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ANALYTICAL RESULTS REPORT
SITE INSPECTION

GOLD HILL TAILINGS SITE
EPA ID# COD983801275

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION VIII

CONTRACT NO. 68-W9-0025
WORK ASSIGNMENT NUMBER 28-8JZZ

October 14, 1994

MORRISON KNUDSEN CORPORATION
Engineering, Construction & Environmental Group
7100 East Belleview Avenue, Suite 300
Englewood, Colorado 80111

APPROVAL PAGE

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MK TASK LEAD	10-14-94 DATE
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1.0 INTRODUCTION

This Analytical Results Report (ARR) is prepared in partial fulfillment of work assignment number 28-8JZZ issued to Morrison Knudsen Corporation (MK) by the Region VIII office of the U.S. Environmental Protection Agency (USEPA) under ARCS Contract Number 68-W9-0025. This ARR has been prepared as part of a Site Inspection of the Gold Hill Tailings Site (EPA ID# COD983801275) located in Colorado Springs, El Paso County, Colorado.

2.0 SITE DESCRIPTION

The Gold Hill Tailings Site is located in Colorado Springs, Colorado adjacent to the foothills northwest of the downtown area. The tailings pile is 170 acres in size and covers most of the east half of Section 14 and portions of the western edge of Section 13, T. 14 S., R. 67 W (see Figure 1). The site is bounded by Fountain Creek and Highway 24 (Midland Expressway) on the north, 21st Street on the west, Rio Grand Street and Moreno Avenue on the south, and residential areas on the east including the A-1 Mobile Village (see Figure 3).

The tailings were produced by milling ore primarily originating from the Cripple Creek Mining District in Colorado. A total of 14.3 million tons of ore were processed yielding 12.5 million tons of tailings. Gold ore from Cripple Creek mines was transported by the Midway Railroad Company to the Golden Cycle Mill, which operated at the Gold Hill Tailings site from prior to 1904 until 1949. This mill processed ore using bromide, roasting, cyanide and flotation processes. Mill operations were modified for the war effort during 1942 and 1943. Flotation units at the mill were converted to process zinc-lead ores from other mineralized areas of Colorado. Zinc concentrates from the mill were shipped to other facilities for further processing. Additional description of the mill processes is provided in the Preliminary Assessment (MK, 1994) (GCC, 1942; GCC, 1943; Harner, 1933, Mosconi, 1952; The Westside).

By February, 1949 mill operations ceased. The mill was dismantled throughout 1950. Mill equipment and supplies that could not be used in the new Carlton Mill, constructed by the Golden Cycle Corporation in the Cripple Creek Mining District, were sold for scrap. By 1950 approximately 357,440 tons of dirt from hills adjacent to the mill was used to

cover the 170-acre tailings pile to a depth of 6 to 8 inches (Bixler, 1987; Aguillar, 1992; Belgum, 1988; GCC, 1947; GCC, 1948; GCC, 1949; GCC, 1950).

The land on which the site is located has been divided into numerous parcels that are currently owned by the Fountain Creek Corporation of Seattle, Washington. Previous landowners of parcels at the site are shown in Table 1. In May, 1994 MK collected soil samples at the site and in the adjacent A-1 Mobile Village, and surface water and sediment samples from Fountain Creek upstream, downstream and adjacent to the site. Sampling locations and observations are detailed in the Sampling Activities Report (Appendix A).

The site is underlain by the Pierre Shale Formation. The thickness of the Pierre Shale ranges from 3,555 to 5,290 feet in the Denver Basin. The southwest edge of the Denver Basin lies a few miles northeast of the site. Surficial geologic maps indicate that Fountain Creek, upstream and downstream from the site, is underlain by the Piney Creek Alluvium. Louvier's Alluvium is found on terraces above Fountain and Monument Creeks, but is absent above the south side of Fountain Creek on Gold Hill Mesa (USGS, 1979a).

3.0 DATA USABILITY

Soil, sediment and surface water samples were analyzed under RAS CLP protocols for Target Analytical List total metals and cyanide. Analytical results were validated by the ESAT contractor, according to CLP Data Validation Functional Guidelines. The laboratory data sheets and data validation summaries are included in Appendix B. The quality assurance review indicated that the analytical data are acceptable with the qualifications noted below. Adjusted values were calculated according to the potential bias indicated by the quality control criteria and quality assurance review.

Soil/Sediment Sample Data

The cyanide concentration in soil sample GH-SO-5 is considered an estimate because analysis for this compound was not performed within the 14-day holding time, which may result in a low bias of the reported value. The antimony, barium, copper and vanadium concentrations detected in all of the soil and sediment samples are considered estimates because matrix spike recoveries were below control limits and associated sample results may be biased low. The sodium and zinc concentrations detected in all of the soil and

sediment samples are considered estimates because serial dilutions were outside of established control limits, indicating a possible low bias of the reported values.

The quality control issues impact the usability of the data set to document antimony, barium and sodium as waste characteristics and to document elevated barium and sodium in residential soils. Sediment data usability is not significantly affected.

Aqueous Sample Data

The arsenic concentration detected in GH-SW-8 is considered an estimate because of negative blank contamination; however, the value still documents elevated arsenic in the surface water sample. All of the iron concentrations in aqueous samples are considered estimates because matrix spike recoveries were below control limits, but downstream concentrations are comparable to those upstream and all reported values are less than the contract required detection limit. The barium concentrations detected in these samples are considered estimates because serial dilutions were outside of established control limits. The quality control issues do not affect the usability of the data to document releases to the surface water.

Field QC Samples

The rinse blank documents adequate decontamination and no apparent cross-contamination between sample locations. The results of field duplicates indicate poor laboratory precision for several aqueous parameters, including arsenic, lead, manganese, and zinc. The release of arsenic indicated by the aqueous sample may be questioned, although sediment samples support the presence of relatively high arsenic levels in the creek.

4.0 WASTE CHARACTERISTICS

Ores sent to the Golden Cycle Mill are classified as sulfo-telluride ores. The gold is present in iron sulfide or pyrites, and in gold, silver tellurides of calverite and sylvanite. Ores were processed at the mill with cyanide, mercury, zinc dust and shavings, lead acetate, sulfuric acid, hydrochloric acid, hydrated lime and sodium nitrate (Harner, 1933).

Metals and cyanide are the primary contaminants at this site. Onsite waste sources include the tailings pile, contaminated soils and building foundations in the mill site area,

and tailings eroded from the pile onto land along Fountain Creek and within A-1 Mobile Village.

Soil samples GH-SO-3, GH-SO-4 and GH-SO-8 were collected from the millsite area. GH-SO-3 was collected in the former sand leach tank area of the millsite. GH-SO-4 and GH-SO-8 were collected in the former slime room area of the millsite (see Figure 3). Inorganic results for the background and millsite area soil samples are shown in Table 2. Mercury and cyanide were detected in all of the millsite area samples, but not in the background samples. Concentrations of twelve additional metals were elevated in the millsite area relative to background levels. Concentrations of several analytes were quite high relative to background levels including arsenic at 385 mg/kg, lead at 1,630 mg/kg, mercury at 4.7 mg/kg, zinc at 3,720 mg/kg and cyanide at 393 mg/kg. GH-SO-9 was collected from a dry basin north of the millsite area and contained elevated levels of manganese and mercury.

Soil samples GH-SO-5 and GH-SO-6 were collected at or near the base of the northeast face of the tailings pile. Soil sample GH-SO-7 was collected from an exposed soil face above the south bank of Fountain Creek in the northwest corner of the site. Soil samples GH-SO-10 through GH-SO-12 were collected from visible areas of tailings deposition within the northwest portion of A-1 Mobile Village (see Figure 4). Results for these samples are shown in Table 3. Cyanide and eight of the fourteen metals found to be elevated at the millsite/basin areas also were elevated along the northeast face and/or Fountain Creek bank. Each of the three samples collected from the A-1 Mobile Village contained elevated concentrations of arsenic, lead, silver and cyanide, with mercury and copper elevated in two of the samples.

The analytical results of the ten source characteristics samples document significant levels of metals and cyanide associated with the tailings pile extending north to the creek. Additionally, metal- and cyanide-laden tailings extend beyond Fountain Creek Corporation's northeastern property boundary and onto the adjacent residential area.

5.0 SOIL EXPOSURE PATHWAY

All soil/waste samples were collected within one-foot of the surface. The analytical results document contaminant sources, as presented in Section 4.0. The millsite area and tailings cover approximately 733,000 square feet. The area of tailings and associated contaminated soil beyond the site property boundary covers a minimum area of 9,636 square feet, as documented by soil samples GH-SO-10, GH-SO-11 and GH-SO-12.

Portions of the site along Fountain Creek are fenced. There is no fencing or other barriers to prevent access to other areas of the site. There is no fence between the site and the A-1 Mobile Village and children from A-1 Mobile Village were observed playing in the tailings deposition area below the northeast face of the tailings pile. Tailings from the northeast face have eroded into the northwest portion of A-1 Mobile Village. There are 24 trailers with a total of 69 residents located within 200 feet of the sample locations in A-1 Mobile Village (see Figure 4). A summary of the trailers and residences within 200 feet is presented in Table 4. Numerous dirt roads and trails cross the site, which is used for recreational trail riding. Youths were also observed in the millsite area (MK, 1994; Aerial Surveys, Inc., 1989).

The Bristol, Buena Vista, Midland and Washington elementary schools lie within one mile of the site. The enrollments of these schools are 339, 324, 205 and 234 students, respectively. The West Junior High School located at 1920 West Pikes Peak, is also within one mile of the site has an enrollment of 637 students. The location of these schools are shown in Figure 2. The populations for the target distance categories within one mile of the site are presented in Section 4.5 (Burkman, 1993; USGS 7.5' Colorado Springs quadrangle map).

6.0 SURFACE WATER MIGRATION PATHWAY

The north and northeast portions of the tailings pile slope toward Fountain Creek. The northeast face of the tailings pile is eroding into the west edge and northwest portion of A-1 Mobile Village, located downslope and to the east of the pile. This large depositional area also extends into Fountain Creek. The southeast and southwest portions of the pile slope toward the east and southwest, respectively. Bear Creek, located south of the site, is the nearest surface water body to the southeast part of the tailings pile. Bear Creek empties into Fountain Creek approximately 0.4 miles downstream from Fountain

Creek/Monument Creek confluence (USGS, Colorado Springs quadrangle map; Aerial Surveys, 1989; Kucera & Associates, 1969; Landis Aerial Photographs, 1981, 1983, 1985 and 1987; MK, 1994).

Surface water and sediment samples were collected from three locations adjacent to the tailings pile. Aqueous samples contained metals concentrations comparable to those upstream of the site, with the exception of an arsenic detection in GH-SW-8. Sediment samples GH-SE-2 and GH-SE-3 contained numerous metals at levels significantly elevated relative to the upgradient sediment sample. Of these sixteen metals, the following also have been established as characteristic of the onsite sources: aluminum, arsenic, beryllium, cadmium, copper, iron, lead, manganese, mercury, silver, vanadium, and zinc. Cyanide also has been released to Fountain Creek sediment.

Sediment sample GH-SE-8 was collected where a channel draining alternate sources enters Fountain Creek. Concentrations of several analytes were higher in GH-SE-8 than were reported for sediment sample GH-SE-4 collected upgradient of this channel. It is possible that GH-SE-4 was not representative of the sediments downgradient of the site. Or, it is possible that the channel is contributing similar heavy metals and cyanide to Fountain Creek. Sample GH-SE-6 was collected to test for impacts to the nearest downstream wetland. The results of this sample and of those collected just upgradient of the wetland indicate no significant impact to the wetland as a result of the tailings site.

Eleven wetland segments have been identified along Fountain Creek within 12 downstream miles of the site. A summary of these wetlands, which meet the criteria for wetlands defined in 40 CFR 230.3, is shown in Table 7 (USF&WS, 1975; USGS, 1979b; MK, 1994).

There are no drinking water intakes in Fountain Creek within 15 downstream miles of the site. Water is withdrawn from Fountain Creek and used for irrigation purposes. The closest diversion point downstream from the site is about 2.5 miles to the east-southeast in the Fountain Mutual Canal, which originates from a headgate on Fountain Creek. The segment of Fountain Creek downstream from the site is not a fishery. No state- or federally-designated threatened or endangered species habitats are known to exist in Fountain Creek. Bald eagles occasionally migrate through the area in winter (McGrady, 1993; Price, 1993; Flory, 1993; Loeffler, 1993).

7.0 GROUND WATER MIGRATION PATHWAY

The City of Colorado Springs obtains potable water from various surface water sources including reservoirs on the slopes of Pikes Peak and Fountain Creek upstream from the site. The city also enforces a municipal ordinance requiring city residents to use city water for drinking. The City of Colorado Springs Utilities Department verified that all addresses with water rights for private domestic wells also receive city water. The City of Manitou Springs obtains potable water from a reservoir on the west side of Pikes Peak and from French Creek (Dagmar, 1993; McGrady, 1993; Price, 1993).

The nearest known drinking water wells to the site are located 3.3 to 3.8 miles to the southeast and are used by the Garden Valley Water & Sanitation District. The District provides water to an estimated 600 residents and 300 workers from 7 wells. The wells are 60 to 65 feet deep and screened in alluvium. No other drinking water wells within the 4-mile target distance limit have been identified (CDH, 1992).

8.0 AIR MIGRATION PATHWAY

The tailings pile originally was covered in 1949 with 6 to 8 inches of dirt from the surrounding hills. Most of the soil cover on the northeast face of the tailings pile has eroded away exposing tailings material (GCC, 1949; MK, 1994; Aerial Surveys, 1989; Kucera & Associates, 1969; Landis, 1981, 1983, 1985 and 1987). No direct observation of wind-blown tailings was made during the SI field event.

The potential target populations for the air migration pathway were calculated by estimating the proportion of each census tract within each distance category and multiplying that proportion by the total population for each tract as given in the 1990 Census of Population and Housing for Colorado. The census tract areas included within each distance category were estimated by examining topographic maps. The estimated population for each distance category is given below:

0 to ¼ Mile:	2,237
¼ to ½ Mile:	2,449
½ to 1 Mile:	6,616
1 to 2 Miles:	22,991
2 to 3 Miles:	23,476
3 to 4 Miles:	27,578

The American Peregrine Falcon, a federally-designated endangered species, is known to breed in the Bear Creek Canyon area, which is within two miles southwest of the site. Bald eagles occasionally migrate through the area during the winter. The Mexican Spotted Owl, a federally-designated threatened species, is known to occur in areas immediately south of Colorado Springs. This species may be present in wooded canyons 3½ to 4 miles west of the site. Bear Creek Regional Park is located less than ½ mile to the south-southeast of the site (Loeffler, 1993; MacVan, 1993).

9.0 SUMMARY

The Gold Hill Tailings site consists of 170 acres of tailings produced by the Golden Cycle Millsite, which operated from 1905 or earlier until 1949. The mill was dismantled in 1950. Gold recovery processes used at the mill included amalgamation, cyanidation, cyanide sand leaching and cyanide slime leaching. Lead acetate, sulfuric acid, hydrochloric acid, hydrated lime, sodium nitrate and zinc shaving and zinc dust were used to aid in the precipitation from leaching solutions.

Most of the ore processed at the Golden Cycle Mill was silicious or basic ore from the Cripple Creek Mining District that contained small amounts of silver, lead, copper, zinc, arsenic, antimony and mercury. The mill also processed some complex sulfide ores from other mining districts in Colorado. Mill operations were modified in World War II in order to process zinc-lead ores for the war effort.

