SITE RE-ASSESSMENT REPORT

Marsac Mills
Summit County, Utah
UT0001894054

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1.0 INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, the Superfund Amendments and Reauthorization Act (SARA) of 1986, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and through a Cooperative Agreement with the U.S. Environmental Protection Agency, Region 8 (EPA), the Utah Department of Environmental Quality (UDEQ), Division of Environmental Response and Remediation (DERR) conducted a Site Re-Assessment (SRA) of the **Marsac Mills** Site (referred to as the "Site"), EPA ID# UT0001894054, in Park City, Summit County, Utah.

The Site is located in the Park City historic downtown district, and silver ore was historically concentrated on-site. The Site was Discovered and entered into the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Database in November 1996. Since that time, a Preliminary Assessment (PA) and Site Inspection (SI) have been conducted.

Soil contamination at the Site was addressed in 1999 by the Park City Municipal Corporation (PCMC) and AGRA Earth and Environmental (AGRA) with oversight by DERR under the Voluntary Cleanup Program (VCP). Approximately half of the Site was addressed under the VCP by removal and capping of affected soils and on-going site management. The other half of the Site is currently regulated under the Park City Soils Ordinance (PCMC, 2010). This SRA was conducted due to lingering regional issues and considerations regarding the general area.

A Table of Previous Sampling (Appendix A), and a Preliminary Assessment Worksheet (Appendix B) are included with this report. A site visit was conducted on May 27, 2010, and a site visit report and photographs are included in Appendix C.

2.0 OBJECTIVES

The objectives of the activities performed during the SRA were to assess if hazardous substances located on-site pose a potential threat to human health or the environment.

The objectives of this SRA were to:

- Determine the continued presence of contamination in selected media;
- Assess the potential contamination characteristics;
- Assess the potential routes for contaminant migration;
- Assess the suspected exposure pathways;
- Identify potential targets that may be affected by on-site contamination as well as other targets that may be impacted by the migration of contamination via the suspected exposure pathways; and,
- Determine if continued assessment under CERCLA is warranted.

3.0 BACKGROUND INFORMATION

3.1 Site Location and Description

The Marsac Mills Site is located on the corner of Marsac Avenue and Swede Alley in Park City, Summit County, Utah. The geographic coordinates for the Site are 40°38′40″ North Latitude and 111°29′38.5″ West Longitude (AGRA, 2000). To reach the Site, travel east of Salt Lake City on I-80 to the Kimball Junction exit. Travel south on State Road 224 to the downtown area of Park City, where State Road 224 becomes Marsac Avenue. The Site is immediately to the south of a roundabout (Figure 1).

The Site consists of approximately four acres and is easily accessible. No fences or signs are present to limit access to the Site. The Site is bounded by Marsac Avenue to the east, Swede Alley to the west, a bend in Empire Creek to the south (which runs under Swede Alley), and a roundabout to the north. Several small commercial businesses, restaurants, and hotels exist around the Site. The Site lies at the hub of the old historic mining district of Park City (Figure 2). The Site is located on the west side of Marsac Avenue, and is situated near Silver Creek on and around Rossie Hill which is approximately sixty feet higher than the surrounding canyon floor. The Site includes two parking lots (east and north), the city hall, the old China Bridge parking structure, and the new China Bridge parking structure. The main business district of Park City is located directly downgradient from the Site.

Historically, the main furnace and chimney on the Site was located near the southeast corner of the north parking lot, and some of the highest concentrations of metals contamination were found in that vicinity.

Empire Creek appears to be approximately fifteen feet below the original grade of the Site. Several worn trails parallel the creeks and the Site. The creek originates approximately three miles to the southeast in Empire canyon, where other substantial milling and mining operations took place. The creek flows northeast from the mouth of Empire Canyon, through town and past the former mills and the Park City smelter. At the north boundary of the Site, Empire Creek flows into Silver Creek. From there, Silver Creek flows northward through Prospector Square area and past Richardson Flat tailings pond, and down the Weber River drainage (DERR, 1999).

Park City is located on the eastern slope of the Wasatch Range, approximately 25 miles southeast of Sale Lake City. The city rests at the convergence of Woodside Gulch from the west and Empire Canyon and Ontario Canyon from the south. These three canyons were the main area for ore production and processing in Park City (Butler, 1918). The Site is also situated at the mouth of Deer Valley to the east, a prominent Park City ski resort.

The immediate area around the Site is one of multiple terraces and slopes that tilt towards Empire Creek. The terraces are generally flat or slightly sloping to the northwest towards the city center and Empire Creek. A railroad spur used to run along the east side of the

Site, branching off into Ontario Canyon and Deer Valley. Just northeast of the Site was another smelter (Park City Smelter) located between Empire Creek and the current lumber company on State Route 224.

The elevation of the Site is approximately 7,060 feet above mean sea level. The nearest school is approximately 0.9 miles northwest from the Site and the nearest residence is less than fifty feet east of Marsac Avenue (DERR, 2010a). Historically, the Site was used for mine-related activities, and now is in an area zoned for commercial and residential use.

3.2 Site History and Previous Work

In 1868, Silver was found in Utah in an area which became known as Bonanza Flats. By the fall of 1869 the Wasatch Mountains were subject to extensive mining activity, particularly Little Cottonwood Canyon and Big Cottonwood Canyon on the westward slope of the range. A few miners ventured east over Guardsman's Pass to the narrow gulches of Parley's Park and eventually founded Park City. Soldiers stationed at Fort Douglas discovered a silver vein in Ontario Canyon, which was sold to James M. Kennedy for $5,000 dollars. Kennedy established the Flagstaff mine, and the first ore shipment in the district was made in 1870 (DERR, 1999).

The Marsac Company under E.P. Ferry bought the Flagstaff Mine in 1873. Two 20 stamp mills were constructed during the summer of 1874, one by the Marsac Company and one by the rival McHenry Company (Butler, 1918). The mills laid idle the first year due to lack of ore. The Ontario mine rented out the two mills the next year, and the $14,000 worth of ore a week was produced on-site. The Site was then abandoned because the Ontario Mine built a 40 stamp amalgamation facility nearby.

The reason that smelters and mills were located so close to each other in Park City was that there were two grades of ore in the Park City mining district. The higher grade ore went directly to one of the smelters and the lower grade ores had to be concentrated at the mills before they could be sold or smelted into bars. These mills commonly had slime ponds where heavier fine materials would settle out and be collected from the floatation process. The flotation was completed by using a mixture of creosote and pine oil to float the lighter density materials to the surface, and the heavier more precious material would sink to the bottom (DERR, 1999).

In 1882, the facility on-site was remodeled to use a more profitable process. This new process consisted of first matting the sulfide in an iron pot, roasting the pulverized matte in a muffle furnace, dissolving the roasted matte in dilute sulfuric acid, crystallizing bluestone from the solution which was used at the facility at the Site to prepare other solutions, washing the silver residue, pressing it into cakes, and then melting the dry cakes into bars (Butler, 1918). The Lixivication and Amalgamation processes were developed in a building near the Site that was owned by McKim Concentrating Machines. These processes were patented February 15, 1876.

The former Marsac Elementary School was built on the top of Rossie hill in 1936, while mining industrial activity was on-going at the base of the hill. No specific dates are given for when operations ceased, but it was likely in the early half of last century, around the time when silver mines were closed in 1942 by war order L208. In the late seventies, Park City moved its city offices to their current location along Marsac Avenue once the elementary school (now known as the city hall) closed. In 1991, the City made several improvements to the property, such as interior renovations, repaving the north and south parking lots, and extensive landscaping.

Prior to clean up, a slag debris pile was located at the upper terrace of the Site; it is unclear if the slag material was moved there from the Park City Smelter or if ores from the Park City area were smelted on-site at one time.

In October 1997, Paul Lammers from the Park City Building Department extracted three soil samples from the north parking lot. Lead contamination was detected in the soil samples ranging from 870 milligrams per kilogram (mg/kg) to 3,670 mg/kg (PCMC, 1997). In 1998, PCMC and AGRA conducted a limited subsurface investigation on select portions of the Site around the parking lot and the city hall. Seven geoprobe borings were advanced in asphalted parking and roadway areas to collect seventeen soil samples. Results of analyses indicated that total lead concentrations ranged from 23.4 mg/kg to 11,260 mg/kg (AGRA, 1999).

