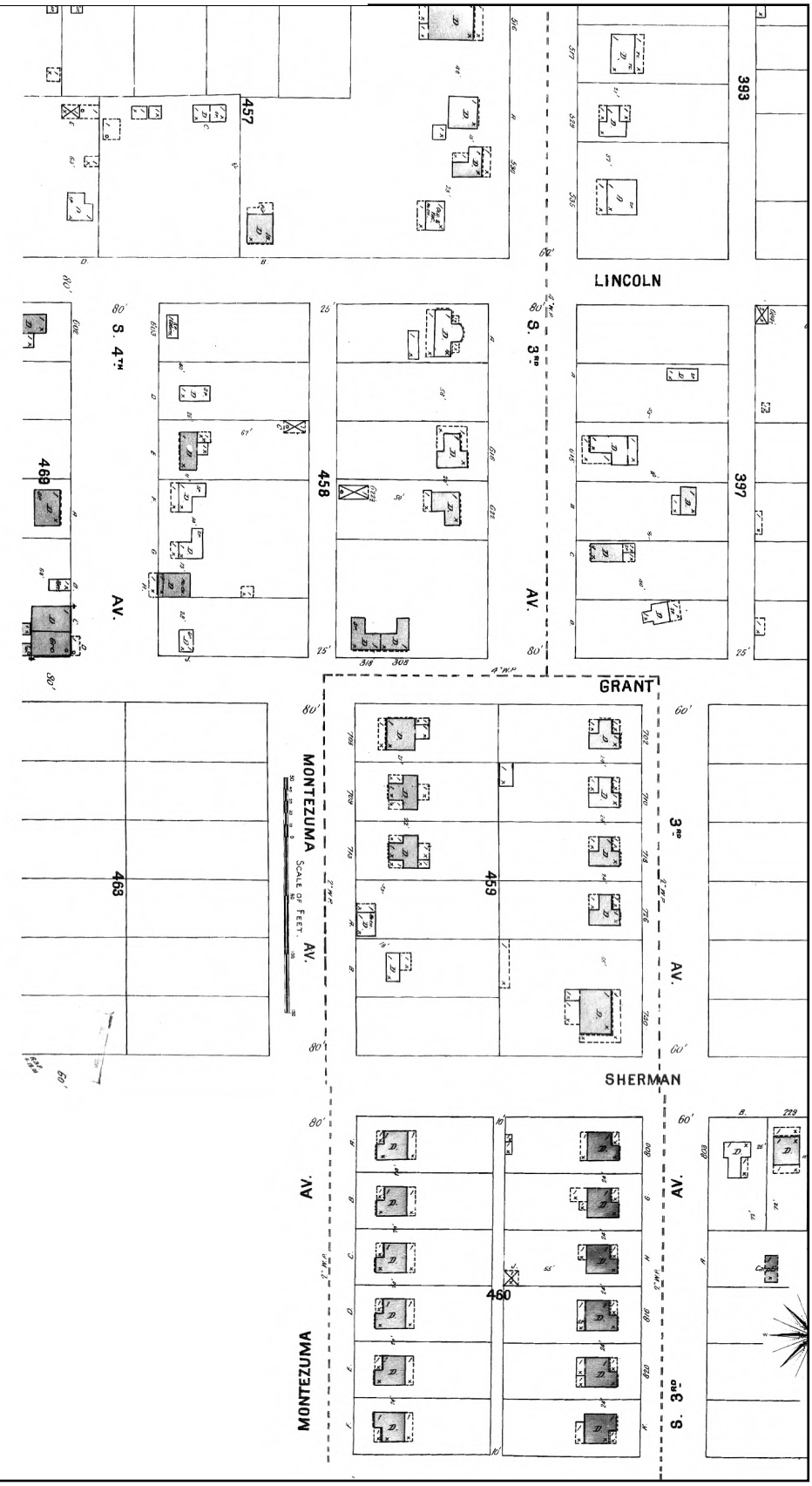
Volume 1, Sheet 28

0 Feet 150 300 600

N

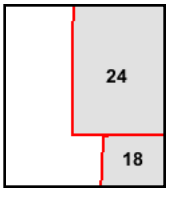
1901 Certified Sanborn Map



Certification # F3E0-455B-97BA

Site Name: Grant Street Apartments
Address: 331 W. Grant Street
City, ST, ZIP: Phoenix AZ 85003
Client: CH2M Hill, Inc.
EDR Inquiry: 3814645.3
Order Date: 12/18/2013 8:14:01 PM
Certification # F3E0-455B-97BA
Copyright: 1901

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.



Volume 1, Sheet 18
Volume 1, Sheet 24

0 Feet 150 300 600

N

Appendix B
Aerial Photographs

Grant Street Apartments
331 W. Grant Street
Phoenix, AZ 85003

Inquiry Number: 3814645.5
December 19, 2013

The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Date EDR Searched Historical Sources:

Aerial Photography December 19, 2013

Target Property:

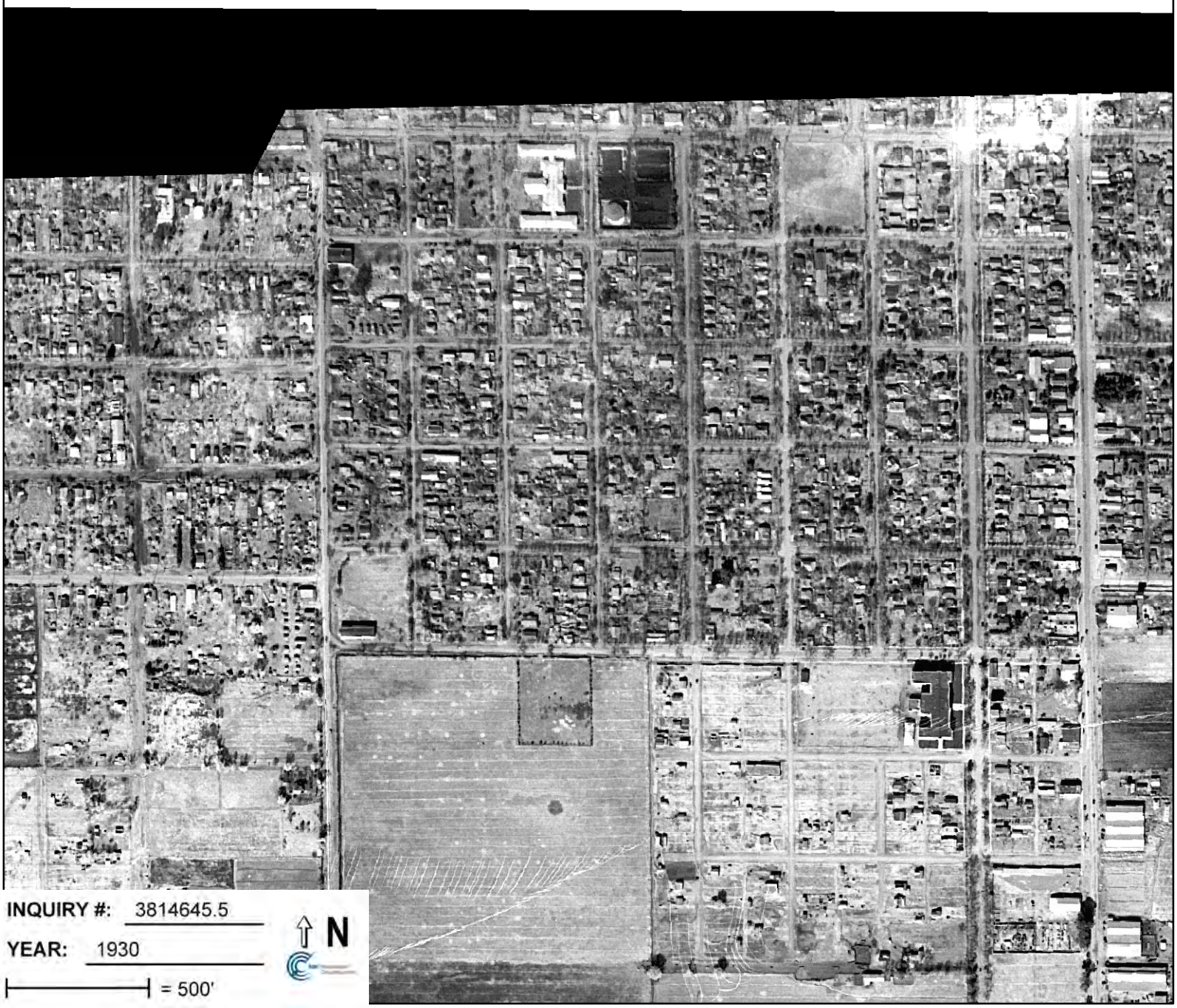
331 W. Grant Street

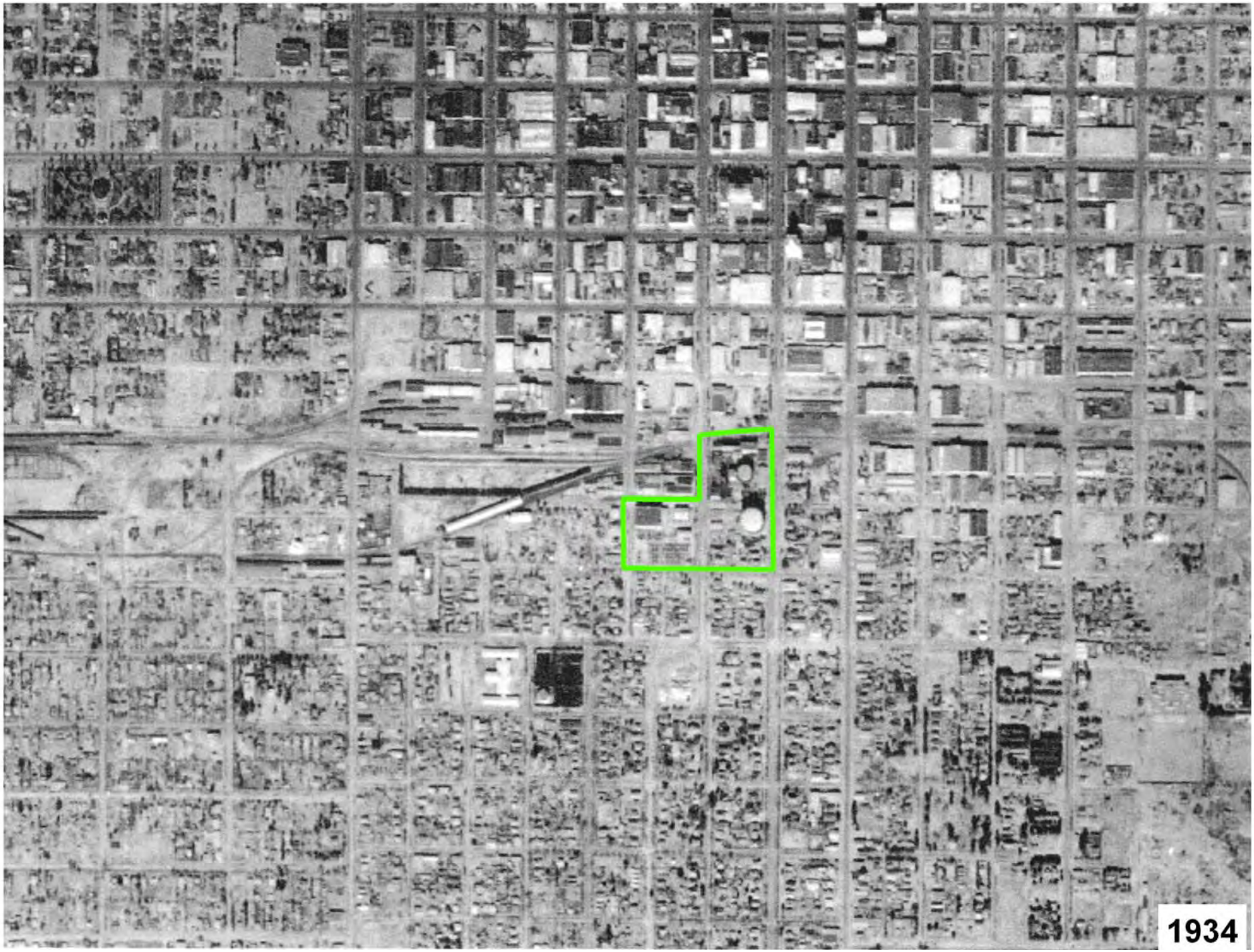
Phoenix, AZ 85003

Year	***Scale***	***Details***	***Source***
1958	Aerial Photograph. Scale: 1"=500'	Panel #: 33112-D1, Phoenix, AZ;/Flight Date: January 01, 1958	EDR
1961	Aerial Photograph. Scale: 1"=500'	Panel #: 33112-D1, Phoenix, AZ;/Flight Date: September 16, 1961	EDR
1964	Aerial Photograph. Scale: 1"=500'	Panel #: 33112-D1, Phoenix, AZ;/Flight Date: January 01, 1964	EDR
1973	Aerial Photograph. Scale: 1"=750'	Panel #: 33112-D1, Phoenix, AZ;/Flight Date: August 21, 1973	EDR
1979	Aerial Photograph. Scale: 1"=1000'	Panel #: 33112-D1, Phoenix, AZ;/Flight Date: June 09, 1979	EDR
1989	Aerial Photograph. Scale: 1"=500'	Panel #: 33112-D1, Phoenix, AZ;/Flight Date: January 01, 1989	EDR
1992	Aerial Photograph. Scale: 1"=500'	Panel #: 33112-D1, Phoenix, AZ;/Flight Date: January 01, 1992	EDR
1997	Aerial Photograph. Scale: 1"=500'	Panel #: 33112-D1, Phoenix, AZ;/DOQQ - acquisition dates: April 30, 1997	EDR
2005	Aerial Photograph. Scale: 1"=500'	Panel #: 33112-D1, Phoenix, AZ;/Flight Year: 2005	EDR
2007	Aerial Photograph. Scale: 1"=500'	Panel #: 33112-D1, Phoenix, AZ;/Flight Year: 2007	EDR
2010	Aerial Photograph. Scale: 1"=500'	Panel #: 33112-D1, Phoenix, AZ;/Flight Year: 2010	EDR

Additional aerials were added by CH2M HILL from the 501/505 South 2nd Avenue Manufactured Gas Plant Remedial Action Plan for the following years (and have been inserted to maintain chronoligical order):

1934
1940
1954


INQUIRY #: 3814645.5
YEAR: 1930
= 500'
N


1934

INQUIRY #: 3814645.5

YEAR: 1937

N

= 1000'