Cover material, which was placed on the tailings pile in 1949, has eroded to expose tailings material on the northeast face. Tailings from the northeast face of the tailings pile have migrated onto the A-1 Mobile Village property. Soil samples collected in May, 1994 from the millsite area, the northeast face of the tailings pile, and within the northwest portion of A-1 Mobile Village contained cyanide and numerous heavy metals, including elevated arsenic, copper, lead, mercury, silver concentrations relative to offsite background soil samples. The site is accessible and is used for recreational purposes. There are 24 trailers with a total of 69 residents present within 200 feet of the sample locations in A-1 Mobile Village. There are four elementary schools and one junior high school within one mile of the site with a combined enrollment of 1,739 students. An estimated 11,302 people reside within one mile of the site. An estimated 85,347 people within four miles of the site are potential targets of airborne releases.

Sediment samples collected from Fountain Creek adjacent to the site contained elevated levels of twelve heavy metals and cyanide. Downstream samples indicate that the levels are substantially reduced within ½ mile and that the nearest wetland is not impacted by site run-off.

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Pikeview, Colorado

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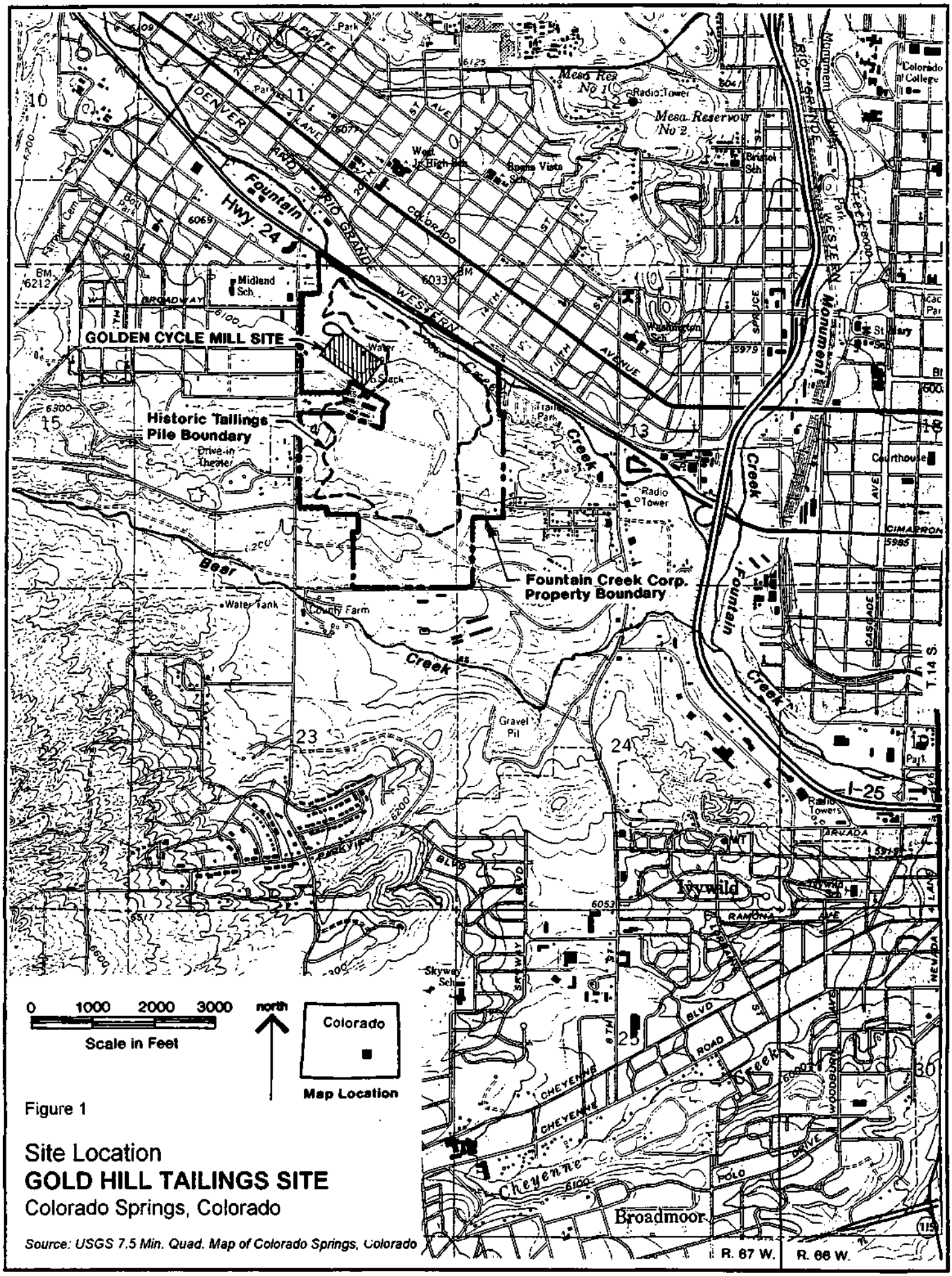

Figure 1

Site Location
GOLD HILL TAILINGS SITE
Colorado Springs, Colorado

Source: USGS 7.5 Min. Quad. Map of Colorado Springs, Colorado

Figure 2

Stream Sampling Locations
GOLD HILL TAILINGS SITE
Colorado Springs, Colorado

Source: USGS 7.5 Min. Quad. Map of Colorado Springs, Colorado

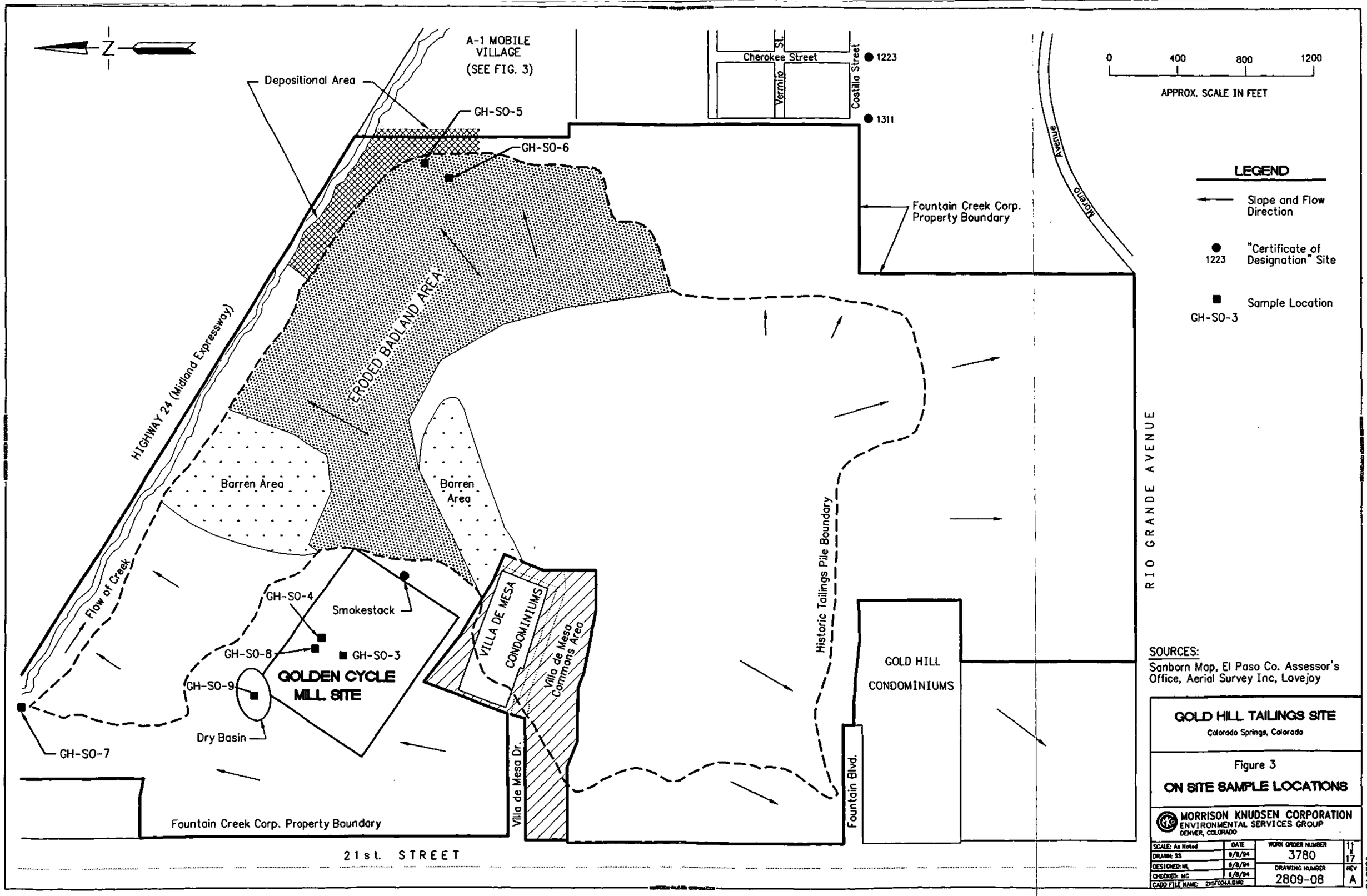
A-1 MOBILE VILLAGE (SEE FIG. 3)
Depositional Area
GH-SO-5
GH-SO-6
Cherokee Street
St.
Vermijo
Costilla Street
1223
1311
0 400 800 1200
APPROX. SCALE IN FEET
Moreno Avenue
LEGEND
Slope and Flow Direction
1223 "Certificate of Designation" Site
GH-SO-3 Sample Location
Fountain Creek Corp. Property Boundary
HIGHWAY 24 (Midland Expressway)
ERODED BADLAND AREA
Barren Area
Barren Area
Flow of Creek
GH-SO-4
Smokestack
GH-SO-8
GH-SO-3
GH-SO-9
GOLDEN CYCLE MILL SITE
Dry Basin
GH-SO-7
VILLA DE MESA CONDOMINIUMS
Villa de Mesa Commons Area
Villa de Mesa Dr.
Historic Tailings Pile Boundary
GOLD HILL CONDOMINIUMS
Fountain Blvd.
RIO GRANDE AVENUE
Fountain Creek Corp. Property Boundary
21st. STREET
SOURCES:
Sanborn Map, El Paso Co. Assessor's Office, Aerial Survey Inc, Lovejoy
GOLD HILL TAILINGS SITE
Colorado Springs, Colorado
Figure 3
ON SITE SAMPLE LOCATIONS
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP
DENVER, COLORADO
SCALE: As Noted
DRAWN: SS
DESIGNED: ML
CHECKED: MG
CADD FILE NAME: 215F004A.DWG
DATE 6/8/94
WORK ORDER NUMBER 3780
DRAWING NUMBER 2809-08
REV A
11 x 17
P:\3780

Figure 4

OFFSITE SAMPLE LOCATIONS IN NORTHWEST PART A-1 MOBILE VILLAGE

Gold Hill Tailings Site

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP
DENVER, COLORADO

SCALE: 1"=50'	DATE	WORK ORDER NUMBER	11 & 17
DRAWN: SS	6/08/94	3780	
DESIGNED:		DRAWING NUMBER	REV
CHECKED: MG	08/8/94	2809-08	A
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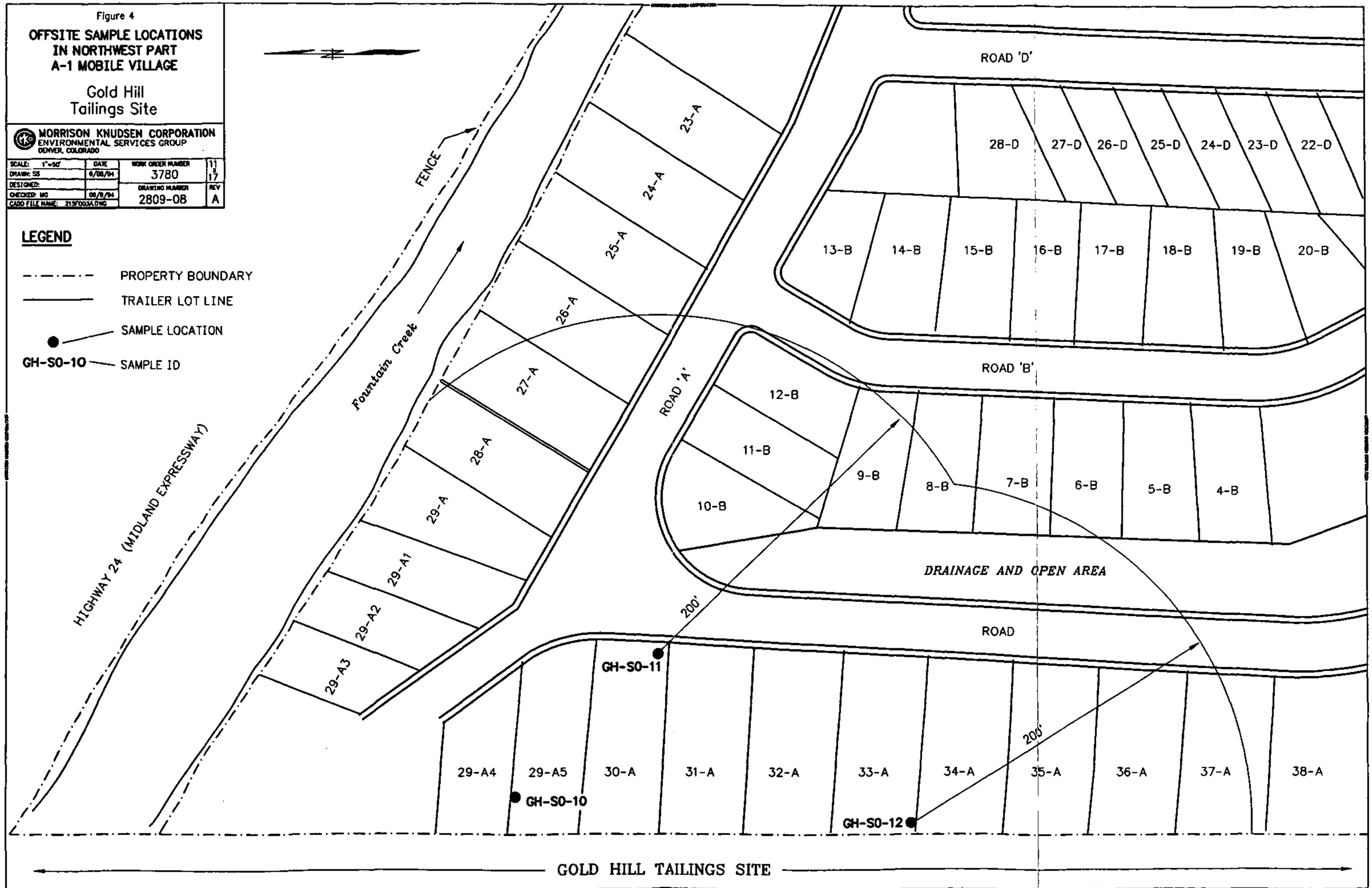
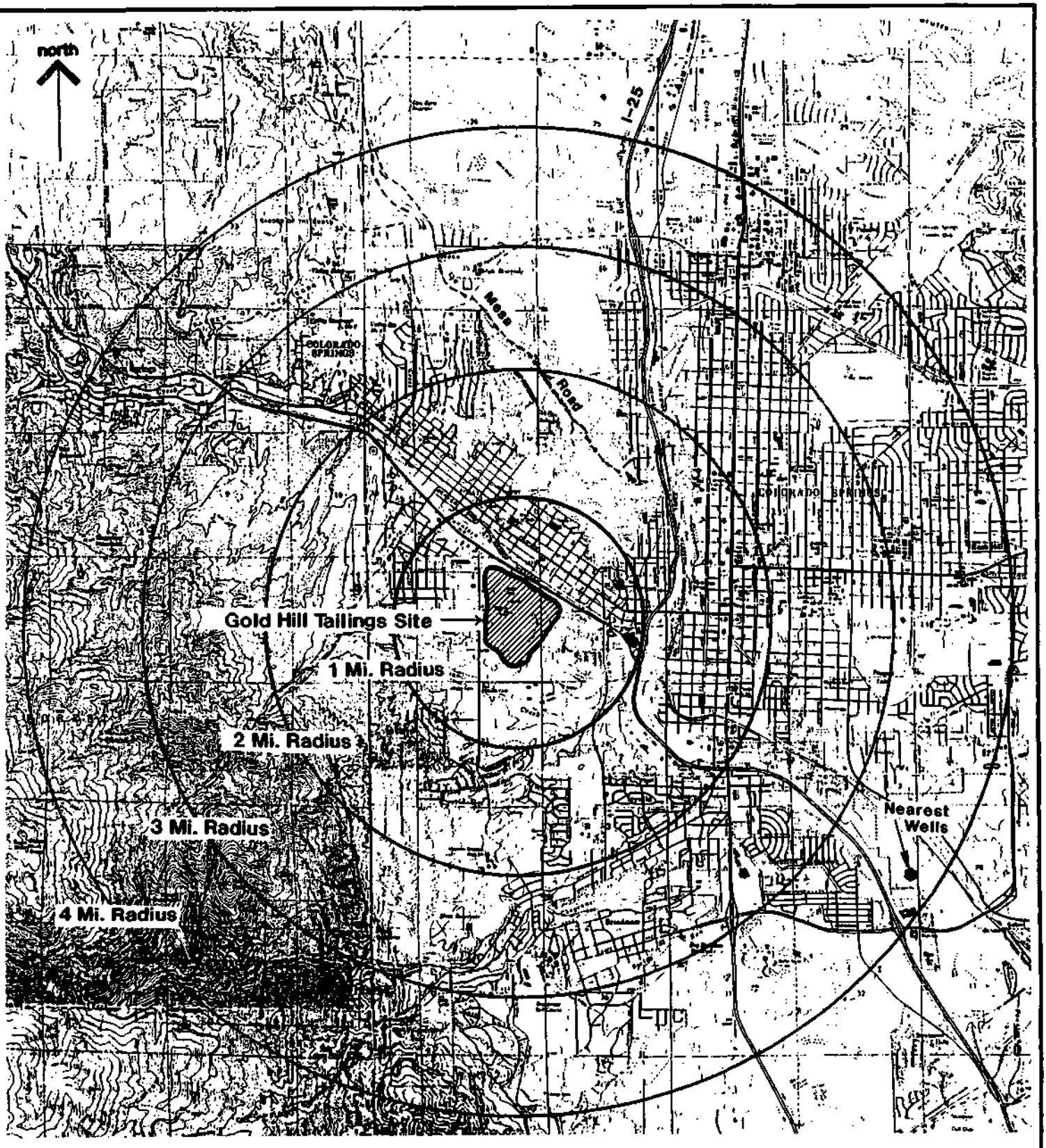