The PCMC submitted an application to the VCP in 1999 and retained AGRA to conduct remedial soil excavation activities and to conduct an SI to aid the EPA and UDEQ in their environmental assessment efforts. The cleanup focused mostly on the parking lot and city hall area, with the former processing area historically located to the southwest of the north parking lot. AGRA noted that soil sampling analytical results indicated that areas of soil around the former processing area could adversely affect human health. Soil was removed from the northern half of the Site to a depth of six inches, and additional soil was removed from areas with high concentrations of metals. The northern half of the Site was then capped like the southern half of the Site. The cap consists of six inches of clean topsoil that is either seeded with grass or landscaped, consistent with the Park City Soils Ordinance, and undergoes maintenance every spring.

Lead was detected in surface water at 120 micrograms per Liter (ug/L) in water from Empire Canyon, compared to the drinking water Action Level of 15 ug/L. AGRA concluded the water flowing from Empire Canyon was the biggest contribution to lead detected downstream. It is difficult to determine the source of the contamination based on the limited data obtained and the number of ore processing mills, mines, tailing piles, and ore train rail lines that operated in the area (AGRA, 2000).

Several metals were detected at varying concentrations in all soil samples (AGRA, 2000). Arsenic, mercury, and lead were the primary contaminants of concern. Surface soil collected around the former processing area had concentrations of arsenic up to 381 mg/kg, mercury up to 433 mg/kg, and lead from 27.8 mg/kg to 24,390 mg/kg (Figure 3). Even off-site soil collected for background samples was found to be contaminated, as the general area was host to a number of mining related processes (Figure 4). Analytical results are summarized on Table 1 in Appendix A.

Approximately half of the soil on-site was addressed under the VCP through sampling, excavation, and capping. The soil on the southern half of the Site was not addressed by the VCP but is covered by structures, a cap, and pavement in accordance with the Park City Soils Ordinance.

The DERR VCP program issued a Certificate of Completion to PCMC for the northern half of the Site in March 2003, with conditions limiting land use, water use, and requiring compliance with a site management plan. An assessment of possible groundwater contamination was conducted in the Upper Silver Creek Watershed study (Kolm and Yan, 2003). In March 2004, after reviewing the results of the study, the EPA agreed with the determination of the consulting firm, which characterized the "likelihood of groundwater problems as low" (see Appendix D).

The new China Bridge parking structure was built in 2008, next to the old China Bridge parking structure. All excavated soils during construction were disposed of at Richardson Flat. Park City did some work in the area of the parking lots in August 2009 building a wet detention basin and installing geothermal wells (Appendix C).

There are three CERCLIS sites within a four-mile search radius of the Site. Only Empire Canyon (UT0002005981) which is half a mile southwest is located upgradient from the Site and may have potential to impact the Site. The remainder of the CERCLIS sites are located downgradient or cross-gradient to the Site (DERR, 2007).

3.3 Current Site Conditions and Near Future Uses

During the 1995 site visit, slag material and discolored soils were noted in the area around the former processing area (DERR, 1995). The slope around the former processing area was being regraded during the 2010 site visit, and no slag was observed. PCMC offices are on-site, as well as two parking lots and two parking structures. The Site is not fenced, and the Site is readily accessible to the public.

In 2009, Park City made a seismic upgrade to the upper parking lot and installed a series of geothermal wells to provide energy for the City Hall. Temporary water retention basins to collect water for dust control were built in the north side, west side, and center of the upper parking lot, then filled in and paved, and all excavated soil was disposed of at Richardson Flat according to Park City officials. Correspondence and photographs regarding the activity are included as an attachment to this report (Appendix C). The Site will likely continue to be used for the city hall offices, parking, and the intermodal hub bus transfer location.

3.4 Geology, Hydrogeology, Hydrology, and Meteorology

3.4.1 Geology

The geology at the Site consists of Permian aged limestone known as the Park City Formation, which was hydrothermally altered by plutonic intrusion 30 to 36 million years ago. The calc-alkaline igneous rocks in the central Wasatch Mountains form a belt comprised of eleven stocks and the Keetley volcanics. The easternmost rocks of the igneous belt in the vicinity of Alta and Park City are fine grained and porphyritic. Igneous material was induced to melt through decompression in a series of pull-apart structures associated with strike-slip displacement along an east–west suture between the Archean Wyoming province and accreted Paleoproterozoic terranes (Vogel et al., 2001). The igneous intrusion introduced the silver ore processed at the Site, as well as other metals.

Soil consists of unconsolidated valley sediment mostly comprised of eroded Woodside Shale which outcrops near the Site. Weber Quartzite, also located in the area, was considered a potential source of contamination in a regional groundwater survey (Kolm and Yan, 2003). Soil in the immediate area of the Site is discolored with a yellow/orange tint that is non-typical of the other soils in the area. Soil particle sizes range from fine silts to cobble-sized rocks. Prior to remediation, slag material was found scattered around the upper terrace of the Site. The actual origin of this slag material is unknown, however based on the location of the materials, the materials likely originated from one or more of the processes undertaken at the Site.

3.4.2 Hydrogeology

Groundwater at the Site occurs in unconsolidated valley fill and consolidated rocks. The unconsolidated valley fill consists of poorly sorted cobbles, gravel, sand, silt, and clay of alluvial origin. The thickness of the unconsolidated valley fill near the Site varies from a few feet near the outcrops of consolidated rock to 260 feet at the Pacific Bridge well located near Prospector Square. The drinking water for the Park City area is from deeper fractured limestone groundwater sources, separated from the surface aquifer by a confining shale layer (Ashland et al., 1996). Groundwater to surface water migration of contaminants from the Site is also possible. Groundwater is expected to flow towards Silver Creek in a northwesterly direction through the Park City area (AGRA, 2000).

3.4.3 Hydrology

The topography of the Site and area consists of a valley surrounded by hilly terrain and terraces. The terraces are generally sloping to the north away from Ontario Canyon and towards downtown Park City and Silver Creek. The creek flows 100 feet north of the Site at an average flow rate of one cubic foot per second (cfs) and a high of 5.5 cfs during the spring months (DERR, 1999). The creek probably bordered the former processing area when it was in operation. Run-off from the Site would flow directly into Silver Creek or soak into the soil adjacent to the creek. A portion of the Site includes the city hall parking lot and is covered with asphalt. During remedial activity under the VCP, a cap was installed on the northern half of the property. The southern half of the property was capped prior to the remedial activities and has been managed consistent with the

Park City Soils Ordinance. Empire Creek runs south to north along the west boundary of the Site, and joins with Silver Creek to the north of the Site. Silver Creek then flows northward, joining with the Weber River just north of Rockport Reservoir, and then enters and leaves Echo Reservoir. The system then turns west, down Weber Canyon, and out to the Great Salt Lake.

Data provided by the Utah Division of Water Rights (DWR) indicates that there are existing rights to 1,864 Points of Diversion (PODs) within a four-mile radius of the Site (DWR, 2008). See Figure 5 for further details. Of the 1,864 PODs, 15 are listed as abandoned wells, three are listed as drains, one is listed as a spring, 22 are listed as river or creek re-diversions, four are returns, 164 are listed as surface PODs and 1,126 are listed as underground. The underground PODs are described as domestic, irrigation, stock watering, municipal, mining, power, or "other" (DWR, 2008). No contact was made with the owners of these underground PODs, so it is not known whether they are using the water for drinking water purposes. The complete listing of all individual PODs within a four-mile radius is available at the DERR office.

3.4.4 Meteorology

Wind conditions vary for the Site depending on the time of year and direction of storm fronts. In Utah, the direction of the prevailing winds varies considerably with the latitude and the topography. In general, prevailing winds are from south to north during the warmer months and from north to south during the colder months (DERR, 1999). The average temperature is around 51 degrees Fahrenheit, and the net precipitation is 43.6 inches a year.

4.0 PATHWAY ANALYSIS

4.1 Waste Characteristics

Based on data collected to date, hazardous constituents at the Site consist of heavy metals, particularly lead, arsenic, and mercury. Analytical results for previous investigations can be found in Appendix A.

Lead and arsenic are naturally occurring trace elements in metal ores and are associated with mining and metal working activities. Lead and arsenic tend to occur on mining and metal working sites in the form of waste materials and soil contamination. Mercury occurs naturally, and is used in ore processing.

The extent of contamination at the Site is not fully delineated, as there are numerous potential sources of contamination both on-site and historically in the area. Potential sources for the contamination include natural sources, historical mining up the canyon, and from the former multiple mills and smelters in the area.