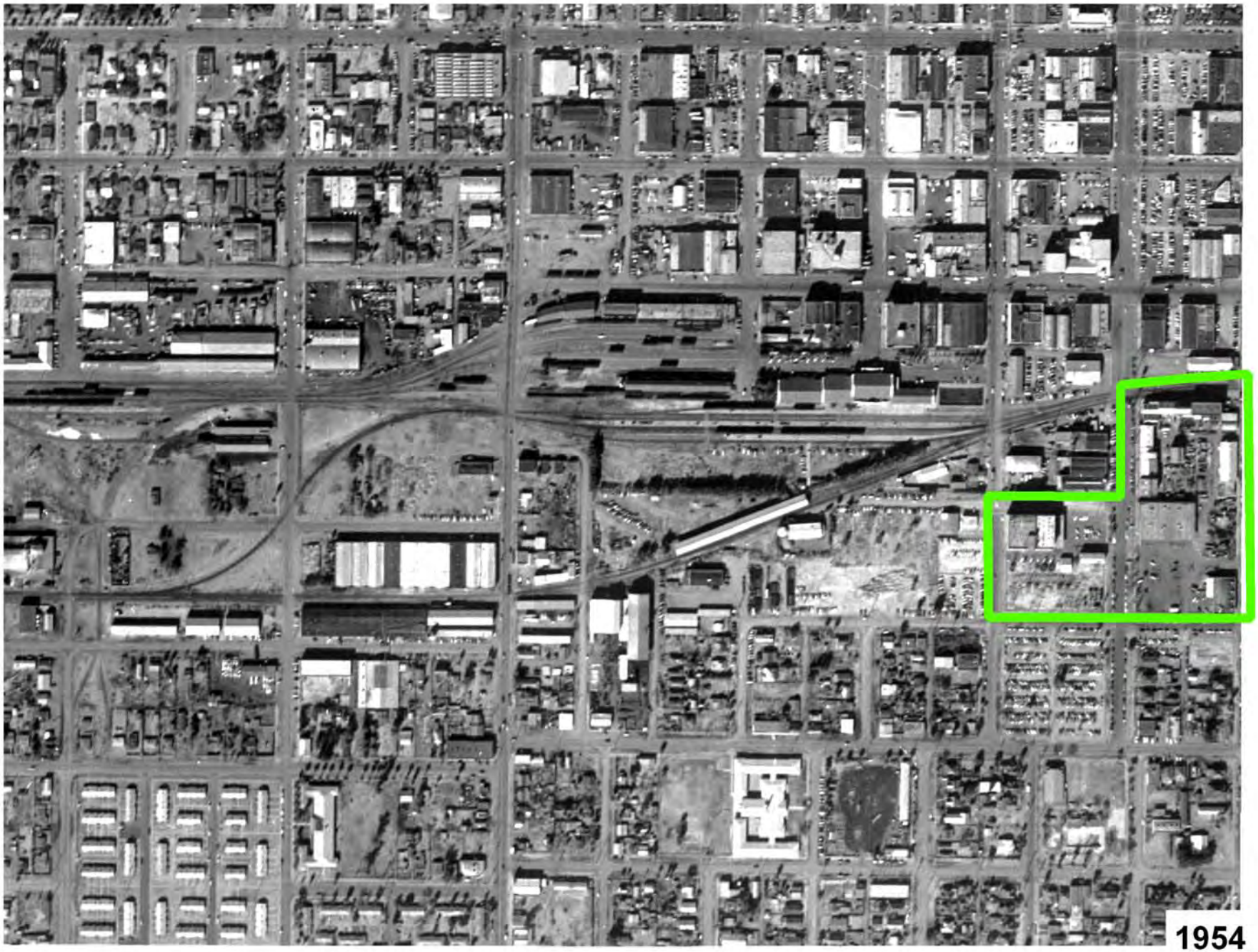

RUPP
Your Source for Aerial Information
9-7-1940
1940

INQUIRY #: 3814645.5

YEAR: 1949

N

= 500'

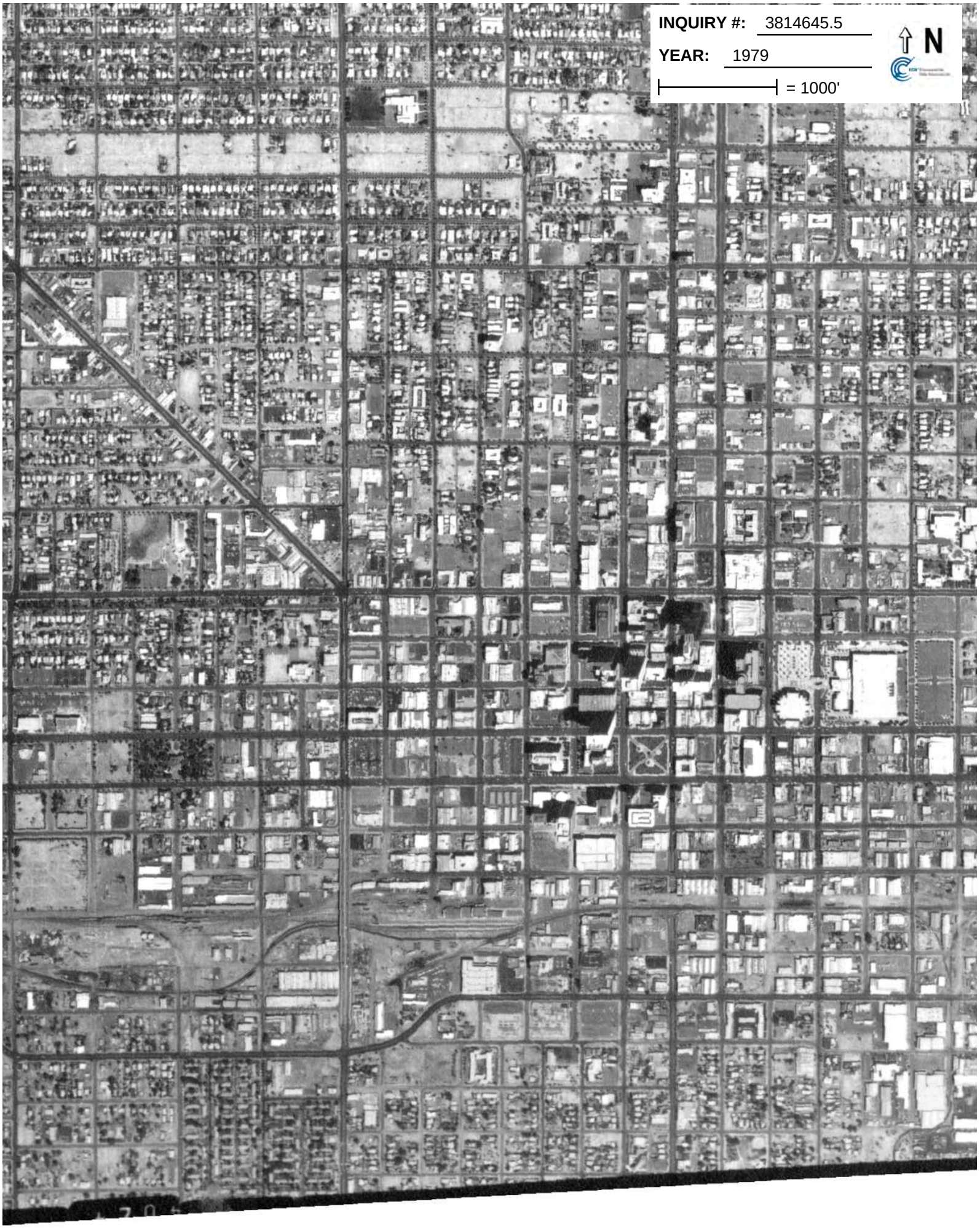

1954


INQUIRY #: 3814645.5
YEAR: 1958
= 500'
N


INQUIRY #: 3814645.5
YEAR: 1961
= 500'
N


INQUIRY #: 3814645.5
YEAR: 1964
= 500'
N

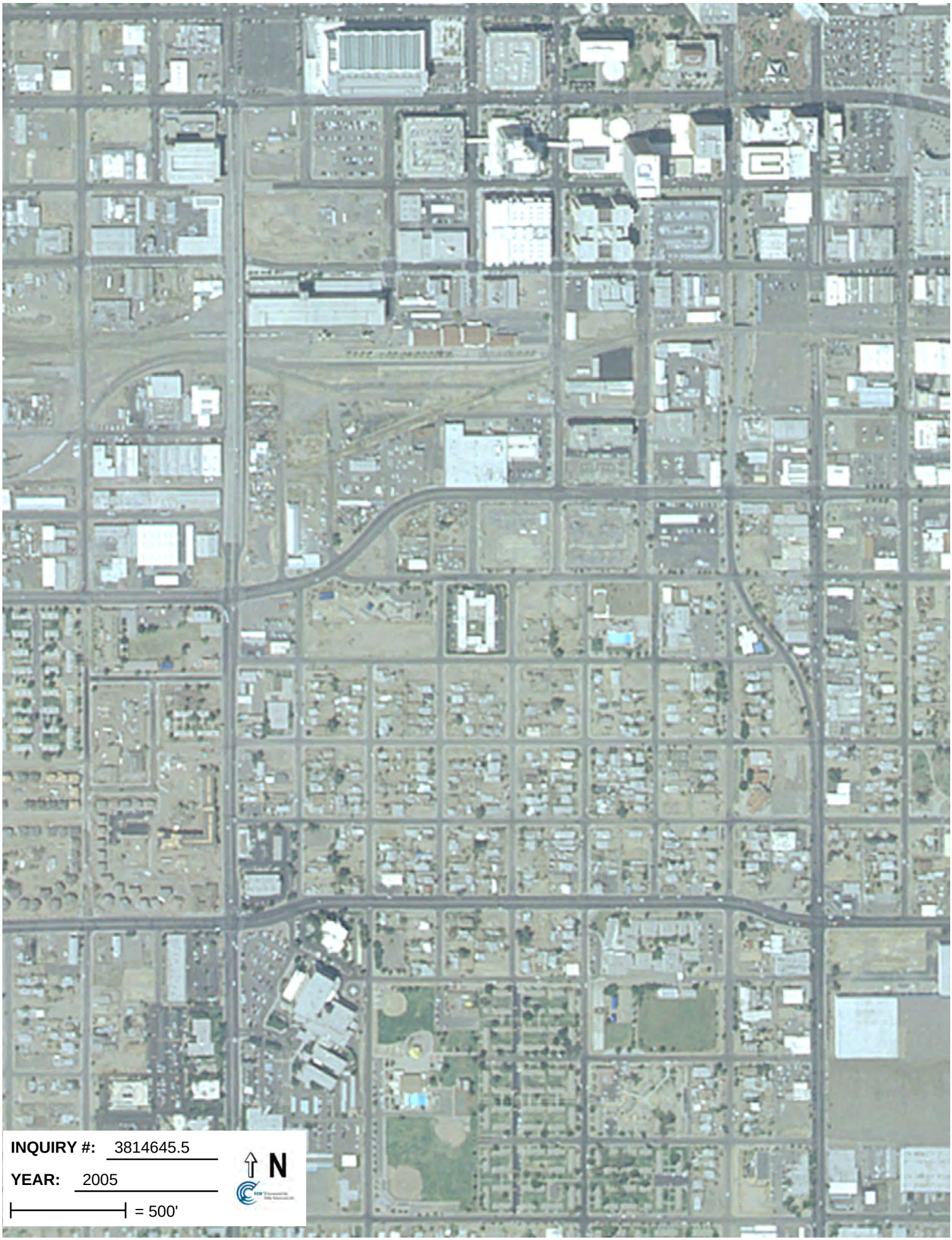

INQUIRY #: 3814645.5
YEAR: 1973
= 750'
N

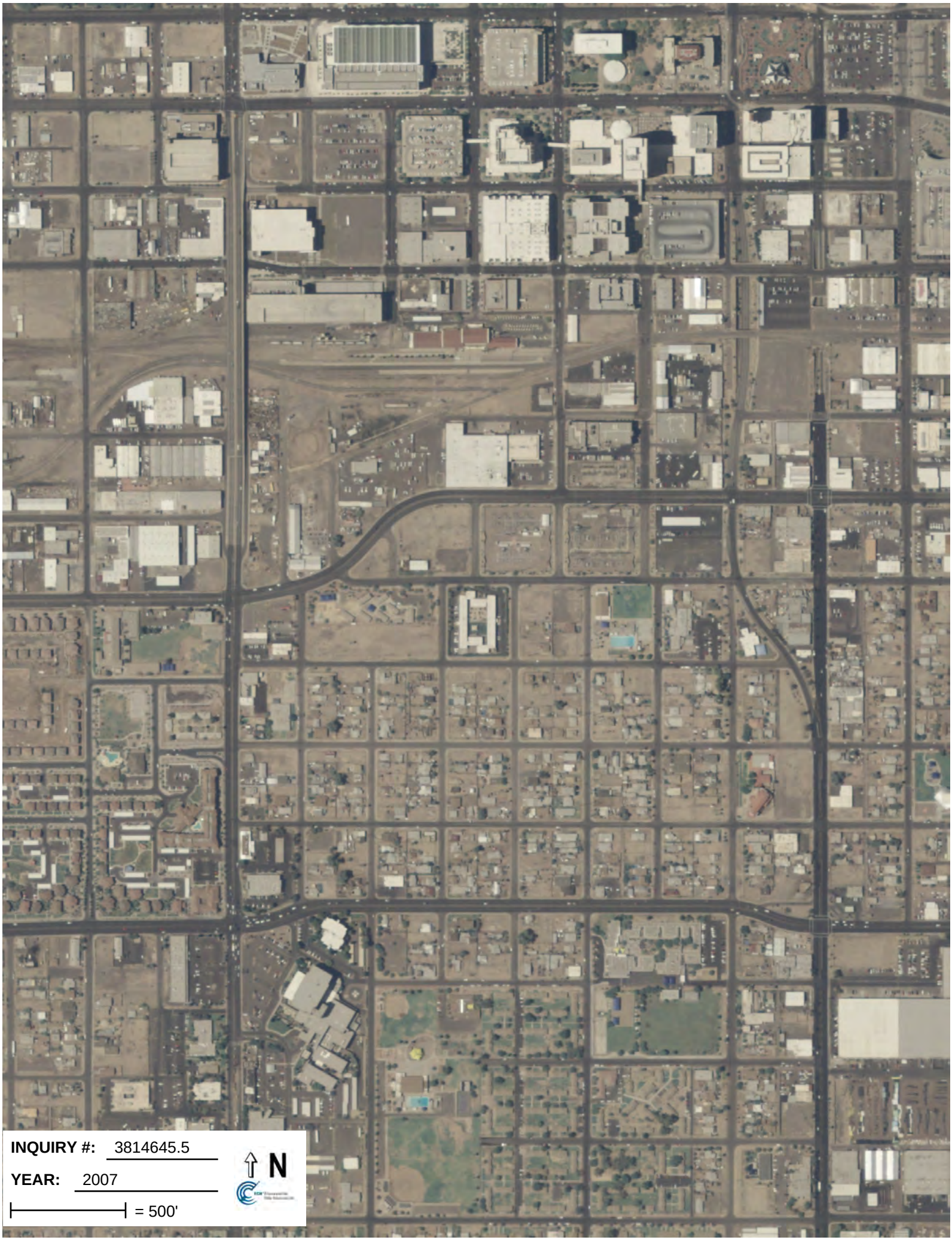

INQUIRY #: 3814645.5
YEAR: 1979
= 1000'
N


INQUIRY #: 3814645.5
YEAR: 1989
= 500'
N


INQUIRY #: 3814645.5
YEAR: 1992
= 500'
N


INQUIRY #: 3814645.5
YEAR: 1997
= 500'
N


INQUIRY #: 3814645.5
YEAR: 2005
= 500'
N


INQUIRY #: 3814645.5
YEAR: 2007
= 500'
N


INQUIRY #: 3814645.5
YEAR: 2010
= 500'
N

Appendix C
Executive Summary of EDR Report

Grant Street Apartments
331 W. Grant Street
Phoenix, AZ 85003

Inquiry Number: 3814645.2s
December 18, 2013

EDR Summary Radius Map Report

Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

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Detail Map	3
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Map Findings	7
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Government Records Searched/Data Currency Tracking	GR-1