0 1 2 3

Scale in Miles

Figure 5

4-Mile Radius Map
Gold Hill Tailings
Colorado Springs, Colorado

Source: USGS 7.5' Quad Map of Colorado Springs, Cascade, Pikeview & Manitou Springs, Colorado

TABLE 1

Land Owners and Dates of Recorded Ownership for Gold Hill Tailings Site

OWNER	DATES
Fountain Creek Corporation, Seattle	1977, 1980, 1983, 1993
APM Land, Inc.	1989
Langford Development, Inc.	1982
Pacific Building Corporation	1978 - 1980
Piranha Properties	1978 - 1979
Bank of Fountain Valley (*)	1978
Riverview Developments (*)	1978
Richard H. Hadley	1977 - 1978
California Pacific Investments, Inc. (*)	1977
1st National Bankette Corporation (*)	1977
William Wiley	1972 - 1974, 1976 - 1977
Gold Toe Associates	1973
Golden Cycle Corporation	1973
Gold Hill Mesa Corporation	1972 - 1973
W.P. and Clara E. O'Brien (*)	1972
Timothy J. Dennehy, Jr. (*)	1972
Front Range Construction Corp. (*)	1970
Lewson Development Corporation (*)	1968
Gold Hills Land Company (*)	1965
Pikes Peak National Bank (*)	?

(*) Owned only one parcel that includes portions of the tailings pile.

(Source: El Paso County Assessor's Office Records)

TABLE 2
Inorganic Results for Background and Millsite Area Soil Samples

(Results in mg/kg)

Sample ID CLP No.	GH-SO-1 MHBM65	GH-SO-2 MHBM66	GH-SO-3 MHBM67	GH-SO-4 MHBM68	GH-SO-8 MHBM72	GH-SO-9 MHBM73
Location	Background		Millsite			Dry Basin
Aluminum	9,950	8,360	36,100	6,730	4,380	16,900
Antimony	2.8 J (5.04)	3.2 UJ	3.2 UJ	10.0 J<	13.1 J (13.1)	3.3 UJ
Arsenic	12.2	6.8	21.5	385	181	33.0
Barium	102 J (337)	97.7 J (322)	521 J (521)	241 J (241)	267 J (267)	232 J (232)
Beryllium	1.2	0.93 J<	4.3	1.2 J<	0.59 J<	1.9
Cadmium	1.4	0.75 J<	1.3	6.2	4.0	1.3
Calcium	6,840	5,450	142,000	137,000	8,320	15,900
Chromium	24.7	10.4	14.8	12.9	11.4	19.9
Cobalt	3.7 J<	3.7 J<	8.7 J<	3.0 J<	3.5 J<	12.6 J<
Copper	12.4 J (13.6)	12.1 J (13.3)	41.2 J (41.2)	86.1 J (86.1)	107 J (107)	39.1 J (39.1)
Iron	16,200	12,400	45,400	17,100	50,700	30,100
Lead	175	42.3	20.5	1,510	1,630	107
Magnesium	2,480	2,520	15,900	8,740	699 J<	6,940
Manganese	273	331	953	776	600	1,190
Mercury	0.11 U	0.12 U	0.22	4.7	2.2	0.38
Nickel	10.7	9.3 J<	20.2	9.6 J<	6.6 J<	28.8
Potassium	2,230	2,390	2,700	1,790	2,570	4,110
Selenium	15.2	15.2	1.4	9.0	15.9	25.4
Silver	1.2 J<	0.98 J<	1.8 J<	3.5	10.2	2.3 J<
Sodium	138 J (1380)	126 J (1260)	1,920 J (1920)	476 J (476)	907 J (907)	300 J (300)
Thallium	2.0 UJ	2.6 UJ	4.6 UJ	2.6 UJ	4.6 UJ	4.1 UJ
Vanadium	26.1 J (31.3)	19.9 J (23.9)	50.1 J (50.1)	164 J (164)	47.9 J (47.9)	48.8 J (48.8)
Zinc	108 J (140)	87.5 J (114)	38.5 J (38.5)	3,720 J (3,720)	703 J (703)	186 J (186)
Cyanide	0.54 U	0.61 U	1.5	393	8.0	0.64 U

J = The associated numerical value is an estimated quantity because the Quality Control Criteria were not met.
U = Analyte was not detected. The number shown is the detection limit.
▒ = Concentration is greater than or equal to three times the background level or concentration is greater than or equal to the Contract Required Detection Limit (CDRL) the analyte and was not detected in the background sample.
J< = Concentration is less than the CRDL.
( ) = Adjusted value based on potential bias, per EPA, 1994.

TABLE 3
Inorganic Results for Northeast Face of Tailings Pile and A-1 Mobile Village Soil Samples

(Results in mg/kg)

Sample ID CLP No	GH-SO-1 MHBM65	GH-SO-2 MHBM66	GH-SO-5 MHBM69	GH-SO-6 MHBM70	GH-SO-7 MHBM71	GH-SO-10 MHBM92	GH-SO-11 MHBM93	GH-SO-12 MHBM94
Location	Background		Northeast Face		F. Creek Wall	A-1 Mobile Village		
Aluminum	9,950	8,360	7,340	2240	9,620	1,820	2,670	3,460
Antimony	2.8 J (5.04)	3.2 UJ	3.3 J<	12.6 J<	6.0 J<	6.0 J<	9.5 J<	7.0 J<
Arsenic	12.2	6.8	157	95.8	290	73.8	102	103
Barium	102 J (337)	97.7 J (322)	203 J (203)	194 J (194)	355 J (355)	159 J (159)	167 J (167)	145 J (145)
Beryllium	1.2	0.93 J<	1.5	0.45 J<	2.0	0.24 J<	0.3 J<	0.39 J<
Cadmium	1.4	0.75 J<	3.4	1.9	1.3	0.97 J<	1.9	1.6
Calcium	6,840	5,450	11,200	8,270	10,300	729 J<	1,890	1,810
Chromium	24.7	10.4	15.4	3.1 UJ	21.2	4.0 UJ	5.6	6.0
Cobalt	3.7 J<	3.7 J<	5.7 J<	1.6 J<	7.0 J<	2.5 J<	2.5 J<	2.4 J<
Copper	12.4 J (13.6)	12.1 J (13.3)	58.0 J (58.0)	69.0 J (69.0)	22.8 J (22.8)	38.9 J (38.9)	66.6 J (66.6)	81.5 J (81.5)
Iron	16,200	12,400	17,700	45,300	20,000	29,000	35,000	40,600
Lead	175	42.3	98.3	1,240	58.0	628	779	684
Magnesium	2,480	2,520	3,700	569 J<	5,300	422 J<	859 J<	817 J<
Manganese	273	331	1,200	291	1,310	159	250	229
Mercury	0.11 U	0.12 U	0.11 U	0.34	0.11 U	0.1 U	0.19	0.17
Nickel	10.7	9.3 J<	14.4	2.9 J<	14.9	4.4 J<	7.1 J<	4.9 J<
Potassium	2,230	2,390	3,590	4,320	4,600	2,000	2,940	2,290
Selenium	15.2	15.2	19.8	15.2	18.2	1.6	4.2	3.4
Silver	1.2 J<	0.98 J<	3.9	9.3	2.9	4.3	5.8	5.2
Sodium	138 J< (1,380)	126 J< (1,260)	339 J<	452 J<	530 J<	238 J<	265 J	246 J<
Thallium	2.0 UJ	2.6 UJ	4.5 UJ	3.7 UJ	4.5 UJ	2.1 UJ	3.6 UJ	3.0 UJ
Vanadium	26.1 J (31.3)	19.9 J (23.9)	93.4 J (93.4)	47.4 J (47.4)	165 J (165)	36.6 J (36.6)	39.9 J (39.9)	41.5 J (41.5)
Zinc	108 J (140)	87.5 J (114)	639 J (492)	348 J (268)	260 J (200)	186 J (143)	280 J (215)	338 J (260)
Cyanide	0.54 U	0.61 U	25.4 J (25.4)	3.7	1.4	1.0	1.6	1.7

J = The associated numerical value is an estimated quantity because the Quality Control Criteria were not met.
U = Analyte was not detected. The number shown is the detection limit.
= Concentration is greater than or equal to three times the background level or concentration is greater than or equal to the Contract Required Detection Limit (CDRL) and the analyte was not detected in the background sample.
J< = Concentration is less than the CRDL.
( ) = Adjusted value based on potential bias, per EPA, 1994.

TABLE 4

Residents Within 200 feet of Sample Locations In A-1 Mobile Village

Trailer Unit Number	Number of Residents
6B	2
7B	2
8B	2
9B	2
10B	3
11B	4
12B	2
26A	4
27A	6
28A	5
29A	4
29A1	3
29A2	3
29A3	2
29A4	4
29A5	2
30A	5
31A	2
32A	2
33A	2
34A	1
35A	4
36A	2
37A	2

TOTALS: 24 Units 69 Residents

(Source: Smith, 1994)

TABLE 5
Inorganic Results for Fountain Creek Sediment Samples
(Results in mg/kg)

Sample ID CLP No.	GH-SE-1 MHBM74	GH-SE-2 MHBM75	GH-SE-3 MHBM76	GH-SE-4 MHBM77	GH-SE-8 MHBM91	GH-SE-5 MHBM78	GH-SE-6 MHBM79	GH-SE-7 MHBM80
Location	Upstream	Adjacent to Tailings Pile			Alt. Source	Downstream	Below Confluence	Monument Creek
Aluminum	675	11,500	8,770	1,520	1,870	1,040	686	528
Antimony	2.8 UJ	3.5 UJ	3.3 UJ	3.0 UJ	3.0 UJ	3.1 UJ	3.1 UJ	3.0 UJ
Arsenic	1.3 J<	99.4	150	4.6	38.4	1.6 J<	2.9	0.78 J<
Barium	9.3 J< (30.7)	332 J (332)	442 J (442)	30.5 J<	86.4 J (86.4)	27.8 J<	17.8 J<	11.2 J<
Beryllium	0.28 J<	1.4 J<	1.9	0.48 J<	0.42 J<	0.39 J<	0.39 J<	0.23 U
Cadmium	0.64 U	1.5	1.4	0.7 U	0.99 J<	0.72 U	0.71 U	0.68 U
Calcium	45,900	13,600	13,200	16,100	3,270	7,280	3,950	969 J<
Chromium	1.9 UJ	14.7	14.8	3.0 UJ	4.3 UJ	1.4 UJ	1.7 UJ	1.3 UJ
Cobalt	1.1 U	7.1 J<	6.1 J<	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U
Copper	2.8 J< (3.1)	19.7 J (19.7)	27.1 J (27.1)	2.5 J<	22.4 J (22.4)	1.5 J<	2.8 J<	1.2 J<
Iron	2,560	21,700	21,500	5,380	12,500	3,610	7,870	2,040
Lead	2.3	60.1	100	11.1	137	4.3	4.8	2.4
Magnesium	1,760	4,640	4,310	2,140	1,020 J<	1,510	1,460	184 J<
Manganese	76.4	681	1,130	183	201	122	193	87.0
Mercury	0.11 U	0.14 U	0.19	0.12 U	0.12 U	0.12 U	0.12 U	0.11 U
Nickel	2.3 U	16.3	11.9	2.6 J<	3.0 J<	2.6 U	3.0 J<	2.5 U
Potassium	234 J<	2,560	3,270	519 J<	813 J<	450 J<	203 J<	80.7 U
Selenium	23.4	25.2	23.4	24.3	9.9	17.2	11.6	4.3
Silver	0.43 U	1.4 J<	2.7	0.61 J<	1.8 J<	0.48 U	0.64 J<	0.46 U
Sodium	120 J< (1,200)	252 J<	313 J<	146 J<	178 J<	124 J<	114 J<	117 J<
Thallium	1.2 UJ	4.4 UJ	4.2 UJ	1.4 UJ	2.1 UJ	1.2 UJ	1.4 UJ	1.2 UJ
Vanadium	1.1 J< (1.3)	45.3 J (45.3)	70.9 J (70.9)	4.3 J<	18.6 J (18.6)	2.3 J<	4.8 J<	2.7 J<
Zinc	12.7 J (16.5)	184 J (184)	293 J (293)	23.8 J (23.8)	136 J (136)	17.4 J (17.4)	19.6 J (19.6)	6.9 J (6.9)
Cyanide	0.53 U	0.68 U	3.5	0.58 U	0.66	0.60 U	0.60 U	0.57 U

J = The associated numerical value is an estimated quantity because the Quality Control Criteria were not met.
U = Analyte was not detected. The number shown is the detection limit.
▒ = Concentration is greater than or equal to three times the background level or concentration is greater than or equal to the Contract Required Detection Limit (CRDL) and the analyte was not detected in the background sample.
J< = Concentration is less than the CRDL.
( ) = Adjusted value based on potential bias, per EPA, 1994.