4.2 Conceptual Site Model

The following sections examine the four pathways (surface water, groundwater, air, and soil) for this Site. A Conceptual Site Model is included as Figure 7.

4.3 Soil Pathway

4.3.1 Targets

The four acre Site has a wide variety of land use from grassy areas and flower beds to parking lots which are covered with cement, gravel, and asphalt. Most of the area is devoid of vegetation except for landscaping, and there are small gardens and grassy areas north of the Site along Silver Creek.

In the regional groundwater survey (Kolm and Yan, 2003), the Weber Quartzite formation was identified as a potential source of metals contamination for the Site. Prior to remedial action under the VCP, soils in the immediate vicinity of former processing area were discolored with a yellow/orange tint consistent with weathered metal contamination that is not typical of other soils in the area (DERR, 1999). There was also a small amount of slag scattered around the upper terrace of the Site. This slag material may have come from ore roasting, the casting process, or from the nearby Park City smelter. The slag and affected soils were removed during remediation.

The Site is not fenced or restricted and is easily accessible to the public. Approximately half of the soil on-site was addressed under the VCP through sampling, excavation, and capping. The soil on the southern half of the Site is covered by structures, a cap, and pavement in accordance with the Park City Soils Ordinance. Soil samples that were taken off-site from residential property in the area, however, were found to have metal contamination. It appears that these residential properties were not included in the Park City Soils Ordinance.

The properties are used daily by area residents, employees, and tourists, with approximately forty people employed at the city hall alone, and around 70 people working in the nearby shops, restaurants, and hotels. A number of visitors also come to the Site as mining history tourists and artifact hunters (DERR, 1999).

4.3.2 Sampling Results

Several metals were detected at varying concentrations in all soil samples (AGRA, 2000). Arsenic, mercury, and lead are the primary contaminants of concern. Surface soil collected around the former processing area had concentrations of arsenic up to 381 mg/kg, mercury up to 433 mg/kg, and lead from 27.8 mg/kg to 24,390 mg/kg (Appendix A). Off-site metals contamination was also detected that may be related to the extensive historic mining-related activity in the general area. Lead was detected in SO-2 at a concentration of 405 mg/kg, and SO-3 had concentrations of 120 mg/kg for arsenic, 4,147 mg/kg for lead, and 31.5 mg/kg for mercury (see Figure 4 and Appendix A).

4.3.3 Containment

Contaminated soil at the Site is contained either by soil caps, landscaping, and management, or regulated by the Park City Soils Ordinance.

4.3.4 Conclusions

Prior to capping the Site under the VCP, soil was sampled in a regular grid pattern on the northern half of the Site for metals contamination. Contaminated soil was then excavated and disposed at Richardson Flat. Half of the Site was excavated during the VCP project remedial action, and all of the Site has been capped consistent with the Park City Soils Ordinance. It is unlikely that the soil pathway on the VCP project continues to pose a threat to human health or the environment. However, soils in the vicinity of the Site may continue to be a concern, as contamination was found off-site and some areas may not be covered under the Park City Soils Ordinance (Figure 4).

4.4 Groundwater Pathway

4.4.1 Targets

The nearest municipal wells in the vicinity of the Site are within two miles of the Site. Of these nearby wells, two are upgradient and located in Empire Canyon, and two more are located in an upgradient drainage near the Silver King Mine complex. Drinking water in Park City comes primarily from the Thirot Spring well, Park Meadows Well, and the Divide Well 2.5 miles to the northwest, and the Middle School Well 2.5 miles to the north (Figure 6). In the Park Meadows well, surface water contamination was introduced during re-development in July 2002, but that was addressed by natural filtration and UV disinfection in 2006 (DERR, 2010b). There are 21 drinking water sources within four miles of the Site (DDW, 2012). A breakdown of population served by the drinking water sources is included in Appendix B.

4.4.2 Sampling Results

No sampling of groundwater has been conducted at the Site, but samples of the Park City water distribution system and downgradient drinking water wells within four miles of the Site meet federal standards for drinking water (DDW, 2012).

4.4.3 Containment

Groundwater at the Site is not contained, but the groundwater pathway is considered incomplete due to the absence of any detectable concentrations of contaminants as shown by the downgradient drinking water well sampling results (DDW, 2012), which would indicate that no significant leaching of surface or subsurface soil contaminants has occurred via the groundwater pathway.

4.4.4 Conclusions

Metals including mercury from historic mining activities could potentially impact shallow groundwater at the Site. An assessment of possible groundwater contamination was conducted in the Upper Silver Creek Watershed study (Kolm and Yan, 2003). In March 2004, after reviewing the results of the study, the EPA Region 8 project manager (Jim Christiansen) agreed with the determination of the consulting firm, which characterized the "likelihood of groundwater problems as low", and sent an email to the DERR project manager requesting a change in the "exclusion" language regarding the groundwater issue as it related to a cleanup completion notice (Appendix D). In addition, downgradient drinking water sampling results (DDW, 2012) have shown no detectable concentrations of contaminants above federal drinking water standards.

4.5 Surface Water Pathway

4.5.1 Targets

There are a number of targets downgradient and adjacent to the Site. These targets include wetlands along Silver Creek, children playing in the water in Silver Creek, and residents that use Silver Creek as an irrigation source. Silver Creek flows into the Weber River drainage (Figure 6), which is a class 3 fishery for trout and whitefish. Silver Creek is a class 4 poor quality stream with limited fishery value. There are no recognized downgradient surface water drinking sources coming from Silver Creek (AGRA 2000).

Metal contaminants that enter into Silver Creek would pass through the Park City tourist district and to the Prospector Square area of the City. The Prospector Square area includes businesses, homes and three schools. The nearest school is 0.9 miles away (DERR, 2008). Ingestion of contaminated surface water from Silver Creek could pose a human health risk.

4.5.2 Sampling Results

The data in Appendix A indicates that the outflow from Empire Canyon for lead had the highest concentration at 120 ug/L, with the next highest concentration for lead being 13 ug/L in the downgradient Silver Creek sample. All other surface water samples had non-detectable concentrations for lead (Appendix A). AGRA concluded the water flowing from Empire Canyon was the biggest contributor to lead detected downstream (AGRA, 2000). The drinking water Action Level for lead is 15 ug/L. All four sediment samples collected by AGRA had detectable concentrations of lead between 79.7 mg/kg and 720 mg/kg, arsenic between 10.4 mg/kg and 52.4 mg/kg, and mercury between 0.21 mg/kg and 3.47 mg/kg.

4.5.3 Containment

There is no containment for surface water on-site.

4.5.4 Conclusions

Sediments and surface water samples have been collected from Empire Creek and Silver Creek, both upstream and downstream of the Site. Metals contamination was present in samples collected from Empire Canyon. The streams have been sufficiently well characterized in the vicinity of the Site; therefore, surface water sampling is not needed or recommended.

4.6 Air Pathway

4.6.1 Targets

The resident population within a four-mile radius of the Site is 7,442. Sixty-eight people reside within ¼ mile of the Site (DERR, 2008).

4.6.2 Sampling Results

Air samples have not been taken at the Site.

4.6.3 Containment

At the present time, the northern and southern portions of the Site have been capped and landscaped to prevent the entrainment of fine dust particles into the air. As such, the air exposure pathway is considered incomplete.

4.6.4 Conclusions

Citizens may come into contact with metal-laden dust in their homes, workplaces, or yards as a result of airborne contamination from historical locations in Park City associated with mining activity. There could be potential risk to the indoor air quality since the extent and source of the contamination is unknown and there are residential properties nearby. However, because most of the Site is capped and metals contamination is not exposed at the surface, it is unlikely that the Site could contribute to windblown metals contamination in the area. Nearby residential properties outside the Park City Soils Ordinance may pose some risk, but unless cover and vegetation are removed from the properties, they are unlikely to contribute significantly to contaminated windblown dust. Therefore, air sampling is not proposed.

5.0 SUMMARY AND CONCLUSIONS

The Site consists of approximately four acres and is easily accessible. Major features of the Site include access from the south and north, the city hall offices for Park City, a parking lot, and the China Bridge parking structures. Historically, there were a number of mining related processes in the area. The main furnace and chimney for the Site were located near the southeast corner of the parking lot, and some of the highest concentrations of metals contamination were found in that vicinity.

Ore processing related activities began in 1874, and used various processes involving sulfuric acid and cooking silver ore to extract silver. No specific dates are given for when operations ceased, but it was likely in the early half of last century, around the time when silver mines were closed in 1942 by war order L208. A school was established on the hill above the former processing area during its period of operation. The city hall offices moved into the former school building in the early eighties.