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Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting SSURGO Soil Map	A-6
Physical Setting Source Map	A-19
Physical Setting Source Map Findings	A-21
Physical Setting Source Records Searched	A-372

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

331 W. GRANT STREET
PHOENIX, AZ 85003

COORDINATES

Latitude (North):	33.4410000 - 33° 26' 27.60''
Longitude (West):	112.0789000 - 112° 4' 44.04''
Universal Tranverse Mercator:	Zone 12
UTM X (Meters):	399713.5
UTM Y (Meters):	3700505.8
Elevation:	1075 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	TP
Source:	USGS 7.5 min quad index

AERIAL PHOTOGRAPHY IN THIS REPORT

Photo Year:	2010
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
331 W. GRANT STREET
PHOENIX, AZ 85003

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft.) DIRECTION
1	APS GRANT STREET YAR	331 W GRANT STREET	AZ VCP		TP
Reg	MOTOROLA 52ND STREET		AZ SPL, AZ NPL	Same	1496, North
Reg	EAST WASHINGTON FLUF		AZ WQARF, AZ SPL	Same	3254, ESE
Reg	WEST VAN BUREN		AZ WQARF, AZ SPL	Same	200, NNW
Reg	FREESCALE SEMICONDUC	5005 E MCDOWELL RD	RCRA-TSDF, NPL, CERCLIS, CORRACTS, RCRA-LQG, US...	Same	1078, North
2	SESMA CLEANERS	371 W SHERMAN ST	EDR US Hist Cleaners	Lower	1 ft.
A3		621 S 5TH AVE	EDR US Hist Auto Stat	Lower	232, WNW
4	DE LUXE CLEANERS & D	706 S 3RD	EDR US Hist Cleaners	Higher	327, East
A5	CONTRACTORS ABATEMEN	600 W GRANT ST	AZ LUST, AZ UST	Lower	474, West
6	STITT A L	623 W GRANT ST	EDR US Hist Cleaners	Lower	613, West
7	CHAMBERS MOVING & ST	523 S 6TH DR	AZ UST	Higher	619, NW
B8	2ND AVENUE MANUFACTU	505 S 2ND ST	AZ LUST, AZ UST, AZ VCP	Higher	692, ENE
B9	APS 2ND AVE MGP	505 S 2ND AVE	EDR MGP	Higher	692, ENE
C10	MARICOPA CO. MATERIA	319 W. BUCHANAN	AZ SHWS	Higher	745, NNE
11	SOUTHSIDE	1002 S 5TH AVE	EDR US Hist Cleaners	Lower	805, SSW
B12	APS CO 501 COMPLEX	501 S 2ND AVE	RCRA NonGen / NLR, FINDS, AZ MANIFEST	Higher	815, NE
13	DUENAS D R	1025 S 3RD AVE	EDR US Hist Auto Stat	Lower	893, SSE
D14	NICKS GARAGE	717 S 7TH AVE	EDR US Hist Auto Stat	Lower	920, West
D15	CONTRACTORS ABATEMEN	717 S 7TH AVE	RCRA NonGen / NLR, FINDS	Lower	920, West
E16	APS	502 S 2ND AVE	AZ LUST, AZ UST	Higher	928, NE
E17	APS 502 SERVICE CENT	502 SOUTH 2ND AVENUE	AZ AST	Higher	928, NE
D18	GRAVETTE J H	702 S 7TH AVE	EDR US Hist Auto Stat	Lower	951, WSW
C19		433 S 3RD AVE	EDR US Hist Auto Stat	Higher	1008, NNE
F20		907 S 7TH AVE	EDR US Hist Auto Stat	Lower	1021, WSW
F21	PHOENIX CITY OF MATT	820 S 7TH AVE APTS 1	RCRA NonGen / NLR, FINDS	Lower	1042, SW
G22	MCDANIEL TRUCKING CO	420 S 3RD AVE	AZ LUST, AZ UST	Higher	1046, NNE
G23	DELGADO ALPHONSO	415 S 3RD	EDR US Hist Auto Stat	Higher	1072, NNE
24	MISSION UNIFORM SERV	621 S 1ST AVE	AZ UST	Higher	1114, East
25	O & M ENVIR REMEDIAT	1101 S 5TH AVE	RCRA NonGen / NLR	Lower	1146, SSW
F26	MARTINEZ DAVID	902 S 7TH AVE	EDR US Hist Auto Stat	Lower	1147, SW
E27	DOWNTOWN PHOENIX LOF	424 S 2ND AVE	AZ UST	Higher	1152, NE
H28		513 S 1ST AVE	EDR US Hist Auto Stat	Higher	1165, ENE
I29	ZELLER WM	924 S 7TH	EDR US Hist Auto Stat	Lower	1177, SW
J30	SPRINT SWITCH	401 W HARRISON ST	AZ LUST, AZ UST, AZ Financial Assurance	Higher	1182, North
H31	APS	501 S. 1ST ST.	AZ SHWS	Higher	1182, ENE
K32	PHOENIX CITY OF NIH	701 W BUCHANAN	RCRA NonGen / NLR, FINDS	Higher	1182, WNW
I33	STUDIO CLEANERS	932 S 7TH AVE	EDR US Hist Cleaners	Lower	1198, SW
K34	CRAFT INK COMPANY	715 W BUCHANAN	RCRA NonGen / NLR, FINDS	Higher	1218, WNW
35		740 W GRANT ST	EDR US Hist Cleaners	Lower	1223, West

MAPPED SITES SUMMARY

Target Property Address:
331 W. GRANT STREET
PHOENIX, AZ 85003

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft.) DIRECTION
K36	MARYATT LAUNDRY	720 WEST BUCHANAN	AZ SHWS	Higher	1239, WNW
K37	ALL STAR COACH CO IN	720 W BUCHANAN ST	EDR US Hist Auto Stat	Higher	1239, WNW
K38	MARONEYS CLEANERS &	720 W BUCHANAN ST	EDR US Hist Cleaners	Higher	1239, WNW
K39	ALSCO	720 W BUCHANAN ST	AZ UST	Higher	1239, WNW
I40	JOYCE A J	1023 S 7TH AVE	EDR US Hist Auto Stat	Lower	1254, SW
L41	QWEST - PHOENIX SOUT	450 S 5TH AVE	AZ LUST, AZ UST, AZ Financial Assurance	Higher	1257, NNW
K42	SOLVENT RENEWAL SERV	422 SOUTH 7TH AVENUE	AZ SHWS	Higher	1259, NW
K43	NATIONAL ENVIRONMENT	737 W BUCHANAN ST	RCRA NonGen / NLR, FINDS	Higher	1276, WNW
M44	SMITH JOSEPH E WHEEL	318 S 2ND AVE	EDR US Hist Auto Stat	Higher	1313, NNE
M45	THARPES CLEANATORIUM	321 S 2ND AVE	EDR US Hist Cleaners	Higher	1316, NNE
46	MIRANDA'S CUSTOM CAR	706 S CENTRAL AVE	AZ LUST, AZ UST	Higher	1381, East
J47	CITY OF PHOENIX - MU	429 W JACKSON ST	AZ LUST, AZ UST	Higher	1403, North
N48	ARIZONA PLATING & AN	618 S CENTRAL AVE	CERC-NFRAP, RCRA-LQG	Higher	1411, ENE
N49	ARIZONA PLATING AND	618 S CENTRAL AVE	AZ SHWS	Higher	1411, ENE
L50	VACANT WAREHOUSE	510 W JACKSON ST	AZ LUST	Higher	1437, NNW
L51	SHIRLEY WILCOX	548 W JACKSON ST	AZ LUST, AZ UST	Higher	1468, NNW
52	7TH AVE. LANDFILL	7TH AVE & LOWER BUCK	AZ SHWS	Lower	1495, SW
53	STERN PRODUCE CO INC	601 E JACKSON ST	AZ LUST, AZ UST	Higher	1496, NNW
54	FIRPO POULTRY	1010 S CENTRAL AVE	AZ WWFAC	Higher	1599, SE
55	MARICOPA COUNTY - WE	101 W JACKSON ST	AZ LUST, AZ UST	Higher	1700, NE
56	IMPERIAL LITHO & DRY	210 S 4TH AVE	AZ LUST, AZ UST	Higher	1736, North
57	PARCEL 112-19-127	525 W MADISON ST	AZ LUST, AZ UST	Higher	1801, NNW
58	MARICOPA COUNTY - MA	225 W MADISON ST	AZ LUST, AZ UST	Higher	1838, NNE
59	CIRCLE K #2701843	10 E BUCKEYE RD	AZ LUST, AZ UST, AZ Financial Assurance	Higher	1871, SE
60	ARIZONA LIFT TRUCKS	317 S 9TH AVE	AZ LUST, AZ UST	Higher	2111, NW
61	MARICOPA COUNTY COUR	111 S 3RD AVE	AZ LUST, AZ UST	Higher	2137, North
62	PHOENIX, CITY OF - G	NE CORNER 5TH AVE &	AZ LUST, AZ UST	Higher	2184, North
63	AJ BAYLESS WAREHOUSE	111 E BUCKEYE RD	AZ LUST, AZ UST	Higher	2199, SE
64	EXCESS DISTRIBUTORS	946 W LINCOLN ST	AZ LUST, AZ UST	Lower	2213, West
O65	COCA-COLA FACILITY	1301 S CENTRAL AVE	AZ LUST, AZ UST	Higher	2272, SE
O66	INTERSTATE PARTS & M	1321 S. CENTRAL	AZ SHWS	Higher	2345, SE
O67	ARIZONA PUMP AND SUP	1308 S. CENTRAL	AZ SHWS	Higher	2350, SE
P68	CITY OF PHOENIX - FI	125 E MADISON ST	AZ LUST, AZ UST	Higher	2513, NE
P69	AMERICA WEST ARENA/F	102 E MADISON ST	AZ LUST, AZ UST	Higher	2519, NE
Q70	PHOENIX ILLUMINATING	SWC W WASHINGTONAND	EDR MGP	Higher	2535, North
71	ARIZONA BUS LINES IN	814 W JEFFERSON ST	AZ LUST, AZ UST	Higher	2545, NW
Q72	PHOENIX COPMEA BUILD	444 W WASHINGTON ST	AZ LUST, AZ UST	Higher	2574, North
R73	CENTRAL TIRE	1500 S. CENTRAL	AZ SHWS	Higher	2576, SSE
S74	CITY OF PHOENIX - MU	301 W WASHINGTON ST	AZ LUST, AZ UST	Higher	2577, North

MAPPED SITES SUMMARY

Target Property Address:
331 W. GRANT STREET
PHOENIX, AZ 85003

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft.) DIRECTION
S75	MUNICIPAL COURT/STOW	324 W WASHINGTON ST	AZ LUST, AZ UST	Higher	2583, North
R76	AXLE TRANSMISSION OF	1401 S CENTRAL AVE	AZ SHWS, AZ UST, AZ Financial Assurance	Higher	2610, SSE
77	CITY OF PHOENIX - MU	12 N 4TH AVE	AZ LUST, AZ UST	Higher	2621, North
78	MISSION UNIFORM SERV	1606 S 1ST AVE	AZ SHWS, AZ UST	Lower	3069, SSE
T79	BUDS OIL SERV INC	1340 W LINCOLN ST	RCRA-TSDF, CERC-NFRAP, CORRACTS, RCRA-LQG, PADS,.	Lower	3297, West
T80	BUD'S OIL	1340 W LINCOLN ST	AZ SHWS	Lower	3297, West
81	ALLEN & COWLEY	625 S. 5TH STREET	AZ SHWS, AZ Dry Wells	Higher	3348, East
82	EAST WASHINGTON FLUF	443 E. BUCKEYE	AZ SPL, AZ SHWS, AZ Dry Wells	Higher	3374, ESE
83	DESERT SPECIALTIES	1020 S 5TH ST	AZ SHWS	Higher	3488, ESE
84	ARIZONA RECYCLING	400 S. 15TH AVE.	AZ SHWS	Lower	3720, WNW
U85	KARLSON MACHINE WORK	605 E GRANT	AZ SHWS	Higher	3855, East
86	LINCOLN LASER CO.	234 E. MOHAVE	AZ SHWS	Higher	4001, SE
U87	KARLSON MACHINE WORK	743 S 7TH ST	AZ SHWS, AZ UST	Higher	4045, East
88	TURCO PRODUCTS DIVIS	365 N. 6TH AVE.	AZ SHWS	Higher	4052, North
89	PHOENIX NEWSPAPERS I	120 E VAN BUREN	AZ SHWS	Higher	4166, NNE
90	QUALITY PRINTED CIRC	1831 S CENTRAL	AZ SHWS	Lower	4211, SSE
V91	CAPITAL ENGINEERING	724 E SOUTHERN PACIF	AZ SHWS, AZ UST	Higher	4398, East
V92	CHEMONICS INDUSTRIES	734 EAST SOUTHERN PA	AZ SHWS, AZ Dry Wells, AZ Aquifer	Higher	4443, East
V93	CANYON INDUSTRIES	734 E. SOUTHERN PACI	AZ SHWS, AZ SPILLS	Higher	4443, East
V94	RAIL SPUR PESTICIDE	734 E. SOUTHERN PACI	AZ SHWS	Higher	4443, East
95	CHECKER CAB	8TH PLACE & SHERMAN	AZ SHWS	Higher	4498, East
96	HAY'S ROOFING AND SU	747 E. BUCKEYE RD.	AZ SHWS	Higher	4515, ESE
97	CYPRUS SPECIALTY STE	1500 S 7TH ST	AZ SHWS	Higher	4667, ESE
98	B & A TRAILER REPAIR	310 W. WATKINS ST.	AZ SHWS	Higher	5197, South
99	CHEM RESEARCH	1101 W HILTON	CERC-NFRAP, RCRA-SQG, FINDS, AZ SHWS, AZ AZURITE	Lower	5206, SSW