TABLE 6
Inorganic Results for Fountain Creek Surface Water Samples
(Results in µg/l)

Sample ID CLP No.	GH-SW-1 MHBM81	GH-SW-2 MHBM82	GH-SW-3 MHBM83	GH-SW-8 MHBM88	GH-SW-4 MHBM84	GH-SW-10 MHBM90	GH-SW-5 MHBM85	GH-SW-6 MHBM86	GH-SW-7 MHBM87	GH-SW-9 MHBM89
Location	Background	NW Corner	North Central Drainage	DUP of SW-3	By N.E. Face	Alternate Source	Above Monument Creek	Below Monument Creek	Monument Creek	Rinse Blank
Aluminum	1,930	2,230	2,080	3,530	2,120	2,310	2,030	2,190	2,310	41.6 UJ
Antimony	13.0 UJ	13.0 UJ	13.0 UJ	13.0 UJ	13.0 UJ	13.0 UJ	13.0 UJ	13.0 UJ	13.0 UJ	13.0 UJ
Arsenic	3.0 UJ	3.0 UJ	3.0 UJ	10.9 J (9.1)	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ
Barium	64.8 J<	71.9 J<	79.7 J<	138 J<	74.3 J<	79.1 J<	74.1 J<	72.0 J<	62.1 J<	1.0 U
Beryllium	1.2 J<	1.6 J<	1.6 J<	1.8 J<	1.1 J<	1.6 J<	1.1 J<	1.4 J<	1.0 U	1.0 U
Cadmium	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Calcium	20,100	23,100	23,100	25,300	24,200	25,600	24,500	26,200	38,800	66.1 UJ<
Chromium	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Cobalt	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Copper	6.4 J<	6.3 J<	6.6 J<	10.1 J<	6.0 J<	6.2 J<	6.6 J<	6.1 J<	8.2 J<	5.0 U
Iron	3,080 J (3696)	3,540 J (3,540)	3,370 J (3,370)	5,820 (5,820)	3,370 J (3,370)	3,870 J (3,870)	3,300 J (3,300)	3,610 J (3,610)	4,250 J (4,250)	79.4 J (79.4)
Lead	8.7	9.6	9.8	25.8	9.8	15.3	10.3	10.0	6.7	2.0 U
Magnesium	4,000 J<	5,380	4,770 J<	5,690	5,480	6,030	5,480	5,670	7,160	16.0 U
Manganese	204	215	250	402	228	245	226	219	153	2.0 U
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U
Potassium	2,320 J<	2,710 J<	2,910 J<	3,300 J<	2,770 J<	2,810 J<	2,690 J<	2,660 J<	3,420 J<	354 U
Selenium	54.7	60.0	59.1	64.9	59.7	67.4	66.0	70.7	86.5	3.0 U
Silver	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Sodium	9,430	14,400	11,100	11,100	12,900	13,500	13,000	13,200	17,700	80.1 UJ
Thallium	4.6 UJ	4.2 UJ	2.0 U	7.2 UJ	2.8 UJ	2.0 U	2.0 U	4.6 UJ	5.9 UJ	2.4 UJ
Vanadium	4.0 U	4.0 U	4.0 U	7.3 J<	4.0 U	4.0 U	4.0 U	6.0 J<	5.0 J<	4.0 U
Zinc	28.0	35.1	35.3	71.2	34.4	40.6	35.9	37.4	28.9	9.3 J<
Cyanide	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

U = The element was not detected. The number shown is the detection limit.
J = The associated numerical value is an estimated quantity because the Quality Control criteria were not met.
J< = Concentration is less than the Contract Required Detection Limit (CDRL).
▒ = Concentration is greater than the CRDL and was not detected in the background sample.
( ) = Adjusted value based on potential bias, per EPA, 1994.

TABLE 7

Summary of Wetland Frontages Along Fountain Creek Within 15 Downstream Miles of Gold Hill Tailings

Type of Wetland*	Frontage Length (in miles	Stream Distance from Site (in miles)
Scrub-Shrub (c)	0.2	0.76
Palustrine, Forested (a)	0.19	1.43
Palustrine, Forested (a)	0.76	3.52
Palustrine, Forested (a)	0.16	4.19
Palustrine, Forested (a)	0.47	4.52
Plains, Streamside (b)	0.78	4.95
Plains, Streamside (b)	0.93	6.92
Palustrine, Forested (a)	0.31	7.74
Palustrine, Forested (a)	0.48	9.60
Palustrine, Forested (a)	0.76	10.02
Palustrine, Forested (a)	0.10	11.64

* = Meets definition of wetland at 40 CFR 230.3.
(a) = As indicated by NWI map (USF&WS).
(b) = Mapped as a "plains, streamside environment" that is inhabited by emergent hydrophytes, such as rushes, sedges and cattails (USGS, 1979b).
(c) = Opinion of Van Truan, Biologist, U.S. Army Corps of Engineers, Southern Colorado Regulatory Office (MK, 1994).

APPENDIX A

SAMPLING ACTIVITIES REPORT

MORRISON KNUDSEN CORPORATION

ENVIRONMENTAL SERVICES DIVISION
7100 E. BELLEVIEW AVENUE, SUITE 300
ENGLEWOOD, COLORADO U.S.A. 80111
PHONE: (303) 793-5000/FAX: (303) 290-0238

June 13, 1994

Ms. Pat Smith
Site Assessment Manager
USEPA, 8HWM-SM
999 18th Street, Suite 500
Denver, CO 80202-2405

Reference: ARCS Contract No. 68-W9-0025
WA 28-8JZZ

Subject: Gold Hill Tailings Site
SAR, CERCLIS ID# COD983801275

Dear Pat:

The Sampling Activities Report for the Gold Hill Tailings Site is enclosed. MK has concerns about exposure of residents to tailings material that has migrated from the site onto the adjacent A-1 Mobile Village. Based on MK field measurements there are 69 residents living in 24 trailers that are within 200 feet of samples collected in the trailer park.

Numerous structural hazards are present in the millsite area. These include subsurface tunnels, potentially unstable walls and ceilings, and trench and manhole openings above flooded basements. There are also numerous signs of recreational use of the millsite, such as graffiti. Youths were also seen jumping across gaps in elevated concrete platforms. Injury could also result from youths playing on numerous narrow pillars and posts at the millsite. The millsite is partially fenced on the west and south sides, but there are no other barriers to prevent access.

Sincerely,

Mark Lunsford
Environmental Specialist

APPROVED:

Marta Green
Pre-Remedial Manager

Enclosure

cc: R.E. Heise w/enclosures
M. Caban (8PM-GSC) letter only
G. Hargreaves (9HWM-SM) letter only

SAMPLING ACTIVITIES REPORT
GOLD HILL TAILINGS SITE

INTRODUCTION

This Sampling Activities Report (SAR) is prepared in partial fulfillment of Work Assignment Number 28-8JZZ issued to Morrison Knudsen Corporation, Environmental Services Division (MK) by the Region VIII office of the U.S. Environmental Protection Agency (EPA) under ARCS Contract Number 68-W9-0025. The subject of this SAR is the Gold Hill Tailings site in Colorado Springs, Colorado (EPA ID# COD983801275). A Sampling and Analysis Plan (SAP) was prepared and approved by EPA on April 22, 1994. The SAP served as a guide for fieldwork associated with the Site Inspection. The SAR discusses compliance with and deviations from the SAP and other field observations.

BACKGROUND

The Gold Hill Tailings Site is located in Colorado Springs, Colorado. The tailings pile is 170 acres in size and is associated with the Golden Cycle Mill, which operated from 1903 to 1949. It covers most of the east half of Section 14 and portions of the western edge of Section 13, T. 14 S., R. 67 W. The site is bounded by Fountain Creek and Highway 24 (Midland Expressway) on the north, 21st Street on the west, Rio Grand Street and Moreno Avenue on the south, and residential areas on the east including the A-1 Mobile Village (see Figure 1).

FIELD OPERATIONS

Stream Sampling

Surface water and sediment samples were collected from seven locations in Fountain Creek and one location in Monument Creek on May 17, 1994. These sampling locations are shown in Figure 1. Fountain Creek had a rust-brown color due to a high flow rate from spring snow melt runoff. Surface water sample GH-SW-1 and sediment sample GH-SE-1 were collected upstream from the site west of the 21st Street bridge along a portion of Fountain Creek adjacent to the G. & C. Packing Company at 240 South 21st Street (see photo #1). Fine sediment could not be located in the immediate vicinity of the upstream location due to the lack of pools and high stream velocity. Coarse substrate

was collected from the center of the channel. Surface water field measurement data is presented in Table 1.

Samples GH-SW-2 and GH-SE-2 were collected at the base of a large exposed soil face along the south bank of Fountain Creek in the northwest corner of the site. The soil face is located along a stream meander downstream of the Highway 24 bridge over Fountain Creek. A layer of reddish-brown fine sand was visible in the center of the exposed soil face (see photo #2). This material was characterized as "roaster" tailings in an Environmental Liability Assessment prepared on the site in 1988 by ENSR Consulting & Engineering. During a reconnaissance along Fountain Creek on May 11, 1994, the roaster tailings were being eroded by high streamflow into the Creek (see photo #3). On May 17 it was apparent the additional material from the streambank had fallen onto the lower bank covering the small area where the tailings were in contact with the creek (see photo #4). Samples were not collected from this portion of the streambed due to safety hazards presented by the unstable slope.

Sample GH-SE-3 was collected at the mouth of a drainage from the north central part of the tailings pile. The drainage mouth drops about 2 feet directly into Fountain Creek (see photo #5). Sample GH-SW-3 was collected directly beneath the mouth. Most of the area in this drainage has uncovered tailings present at the surface (see photos #6 through 8).

Samples GH-SE-4 and GH-SW-4 were collected just downstream of where the drainage channel from the northeast face of the tailings pile enters the creek. A sample was not collected directly at the probable point of entry (PPE) of tailings material to the creek because the south bank where the drainage channel enters has been covered with asphalt and the sediment in the center of the creek was composed of coarse material (see photos #9 and 10). The SAP specified that these samples would be collected downstream of an alternate source of contamination along Fountain Creek. Samples GH-SE-8 and GH-SW-10 are associated with the alternate source.

Sample GH-SE-5 was collected near the west bank at the mouth of Fountain Creek adjacent to the confluence with Monument Creek (see photo #11). Sample GH-SW-5 was collected near the east bank at the mouth of Fountain Creek in a pool adjacent to a sand spit separating the creeks where the flow was less turbulent. This location represents the beginning of the nearest downstream wetland segment from the site. Samples GH-SE-6 and GH-SW-6 were collected downstream of the confluence beyond

0.1 mile of wetland frontage (see photo #12). This sample point is located downstream of the mixing zone below the confluence. This mixing zone was obvious because of color differences in the creeks. Above the confluence Fountain Creek was a turbid, rust-brown color. Monument Creek was a turbid greenish-gray color (see photo #11). The mixing zone extended downstream from the Cimarron Street bridge.

Samples GH-SW-7 and GH-SE-7 were collected in Monument Creek just upstream of a concrete retaining wall located upstream of the confluence with Fountain Creek (see photo #13). GH-SW-10 and GH-SE-8 were collected immediately downstream of an alternate potential source of contamination along the north bank of Fountain Creek between the Interstate 25 and Highway 24 bridges. A small channel (1 foot wide) in this area conveys drainage from a culvert that may originate at an adjacent auto parts/salvage yard (see photo #14). The channel appeared to contain oily sediment and splits into two channels both of which empty into the creek. The first branch leads on southeastward into the creek. The second branch continues roughly 35 feet to the east, then roughly 75 feet southeastward and enters the creek downstream from the first branch. GH-SW-10 and GH-SE-8 were collected just downstream of the second branch (see photo #15).

Soil Sampling

A total of twelve soil samples were collected during May 17-19, 1994. The locations of soil samples GH-SO-1 and GH-SO-2 are shown in Figure 1. Soil samples GH-SO-3 through GH-SO-9 were collected onsite at the locations shown in Figure 2. Soil samples GH-SO-10 through GH-SO-12 were collected in the northwest portion of A-1 Mobile Village at the locations shown in Figure 3.

Background sample GH-SO-1 was collected within the City of Colorado Springs Utilities Department "Little Mesa" Tank property at 1410 Manitou Boulevard. The sample location is approximately 30 feet north of the north portion of the fence around the radio tower (see photo #16). The soil at this location consisted of brown silt and sand loam. The soils in this area have been mapped as Chaseville-Midway Complex soil.

Background sample GH-SO-2 was collected west of Beidelman Environmental Center (BEC) within Sonderman Park at 740 Camarillo Street. The sample location is west of the intersection of the main park trail and the trail leading west from the BEC (see photo #17). The soil at this location consisted of brown sandy loam. Soils in this area have been classified as Razor-Midway Complex soil.

Sample GH-SO-3 was collected from the northwest portion of the former sand leach tank area of mill site (see photo #18). Six inches of soil and tailings rest on concrete and/or masonry surfaces in this area. Slag cinders are scattered on the surface. Beneath the surface is a brown silty sand. Sample GH-SO-4 was collected from a small pile near the east wall of the basement in the filter portion of the slime room at the millsite (see photo #19). The material in the pile consisted of brown silt and sand with small white and gray quartz fragments. The quartz fragments may have come from rough masonry surfaces that were present nearby.

Sample GH-SO-5 was collected in a gully at the base of the northeast face of the tailings pile (see photo #20). This sample consisted of fine reddish-brown "roaster" tailings. Sample GH-SO-6 was collected from the lower slope of the northeast face of the tailings pile (see photo #21). This sample consisted of yellow-green to tan fine sand. This material was identified by ENSR as "flotation" tailings.

The SAP specified that GH-SO-7 through GH-SO-9 would be collected from the Northern Commons Area of the Villa de Mesa (VDM) Condominiums. The VDM Homeowner's Association, however, denied MK access to collect samples on their property. Sample GH-SO-7 was collected from the exposed soil face along the south bank of Fountain Creek in the northwest corner of the site above the edge of the creek where GH-SW-2 and GH-SE-2 were collected (see photo #2). This sample was collected from a layer of fine reddish brown sand ("roaster" tailings). The portion of the streambed that was sampled appeared to be stable and the tailings were not visibly eroding into the creek as was apparent at an adjacent portion of the streambed on May 11, 1994.

Sample GH-SO-8 was collected from the center of the basement in the slime area of the mill site (see photo #22). This sample consisted of light brown to tan fine sand with some silt and slag, cinder and/or coal fragments. Sample GH-SO-9 was collected at the lowest part of a dry basin north of the mill site (see photo #23). Soil in the basin consisted of dark brown silty loam. During the operation of the Golden Cycle Mill this basin may have been used as a cooling pond and may have received runoff from the mill site area. Currently there is no overland flow path or other visible drainage from the basin to Fountain Creek.

The samples collected in A-1 Mobile Village all consisted of tan to light brown fine sand that has the same color and texture as the flotation tailings sample GH-SO-5 collected

from the northeast face of the tailings pile. Sample GH-SO-10 was collected approximately 5 feet northwest of the northwest corner of trailer unit 29A5 (see photo #24). Sample GH-SO-11 was collected approximately 10 feet north of the northeast corner of trailer unit 31A (see photo #25). Sample GH-SO-12 was collected east of the background fence located between trailer units 33A and 34A (see photo #26).

Quality Control Samples

Sample GH-SO-4 was designated as a matrix spike (MS)/MS Duplicate (MSD). Sample GH-SW-4 was not designated as an MS/MSD sample on the Chain of Custody Record, but was so designated in verbal communication with the RSCC and the assigned CLP laboratory. A duplicate sample, GH-SW-8, was collected from sample location GH-SW-3, rather than GH-SW-2 as specified in the SAP. A rinsate blank, GH-SW-9 was collected as specified in the SAP.

Sample Documentation and Shipment

Protocols for NEIC chain-of-custody were strictly followed. Sampling documentation, including sample identification numbers, sample tag numbers, and CLP sample numbers are summarized in Table 2.

Samples were shipped to Southwest Labs of Oklahoma in Broken Arrow, Oklahoma under Case #22102 via Federal Express on May 18 and 19, 1994 under airbill numbers 8390016854 and 1499985874, respectively. All samples are to be analyzed under routine analytical services (RAS) protocols at low or environmental concentrations for TAL total metals and cyanide.