The PCMC submitted an application to the VCP in 1999 and retained AGRA to conduct environmental assessment and remedial soil excavation. The data in Appendix A indicates that the outflow from Empire Canyon for lead had the highest concentration at 120 ug/L, with the next highest concentration for lead being 13 ug/L in the downgradient

Silver Creek sample. All other surface water samples had non-detectable concentrations for lead (Appendix A). AGRA concluded the water flowing from Empire Canyon was the biggest contributor to lead detected downstream (AGRA, 2000). The drinking water Action Level for lead is 15 ug/L. All four sediment samples had detectable concentrations of metals including lead between 79.7 mg/kg and 720 mg/kg, arsenic between 10.4 mg/kg and 52.4 mg/kg, and mercury between 0.21 mg/kg and 3.47 mg/kg.

Metals were detected at varying concentrations in all soil samples, and selenium was the only analyte below detection levels. Arsenic, mercury, and lead are the primary contaminants of concern. Surface soil collected around the former processing area had concentrations of arsenic up to 381 mg/kg, mercury up to 433 mg/kg, and lead from 27.8 mg/kg to 24,390 mg/kg. Contamination was also detected in soil collected off-site. Previous analytical results are summarized in Appendix A on Table 1.

The cleanup focused mostly on the parking lot and city hall area. Approximately half of the soil on-site was addressed under the VCP through sampling, excavation, and capping. The southern half of the Site has been addressed under the Park City Soils Ordinance.

DERR issued a Certificate of Completion to PCMC for the northern half of the Site in March 2003, with conditions limiting land use, water use, and requiring compliance with a site management plan. In March 2004, after reviewing the results of the Upper Silver Creek Watershed study (Kolm and Yan, 2003), the EPA agreed with the determination of the consulting firm, which characterized the "likelihood of groundwater problems as low" (Appendix D).

6.0 REFERENCES

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[illegible] Sample Analytical Results: Three Parking Lots and Connected Ridge [illegible]

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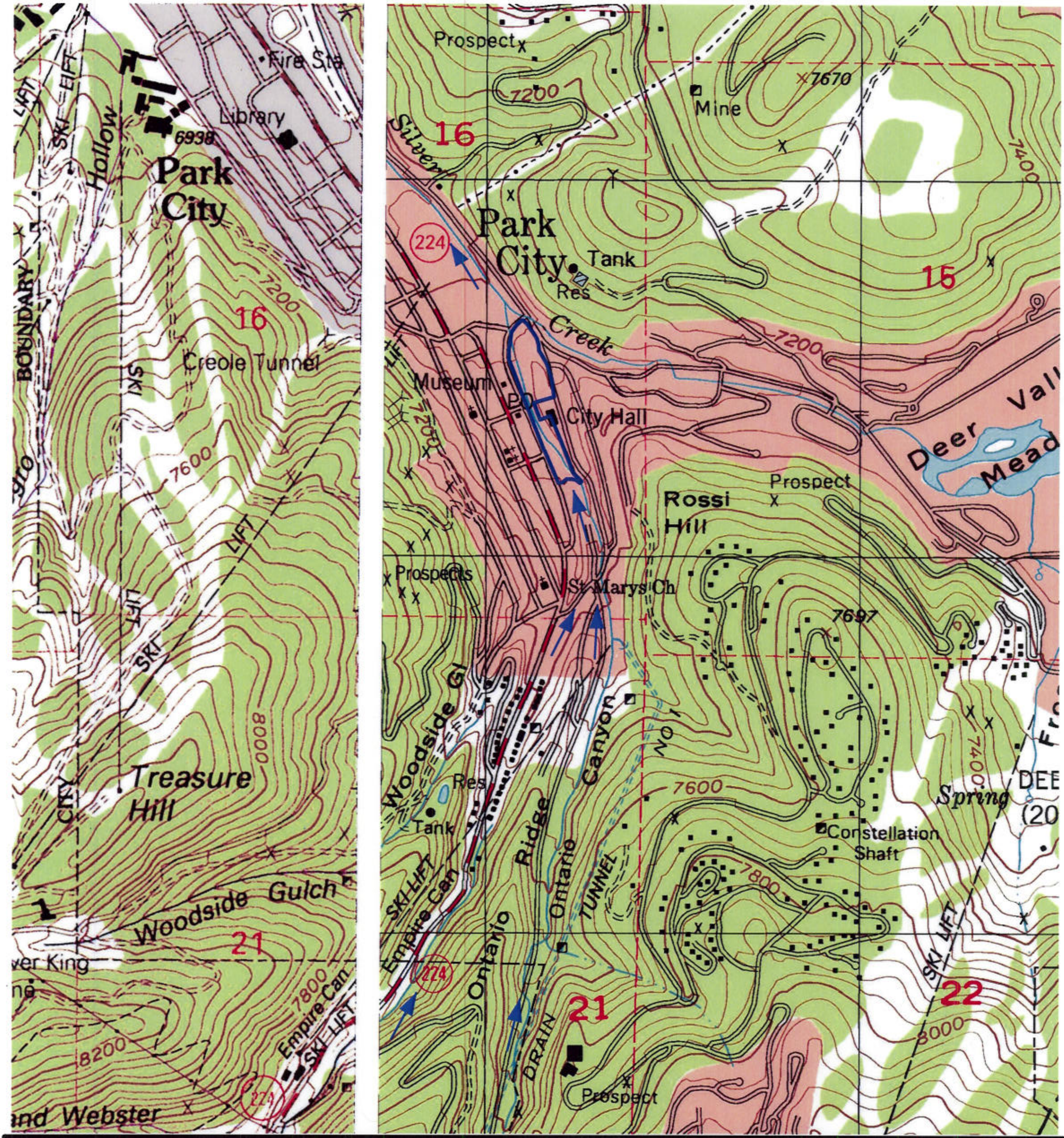
Figures