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following records. For more information on this property see page 7 of the attached EDR Radius Map report:

Site	Database(s)	EPA ID
APS GRANT STREET YAR 331 W GRANT STREET PHOENIX, AZ 85003	AZ VCP	N/A

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: A review of the NPL list, as provided by EDR, and dated 04/26/2013 has revealed that there is 1 NPL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FREESCALE SEMICONDUC	***5005 E MCDOWELL RD***	***N 1/8 - 1/4 (0.204 mi.)***	***0***	***7***

Federal CERCLIS list

CERCLIS: A review of the CERCLIS list, as provided by EDR, and dated 04/26/2013 has revealed that there is 1 CERCLIS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FREESCALE SEMICONDUC	***5005 E MCDOWELL RD***	***N 1/8 - 1/4 (0.204 mi.)***	***0***	***7***

EXECUTIVE SUMMARY

Federal CERCLIS NFRAP site List

CERC-NFRAP: A review of the CERC-NFRAP list, as provided by EDR, and dated 04/26/2013 has revealed that there is 1 CERC-NFRAP site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
ARIZONA PLATING & AN	*618 S CENTRAL AVE*	*ENE 1/4 - 1/2 (0.267 mi.)*	*N48*	*18*

Federal RCRA CORRACTS facilities list

CORRACTS: A review of the CORRACTS list, as provided by EDR, and dated 09/10/2013 has revealed that there are 2 CORRACTS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FREESCALE SEMICONDUC	*5005 E MCDOWELL RD*	*N 1/8 - 1/4 (0.204 mi.)*	*0*	*7*
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
BUDS OIL SERV INC	*1340 W LINCOLN ST*	*W 1/2 - 1 (0.624 mi.)*	*T79*	*27*

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: A review of the RCRA-TSDF list, as provided by EDR, and dated 09/10/2013 has revealed that there is 1 RCRA-TSDF site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FREESCALE SEMICONDUC	*5005 E MCDOWELL RD*	*N 1/8 - 1/4 (0.204 mi.)*	*0*	*7*

Federal RCRA generators list

RCRA-LQG: A review of the RCRA-LQG list, as provided by EDR, and dated 09/10/2013 has revealed that there is 1 RCRA-LQG site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FREESCALE SEMICONDUC	*5005 E MCDOWELL RD*	*N 1/8 - 1/4 (0.204 mi.)*	*0*	*7*

EXECUTIVE SUMMARY

Federal institutional controls / engineering controls registries

US ENG CONTROLS: A review of the US ENG CONTROLS list, as provided by EDR, and dated 06/17/2013 has revealed that there is 1 US ENG CONTROLS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FREESCALE SEMICONDUC	***5005 E MCDOWELL RD***	***N 1/8 - 1/4 (0.204 mi.)***	***0***	***7***

State- and tribal - equivalent NPL

AZ WQARF: A review of the AZ WQARF list, as provided by EDR, and dated 07/01/2012 has revealed that there are 2 AZ WQARF sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EAST WASHINGTON FLUF		***ESE 1/2 - 1 (0.616 mi.)***	***0***	***7***
WEST VAN BUREN		***NNW 0 - 1/8 (0.038 mi.)***	***0***	***7***

AZ NPL: A review of the AZ NPL list, as provided by EDR, and dated 07/01/2012 has revealed that there is 1 AZ NPL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MOTOROLA 52ND STREET		***N 1/4 - 1/2 (0.283 mi.)***	***0***	***7***

State- and tribal - equivalent CERCLIS

AZ SPL: A review of the AZ SPL list, as provided by EDR, and dated 08/25/2004 has revealed that there are 4 AZ SPL sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MOTOROLA 52ND STREET		***N 1/4 - 1/2 (0.283 mi.)***	***0***	***7***
EAST WASHINGTON FLUF		***ESE 1/2 - 1 (0.616 mi.)***	***0***	***7***
WEST VAN BUREN		***NNW 0 - 1/8 (0.038 mi.)***	***0***	***7***
EAST WASHINGTON FLUF	***443 E. BUCKEYE***	***ESE 1/2 - 1 (0.639 mi.)***	***82***	***28***

AZ SHWS: A review of the AZ SHWS list, as provided by EDR, and dated 01/03/2000 has revealed that there are 31 AZ SHWS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MARICOPA CO. MATERIA	319 W. BUCHANAN	NNE 1/8 - 1/4 (0.141 mi.)	C10	10
APS	501 S. 1ST ST.	ENE 1/8 - 1/4 (0.224 mi.)	H31	14
MARYATT LAUNDRY	720 WEST BUCHANAN	WNW 1/8 - 1/4 (0.235 mi.)	K36	15

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SOLVENT RENEWAL SERV	422 SOUTH 7TH AVENUE	NW 1/8 - 1/4 (0.238 mi.)	K42	17
ARIZONA PLATING AND	618 S CENTRAL AVE	ENE 1/4 - 1/2 (0.267 mi.)	N49	18
INTERSTATE PARTS & M	1321 S. CENTRAL	SE 1/4 - 1/2 (0.444 mi.)	O66	23
ARIZONA PUMP AND SUP	1308 S. CENTRAL	SE 1/4 - 1/2 (0.445 mi.)	O67	24
CENTRAL TIRE	1500 S. CENTRAL	SSE 1/4 - 1/2 (0.488 mi.)	R73	25
AXLE TRANSMISSION OF	***1401 S CENTRAL AVE***	***SSE 1/4 - 1/2 (0.494 mi.)***	***R76***	***26***
ALLEN & COWLEY	***625 S. 5TH STREET***	***E 1/2 - 1 (0.634 mi.)***	***81***	***28***
EAST WASHINGTON FLUF	***443 E. BUCKEYE***	***ESE 1/2 - 1 (0.639 mi.)***	***82***	***28***
DESERT SPECIALTIES	1020 S 5TH ST	ESE 1/2 - 1 (0.661 mi.)	83	28
KARLSON MACHINE WORK	605 E GRANT	E 1/2 - 1 (0.730 mi.)	U85	29
LINCOLN LASER CO.	234 E. MOHAVE	SE 1/2 - 1 (0.758 mi.)	86	29
KARLSON MACHINE WORK	***743 S 7TH ST***	***E 1/2 - 1 (0.766 mi.)***	***U87***	***29***
TURCO PRODUCTS DIVIS	365 N. 6TH AVE.	N 1/2 - 1 (0.767 mi.)	88	29
PHOENIX NEWSPAPERS I	120 E VAN BUREN	NNE 1/2 - 1 (0.789 mi.)	89	29
CAPITAL ENGINEERING	***724 E SOUTHERN PACIF***	***E 1/2 - 1 (0.833 mi.)***	***V91***	***30***
CHEMONICS INDUSTRIES	***734 EAST SOUTHERN PA***	***E 1/2 - 1 (0.841 mi.)***	***V92***	***30***
CANYON INDUSTRIES	***734 E. SOUTHERN PACI***	***E 1/2 - 1 (0.841 mi.)***	***V93***	***30***
RAIL SPUR PESTICIDE	734 E. SOUTHERN PACI	E 1/2 - 1 (0.841 mi.)	V94	30
CHECKER CAB	8TH PLACE & SHERMAN	E 1/2 - 1 (0.852 mi.)	95	31
HAY'S ROOFING AND SU	747 E. BUCKEYE RD.	ESE 1/2 - 1 (0.855 mi.)	96	31
CYPRUS SPECIALTY STE	1500 S 7TH ST	ESE 1/2 - 1 (0.884 mi.)	97	31
B & A TRAILER REPAIR	310 W. WATKINS ST.	S 1/2 - 1 (0.984 mi.)	98	31

Lower Elevation	Address	Direction / Distance	Map ID	Page
7TH AVE. LANDFILL	7TH AVE & LOWER BUCK	SW 1/4 - 1/2 (0.283 mi.)	52	19
MISSION UNIFORM SERV	***1606 S 1ST AVE***	***SSE 1/2 - 1 (0.581 mi.)***	***78***	***27***
BUD'S OIL	1340 W LINCOLN ST	W 1/2 - 1 (0.624 mi.)	T80	28
ARIZONA RECYCLING	400 S. 15TH AVE.	WNW 1/2 - 1 (0.705 mi.)	84	28
QUALITY PRINTED CIRC	1831 S CENTRAL	SSE 1/2 - 1 (0.798 mi.)	90	30
CHEM RESEARCH	***1101 W HILTON***	***SSW 1/2 - 1 (0.986 mi.)***	***99***	***31***

State and tribal leaking storage tank lists

AZ LUST: A review of the AZ LUST list, as provided by EDR, and dated 11/01/2013 has revealed that there are 29 AZ LUST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
2ND AVENUE MANUFACTU Date Closed: 11/18/99	***505 S 2ND ST***	***ENE 1/8 - 1/4 (0.131 mi.)***	***B8***	***9***
APS Date Closed: 11/21/00	***502 S 2ND AVE***	***NE 1/8 - 1/4 (0.176 mi.)***	***E16***	***11***
MCDANIEL TRUCKING CO Date Closed: 05/26/06	***420 S 3RD AVE***	***NNE 1/8 - 1/4 (0.198 mi.)***	***G22***	***12***
SPRINT SWITCH Date Closed: 03/02/05	***401 W HARRISON ST***	***N 1/8 - 1/4 (0.224 mi.)***	***J30***	***14***
QWEST - PHOENIX SOUT Date Closed: 08/29/98	***450 S 5TH AVE***	***NNW 1/8 - 1/4 (0.238 mi.)***	***L41***	***16***
MIRANDA'S CUSTOM CAR Date Closed: 04/10/07	***706 S CENTRAL AVE***	***E 1/4 - 1/2 (0.262 mi.)***	***46***	***17***

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CITY OF PHOENIX - MU Date Closed: 06/16/98	***429 W JACKSON ST***	***N 1/4 - 1/2 (0.266 mi.)***	***J47***	***18***
VACANT WAREHOUSE Date Closed: 01/25/95	510 W JACKSON ST	NNW 1/4 - 1/2 (0.272 mi.)	L50	18
SHIRLEY WILCOX Date Closed: 11/16/99	***548 W JACKSON ST***	***NNW 1/4 - 1/2 (0.278 mi.)***	***L51***	***19***
STERN PRODUCE CO INC Date Closed: 07/12/06	***601 E JACKSON ST***	***NNW 1/4 - 1/2 (0.283 mi.)***	***53***	***19***
MARICOPA COUNTY - WE Date Closed: 10/21/98 Date Closed: 03/02/87	***101 W JACKSON ST***	***NE 1/4 - 1/2 (0.322 mi.)***	***55***	***20***
IMPERIAL LITHO & DRY Date Closed: 06/04/98	***210 S 4TH AVE***	***N 1/4 - 1/2 (0.329 mi.)***	***56***	***20***
PARCEL 112-19-127 Date Closed: 01/11/95	***525 W MADISON ST***	***NNW 1/4 - 1/2 (0.341 mi.)***	***57***	***20***
MARICOPA COUNTY - MA Date Closed: 03/24/05	***225 W MADISON ST***	***NNE 1/4 - 1/2 (0.348 mi.)***	***58***	***21***
CIRCLE K #2701843 Date Closed: 05/23/06	***10 E BUCKEYE RD***	***SE 1/4 - 1/2 (0.354 mi.)***	***59***	***21***
ARIZONA LIFT TRUCKS Date Closed: 05/16/00	***317 S 9TH AVE***	***NW 1/4 - 1/2 (0.400 mi.)***	***60***	***21***
MARICOPA COUNTY COUR Date Closed: 06/27/05	***111 S 3RD AVE***	***N 1/4 - 1/2 (0.405 mi.)***	***61***	***22***
PHOENIX, CITY OF - G Date Closed: 09/17/90	***NE CORNER 5TH AVE &***	***N 1/4 - 1/2 (0.414 mi.)***	***62***	***22***
AJ BAYLESS WAREHOUSE Date Closed: 11/30/98	***111 E BUCKEYE RD***	***SE 1/4 - 1/2 (0.416 mi.)***	***63***	***22***
COCA-COLA FACILITY Date Closed: 11/08/05	***1301 S CENTRAL AVE***	***SE 1/4 - 1/2 (0.430 mi.)***	***O65***	***23***
CITY OF PHOENIX - FI Date Closed: 03/30/06	***125 E MADISON ST***	***NE 1/4 - 1/2 (0.476 mi.)***	***P68***	***24***
AMERICA WEST ARENA/F Date Closed: 09/26/00	***102 E MADISON ST***	***NE 1/4 - 1/2 (0.477 mi.)***	***P69***	***24***
ARIZONA BUS LINES IN Date Closed: 09/18/98	***814 W JEFFERSON ST***	***NW 1/4 - 1/2 (0.482 mi.)***	***71***	***25***
PHOENIX COPMEA BUILD Date Closed: 09/24/98	***444 W WASHINGTON ST***	***N 1/4 - 1/2 (0.488 mi.)***	***Q72***	***25***
CITY OF PHOENIX - MU Date Closed: 05/05/94	***301 W WASHINGTON ST***	***N 1/4 - 1/2 (0.488 mi.)***	***S74***	***26***
MUNICIPAL COURT/STOW Date Closed: 05/23/97	***324 W WASHINGTON ST***	***N 1/4 - 1/2 (0.489 mi.)***	***S75***	***26***
CITY OF PHOENIX - MU Date Closed: 12/13/94	***12 N 4TH AVE***	***N 1/4 - 1/2 (0.496 mi.)***	***77***	***27***