MK provided sample containers and collected split samples for the site owner, Fountain Creek Corporation (FCC). FCC did not witness the sampling. Split samples were provided for all samples except GH-SW-8 and GH-SW-9. MK delivered the split samples to the law offices of Kenneth Covell at 102 N. Cascade Avenue, Colorado Springs, and relinquished the samples to Shawn McGee, a representative of the Pace, Inc. laboratory in Golden, Colorado. Pace will analyze the split samples for FCC.

NON-SAMPLING DATA COLLECTION

On May 18, MK interviewed the resident manager of A-1 Mobile Village, Marge Smith, to identify residents of trailers within 200 feet of the samples collected on that property. Data based on her responses is summarized in Table 3.

On May 11, MK met with Van Truan, a Biologist with the U.S. Army Corps of Engineers (USACE) Southern Colorado Regulatory Office in Pueblo, to conduct a wetlands reconnaissance for the basin northwest of the mill site and along Fountain Creek downstream from the Highway 24 bridge. The National Wetland Inventory (NWI) Map of the Colorado Springs quadrangle indicated the presence of palustrine, forested wetlands in the basin onsite and along Fountain Creek between Highway 24 and Interstate 25. Mature cottonwood trees present along the perimeter of the onsite basin are not indicative of wetlands according to Mr. Truan. The south bank of Fountain Creek and east of the Highway 24 bridge are occupied by 6- to 8-year old peach-leaf willows and young cottonwoods. He pointed out that these trees appeared to be stressed, but could be indicative of a wetland although hydrologic conditions along this stretch aren't favorable.

The shoreline fringes of Fountain Creek downstream of the confluence with Monument Creek to the city power plant bridge and upstream of the confluence to the abandoned railroad bridge across Monument Creek were observed for indicative wetland vegetation. Young sand bar willows occur along the shore throughout these stream reaches. Mr. Truan was involved in the granting of Section 404 permit needed to allow the construction of the bridge by the power plant (see photo #27). Upstream of the confluence a single row of willows are present on both sides of Monument Creek, upstream and downstream from the railroad bridge (see photo #28). He believes the lines of willows in this stream reach demarcates the border of the wetland fringe. He believes these wetland fringe areas along the creeks are a scrub/shrub type of wetland. These findings are consistent with the results of a 1990 wetlands survey of the portions of these creeks within the I-25 corridor that was performed for the Colorado Department of Transportation.

Large areas of the ground surface in the north central and northeast portions of the site were lacking cover material. Photos 6 through 8 show the portions of the drainage from the north central portion of the site that do not have cover material. Photos 24, 26 and 31 show views of the northeast face of the tailings pile from A-1 Mobile Village. Photos 29 and 30 show other views of the northeast face. A cylindrical steel tank approximately

15 feet long x 7 feet in diameter is present in the ore bin area of the mill site (see photos #34 and 35). No odors were noticeable near the tank. The tank is believed to be empty.

Children were observed playing on suspected tailings material near the A-1 Mobile Village/site boundary (see photo #31). Youths were also observed in the mill site area (see photo #32) in the vicinity of the former Tin Box and Precipitating Rooms and jumping across on elevated platforms at the roasting furnace (see photos #22 and 23 and Figure 2). A long trench and manholes in the Tin Box and Precipitating room floors were open to basement areas where water has accumulated. Leakage from the basements may have caused the saturated soil conditions that were noted in the mill site area. A motorcyclist and bicyclists also were observed onsite on May 11 (see photo #33).

William Cody, a resident of trailer unit 29A4 at A-1 Mobile Village, reported to MK that storm water runoff from the northeast face of the tailings pile deposited several inches or more of tailings onto the ground around his trailer during a single storm event. He also reported that an outdoor cooling basin for the air conditioner in his trailer accumulated 3 to 4 inches of tailings over the winter from airborne deposition of dust from the northeast face of the tailings pile.

It was also reported to MK that children swim in Fountain Creek below the confluence with Monument Creek. Transients were also observed along Fountain Creek beneath the Highway 24 bridge and at the confluence with Monument Creek on May 11.

TABLE 1

Field Measurement Data for Fountain Creek

Sample ID	pH (a)	Conductivity (b)	Temperature
GH-SW-1	5.5	90 μmhos	52° F.
GH-SW-2	5.5	150 μmhos	63° F.
GH-SW-3	6	160 μmhos	68° F.
GH-SW-4	6	180 μmhos	66° F.
GH-SW-5	6	195 μmhos	56° F.
GH-SW-6	6	200 μmhos	61° F.
GH-SW-7 (*)	6	315 μmhos	67° F.
GH-SW-10 (✓)	6	220 μmhos	56° F.

(a) Colorimetric reading obtained using colorpHast pH 5-10 reagent paper.

(b) Obtained using Prestotek DP-03 Conductivity Meter calibrated to 700 μmhos standard solution.

* Location in Monument Creek just upstream of confluence with Fountain Creek.

(✓) No measurements were taken for GH-SW-8 (duplicate of GH-SW-3) or GH-SW-9 (Rinsate Blank)

TABLE 2

SAMPLE DOCUMENTATION SUMMARY FOR GOLD HILL TAILINGS
Case #22102

Station No.	INORGANICS		Sample Date/Time	QC Sample
	CLP ID	Tag No.		
GH-SO-1	MHBM65	8-96651	5/17/94; 1415	
GH-SO-2	MHBM66	8-96652	5/17/94; 1025	
GH-SO-3	MHBM67	8-96653	5/19/94; 0835	
GH-SO-4	MHBM68	8-96654	5/19/94; 0915	MS/MSD
GH-SO-5	MHBM69	8-96655	5/18/94; 1615	
GH-SO-6	MHBM70	8-96656	5/18/94; 1620	
GH-SO-7	MHBM71	8-96657	5/17/94; 1255	
GH-SO-8	MHBM72	8-96658	5/19/94; 0925	
GH-SO-9	MHBM73	8-96659	5/19/94; 0950	
GH-SO-10	MHBM92	8-96689	5/18/94; 1500	
GH-SO-11	MHBM93	8-96690	5/18/94; 1505	
GH-SO-12	MHBM94	8-96691	5/18/94; 1515	

TABLE 2 (Continued)

SAMPLE DOCUMENTATION SUMMARY FOR GOLD HILL TAILINGS
Case #22102

Station No.	INORGANICS			Sample Date/Time	QC Sample
	CLP ID	Tag No.			
		Metals	CN		
GH-SW-1	MHBM81	8-96661	8-96662	5/17/94; 1100	
GH-SW-2	MHBM82	8-96663	8-96664	5/17/94; 1320	
GH-SW-3	MHBM83	8-96665	8-96666	5/17/94; 1520	
GH-SW-4	MHBM84	8-96667	8-96668	5/17/94; 1635	MS/MSD
GH-SW-5	MHBM85	8-96669	8-96670	5/17/94; 1745	
GH-SW-6	MHBM86	8-96671	8-96672	5/17/94; 1715	
GH-SW-7	MHBM87	8-96673	8-96674	5/17/94; 1800	
GH-SW-8	MHBM88	8-96676	8-96675	5/17/94; 1525	DUP of SW-3
GH-SW-9	MHBM89	8-96677	8-96678	5/18/94; 1140	Rinse Blank
GH-SW-10	MHBM90	8-96686	8-96687	5/17/94; 1840	

TABLE 2 (Continued)

SAMPLE DOCUMENTATION SUMMARY FOR GOLD HILL TAILINGS
Case #22102

Station No.	INORGANICS		Sample Date/Time	QC Sample
	CLP ID	Tag No.		
GH-SE-1	MHBM74	8-96679	5/17/94; 1110	
GH-SE-2	MHBM75	8-96680	5/17/94; 1305	
GH-SE-3	MHBM76	8-96681	5/17/94; 1530	
GH-SE-4	MHBM77	8-96682	5/17/94; 1640	
GH-SE-5	MHBM78	8-96683	5/17/94; 1750	
GH-SE-6	MHBM79	8-96684	5/17/94; 1720	
GH-SE-7	MHBM80	8-96685	5/17/94; 1805	
GH-SE-8	MHBM91	8-96688	5/17/94; 1845	

TABLE 3

Residents Within 200 feet of Sample Locations in A-1 Mobile Village

Trailer Unit Number	Number of Residents
6B	2
7B	2
8B	2
9B	2
10B	3
11B	4
12B	2
26A	4
27A	6
28A	5
29A	4
29A1	3
29A2	3
29A3	2
29A4	4
29A5	2
30A	5
31A	2
32A	2
33A	2
34A	1
35A	4
36A	2
37A	2

TOTALS: 24 Units 69 Residents

(Source: Smith, 1994)

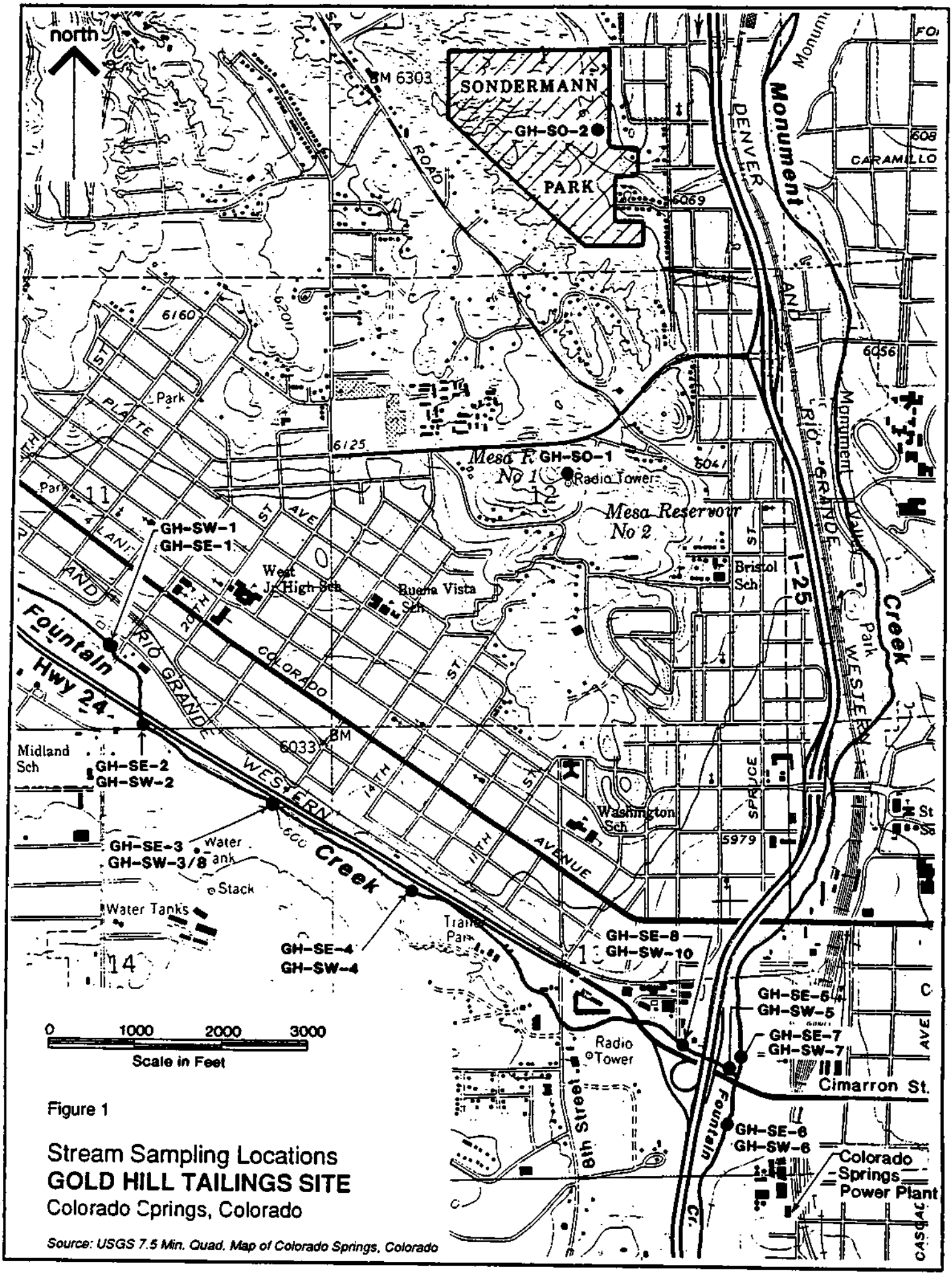


Figure 1

Stream Sampling Locations
GOLD HILL TAILINGS SITE
Colorado Springs, Colorado

Source: USGS 7.5 Min. Quad. Map of Colorado Springs, Colorado

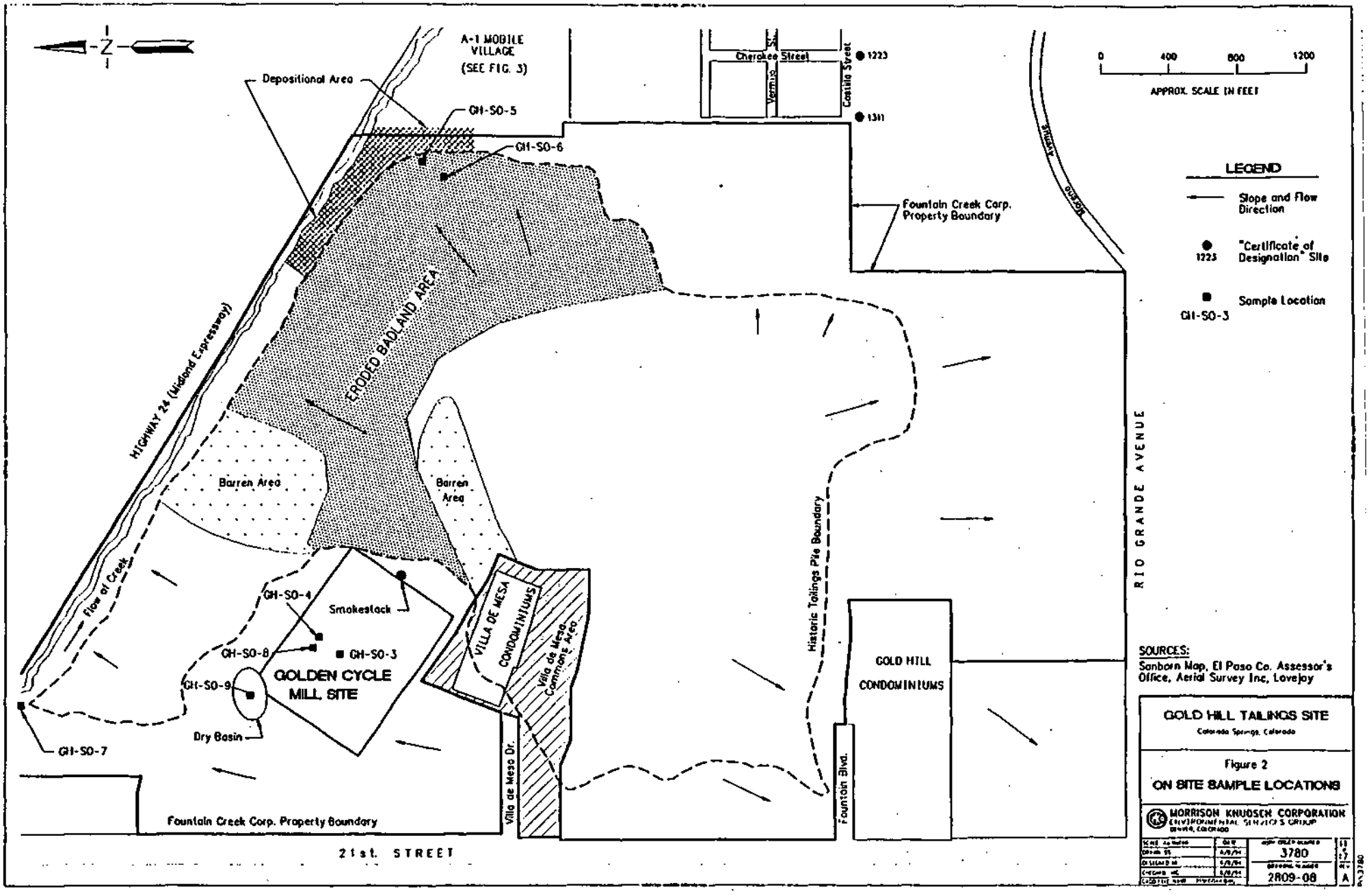

N
A-1 MOBILE VILLAGE (SEE FIG. 3)
Depositional Area
GH-SO-5
GH-SO-6
Cherokee Street
Vermijo
Castilo Street
1223
1311
0 400 800 1200
APPROX. SCALE IN FEET
LEGEND
Slope and Flow Direction
"Certificate of Designation" Site
Sample Location
GH-SO-3
Fountain Creek Corp. Property Boundary
ERODED BADLAND AREA
HIGHWAY 24 (Midland Expressway)
Barren Area
Barren Area
Flow of Creek
GH-SO-4
Smokestack
GH-SO-8
GH-SO-3
GH-SO-9
GOLDEN CYCLE MILL SITE
Dry Basin
GH-SO-7
VILLA DE MESA CONDOMINIUMS
Villa de Mesa Commons Area
Villa de Mesa Dr.
Historic Tailings Pile Boundary
GOLD HILL CONDOMINIUMS
Fountain Blvd.
RIO GRANDE AVENUE
Fountain Creek Corp. Property Boundary
21st. STREET
SOURCES:
Sanborn Map, El Paso Co. Assessor's Office, Aerial Survey Inc, Lovejoy
GOLD HILL TAILINGS SITE
Colorado Springs, Colorado
Figure 2
ON SITE SAMPLE LOCATIONS
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP
DENVER, COLORADO
3780
2809-08
A