Figures



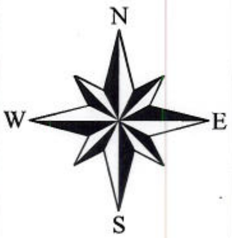
Legend

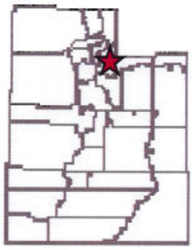
Site Boundary

Surface Water Flow Direction

0 550 1,100 2,200 Feet

1 inch = 1,200 feet





Utah Department of Environmental Quality
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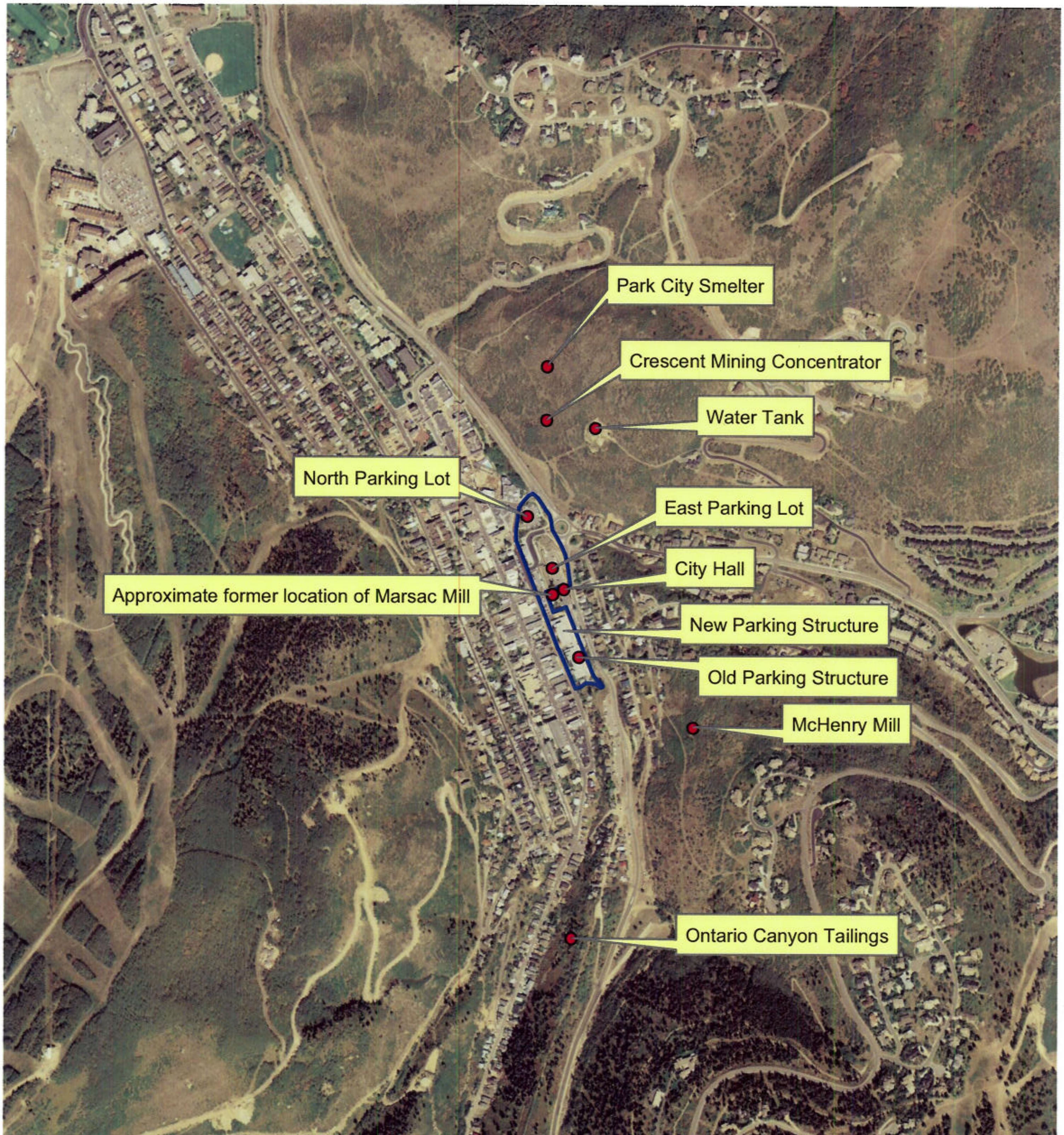
FIGURE #1
Marsac Mill
Site Location

445 Marsac Ave, Park City, Utah

by: Leigh Anderson

Date: 02-22-10

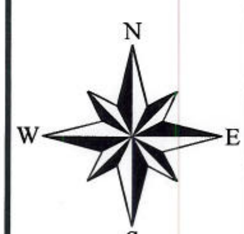


Legend

- Points of Interest
- Site Boundary

0 500 1,000 2,000 Feet

1 inch = 1,000 feet



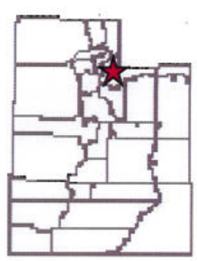


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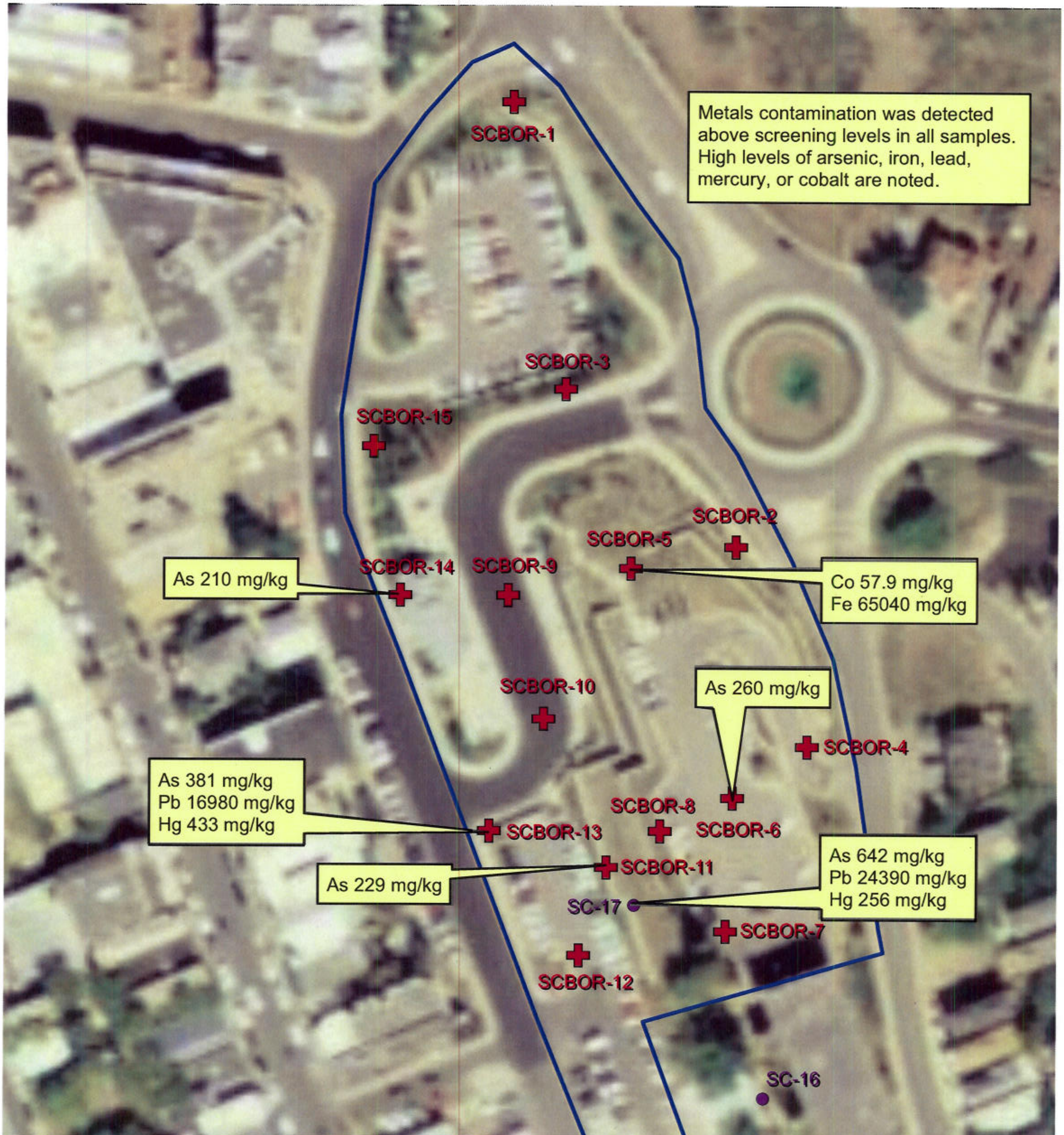
FIGURE #2
Marsac Mill
Site Detail Map