Lower Elevation	Address	Direction / Distance	Map ID	Page
CONTRACTORS ABATEMEN Date Closed: 07/21/98	***600 W GRANT ST***	***W 0 - 1/8 (0.090 mi.)***	***A5***	***8***

Lower Elevation	Address	Direction / Distance	Map ID	Page
EXCESS DISTRIBUTORS	***946 W LINCOLN ST***	***W 1/4 - 1/2 (0.419 mi.)***	***64***	***23***
Date Closed: 10/15/98				

State and tribal registered storage tank lists

AZ UST: A review of the AZ UST list, as provided by EDR, and dated 11/05/2013 has revealed that there are 11 AZ UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FREESCALE SEMICONDUC	***5005 E MCDOWELL RD***	***N 1/8 - 1/4 (0.204 mi.)***	***0***	***7***
CHAMBERS MOVING & ST	523 S 6TH DR	NW 0 - 1/8 (0.117 mi.)	7	9
Closure Type: Perm Removal				
2ND AVENUE MANUFACTU	***505 S 2ND ST***	***ENE 1/8 - 1/4 (0.131 mi.)***	***B8***	***9***
Closure Type: Perm Removal				
Closure Type: Perm Closure				
APS	***502 S 2ND AVE***	***NE 1/8 - 1/4 (0.176 mi.)***	***E16***	***11***
Closure Type: Perm Removal				
MCDANIEL TRUCKING CO	***420 S 3RD AVE***	***NNE 1/8 - 1/4 (0.198 mi.)***	***G22***	***12***
Closure Type: Perm Removal				
MISSION UNIFORM SERV	621 S 1ST AVE	E 1/8 - 1/4 (0.211 mi.)	24	13
Closure Type: Perm Removal				
DOWNTOWN PHOENIX LOF	424 S 2ND AVE	NE 1/8 - 1/4 (0.218 mi.)	E27	13
SPRINT SWITCH	***401 W HARRISON ST***	***N 1/8 - 1/4 (0.224 mi.)***	***J30***	***14***
Closure Type: Perm Closure				
ALSCO	720 W BUCHANAN ST	WNW 1/8 - 1/4 (0.235 mi.)	K39	16
Closure Type: Perm Removal				
QWEST - PHOENIX SOUT	***450 S 5TH AVE***	***NNW 1/8 - 1/4 (0.238 mi.)***	***L41***	***16***
Closure Type: Perm Closure				
Closure Type: Perm Removal				

Lower Elevation	Address	Direction / Distance	Map ID	Page
CONTRACTORS ABATEMEN	***600 W GRANT ST***	***W 0 - 1/8 (0.090 mi.)***	***A5***	***8***
Closure Type: Perm Removal				

AZ AST: A review of the AZ AST list, as provided by EDR, and dated 09/16/2013 has revealed that there is 1 AZ AST site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
APS 502 SERVICE CENT	502 SOUTH 2ND AVENUE	NE 1/8 - 1/4 (0.176 mi.)	E17	11

State and tribal voluntary cleanup sites

AZ VCP: A review of the AZ VCP list, as provided by EDR, and dated 07/16/2013 has revealed that there is 1 AZ VCP site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
2ND AVENUE MANUFACTU	***505 S 2ND ST***	***ENE 1/8 - 1/4 (0.131 mi.)***	***B8***	***9***

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

RCRA NonGen / NLR: A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 09/10/2013 has revealed that there are 7 RCRA NonGen / NLR sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
APS CO 501 COMPLEX	***501 S 2ND AVE***	***NE 1/8 - 1/4 (0.154 mi.)***	***B12***	***10***
PHOENIX CITY OF NIH	***701 W BUCHANAN***	***WNW 1/8 - 1/4 (0.224 mi.)***	***K32***	***14***
CRAFT INK COMPANY	***715 W BUCHANAN***	***WNW 1/8 - 1/4 (0.231 mi.)***	***K34***	***15***
NATIONAL ENVIRONMENT	***737 W BUCHANAN ST***	***WNW 1/8 - 1/4 (0.242 mi.)***	***K43***	***17***
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
CONTRACTORS ABATEMEN	***717 S 7TH AVE***	***W 1/8 - 1/4 (0.174 mi.)***	***D15***	***11***
PHOENIX CITY OF MATT	***820 S 7TH AVE APTS 1***	***SW 1/8 - 1/4 (0.197 mi.)***	***F21***	***12***
O & M ENVIR REMEDIAT	1101 S 5TH AVE	SSW 1/8 - 1/4 (0.217 mi.)	25	13

ROD: A review of the ROD list, as provided by EDR, and dated 04/26/2013 has revealed that there is 1 ROD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FREESCALE SEMICONDUC	***5005 E MCDOWELL RD***	***N 1/8 - 1/4 (0.204 mi.)***	***0***	***7***

AZ MANIFEST: A review of the AZ MANIFEST list, as provided by EDR, and dated 12/31/2007 has revealed that there are 2 AZ MANIFEST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FREESCALE SEMICONDUC	***5005 E MCDOWELL RD***	***N 1/8 - 1/4 (0.204 mi.)***	***0***	***7***
APS CO 501 COMPLEX	***501 S 2ND AVE***	***NE 1/8 - 1/4 (0.154 mi.)***	***B12***	***10***

EXECUTIVE SUMMARY

NY MANIFEST: A review of the NY MANIFEST list, as provided by EDR, and dated 12/31/2007 has revealed that there is 1 NY MANIFEST site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FREESCALE SEMICONDUC	***5005 E MCDOWELL RD***	***N 1/8 - 1/4 (0.204 mi.)***	***0***	***7***

AZ WWFAC: A review of the AZ WWFAC list, as provided by EDR, and dated 07/09/2012 has revealed that there is 1 AZ WWFAC site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FIRPO POULTRY	1010 S CENTRAL AVE	SE 1/4 - 1/2 (0.303 mi.)	54	19

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: A review of the EDR MGP list, as provided by EDR, has revealed that there are 2 EDR MGP sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
APS 2ND AVE MGP	505 S 2ND AVE	ENE 1/8 - 1/4 (0.131 mi.)	B9	10
PHOENIX ILLUMINATING	SWC W WASHINGTONAND	N 1/4 - 1/2 (0.480 mi.)	Q70	24

EDR US Hist Auto Stat: A review of the EDR US Hist Auto Stat list, as provided by EDR, has revealed that there are 13 EDR US Hist Auto Stat sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	433 S 3RD AVE	NNE 1/8 - 1/4 (0.191 mi.)	C19	12
DELGADO ALPHONSO	415 S 3RD	NNE 1/8 - 1/4 (0.203 mi.)	G23	12
Not reported	513 S 1ST AVE	ENE 1/8 - 1/4 (0.221 mi.)	H28	13
ALL STAR COACH CO IN	720 W BUCHANAN ST	WNW 1/8 - 1/4 (0.235 mi.)	K37	15
SMITH JOSEPH E WHEEL	318 S 2ND AVE	NNE 1/8 - 1/4 (0.249 mi.)	M44	17

Lower Elevation	Address	Direction / Distance	Map ID	Page
Not reported	621 S 5TH AVE	WNW 0 - 1/8 (0.044 mi.)	A3	8
DUENAS D R	1025 S 3RD AVE	SSE 1/8 - 1/4 (0.169 mi.)	13	10
NICKS GARAGE	717 S 7TH AVE	W 1/8 - 1/4 (0.174 mi.)	D14	11
GRAVETTE J H	702 S 7TH AVE	WSW 1/8 - 1/4 (0.180 mi.)	D18	11
Not reported	907 S 7TH AVE	WSW 1/8 - 1/4 (0.193 mi.)	F20	12
MARTINEZ DAVID	902 S 7TH AVE	SW 1/8 - 1/4 (0.217 mi.)	F26	13
ZELLER WM	924 S 7TH	SW 1/8 - 1/4 (0.223 mi.)	I29	14
JOYCE A J	1023 S 7TH AVE	SW 1/8 - 1/4 (0.237 mi.)	I40	16

EXECUTIVE SUMMARY

EDR US Hist Cleaners: A review of the EDR US Hist Cleaners list, as provided by EDR, has revealed that there are 8 EDR US Hist Cleaners sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DE LUXE CLEANERS & D	706 S 3RD	E 0 - 1/8 (0.062 mi.)	4	8
MARONEYS CLEANERS &	720 W BUCHANAN ST	WNW 1/8 - 1/4 (0.235 mi.)	K38	16
THARPES CLEANATORIUM	321 S 2ND AVE	NNE 1/8 - 1/4 (0.249 mi.)	M45	17

Lower Elevation	Address	Direction / Distance	Map ID	Page
SESMA CLEANERS	371 W SHERMAN ST	0 - 1/8 (0.000 mi.)	2	8
STITT A L	623 W GRANT ST	W 0 - 1/8 (0.116 mi.)	6	9
SOUTHSIDE	1002 S 5TH AVE	SSW 1/8 - 1/4 (0.152 mi.)	11	10
STUDIO CLEANERS	932 S 7TH AVE	SW 1/8 - 1/4 (0.227 mi.)	I33	15
Not reported	740 W GRANT ST	W 1/8 - 1/4 (0.232 mi.)	35	15

Appendix D
Available Soil Boring Logs from Previous Investigations

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12/2/13

SAMPLE/CORE LOG

Boring/Well ~~MW-3~~ 3 Project/No. [illegible] Page 1 of 1

Site Location [illegible] Drilling Started 7.45 Drilling Completed 11.00

Total Depth Drilled 17 feet Hole Diameter 9 inches Type of Sample/ Coring Device SS

Length and Diameter of Coring Device 24"-long 2"-DIAMETER Sampling Interval 10'-continuous feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Boyle's Bros Driller Mike Holt Helper _____

Prepared By Ed Hagan Hammer Weight _____ Hammer Drop _____ inches

water table @ bgs = 0.0 ft each

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	2			Fill brown [illegible]
				w/ some fine S. clasts, no odor
2	4			Dark brown silty clay to 2.3'
				some lamplanti chunks, S. clasts, No odor
				3-4 Brown clayey silt, some S, no odor
4	6			Brown clayey silt S. moist
				No odor
				Core Sample at 4.5'
6	8			Brown silt [illegible] clay, fine sand
				clay - No odor
8	10			[illegible]
				Lost recovery
10	12.5			Soil Brown - light brown silty fine sand
				w/clay dry no odor
15	17			Brown F.G sand w/silt & clay
				clay, no odor

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SAMPLE/CORE LOG

Boring/Well GB-2 Project/No. AZ0430.001 Page 1 of 1

Site Location Grant St Drilling Started 11:30 Drilling Completed 12:00

Total Depth Drilled 18 feet Hole Diameter 9 inches Type of Sample/ Coring Device Split spoon

Length and Diameter of Coring Device 24"-long 2"-diameter Sampling Interval 10'-continuous feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Boyle's Bros Driller Mike Holt Helper _____

Prepared By Ed Hagan Hammer Weight _____ Hammer Drop _____ inches

water 7:00 12/21/93

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	2			Fill coarse gravel, cobbles silt + sand, clay, no odor
2	4			Black + brown interbedded clayey silt, s. moist no odor possibly coal/black mineral
4	6			Brown silt w/ clay s. moist -clay, no odor
6	8			Brown silt w/ fine sand + clay s. moist No odor No staining
8	10.5	2	12:00	Brown - light brown fine sand with silt + minor clay, s. moist no odor
10.5	12.5			Same as above
12.5	15	3'	100-1.5'	Fill coarse sand gravel cobbles
		15'	15' 50-2'	clay, no odor
				very slow drilling
15	18			No recovery in SS

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SAMPLE/CORE LOG

12/23/93

Boring/Well GB-4 Project/No. AZ0430.001 Page 1 of 2

Site Location Grant St Drilling Started 08:20 Drilling Completed 10:30

Total Depth Drilled 22 feet Hole Diameter 9 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device 24" Split Spoon 2"-diam Sampling Interval continuous -10' feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Boyles Bros Driller Mike Holt Helper ______

Prepared By Ed Hagan Hammer Weight ______ Hammer Drop ______ inches

350

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	
0	3				
3	5			Dark brown blk silty gravel S. moist no odor asphalt looking	20
5	6.5			Dark brown black silty gravel from 5-6' at 6' black asphalt-? silty sand, moist, slight odor gravel	20
6.5	7.5				
7	8.			Brown-light brn silt, clay, no odor	
8	10.5			Brown light brn to 9 9-10.5 clayey silt soft with white str-gray, s.moist, no odor	15
11	13			Brown soft clayey silt moist, no odor	25
13	15			Brown soft clayey silt w/ thin Black laminated stringers, s. moist, no odor	40

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SAMPLE/CORE LOG

Boring/Well GP-3 Project/No. AZ0430.01 Page 1 of 1

Site Location Grant St. Drilling Started ≈11:00 Drilling Completed 3 pm

Total Depth Drilled 60' feet Hole Diameter 11 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device 18"-long 1.5"-diameter Sampling Interval 10' feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used AIR Drilling Method Hammer

Drilling Contractor Layne Environmental Driller Art Helper _____

Prepared By Ed Hagan Hammer Weight _____ Hammer Drop _____ inches

(3/25/94)

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
25	30			sandy silt
30		5.0-3'		No recovery cuttings
		2.5.6		Sandy cuttings gray-medium-brown fine grained
30	38	7.0		Same as above
38	40			moist colors decrease
40		<1, <10		brown colored
40	50			Same as above No odors
50	—	7.0		
50	60			Same as above no odor
				Sandy medium silt
60		24-6"		No odor
collected		55	sample	TD = @ 60'
@	60'	<1, <10		at 60 moist spoon

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SAMPLE/CORE LOG

Boring/Well GB3B Project/No. AZ 0430.001 Page 1 of 1

Site Location Grant St Drilling Started 9:00 Drilling Completed 10:00

Total Depth Drilled 23 feet Hole Diameter 8 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device 18"-long 1.5"-diameter Sampling Interval ______ feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Geomechanics Driller ______ Helper ______

Prepared By Ed Hagan Hammer Weight ______ Hammer Drop ______ inches

Redrill at GB-3 2/23/94

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	1.5			Fill
[illegible]	2.5			Gravels [illegible] diameter
3	4.5		3,4,7	[illegible] bricks some [illegible]
				brown silty, s. moist, no odor
4.5	7			[illegible] 7 odors
7	7.5			Gravels dry odors
7.5	10			Brown silt s. moist odor
10	11.5		18,24,30	[illegible]
12	13		9,12,13	Brown olive silt s. moist
				odor
13	19			same as above
19	23			gravels & cobbles
				very dry

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12/21/9?