Figure 3

OFFSITE SAMPLE LOCATIONS IN NORTHWEST PART A-1 MOBILE VILLAGE

Gold Hill Tailings Site

MORRISON KNUDSEN CORPORATION

SCALE 1"=50'	DATE 6/08/94	WORK ORDER NUMBER 3/80	REV A
DESIGNED		DRAWING NUMBER 2809-08	
CHECKED BY	08/08/94		

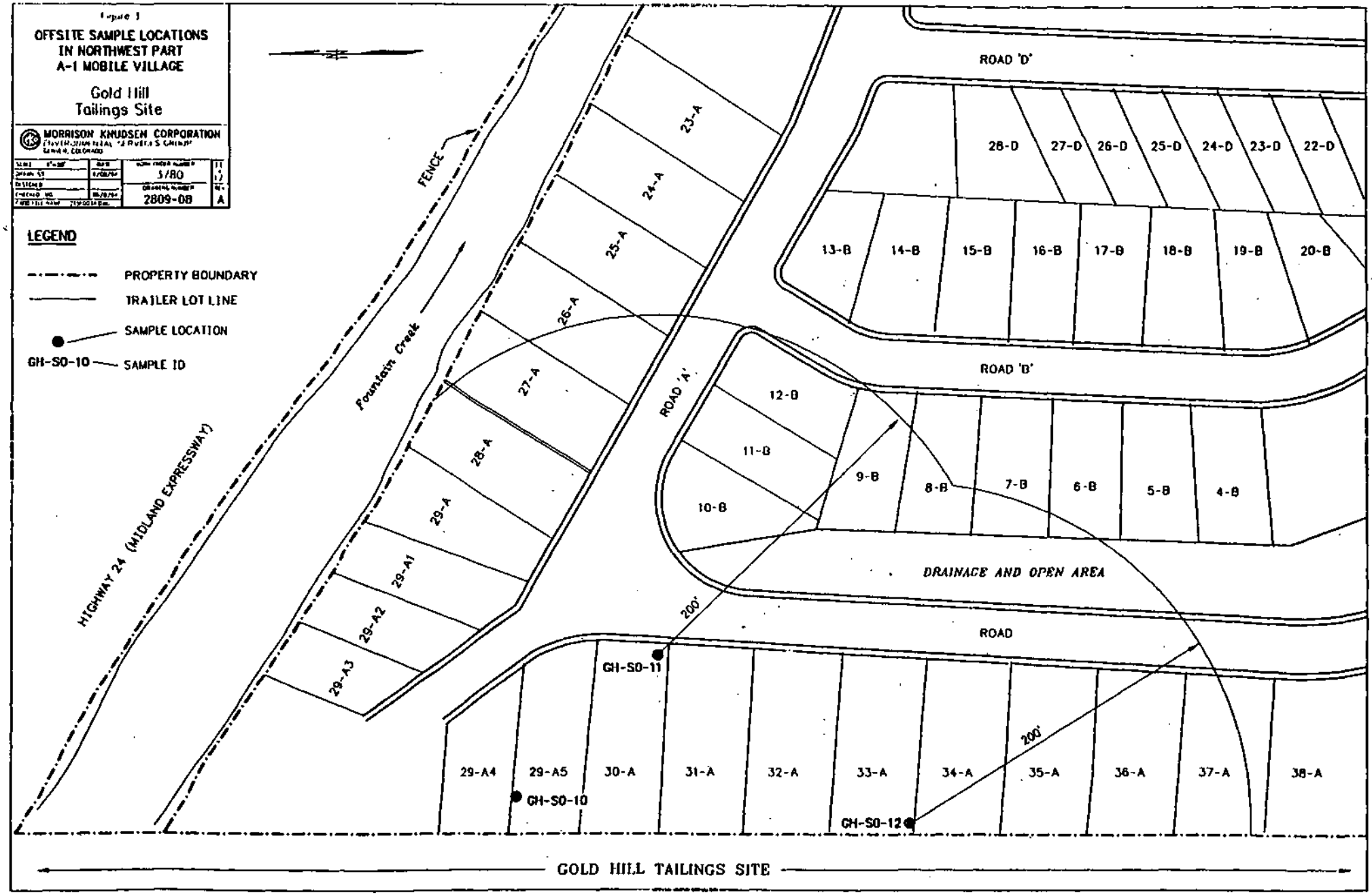
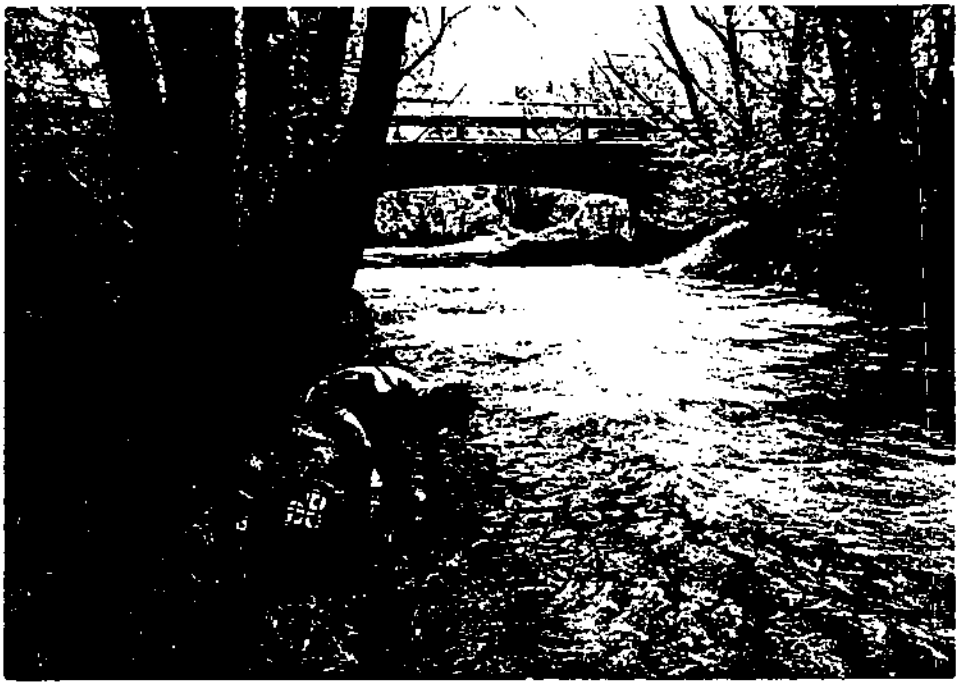


Photo No.
1



Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photographer/Witness Mark Lunsford
Date 5/17/94 Time 1100 Direction Southeast
Description MK collecting upstream surface water sample GH-SW-1 from Fountain Creek. The 21st street bridge is downstream. Sediment sample GH-SE-1 was collected in center of stream at this location.

Photo No.
2

Photographer/Witness Wesley Hill
Date 5/17/94 Time 1325 Direction South
Description Exposed soil face along south border of Fountain Creek in northwest corner of site. Samples GH-SW-2 and GH-SE-2 were collected at base of the soil wall. The pink to reddish-brown layer at left center is suspected "roaster" tailings. Soil sample GH-SO-7 was collected from this layer.

Photo No.
3

Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photographer/Witness Mark Lunsford
Date 5/11/94 Time _____ Direction South
Description Pink to reddish brown layer of suspected "roaster" tailings in exposed soil face in northwest corner of site is eroding into Fountain Creek.

Photo No.
4

Photographer/Witness Mark Lunsford
Date 5/17/94 Time _____ Direction South
Description Unstable soil face along south bank of Fountain Creek in northwest portion of site. Collapse of material covered location where the "roaster" tailings were in direct contact with the creek.

Photo No.
5

Site Name:
Gold Hill Tailings

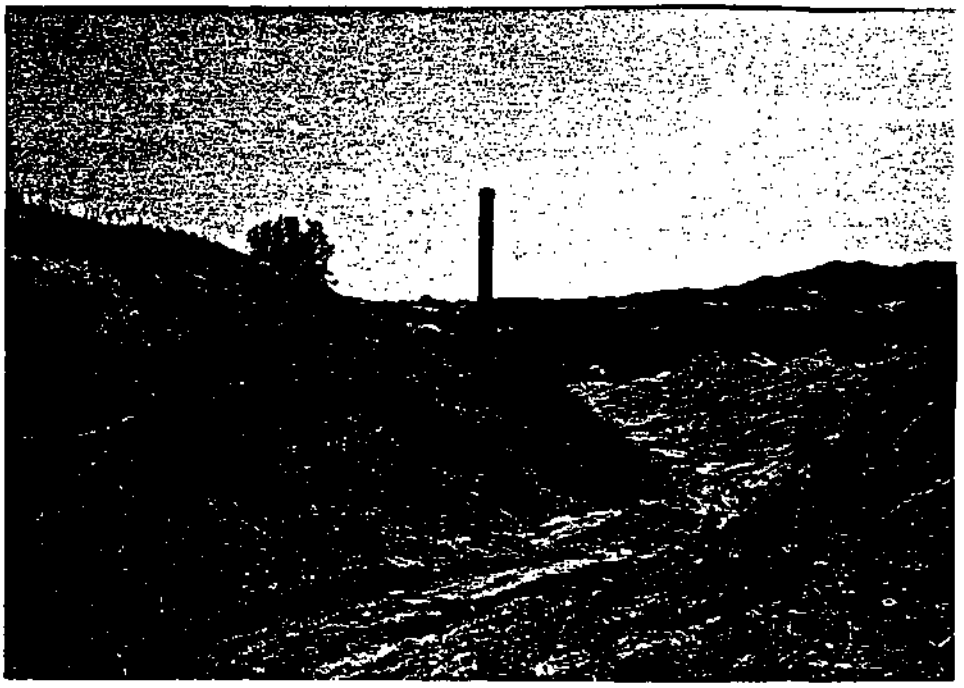
Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photographer/Witness Mark Lunsford
Date 5/17/94 Time 1535 Direction West
Description "Mouth" of drainage channel from north central part of tailings pile. Sample GH-SE-3 was collected at edge of channel above Fountain Creek. Sample GH-SW-3 was collected in the creek beneath the 2-foot drop from the channel.

Photo No.
6

Photographer/Witness Mark Lunsford
Date 5/17/94 Time Direction Southeast
Description Lower part of drainage channel from north central part of tailings pile. Exposed tailings are visible in center.

Photo No.
7



Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photographer/Witness Mark Lunsford
Date 5/17/94 Time Direction South
Description View of middle part of drainage channel from north central part of tailings pile showing exposed tailings.

Photo No.
8

Photographer/Witness Mark Lunsford
Date 5/11/94 Time Direction North
Description Upper part of drainage channel that extends from north-central portion of tailings pile to Fountain Creek.

Photo No.
9

Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photographer/Witness Mark Lunsford
Date 5/17/94 Time _____ Direction East
Description Tailings material in drainage channel from northeast face of pile enters Fountain Creek at this location.

Photo No.
10

Photographer/Witness Mark Lunsford
Date 5/17/94 Time 1645 Direction East
Description Fountain Creek downstream of entry point of tailings from drainage channel of northeast face. Samples GH-SE-4 and GH-SW-4 were collected behind clump of grass by the right (south) bank. Asphalt covers the south bank.

Photo No.
11

Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photographer/Witness Mark Lunsford
Date 5/11/94 Time 1755 Direction Northeast
Description Confluence of Fountain Creek (on left) and Monument Creek (on right) from beneath Cimarron Street bridge. Sample GH-SE-5 was collected from small pool of water in Fountain Creek adjacent to sand spit separating the creeks. Sample GH-SW-5 was collected near the west bank of Fountain Creek in lower portion of photo.

Photo No.
12

Photographer/Witness Mark Lunsford
Date 5/17/94 Time Direction North
Description Looking upstream toward Cimarron Street bridge from sample location GH-SE-6. Scrub-shrub wetlands are present in this segment of Fountain Creek.

Photo No.
13

Site Name:
Gold Hill Tailings

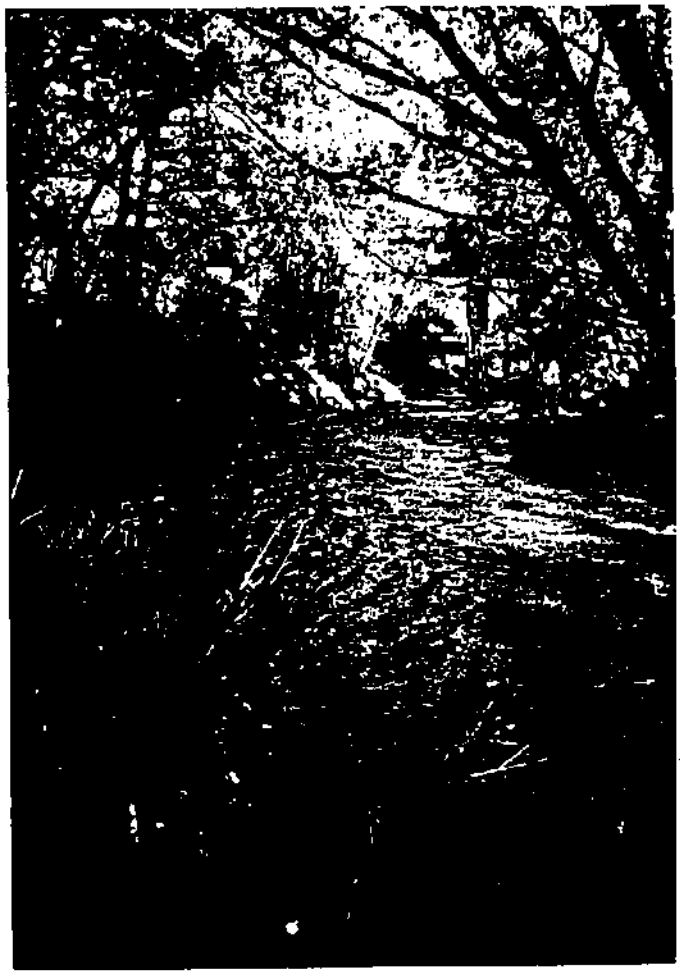
Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photographer/Witness Mark Lunsford
Date 5/17/94 Time 1810 Direction SSW
Description View of Monument Creek looking downstream at confluence with Fountain Creek and Cimarron Street bridge. Samples GH-SW-7 and GH-SE-7 were collected upstream of the concrete retaining wall near the right (west) bank.