445 Marsac Ave, Park City, Utah

by: Leigh Anderson Date: 02-22-10

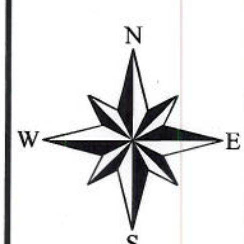


Legend

- Construction Boring Sample
- Possible Source Sample
- Site Boundary

0 50 100 200 Feet

1 inch = 100 feet



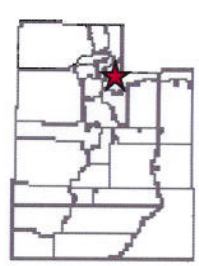


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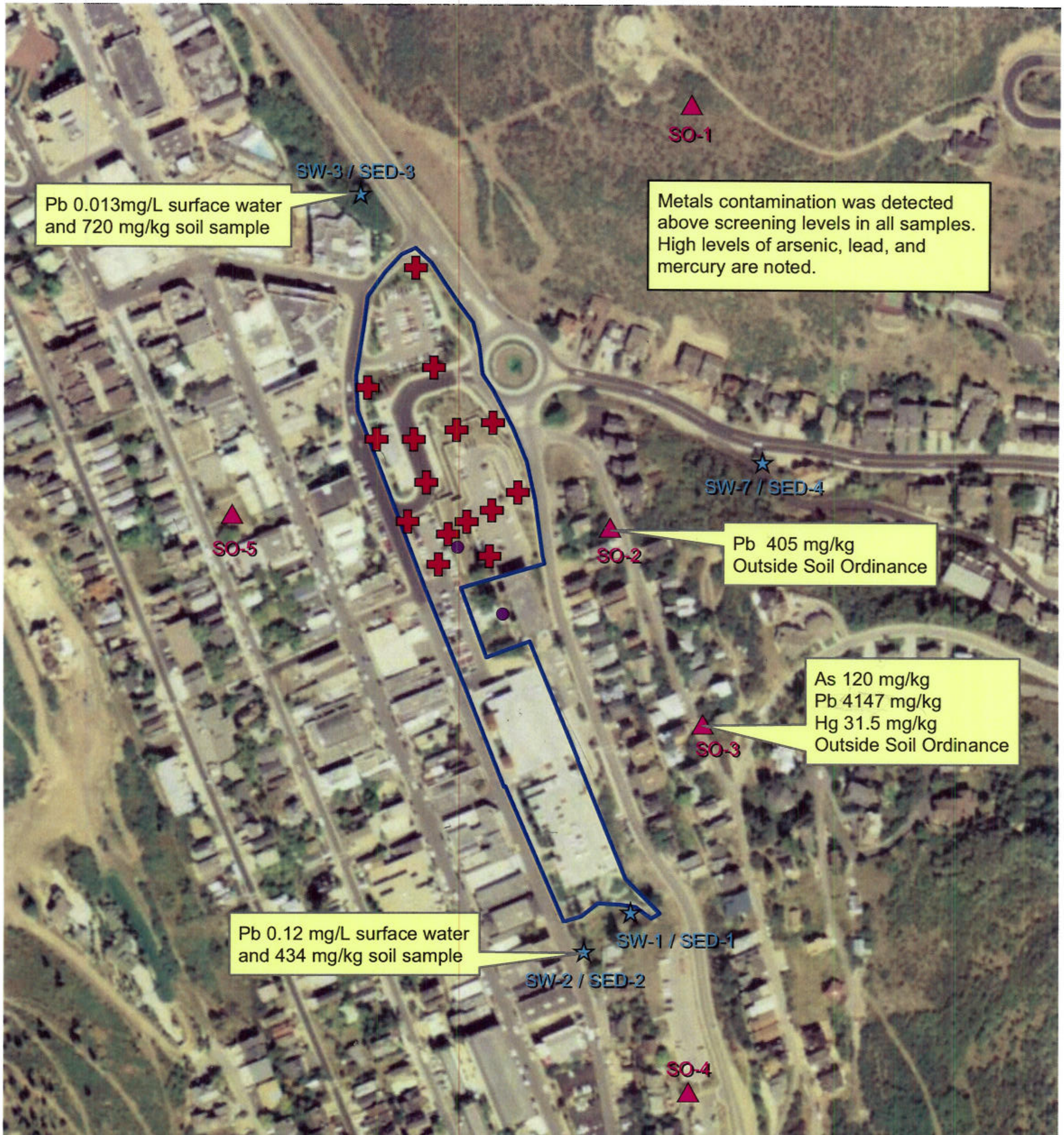
FIGURE #3
Marsac Mill
AGRA On-Site Sample Points

445 Marsac Ave, Park City, Utah

by: Leigh Anderson

Date: 02-22-10

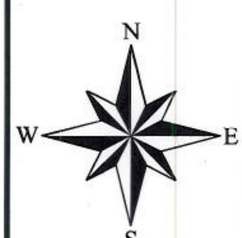


Legend

- Construction Boring Sample
- SI Soil Sample
- Possible Source Sample
- SI Sediment/Water Sample
- Site Boundary

0 145 290 580 Feet

1 inch = 290 feet



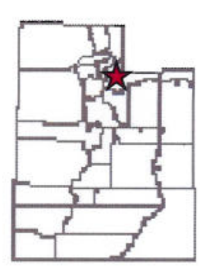


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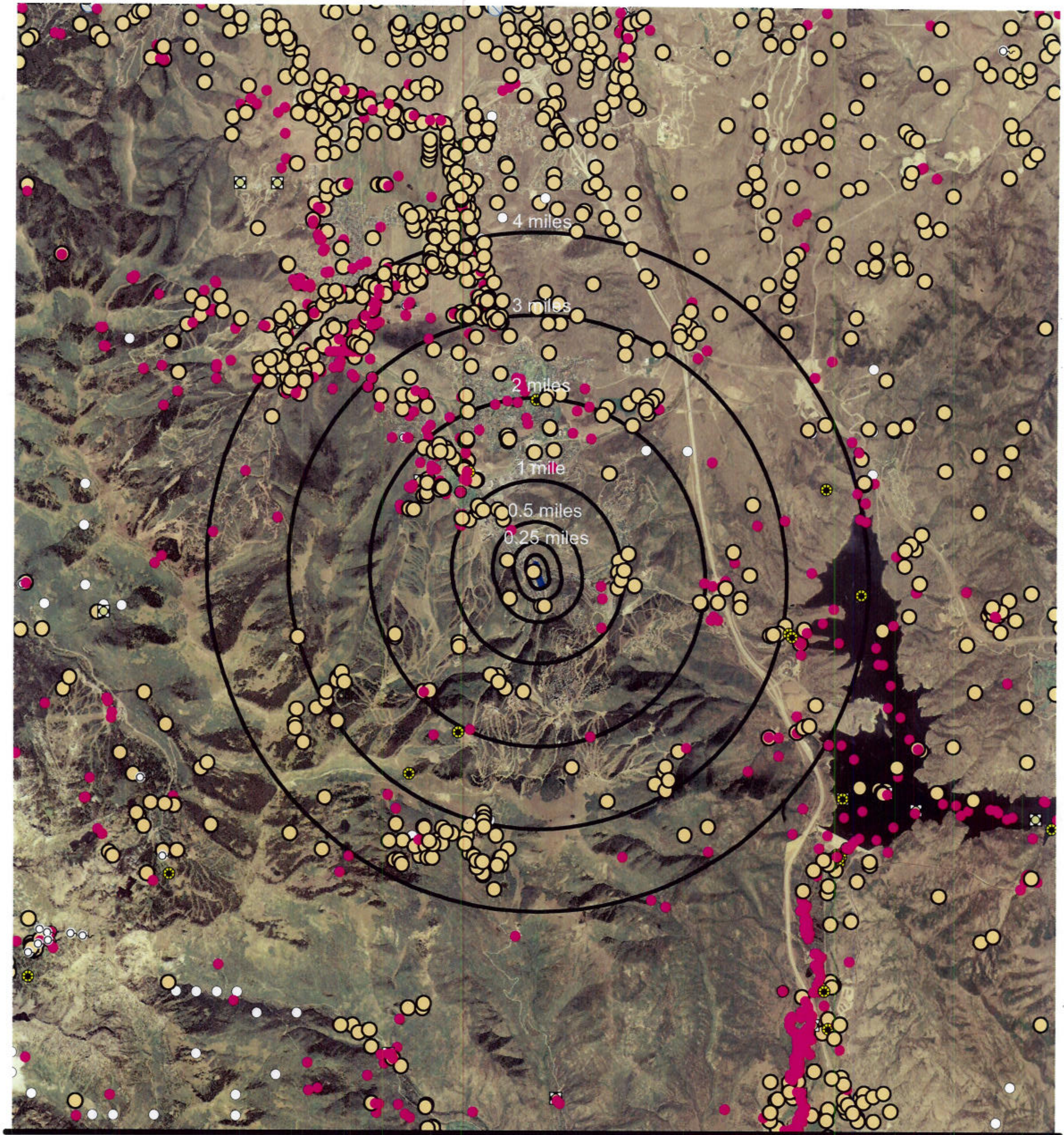
FIGURE #4
Marsac Mill
AGRA Off-Site Sample Points

445 Marsac Ave, Park City, Utah

by: Leigh Anderson

Date: 02-22-10



Legend

Points of Diversion

- Abandonded Well
- Drain
- Point to Point
- Rediversion
- Return
- Spring
- Surface
- Underground