SAMPLE/CORE LOG

Boring/Well GB-3 Project/No. AZ0430.001 Page 1 of 1

Site Location Grant St Drilling Started 12 30 Drilling Completed 14:50

Total Depth Drilled 24 feet Hole Diameter 9 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device 24"-long 2" diameter Sampling Interval continuous feet

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Datum ____

Drilling Fluid Used ~~??~~ NONE Drilling Method HSA

Drilling Contractor Boyles Bros Driller Mike Holt Helper ____

Prepared By Ed Hagan Hammer Weight ____ Hammer Drop ____ inches

	Sample/Core Depth (feet below land surface) From	To	OVA Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
	0	3			Fill coarse sand gravel & cobbles
					w/silt S. moist No odor
	3	5	50		Dark Brown dense clayey
					silt w/sand, S.moist-moist,
					no odor
??	5	6	920		lampblack hard brittle silt
					clay, strong odor
:30	6	7	1000		Lampblack, hard dense ~~clay~~ gravel & cobble clay
					silty clay, moist, odor
.45	7	9	20		Brown silt w/fine sand
					clay - S.moist, No odor
					Brown - light brown
55	9	11	60		silty clay white streaks of
					$CaCO_3$-?, moist, ~~no~~ slight odor
'20	11	13	90		Brown mix w/ clay layers +
					Fine Sands, moist odor
.30	13	15	10	~~50 4.5~~"	Brown Coarse Sand moist, odor
	15	19			"
	19	20		50 5"	Coarse Sand moist odor

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SAMPLE/CORE LOG

Boring/Well CH4 Project/No. AZ0430.001 Page 2 of 2

Site Location Grant st. Drilling Started 08:20 Drilling Completed 10:30

Total Depth Drilled 22 feet Hole Diameter 9 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device 24"-long 2.0" diameter Sampling Interval continuous to 10' feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Boyles Bros Driller M. Holt Helper _____

Prepared By Ed Hagen Hammer Weight _____ Hammer Drop _____ inches

12/23/93

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
15	17			Med. coarse sand gravel to cobbles 10
				Smooth, no odor
20	22			Sand as above but 30
				No cobbles
				Pull casing 5' to
				reveal screen 7 to 11'
				10:30 Finish reading

/

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12/22/93

SAMPLE/CORE LOG

Boring/Well GB-5 Project/No. AZ0430.001 Page 1 of 2

Site Location Grant St. Drilling Started 08:30 Drilling Completed ~~15:00~~ 14:05

Total Depth Drilled 32 feet Hole Diameter 9 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device 24" long 2" diameter Sampling Interval Continuous - 10 feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used — NONE Drilling Method HSA

Drilling Contractor Boyle's Bros Driller M. Holt Helper _____

Prepared By Ed Hagan Hammer Weight _____ Hammer Drop _____ inches

cold @ 35°

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	2			8" Concrete pad at 2 ~~[illegible]~~ out
				Fill above concrete silt to gravel brown S. moist, no odor
2.5	3			
3	5			Dark brown silt w/clay, +fine sand S. moist no odor 30
5	7			~~Brown~~ Same as above very dense dryer + stiffer, no odor 40
7	9			Brown silty fine sand little clay Not as ~~stiff as last~~ well (consolidated) dry S. moist No odor 2C
9	10			No SS recovery
				cobbles at 10'
				Drill to 16' silt sand + cobbles
16	17			Brown sandy silt w/ lampblack chunks, dry-S. moist no odor 20
20	21			brown fine sand, w/ gravel, dry, very slight odor

12/22/93

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SAMPLE/CORE LOG

Boring/Well GB 5 Project/No. 430.001 Page 2 of 2

Site Location Grant St Drilling Started 08:30 Drilling Completed 14:05

Total Depth Drilled 32 feet Hole Diameter 9 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device 24" SS 2"-dia Sampling Interval Continuous to 10 feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Boyles Bros Driller Mike Holt Helper Corey

Prepared By Earl Hagen Hammer Weight _____ Hammer Drop _____ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
21	24			gray-brown cuttings pea gravel to cobbles w/ fine sand silt matrix, dry. Slight to no odor
25	26			~~sand~~ - fine sand w/ gravel very slight odor. very dry
30	31			No recovery
31	32			Recovery 1' ~~sand~~ fine sand & gravels w/ cobbles dry very slight odor clean sample
				Drill to 33' TD
10				STOP Drilling
				Pull Augers backfill hole grout + Asphalt patch
4:05				Move to GB-6

Not enough Recovery for Chem

Chem 2d

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SAMPLE/CORE LOG

12/22/93

Boring/Well GB-6 Project/No. 430.001 Page 1 of 1

Site Location Grant St. Drilling Started 14:20 Drilling Completed 16:00

Total Depth Drilled 20 feet Hole Diameter 9 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"-long 2"-diam Sampling Interval Continuous feet to 20

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used _____ Drilling Method HSA

Drilling Contractor Boyles Bros Driller M. Holt Helper Corey

Prepared By Ed Hagen Hammer Weight _____ Hammer Drop _____ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	2			Fill
2	4			Brown fine sandy silt w/ clay s. moist, no odor
4	6			Dark brn dense clayey silt s. moist, no odor
6	8			Brown dense clayey silt w/ sand s. moist no odor
~~8~~	10			No Recovery rocks unknown
10	12		11, 23, 21, 20	Brown - light brown sandy silt dry, no odor white stringers at 11.5-12'
12	15.5		15	15-15.5 dark brown dense silt dry - s. moist, no odor
15.5	17			brown med-fine sand uniform dry, no odor
17	20			Same as above
17				cobbles @ 20'

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SAMPLE/CORE LOG

12/22/93

Boring/Well CB-7 Project/No. A20430.001 Page 1 of 1

Site Location Cornet St Drilling Started 14:10 Drilling Completed 18:30

Total Depth Drilled 21 feet Hole Diameter 9 inches Type of Sample/Coring Device ~~Cat~~ Split Spoon

Length and Diameter of Coring Device 24" 2" diameter Sampling Interval Continuous - 10 feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Boyle's Bros Driller M. Holt Helper Corey

Prepared By Ed Hagen Hammer Weight _____ Hammer Drop _____ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	3.5			Brown Fill Silts w/ cobbles & well graded sandy gravels, dry - S. moist, no odor
3.5	4.5			Same as above 30
4.5	6.5			clays, silts 15 Brown well graded fine - coarse sands w/ gravels possibly Fill S. moist, no odor very slow drilling
				Increase in water at 6.5' to 7.5'
6.5	10.5			Brown sandy silt w/ some clay & gravels, dry No odor
11	13			Same as above white stringers
15	17			Brown silty sandy ~~clay~~ w/ minor clay & gravel, dry, no odor
17	18			"
18	20			Brown fine silt matrix S. moist, no odor
20	21			Gravels & stone

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VE well Install

SAMPLE/CORE LOG

Boring/Well EW-5 Project/No. AZ0430.002 Page 1 of 1

Site Location Graf st Drilling Started 08:30 Drilling Completed 9:15

Total Depth Drilled 10 feet Hole Diameter ~~8~~ 10 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device 18"-long 1.5" diameter Sampling Interval 5 & 10 feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Geomechanics SW Driller Dwayne (Bean) Helper _____

Prepared By Ed Hagan Hammer Weight _____ Hammer Drop _____ inches

5/9/94

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	~~5~~			Dark Brown silt s. moist no odor 0'-5'
3	4			
4	5			Brick dust Brick silt, s. moist, slight odor of moth balls
5	6.0		5, 18, 9	5-5.5 lampblack silt chunks of Brick s. moist, very slight odor
6.0	10			Dark Brown-Brown silt w/ some clay s. moist, No odor
10	11		5, 8, 8	Lt Brown silt, less clay white veins, dry, no odor 9:15

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UEPT

SAMPLE/CORE LOG

Boring/Well EW-4 Project/No. AZ 0730.002 Page 1 of 1

Site Location Grant St Drilling Started 10:30 Drilling Completed

Total Depth Drilled 10 feet Hole Diameter ~~8~~ 10 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device 18"-long 1.5"-diameter Sampling Interval ~~5~~ 2 feet

Land-Surface Elev. feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Geomechanics SW Driller Dwayne Helper

Prepared By Ed Hagan Hammer Weight Hammer Drop inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	2			~~Dark~~ Brown Fill with gravel, silt, some brick, moist
				No odor
2	5			Dark Brown silt with clay, some orange brick fragments, moist,
				No odor
5	6		2-2-3	~~well graded silty sand~~ Fill some light black + brick, moist
				No odor
6	7			Black organic rich material, clayey, fiber, moist, no odor
7	7.5			Cobbles,
7.5	10			Brown silt, w/clay, moist, no odor

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VEPT 5/9/94

SAMPLE/CORE LOG

Boring/Well EW-3 Project/No. AZ0430.002 Page 1 of 1

Site Location Grant St Drilling Started 12:00 Drilling Completed

Total Depth Drilled 10 feet Hole Diameter ~~8~~ 10 inches Type of Sample/ Coring Device split spoon

Length and Diameter of Coring Device 18" long x 1.5"-diameter Sampling Interval 5 & 10 feet

Land-Surface Elev. feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Geomechanics SW Driller Dwayne Helper

Prepared By Ed Hagan Hammer Weight Hammer Drop inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	
0	5			Brown Fill well graded gravel cobbles, s. moist - dry - No odor	12:00
5	6		8-8-5	No recovery cobbles + gravels	
6	7.5		30-20-20	Poor recovery cobbles + gravels red brick chunks small 1" inch of lampblack, slight Naph odor from Boreh	
6.5	7.5			Inch of lampblack mixed w/gravel cuttings dry - moderate Naph odor	
8	9.5		10,12,12	No recovery	
8	10			Brown silt	

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VEPT

SAMPLE/CORE LOG

5/9/94

Boring/Well MP-7 Project/No. AZ0430.002 Page 1 of 1

Site Location Cramer st Drilling Started 2:50 Drilling Completed 3:15

Total Depth Drilled 26.5 feet Hole Diameter 8 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device 18"-long 2 1.5"-diameter Sampling Interval 5' feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Geomechanics SW Driller Dwayne Helper _____

Prepared By Ed Hagan Hammer Weight _____ Hammer Drop _____ inches

2:50

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	3.5			Brown ~~sit~~ ~~mst~~ gravels cobbles ~~wet~~ in a silty-sandy Matrix S. moist No odor
3.5	5.0			gravels + cobbles in a silty Lamphlack Type matrix dry, slight odor
5'	6.5		14-6-5	Tri to sample 3:05 Pure lamblack, extremely dense + rubbery moderate to strong odor S. moist to moist, out of Spoon and Lng Cylinder Very fine grained clayey + Plastic

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SAMPLE/CORE LOG

5/9/94

Boring/Well MP-1 Project/No. AZ0430.002 Page 1 of 1

Site Location Grant St. Drilling Started 3:45 Drilling Completed 4:00

Total Depth Drilled 6 feet Hole Diameter 8 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device 18"-long 1.5"-diameter Sampling Interval 5' feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Geomechanics SW Driller Dwayne Helper _____

Prepared By Ed Hagan Hammer Weight _____ Hammer Drop _____ inches

Tim core Back says Soil

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	3			Fill Brown gravels + cobbles in silty matrix, dry, no odor
3	4			Brown, silt dry-slmoist, no odor
4	5			Lampback dry silty crumbly moderate odor less than at MP-2
5	6			~~5-5.5~~ 5-5.5 same as above 4'oc
				5.5-6.0 very damp moist lampblack same as in MP-2
				Plastic + rubbery strong odor

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VEPT

5/9/94

SAMPLE/CORE LOG

Boring/Well EW 1 Project/No. A-2430.002 Page 1 of 1

Site Location Grant St. Apts Drilling Started ~4:30 Drilling Completed 5:45

Total Depth Drilled 10 feet Hole Diameter 10 inches Type of Sample/ Coring Device split spoon

Length and Diameter of Coring Device 18"-long 3" -diameter Sampling Interval 3, 4.5 feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Geomechanics SW Driller Dwayne Helper _____

Prepared By Ed Hagan Hammer Weight _____ Hammer Drop _____ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	3			Fill, Brown cobbles & gravel in a silty sandy matrix, dry - s. moist No odor
3.5			3,6,10	Brown silty clay & well graded sand s. moist, no odor soil is molding some asphalt chunks in soil
4.5	6		6,14,13	~~Black~~ N. recovery
6	7.5			N. Recovery
4.5	8			Dark Brn Black gravel & cobbles in a silt fine grained sand matrix, slight high water dry.
8	10			Brown - Dark brn silt s. moist No odor
				set Double well

4/c

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VEPT

SAMPLE/CORE LOG

5/9/94

Boring/Well EW3 Project/No. AZ0430.001 Page 1 of 1

Site Location Grant St Drilling Started 6 pm Drilling Completed 6:30

Total Depth Drilled 10 feet Hole Diameter 10 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device 18" long 1.5"-diameter Sampling Interval 5' feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Geomechanics SW Driller Dwayne Helper _____

Prepared By Ed Hagen Hammer Weight _____ Hammer Drop _____ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	3			Dark Brn Fill, gravel & cobbles w/ silt, dry, s.moist No odor
3	5			Black Dk Brn gravels & cobbles w/silt s.moist No odor
5	6.5		4,2,5	Lt/M Brn - Brn silt, faint soft white veins, dry - s.moist No odor 10:15
6.5	10			Same as above
				Set Double well

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Dec 22, 93

SAMPLE/CORE LOG

Boring/Well HA-1 Project/No. AZ0430.001 Page ____ of ____

Site Location Grant st. Drilling Started ____ Drilling Completed ____

Total Depth Drilled 5 feet Hole Diameter ____ inches Type of Sample/ Coring Device ____

Length and Diameter of Coring Device ____ Sampling Interval ____ feet

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Datum ____

Drilling Fluid Used ____ Drilling Method ____

Drilling Contractor ____ Driller ____ Helper ____

Prepared By Ed Hagan Hammer Weight ____ Hammer Drop ____ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	1			Light Brown silty sand w/ gravel slightly moist, No odor
1	2			lots of gravels same as above
25				Refusal cobbles large stones more hole
0	1			Light Brown silty sand w/ gravel S. moist, no odor
1	2			Same as above
2	3			Same as above more clay
3	4			Brown silt-sands & clay trace gravel, S. moist no odor
4	5			Same as above