Photo No.
14

Photographer/Witness Mark Lunsford
Date 5/17/94 Time Direction North
Description Culvert with oily outflow channel that leads to Fountain Creek. Culvert is located between the Interstate 25 and Highway 24 bridges.

Photo No.
15



Photographer/Witness Mark Lunsford
Date 5/17/94 Time 1850 Direction Southeast
Description Looking downstream along Fountain Creek toward I-25 bridge from sample location GH-SW-10/GH-SE-8.

Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photo No.
16

Photographer/Witness Mark Lunsford
Date 5/17/94 Time 1405 Direction SSE
Description View of background soil sample (GH-SO-1) location. The red building is at the base of a radio tower. The City of Colorado Springs "Little Mesa" water storage tank is in the background.

Photo No.
17

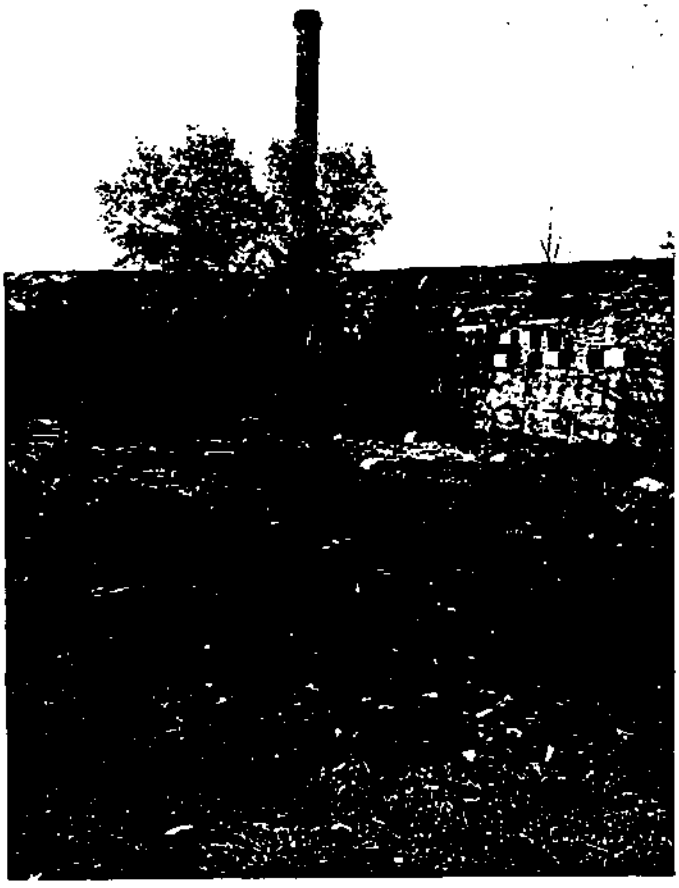
Site Name:
Gold Hill Tailings

Location:
Colorado Springs,
Colorado

CERCLIS #:
COD983801275

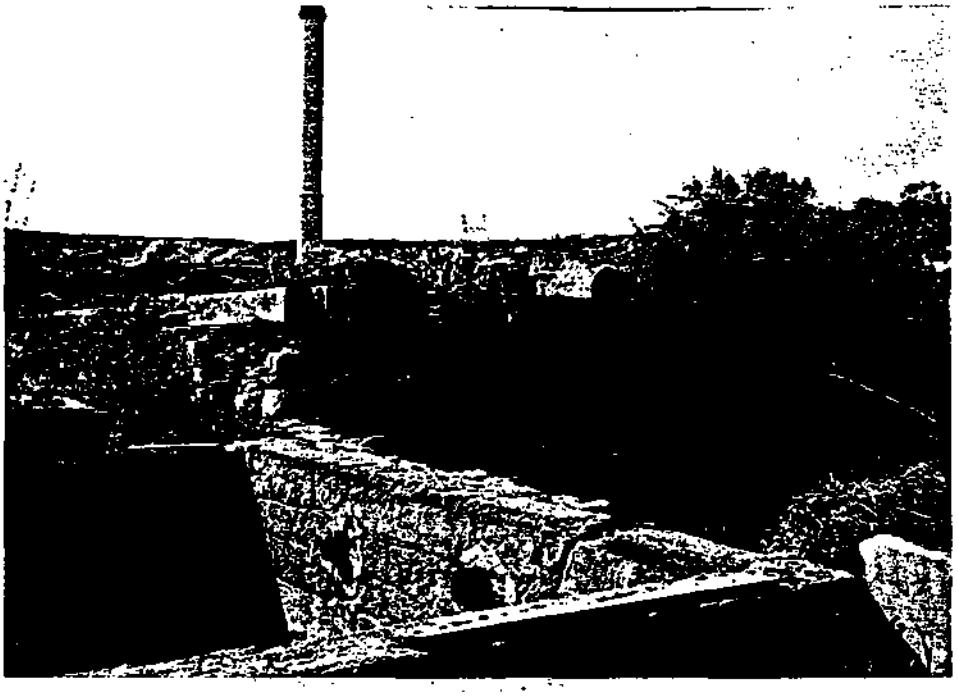
Photographer/Witness Wesley Hill
Date 5/17/94 Time 1035 Direction West
Description Entry sign to the Colorado Springs city park where background soil sample GH-SO-2 was collected.

Photo No.
18



Photographer/Witness Mark Lunsford
Date 5/19/94 Time 0840 Direction Southeast
Description View of sample location GH-SO-3 in sand leach tank area of millsite. The mill stack is in the background.

Photo No.
19

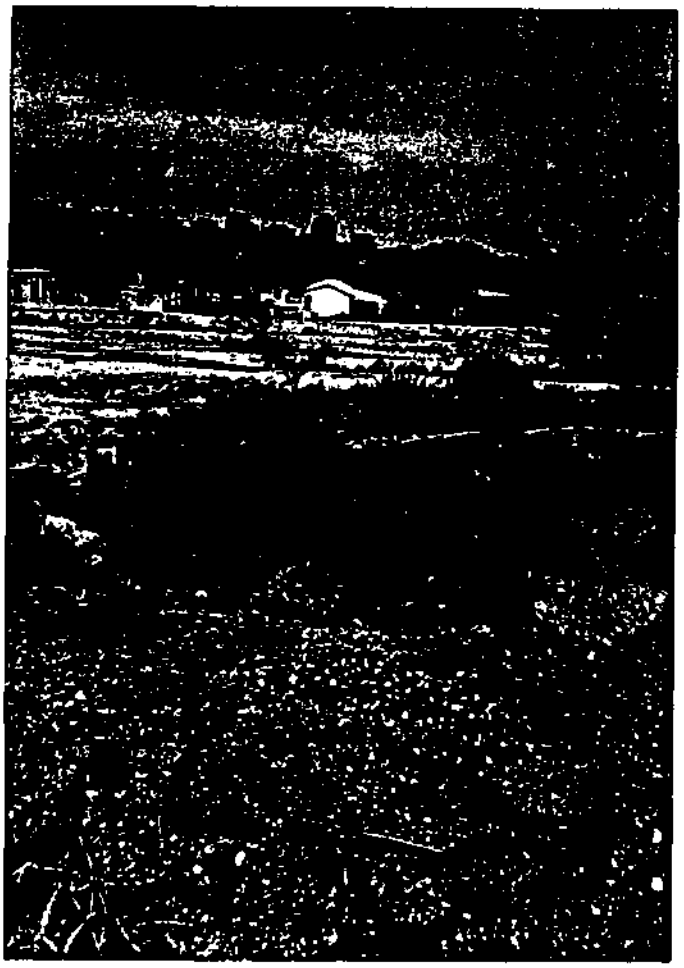


Site Name:
Gold Hill Tailings

Location:
Colorado Springs,
Colorado
CERCLIS #:
COD983801275

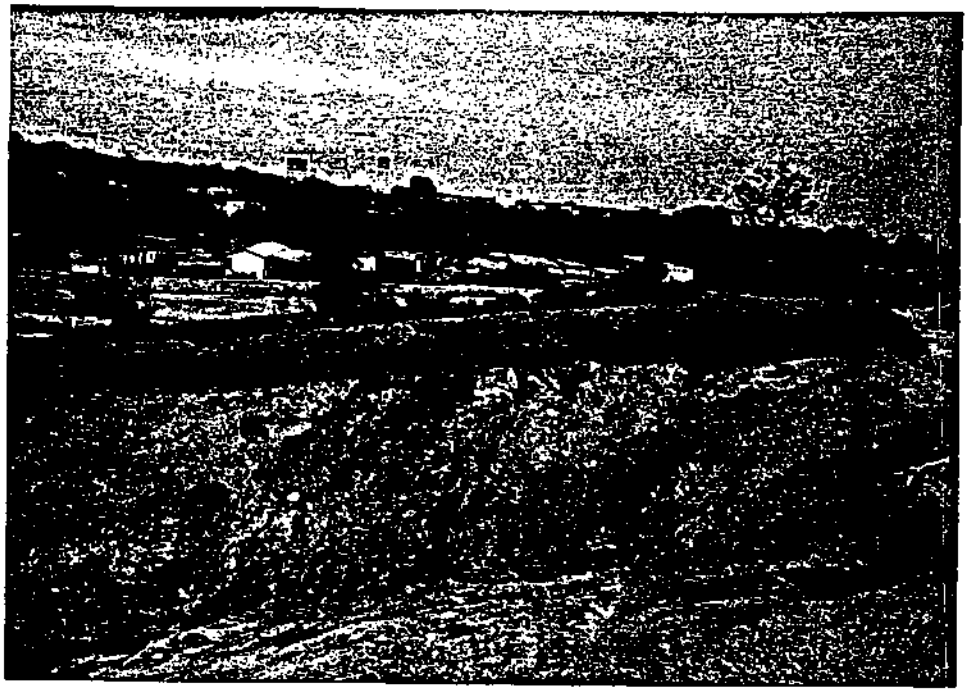
Photographer/Witness Mark Lunsford
Date 5/19/94 Time 0920 Direction ESE
Description Wall at center right is east wall of the filter basement in the "slime" room of the millsite. Sample GH-SO-4 was collected near the east wall.

Photo No.
20



Photographer/Witness Mark Lunsford
Date 5/18/94 Time 1620 Direction East
Description View of sample location GH-SO-5 on side of gully at the base of the northeast face of the tailings pile. Tailings depositon area and A-1 Mobile Village are in the background.

Photo No.
21

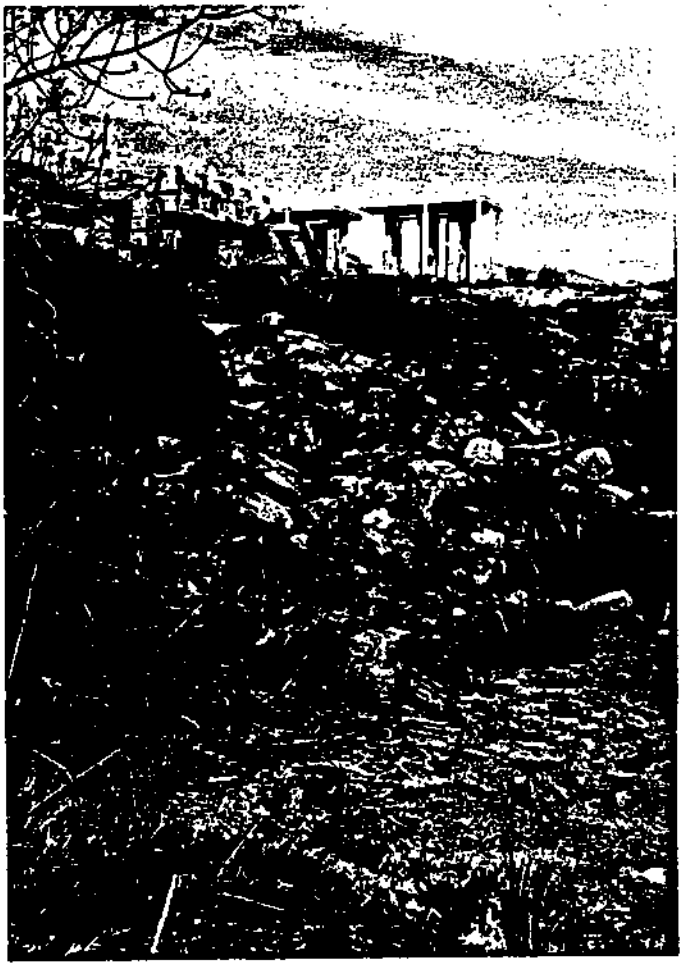


Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photographer/Witness Mark Lunsford
Date 5/18/94 Time 1625 Direction East
Description View of sample location GH-SO-6. Rust-brown layer at top is probably cover material. Rest of material in gully is suspected "flotation" tailings.

Photo No.
22



Photographer/Witness Mark Lunsford
Date 5/19/94 Time 0930 Direction West
Description View of sample location GH-SO-8 looking toward roasting furnace at the millsite.

Photo No.
23

Photographer/Witness Mark Lunsford
Date 5/19/94 Time 0955 Direction Southeast
Description View of sample location GH-SO-9 in basin northwest of millsite looking toward mill stack. Concrete platforms at right are by roasting furnace.

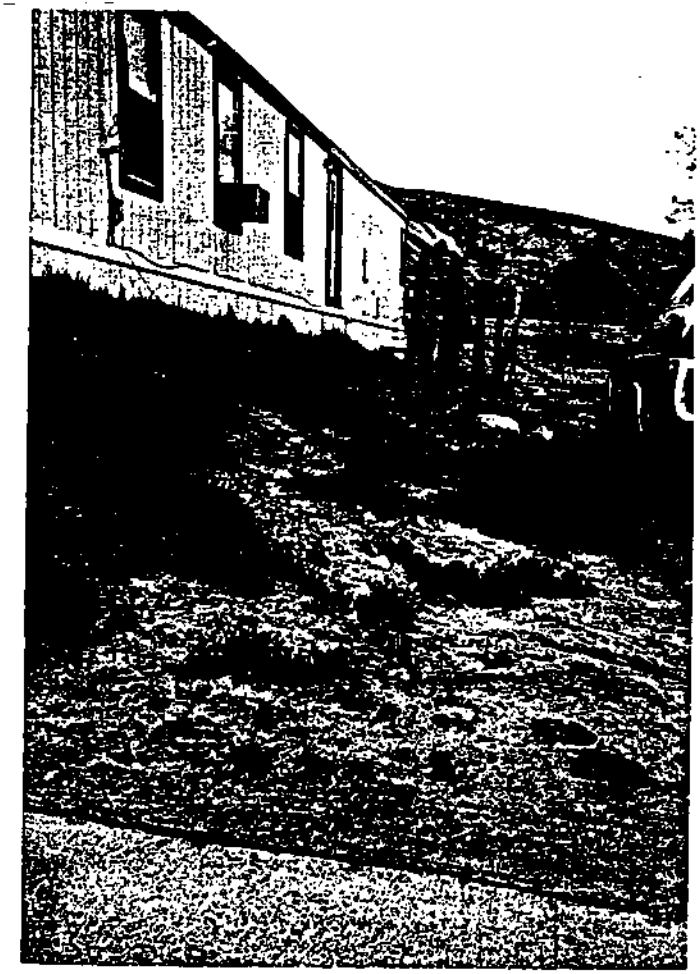
Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photo No.
24

Photographer/Witness Mark Lunsford
Date 5/18/94 Time 1505 Direction West
Description Sample GH-SO-10 was collected approximately 5 feet from trailer unit 29A5. Northeast face of tailings pile is in the background.