0 4,300 8,600 17,200 Feet

1 inch = 8,700 feet

N W E S

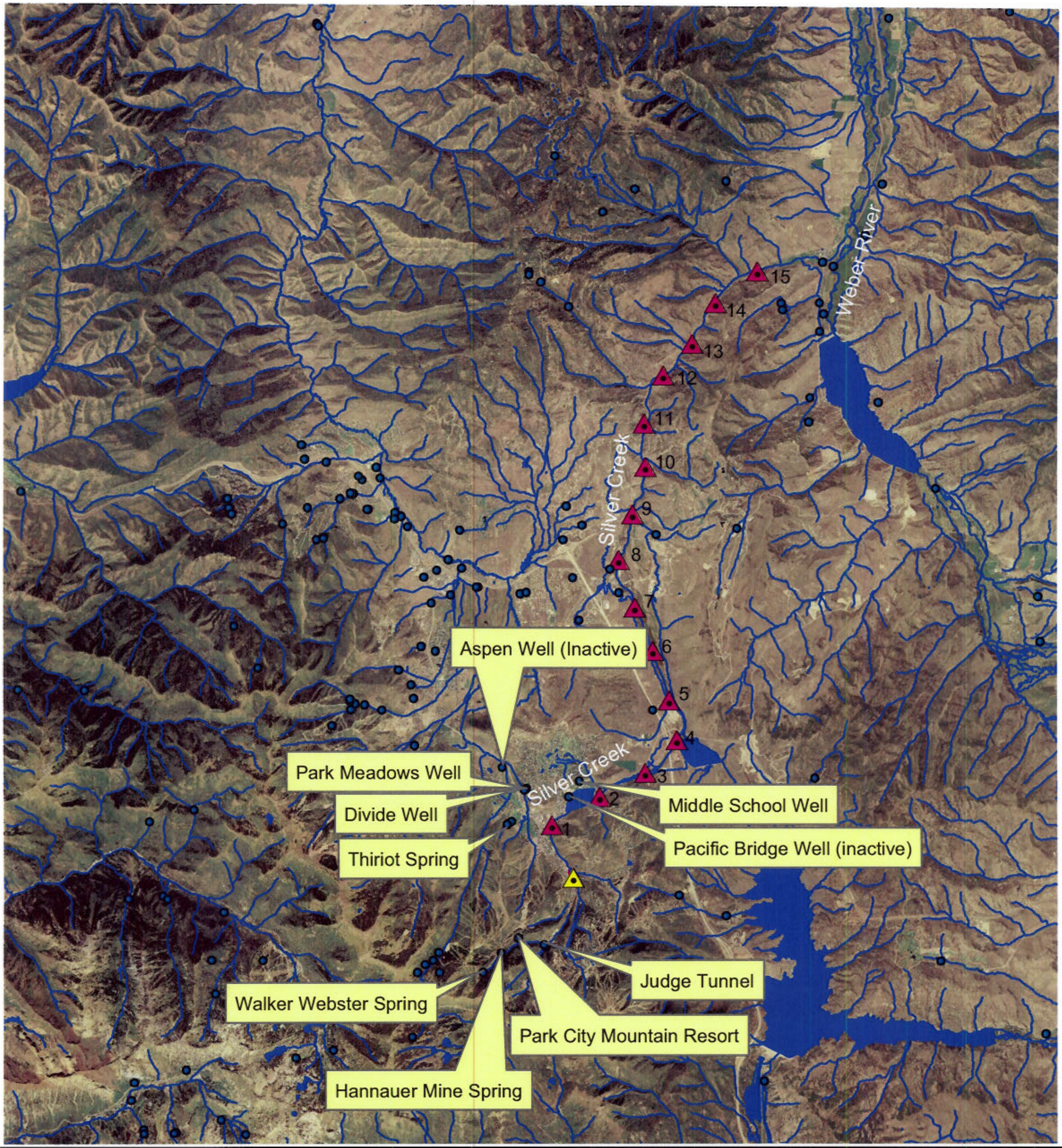
Utah Department of Environmental Quality
Division of Environmental Response and Remediation

FIGURE #5
Marsac Mill
Points of Diversion

445 Marsac Ave, Park City, Utah

by: Leigh Anderson

Date: 02-22-10



Legend

- Public Drinking Water Sources
- Site Location
- Downstream Mile Marker

Note: Labeled drinking water sources are within four miles of the Site and directly upstream or downstream of the Site.

0 6,500 13,000 26,000 Feet

1 inch = 13,000 feet

N S E W

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FIGURE #6
Marsac Mill
15 Mile Downstream Influence

445 Marsac Ave, Park City, Utah

by: Leigh Anderson

Date: 02-22-10

Table 1: Marsac Mill
Samples from AGRA Site Inspection Analytical Results Report Dated December 4, 2000