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12/22/93

SAMPLE/CORE LOG

Boring/Well HA-2 Project/No. _____ Page _____ of _____

Site Location _____ Drilling Started _____ Drilling Completed _____

Total Depth Drilled 5 feet Hole Diameter _____ inches Type of Sample/ Coring Device _____

Length and Diameter of Coring Device _____ Sampling Interval _____ feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used _____ Drilling Method _____

Drilling Contractor _____ Driller _____ Helper _____

Prepared By Ed Hagan Hammer Weight _____ Hammer Drop _____ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	1			Brown silty fine sand
				w/ minor gravel, S. moist
				no odor
1	2			Brown Silty - Sandy - clay
				no gravel, S. moist, no odor
2	3			same as above
				Brown, well graded sand w
				~~Silt~~ + clay, S. moist, no odor
3	4			Brown clay - Sandy - silt
				trace black mottles - lamy black - ?
				S. moist no odor
4	5			Brown Silt w/ clay
Sampled				S. moist, no odor

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12/23/93

SAMPLE/CORE LOG

Boring/Well #A-4 Project/No. Graf ST Page ____ of ____

Site Location ____ Drilling Started ____ Drilling Completed ____

Total Depth Drilled 5 feet Hole Diameter ____ inches Type of Sample/ Coring Device ____

Length and Diameter of Coring Device ____ Sampling Interval ____ feet

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Datum ____

Drilling Fluid Used ____ Drilling Method ____

Drilling Contractor ____ Driller ____ Helper ____

Prepared By ____ Hammer Weight ____ Hammer Drop ____ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	1			Brown silty clay organic matter some gravel & sand, S. moist, no odor
1	2			Basically same as above maybe a little more sand
2	3			Brown fine sandy silt w/ clay S. moist, no odor
3	4			Same as above
4	5			Drk brown clayey silt S. moist, no odor

G&M Form 03.6.86

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12/22/93

SAMPLE/CORE LOG

Boring/Well HA-3 Project/No. AZ 430.001 Page ____ of ____

Site Location ____ Drilling Started ____ Drilling Completed ____

Total Depth Drilled 8 feet Hole Diameter ____ inches Type of Sample/ Coring Device ____

Length and Diameter of Coring Device ____ Sampling Interval ____ feet

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Datum ____

Drilling Fluid Used ____ Drilling Method ____

Drilling Contractor ____ Driller ____ Helper ____

Prepared By ____ Hammer Weight ____ Hammer Drop ____ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	1			Brown silty sand w/ gravels
				Some gravels, S. moist, no odor
1	2			same as above but more well graded
				more sand + gravels
				minor organic matter, no odor
2	3			dark brown clayey sand S. moist
				no odor
			sample	
3	4	X		Lampblack, brittle, silty, S. moist,
				No odor
4	5			Lampblack moister some
				organic matter
5	6			Still lampblack moist slightly
				Plastic no odor
6	7			Lampblack very moist clayey w/ some
				Sand no odor plastic
		X Sample		very gooey
7	8	Bottom Hole		Bottom very wet feels like

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SAMPLE/CORE LOG

1/20/94

Boring/Well HA-3B Project/No. AZ0430.001 Page 1 of 1

Site Location _____ Drilling Started _____ Drilling Completed _____

Total Depth Drilled _____ feet Hole Diameter _____ inches Type of Sample/ Coring Device Hand Auger

Length and Diameter of Coring Device _____ Sampling Interval _____ feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used _____ Drilling Method _____

Drilling Contractor _____ Driller _____ Helper _____

Prepared By Scott Hennessey Hammer Weight _____ Hammer Drop _____ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	1			Brown silty clay trace silt & gravel
				moist strong plasticity, no odor
1	2			Brown silt w/ clay & sand
				well graded trace charcoal Black mottles
				Damp, no odor
2	3			Black-Brown Sandy clay, damp, No odor
collect	sample 3'			
	↓			
3	3.5			lamp black, No odor - sampled
				slightly Brittle
3.5	5			Brown Silty clay, damp
				weak plasticity, No odor
collect	sample 5'			

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SOIL/SEDIMENT SAMPLING LOG

Project No. AZ0930.001 Page 1 of 10

Site Location Grant St.

Sample I.D. No. SS-1 Coded/Replicate No.

Date 9/29/93 Time of Sampling: Begin 10:35 End

Weather Sunny 90°

Site Description Grant St.

Planter outside W. side of Apt. N. of middle Entrance

SAMPLING DATA

Collection Method Hand Trowel

Depth 0 - 6" Moisture Content S. moist

Color Light brown Odor none

Description Silty - Sandy

Analyses Required

Metals + Cyanide

PAHs 8310

~~VOCs~~ BTEX 8020

Container Description

From Lab X or G&M

2 - 4oz Jars

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks

Sampler(s) Ed Hagan

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SOIL/SEDIMENT SAMPLING LOG

Project No. AZ0430.001 Page 2 of 10

Site Location Grant st.

Sample I.D. No. SS-2 Coded/Replicate No. _____

Date 9/29/93 Time of Sampling: Begin 10:50 End _____

Weather Sunny 90°

Site Description Just west of SW corner of BB court

SAMPLING DATA

Collection Method Hand Trowel

Depth 0-6" Moisture Content Dry

Color Tan - light Brown Odor None

Description Silty Sand w/ some stones

Analyses Required

Metals + Cyanide

PAHs 8310

BTEX 8020

Container Description

From Lab X or G&M _____

2 - 4oz Jars

Sample Monitoring (TIP, OVA, HNU, etc.) _____

Remarks _____

Sampler(s) Ed Hagan

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SOIL/SEDIMENT SAMPLING LOG

Project No. AZ0430.001 Page 3 of 10

Site Location Grant St.

Sample I.D. No. SS-3 Coded/Replicate No.

Date 9/29/93 Time of Sampling: Begin 11:10 End

Weather Sunny 90°

Site Description SW Corner Courtyard

SAMPLING DATA

Collection Method Hand trowel

Depth 0-6" Moisture Content S. moist

Color light Brown Odor None

Description silty - fine sand w/ lots of stones

Analyses Required

metals & cyanide

PAHs 8310

BTEX 8020

Container Description

From Lab X or G&M

2 - 4oz Jars

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks

Sampler(s) Ed Hagan

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SOIL/SEDIMENT SAMPLING LOG

Project No. AZ0430.001 Page 4 of 10

Site Location Grant St.

Sample I.D. No. SS-4 Coded/Replicate No. _____

Date 9/29/93 Time of Sampling: Begin 11:25 End _____

Weather Sunny 90°

Site Description under stairs middle of courtyard w. side of complex

SAMPLING DATA

Collection Method Hand Trowel

Depth 0-6 Moisture Content S. moist

Color Light Brown Odor None

Description Silt w/ some gravels & stones

Analyses Required

metals + cyanide

PAHs 8310

BTEX - 8020

Container Description

From Lab X or G&M _____

2 - 4oz Jars

Sample Monitoring (TIP, OVA, HNU, etc.) _____

Remarks _____

Sampler(s) Ed Hagan

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SOIL/SEDIMENT SAMPLING LOG

Project No. AZ0430.001 Page 5 of 10

Site Location Grant St

Sample I.D. No. SS-5 Coded/Replicate No. _____

Date 9/29/93 Time of Sampling: Begin 11:30 End _____

Weather Sunny 90°F

Site Description NE Corner of courtyard near ~~Courtyard Area~~ near shrubs ~~some major~~

SAMPLING DATA

Collection Method Hand Trowel

Depth ~~Brown~~ 0-6" Moisture Content S. moist

Color Brown Odor None

Description silt w/stones some organic matter

Analyses Required

Metals + Cyanide

PAHs 8310

BTEX 8020

Container Description

From Lab X or G&M _____

2 - 4 oz Jars

Sample Monitoring (TIP, OVA, HNU, etc.) _____

Remarks _____

Sampler(s) Ed Hagen

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SOIL/SEDIMENT SAMPLING LOG

Project No. AZ0430.001 Page 6 of 10

Site Location Grant St.

Sample I.D. No. SS-6 Coded/Replicate No. SS-11

Date 9/29/93 Time of Sampling: Begin 11:45 End

Weather Sunny 90-95°

Site Description SE corner of court yard

easy digging

SAMPLING DATA

Collection Method Hand Trowel

Depth 0-6" Moisture Content S. moist

Color Light Brown Odor None

Description landscape gravel 1/8" diameta on top

silt below.

Analyses Required

metals + cyanide

PAHs

BTEX

Container Description

From Lab X or G&M

2 - 4oz Jars

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks

Sampler(s) Ed Hagen

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SOIL/SEDIMENT SAMPLING LOG

Project No. AZ0430.001 Page 7 of 10

Site Location Grant St.

Sample I.D. No. SS-7 Coded/Replicate No. _____

Date 9/29/94 Time of Sampling: Begin 12:00 End _____

Weather 70-100°F Sunny

Site Description 5' outside Fence 3' east of sidewalk than runs onto side in N-S direction

SAMPLING DATA

Collection Method Hand trowel

Depth 0-6" Moisture Content dry

Color tan Odor None

Description Caliche - hard digging gravels + fine silt very dusty & dry

Analyses Required

metals + cyanide

PAHs 8310

BTEX 8020

Container Description

From Lab X or G&M _____

2- 4oz Soil Jars

Sample Monitoring (TIP, OVA, HNU, etc.) _____

Remarks _____

Sampler(s) Ed Hagen

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Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. AZ0430.001 Page 8 of 10

Site Location Grant St.

Sample I.D. No. E 55-8 Coded/Replicate No. _____

Date 9/29/93 Time of Sampling: Begin 12:20 End _____

Weather Sunny 90-100°

Site Description 5' outside of Fence east side of site

SAMPLING DATA

Collection Method Hand Trowel

Depth 0-6" Moisture Content dry

Color Tan Odor None

Description Caliche fine sand & gravels - stones

Analyses Required

metals + cyanide

PAHs 8310

BTEX 8020

Container Description

From Lab X or G&M _____

2 4 oz Soil Jars

Sample Monitoring (TIP, OVA, HNU, etc.) _____

Remarks _____

Sampler(s) Ed Hagen

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SOIL/SEDIMENT SAMPLING LOG

Project No. AZ0430.001 Page 9 of 10

Site Location Grant St.

Sample I.D. No. SS-9 Coded/Replicate No. _____

Date 9/29/93 Time of Sampling: Begin 12:40 End _____

Weather Sunny 90-100°

Site Description NW Corner Tonto & 1st
off site Background across from St. Anthonys

SAMPLING DATA

Collection Method Hand Trowel

Depth 0-6" Moisture Content dry

Color Light Brown Odor None

Description Silty w/ stones
Hard digging

Analyses Required

metals & cyanide
PAHs 8310
BTEX 8020

Container Description

From Lab X or G&M _____

2- 4 oz Soil Jars

Sample Monitoring (TIP, OVA, HNU, etc.) _____

Remarks _____

Sampler(s) Ed Hagan

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SOIL/SEDIMENT SAMPLING LOG

Project No. AZ0430.001 Page 10 of 10

Site Location Grant St.

Sample I.D. No. A SS-10 Coded/Replicate No.

Date 9/29/93 Time of Sampling: Begin 13:50 End

Weather Sunny 90-100°

Site Description SW corner Hadley & 6th Ave
across from Pre-school / Day care

SAMPLING DATA

Collection Method Hand Trowel

Depth 0-6 Moisture Content ~~Sa~~ Dry

Color Light Brown Odor None

Description Silty Sand
easy digging

Analyses Required

metals + cyanide
PAH 8310
BTEX 8020

Container Description

From Lab X or G&M

2 - 4 oz Jars

Sample Monitoring (TIP, OVA, HNU, etc.)

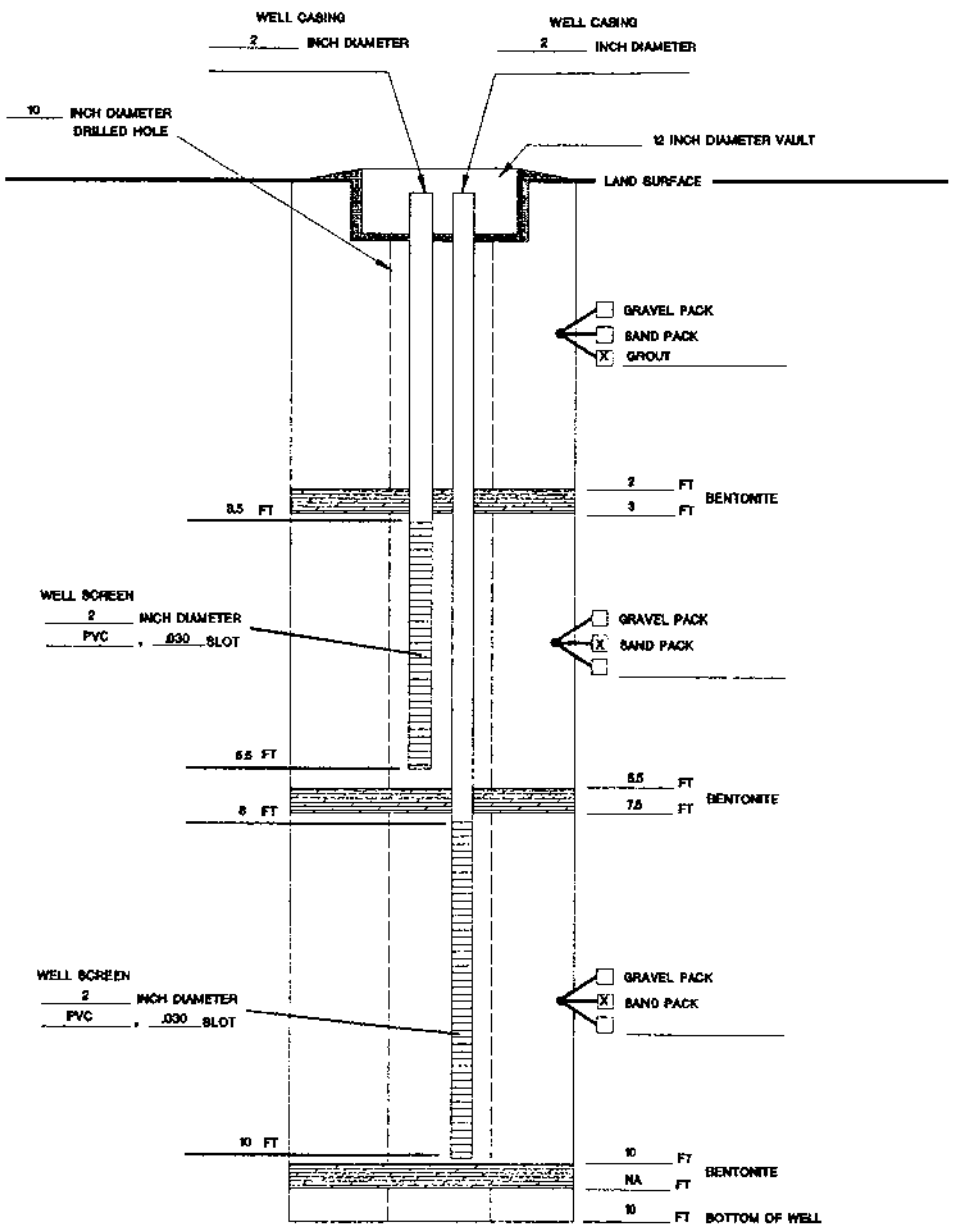
Remarks

Sampler(s) Ed Hagan

Southprint 89-1093

VAPOR EXTRACTION / MONITOR WELL CONSTRUCTION LOG

(UNCONSOLIDATED)