Sample	Sample Type	Depth (ft bgs)	Analytical Concentrations in Milligrams per Kilogram (mg/kg)																					Notes
			Al	Sb	*As	Ba	Be	Ca	Cs	Cr	Co	Cu	Fe	Pb	Mn	Hg	Ni	K	Se	Ag	Na	Ti	V	Zn	
SCBOR-1-1	Soil	0 - 0.5	12360	1	35	90.4	ND	5.2	6361	11	**10.4**	52.7	11690	**465**	509	0.72	10.6	2546	ND	ND	214	ND	**16.2**	1025	Mill vicinity (North Point)
SCBOR-1-9	Soil	16 - 16.5	28860	ND	52.4	68.2	ND	2	3094	20.9	**16.6**	18.7	20260	15.6	571	0.18	14.3	3117	ND	ND	339	ND	**27.2**	1073	Depth SCBOR-1
SCBOR-2-1	Soil	0 - 0.5	15230	3.41	85.9	250	ND	11.9	6260	17.7	**16.3**	189	14760	**1860**	650	**22.3**	13.4	2712	ND	28.1	287	ND	**24.8**	1545	Mill vicinity (East Boundary)
SCBOR-3-1	Soil	0.5 - 1	5841	5.02	47.2	74.8	ND	8.56	11390	15.4	**5.25**	79.2	8624	**1163**	732	3.43	10.2	832	ND	16.3	247	ND	**14.2**	1092	Mill vicinity (Center-North)
SCBOR-3-3	Soil	6 - 6.5	8625	ND	20.7	82.6	ND	ND	1441	14.4	**18.3**	44.1	15720	48.7	579	0.51	14	815	ND	ND	131	ND	**19**	99.9	Depth SCBOR-3
SCBOR-4-1	Soil	0.5 - 1	14450	ND	24.1	127	ND	ND	10690	19.8	**14.9**	31.7	14750	205	550	0.67	13.7	1121	ND	ND	1178	ND	**25.7**	299	Mill vicinity (East Boundary)
SCBOR-4-5	Soil	8 - 8.5	17390	ND	38.5	112	ND	ND	3159	15	**19**	15.3	14650	41.3	368	ND	11.8	1941	ND	ND	198	ND	**28.5**	63.7	Depth SCBOR-4
SCBOR-5-1	Soil	0.75- 1.25	16490	1.43	35.2	103	ND	3.03	6719	20	**16.8**	62.9	17140	**467**	1029	2.66	15.9	1602	ND	6.9	1162	ND	**27.2**	479	Mill vicinity (Center Site)
SCBOR-5-5	Soil	8.5 - 9	28560	ND	69.8	124	ND	ND	3574	18	**57.9**	15.9	**65040**	50.3	702	ND	16.3	3241	ND	ND	234	ND	**38**	98	Depth SCBOR-5
SCBOR-6-1	Soil	2 - 2.5	6322	11.7	63.1	96.7	ND	6.42	4452	11.6	**6.37**	192	6887	**2511**	496	**40.4**	11.8	907	9.06	12.8	396	ND	**16.8**	1026	Mill vicinity (Near Source)
SCBOR-6-2	Soil	4.5 - 5	18050	126	**260**	183	ND	9.64	2532	21	**15**	857	11120	**8944**	793	**176**	14.9	2108	213	34.5	1329	5.41	**35.5**	2532	Depth SCBOR-6
SCBOR-7-1	Soil	0.25 -0.75	8185	6.01	38.8	123	ND	7.6	10960	14.8	**9.28**	146	9839	**1238**	539	**17.9**	10.1	1664	ND	ND	703	ND	**23.7**	1622	Mill vicinity (Near Source)
SCBOR-7-4	Soil	6 - 6.5	17400	ND	49.4	69.7	ND	ND	5015	28.4	**13**	45.2	16540	278	179	1.65	10.3	1601	ND	ND	165	ND	**28.2**	271	Depth SCBOR-7
SCBOR-8-1	Soil	0.5 - 1	17450	2.28	88.7	107	ND	5.31	4519	16.3	**16.5**	191	17130	**1721**	1072	10	15.8	2081	ND	33.1	3385	ND	**27.9**	1347	Mill vicinity (Near Source)
SCBOR-8-2	Soil	4 - 4.5	21440	ND	17.7	64.8	ND	ND	5180	36.6	**21.1**	16.6	20800	36	557	ND	32.4	815	ND	ND	1703	ND	**42.1**	76.9	Depth SCBOR-8
SCBOR-9-1	Soil	0.5 - 1	16460	ND	68.7	118	ND	6.97	5973	25.8	**16.7**	160	16900	**1584**	581	**6.38**	18	1159	ND	19.4	930	ND	**29**	1128	Mill vicinity (Center Site)
SCBOR10-1	Soil	0 - 0.5	8012	5.09	60.4	170	ND	8.79	21020	22	**8.96**	145	12100	**1146**	812	5.88	11.1	1033	ND	11.7	1625	ND	**26.3**	1455	Mill vicinity (Center Site)
SCBOR10-2	Soil	2.5 - 3	9994	ND	18.7	102	ND	2.15	8765	44.5	**11.4**	17.9	12100	36.7	557	1.4	17.7	619	ND	ND	994	ND	**16.4**	132	Depth SCBOR-10
SCBOR11-1	Soil	0.5 - 1	3445	45.8	**229**	39.5	ND	58.8	38940	21.4	ND	451	13930	**5129**	1739	**9.44**	7.33	598	2.86	32	402	1.78	**12.2**	11690	Mill vicinity (Near Source)
SCBOR11-3	Soil	4 - 4.5	14380	ND	41.3	135	ND	4.01	6202	23.3	**15.7**	20.5	19200	44.3	884	**14.7**	12.4	1413	ND	ND	1729	ND	**24.2**	516	Depth SCBOR-11
SCBOR12-1	Soil	1 - 1.5	3328	6.4	30.6	77	ND	2.5	4832	16.8	**5.29**	65.7	8799	557	606	**114**	11.1	435	ND	ND	630	ND	**7.63**	271	Mill vicinity (West Boundary)
SCBOR12-4	Soil	10 - 10.5	6435	ND	72	167	ND	17.8	4785	17.4	**11.8**	14.3	15300	34.2	545	**6.35**	15.3	463	1.25	ND	358	ND	**15.7**	1453	Depth SCBOR-12
SCBOR13-1	Soil	1 - 1.5	15400	83.1	**381**	307	ND	37.7	9432	17.7	**13.5**	1506	15120	**16980**	802	**433**	12	1060	2.93	123	3082	1.72	**23.2**	8588	Mill vicinity (West Boundary)
SCBOR13-5	Soil	8 - 8.5	18610	ND	37.1	103	ND	3.97	5054	21	**20.4**	21.5	22600	72.7	800	0.36	17.9	2174	ND	ND	464	ND	**29.7**	137	Depth SCBOR-13
SCBOR14-1	Soil	1.5 - 2	4671	30.6	**210**	109	ND	33.2	27710	17.5	**8.04**	409	15730	**4053**	1643	**28.4**	11.1	754	2.49	41.3	316	3.08	**15.9**	7209	Mill vicinity (West Boundary)
SCBOR14-4	Soil	6 - 6.5	6465	10.8	**123**	256	ND	202	4229	14	**8.91**	390	12210	**1496**	662	**33.7**	12	547	5.83	27.4	514	1.74	**10**	3102	Depth SCBOR-14
SCBOR15-1	Soil	0.5 - 1	5835	ND	ND	85.7	ND	2.77	22040	ND	**5.64**	17.1	1799	27.8	554	1.06	6.82	858	ND	ND	1014	ND	**11.1**	67.6	Mill vicinity (West Boundary)
SCBOR15-2	Soil	1.5 - 2	10060	ND	ND	49.1	ND	ND	690	20.1	**6.1**	ND	4555	6.56	237	ND	20.1	1810	ND	ND	1196	ND	**11.7**	39.5	Depth SCBOR-15
SC-16	Soil	0 - 0.5	8684	44.4	**146**	109	ND	14.7	4362	13.5	**8.84**	369	10630	**3908**	1031	**46.5**	12	1866	1.24	58.1	251	ND	**13.9**	2782	Potential Source Sample
SC-17	Soil	0 - 0.5	11870	175	**642**	622	ND	51.4	2564	17.8	**12.7**	2252	16380	**24390**	1574	**256**	13.1	821	5.18	227	817	1.63	**19.5**	9518	Potential Source Sample
SO-1	Soil	0 - 0.5	12090	1.99	38.5	143	ND	ND	3557	7.57	**8.29**	71.8	11200	**499**	593	2.04	8.9	3295	ND	11.8	98.7	ND	**18.3**	477	Soil Background
SO-2	Soil	0 - 0.5	9166	1.35	21.1	112	ND	ND	5092	10.8	**8.56**	56.5	11800	**405**	760	1.09	7.44	1903	ND	7.8	102	ND	**17.7**	498	Resident yard sample
SO-3	Soil	0 - 0.5	4837	37.6	**120**	97.1	ND	6.77	6877	23	ND	364	9999	**4147**	1227	**31.5**	ND	1029	1.99	25.4	384	ND	**13.1**	3980	Resident yard sample
SO-4	Soil	0 - 0.5	10860	9.83	66.6	199	ND	5.8	7489	12.6	**6.71**	233	10640	**2146**	888	**18.5**	7.53	2417	ND	44.6	130	ND	**17.9**	1553	Right-of-way near residence
SO-5	Soil	0 - 0.5	12980	1.99	50.8	141	ND	3.98	7876	15.3	**10.7**	122	14350	**696**	943	1.83	8.36	2736	1.51	11.1	346	ND	**24.2**	1085	Empty lot near residence
SO-6	Soil	0 - 0.5	12820	ND	26.8	92.1	ND	ND	3173	15.3	**9.82**	61.8	13610	**516**	1106	2.66	8.22	2222	ND	5.4	105	ND	**22.5**	1005	Near residence
SED-1	Sed	0 - 0.5	8784	3.37	34.7	96.4	ND	2.37	15930	18.3	**7.86**	51.1	9628	**405**	693	3.47	ND	1309	ND	5.6	754	ND	**27.6**	582	Outflow Ontario Canyon
SED-2	Sed	0 - 0.5	8501	1.98	17.9	57.5	ND	8.26	22780	12.5	ND	39.5	7337	**434**	582	0.21	5.43	947	ND	ND	422	ND	**14.1**	1365	Outflow Empire Canyon
SED-3	Sed	0 - 0.5	7393	3.82	52.4	49.1	ND	7.93	23150	11	ND	45.6	11480	**720**	442	1.82	ND	898	1.09	6	579	ND	**14.1**	1531	Downgradient Silver Creek
SED-4	Sed	0 - 0.5	6254	ND	10.4	62.7	ND	5.35	10340	12.1	ND	22.8	7149	79.7	590	0.31	ND	840	ND	ND	386	ND	**16.7**	856	Upgradient Silver Creek
RSL			78000	47000	2.3	16000	160			220	2.3	3100	55000	400		2.3	3900		390	390			5.5	23000	
			Analytical Concentrations in Milligrams Per Liter (mg/L)																					
SW-1	Water	0 - 0.5	0.37	0.013	ND	0.086	ND	0.027	174	ND	ND	ND	0.19	ND	0.067	ND	ND	4.74	ND	ND	666	ND	ND	2.03	Outflow Ontario Canyon
SW-2	Water	0 - 0.5	0.32	0.023	ND	0.04	ND	0.054	103	ND	ND	**0.11**	0.85	**0.12**	0.14	ND	ND	2.32	0.012	ND	45.4	ND	ND	8.94	Outflow Empire Canyon
SW-3	Water	0 - 0.5	0.49	ND	ND	0.11	ND	ND	85.9	ND	ND	ND	0.34	0.013	0.17	ND	ND	2.47	ND	ND	15	ND	ND	0.99	Downgradient Silver Creek
SW-4	Water	0 - 0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	De-con Sample
SW-5	Water	0 - 0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Trip Blank
SW-6	Water	0 - 0.5	0.56	ND	ND	0.12	ND	ND	74.1	ND	ND	ND	0.31	ND	0.16	ND	ND	2.15	ND	ND	103	ND	ND	0.33	Field Duplicate of SW-7
SW-7	Water	0 - 0.5	0.46	ND	ND	0.12	ND	ND	73.9	ND	ND	ND	0.32	ND	0.16	ND	ND	2.28	ND	ND	105	ND	ND	0.32	Upgradient Silver Creek
MCL	Water		0.87		0.01	2	0.004			0.1		1.3		0.015		0.1			.05						

ND = Not detected at or above the laboratory Method Detection Limit RSL = November 2011 Oakridge Residential Screening Level for soil MCL = Maximum Contaminant Level
***Bold** = > Exceeds RSL or MCL (Level of 90 mg/kg used for toxicity screening level for Arsenic)