PROJECT GRANT STREET WELL EW-1, 3, 4, 5
TOWN/CITY PHOENIX
COUNTY MARICOPA STATE AZ
PERMIT NO. NONE REQUIRED
LAND-SURFACE ELEVATION
AND DATUM _____ FEET ☐ SURVEYED ☐ ESTIMATED
INSTALLATION DATE(S) MAY 6, 1994
DRILLING METHOD HOLLOW STEM AUGER
DRILLING CONTRACTOR GEOMECHANICS SW
DRILLING FLUID NONE
DEVELOPMENT TECHNIQUE(S) AND DATE(S)
NA

FLUID LOST DURING DRILLING NA GALLONS
WATER REMOVED DURING DEVELOPMENT NA GALLONS
STATIC DEPTH TO WATER NA FEET BELOW M.P.
PUMPING DEPTH TO WATER NA FEET BELOW M.P.
PUMPING DURATION NA HOURS
YIELD NA G.P.M. DATE NA
SPECIFIC CAPACITY NA GPM/FT
WELL PURPOSE VAPOR EXTRATION / MONITOR FOR VAPOR EXTRACTION PILOT TEST.
REMARKS
PREPARED BY MIKE BAILZ

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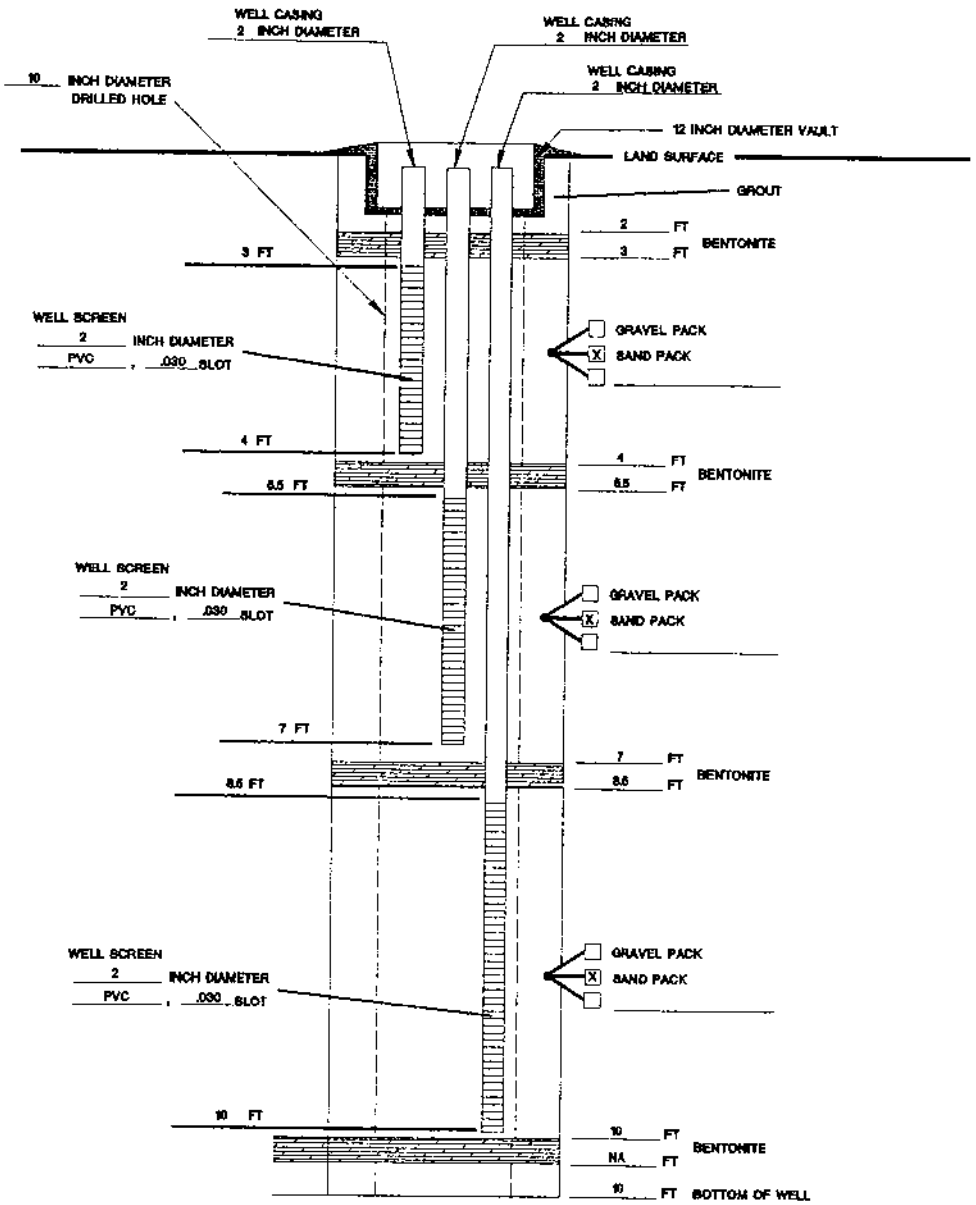
Environmental Services

DEPTH VALUES ARE IN FEET BELOW LAND SURFACE.

FIGURE 4

DWG. DATE: 6/23/94 | PROJECT NO.: AZ0450.002 | FILE: | DRAWING: 42002-4 | CHECKED: HAGAN | APPROVED: HAGAN | DRAFTER: STILES

EW-2 EXTRACTION WELL
CONSTRUCTION LOG
(UNCONSOLIDATED)



PROJECT GRANT STREET WELL EW-2
TOWN/CITY PHOENIX
COUNTY MARICOPA STATE AZ
PERMIT NO. NONE REQUIRED
LAND-SURFACE ELEVATION
AND DATUM ____ FEET ☐ SURVEYED
____ ☐ ESTIMATED
INSTALLATION DATE(S) MAY 6, 1994
DRILLING METHOD HOLLOW STEM AUGER
DRILLING CONTRACTOR GEOMECHANICS SW
DRILLING FLUID NONE

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
NA

FLUID LOST DURING DRILLING NA GALLONS
WATER REMOVED DURING DEVELOPMENT NA GALLONS
STATIC DEPTH TO WATER NA FEET BELOW M.P.
PUMPING DEPTH TO WATER NA FEET BELOW M.P.
PUMPING DURATION NA HOURS
YIELD NA G.P.M. DATE NA
SPECIFIC CAPACITY NA GPM/FT
WELL PURPOSE VAPOR EXTRACTION / MONITOR FOR VAPOR EXTRACTION PILOT TEST.

REMARKS

PREPARED BY MIKE BRILZ

GERAGHTY & MILLER, INC.
Environmental Services

DEPTH VALUES ARE IN
FEET BELOW LAND SURFACE.

FIGURE 5

DWG DATE: 6/29/94 | PROJ NO.: AZ0430.002 | FILE: | DRAWING: 43002-4 | CHECKED: HAGAN | APPROVED: HAGAN | DRAFTER: STILES

Appendix E
Standard Operating Procedure for En Core™ Soil Sampling

STANDARD OPERATING PROCEDURE
COLLECTION OF SHALLOW SOIL SAMPLES

1.0 Scope and Application

The purpose of this Standard Operating Procedure (SOP) is to describe the collection of soil samples. This SOP will ensure that soil samples are handled in a manner which will minimize the loss of contaminants due to volatilization and biodegradation.

2.0 Materials

a. En Core™ Samplers (5g)
b. T-handle
c. Stainless steel spoon or spatula
d. Paper towel

3.0 Procedure

Soil from the test pit will be scraped away using a decontaminated stainless steel spoon to reveal fresh soil. The sample aliquot for VOC analysis will be collected using En Core™ Samplers. Note that duplicate samples for VOC analysis are to be collected as close as possible to each other. Once the sample for VOC analysis is collected, Additional soil will be placed in sample containers for the remaining analyses collected following the SOP.

3.1 Collect three En Core™ samples and one 8-ounce wide mouth glass jar for each sample location.

3.2 Remove the sampler and cap from the En Core™ package and attach the T-handle to the sampler body.

3.3 Quickly push the sampler into a freshly exposed surface of soil until the sampler is full.

3.4 Check to see whether the sampler is full by looking into the viewing hole in the T-handle. The back o-ring on the plunger will show in the viewing window when soil has fully pushed the plunger back. The plunger can only be rotated when it is completely pushed to the back of the sampler body. If the plunger can be twisted, this indicates that soil has completely filled the sampler and the back o-rings have sealed.

3.5 Scrape any excess soil flush with the edge of the sampler using a dedicated or decontaminated stainless steel trowel.

3.6 Use a paper towel to quickly and carefully wipe the sampler head so that the cap can be tightly attached and sealed.

3.7 To attach the cap, push the cap on with a twisting motion. The cap is properly sealed when the two locking arms are completely seated over the ridge on the body of the sampler.

3.8 Complete the sample label on the En Core™ zipper lock package.

3.9 Fill in the sample identification number on the self adhesive label attached beneath the sample label on the En Core™ package.

3.10 Tear the self adhesive label at the perforation and attach the label to the rim of the sampler cap.

3.11 Place the sampler back into the En Core™ zipper lock package and seal the zipper lock.

3.12 Repeat the procedure above for the other two samplers.

3.13 Once all three samplers have been filled, labeled and packaged, place the three En Core™ packages into one large zipper lock bag.

3.14 Collect the sample for PAH analysis in a separate sample container (8-ounce wide mouth glass container) using a decontaminated stainless steel spoon.

Use a paper towel to clean the threads of the sample container and cap. Ensure that the sample bottle is tightly sealed.

3.15 Double volume is required for the collection of the MS/MSD samples. This includes six En Core™ samplers and two 8-ounce wide mouth glass container.

3.16 Store all samples in a cooler with bagged ice to maintain 4 degrees Celsius while storing on site and during shipment to the laboratory.

3.17 Samples must be shipped off site to the laboratory within 24 hours.

3.18 Samples must be received by the laboratory for preservation and preparation for extraction with in 2 days from the date of sample collection.

4.0 Maintenance

Not Applicable.

5.0 Precautions

The En Core™ sampler can not be used in the normal manner when sampling non-cohesive/unconsolidated soils (e.g., sands). When sampling sandy soils, the procedure to be used in place of step 3 above is as follows:

Manually pull back the plunger to form the seal on the back of the sampler body. Use a dedicated or decontaminated stainless steel trowel or spatula as a rigid structure to push the soil into the sampler. The soil should be packed tight to completely fill the sampler. Proceed through the remaining steps.

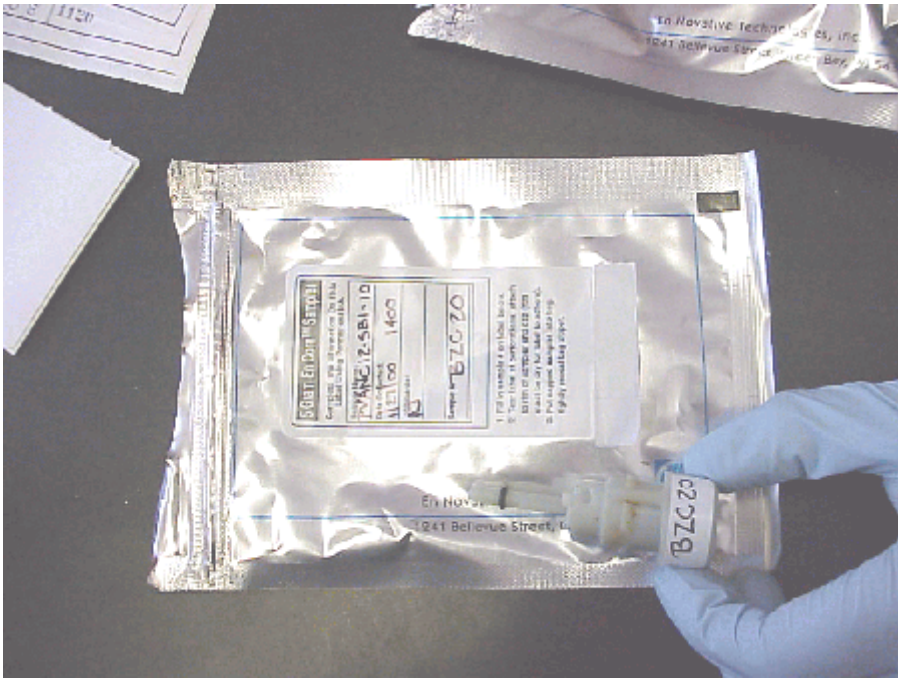
6.0 References

USEPA. Introduction to the CLP, EPA540-R-99-004, OSWER 9240.0-34P, February 2000.
USEPA. CLP Guidance for Field Samplers, EPA 540-R-00-003, OSWER 9240.0-35, Draft Final, June 2001.
USEPA. SOPs Soil Sampling SOP 2012, December 2002.

7.0 Attachments

Figure1.

Figure 1 - En Core™ Sampler and Zipper Lock Package



Sample Number, Date / Time, and Sampler's Initials on Baggie

Sample Number ONLY on EnCore Sampler