Photo No.
25

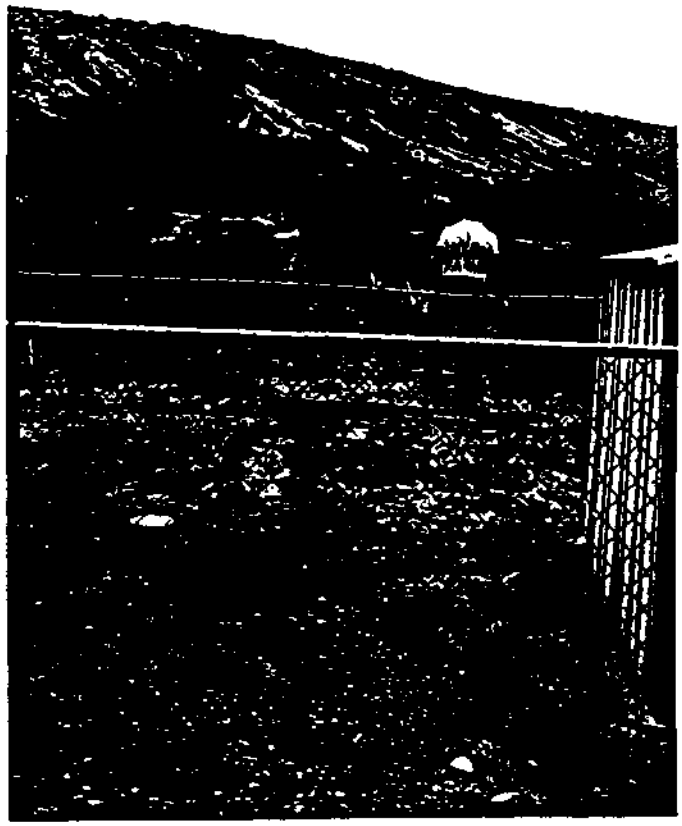


Photographer/Witness Mark Lunsford
Date 5/18/94 Time 1510 Direction West
Description Sample GH-SO-11 was collected approximately 10 feet from trailer unit 31A (at left). Northeast face of tailings pile is in background.

Site Name:
Gold Hill Tailings

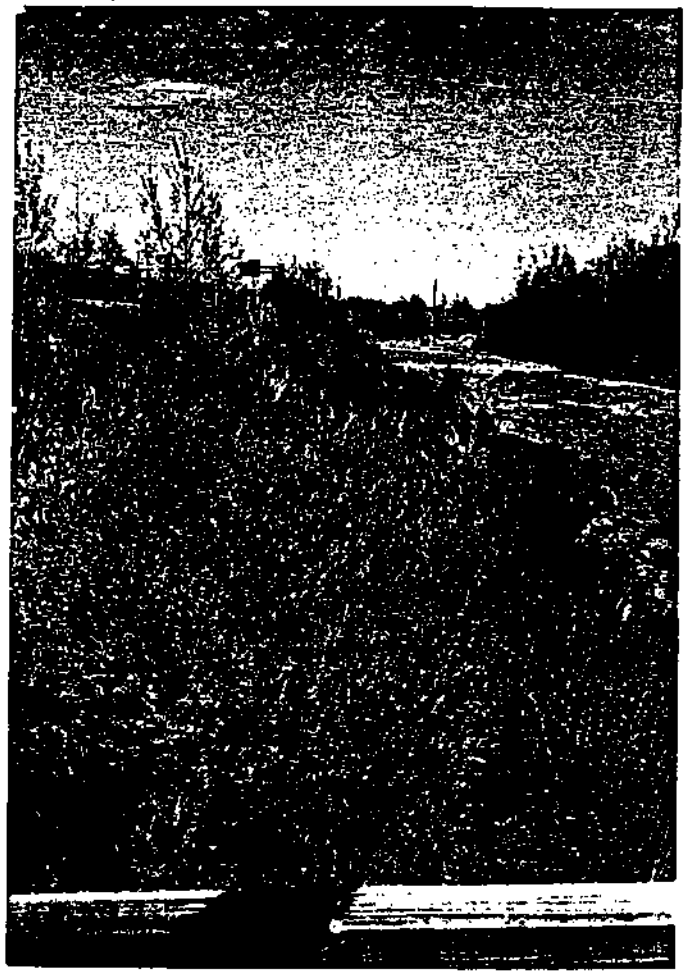
Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photo No.
26



Photographer/Witness Mark Lunsford
Date 5/18/94 Time 1520 Direction West
Description Sample GH-SO-12 was collected west of fence between trailer units 33A and 34A at A-1 Mobile Village.

Photo No.
27



Photographer/Witness Mark Lunsford
Date 5/11/94 Time ___ Direction North
Description Looking north from power plant bridge along west bank of Fountain Creek below the confluence with Monument Creek. West bank is a sand bar willow (scrub-shrub) wetland.

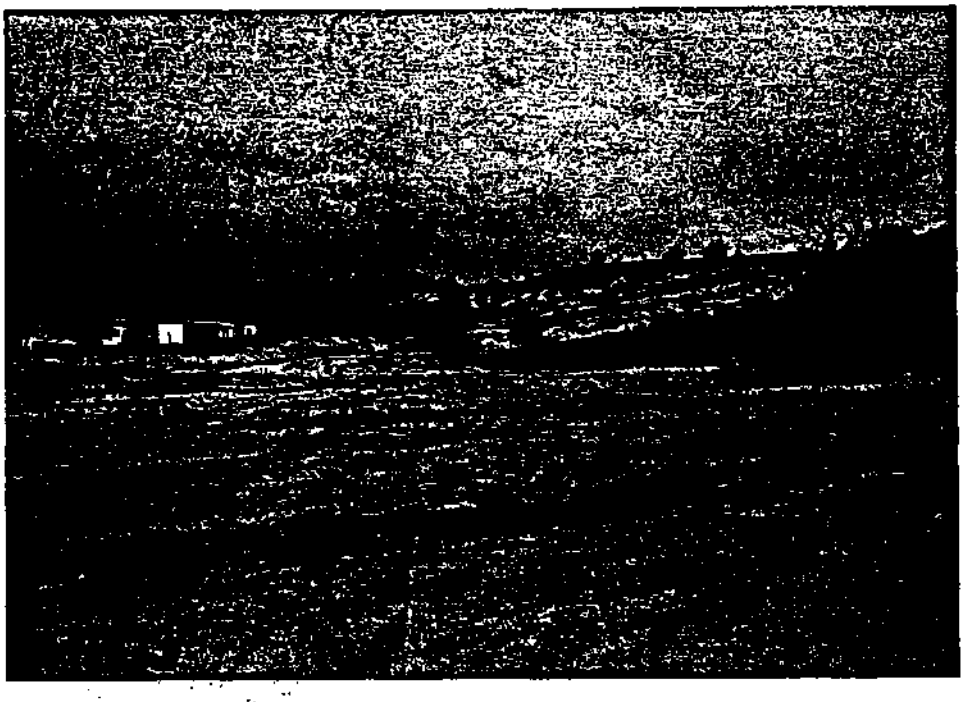
Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photo No.
28

Photographer/Witness Mark Lunsford
Date 5/11/94 Time ___ Direction South
Description View of Monument Creek downstream (south) from RR bridge north of confluence with Fountain Creek. Line of young willow trees on east bank (at left) demarcates edge of wetland fringe.

Photo No.
29

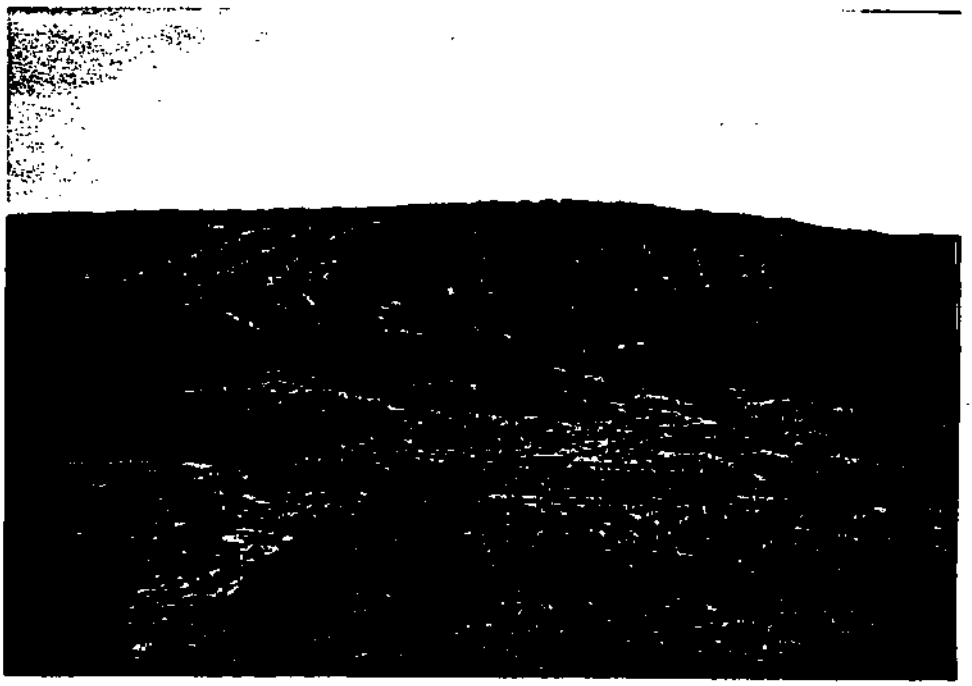


Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photographer/Witness Mark Lunsford
Date 5/18/94 Time _____ Direction South
Description Southeast part of the northeast face of the tailings pile. A-1 Mobile Village is at the left.

Photo No.
30



Photographer/Witness Mark Lunsford
Date 5/18/94 Time _____ Direction Southwest
Description Central part of the northeast face of the tailings pile.

Photo No.
31

Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

Photographer/Witness Wesley Hill
Date 5/18/94 Time Direction Southwest
Description Children playing in tailings deposition area near A-1 Mobile Village/ site boundary.

Photo No.
32

Photographer/Witness Mark Lunsford
Date 5/19/94 Time Direction ESE
Description Youths in the vicinity of the former Tin Box and Precipitating Rooms at the millsite.

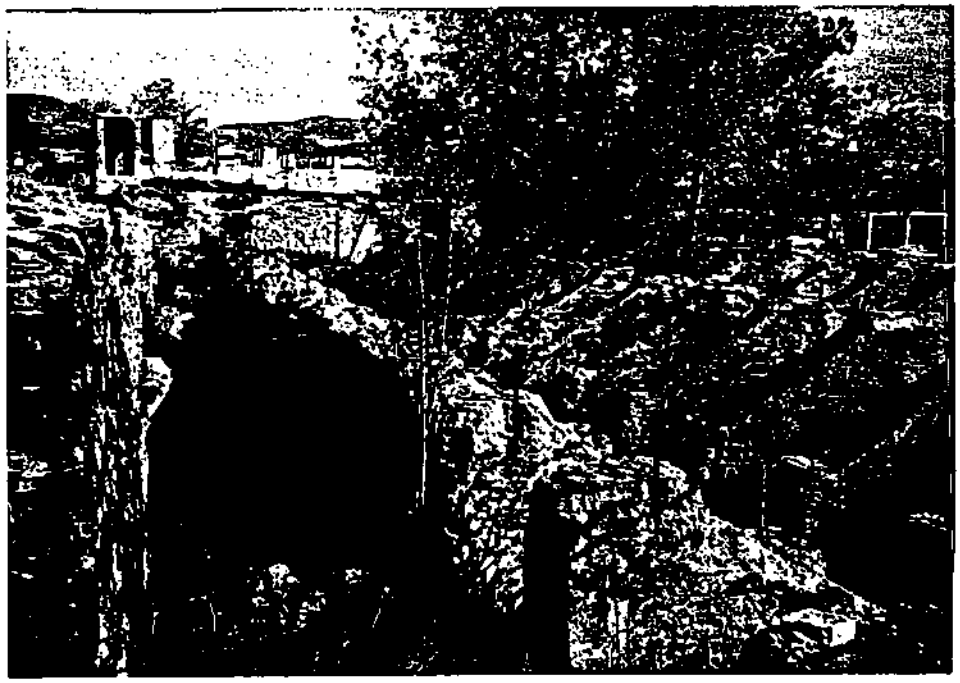
Photo No.
33

Site Name:
Gold Hill Tailings

Location:
Colorado Springs, Colorado
CERCLIS #:
COD983801275

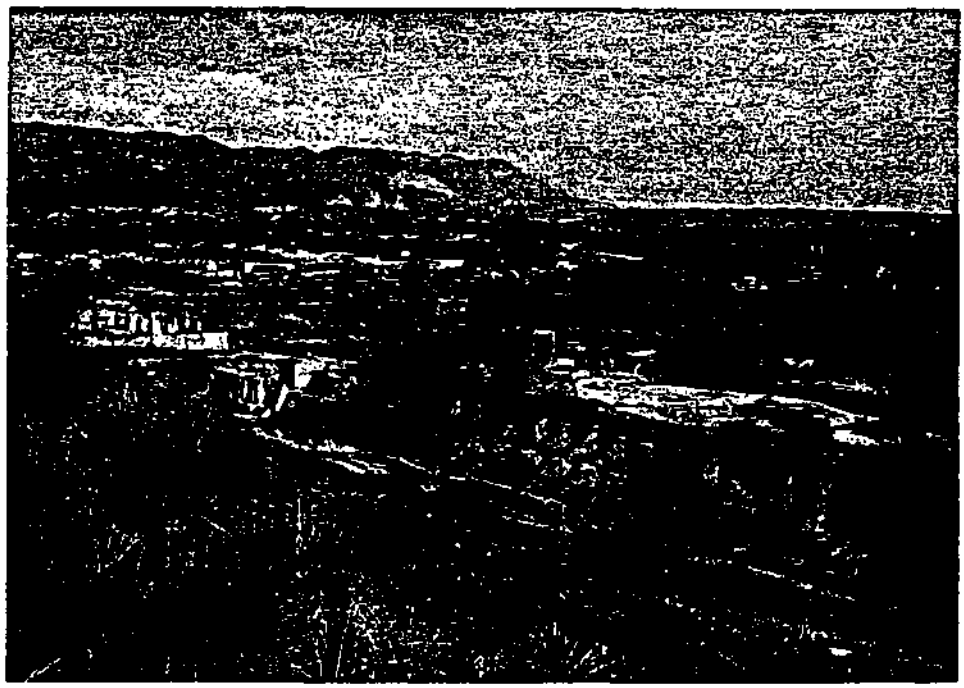
Photographer/Witness Mark Lunsford
Date 5/11/94 Time 1515 Direction South
Description Motorcyclist onsite. Soil bank in foreground is along Fountain Creek. Dark grayish layer in upper part of bank are charcoal/ash cinder/chinker layers

Photo No.
34



Photographer/Witness Mark Lunsford
Date 5/19/94 Time Direction
Description View of cylindrical steel tank in the ore bin area of the millsite. The tank was apparently empty.

Photo No.
35



Site Name:
Gold Hill Tailings

Location:
Colorado Springs,
Colorado

CERCLIS #:
COD983801275

Photographer/Witness Mark Lunsford

Date 5/19/94 Time _____ Direction Northwest

Description View of ore bin area of millsite.

TARGET SHEET

EPA REGION VIII

SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 448808

SITE NAME: GOLD HILL TAILINGS

DOCUMENT DATE: 10/14/1994

DOCUMENT NOT SCANNED

Due to one of the following reasons:

- ☐ PHOTOGRAPHS
- ☐ 3-DIMENSIONAL
- ☐ OVERSIZED
- ☐ AUDIO/VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☑ TYPES OF DOCUMENTS NOT TO BE SCANNED
  (Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

APPENDIX B LABORATORY DATA SHEETS AND DATA VALIDATION REPORT

Contact the Superfund Records Center to view available document.
(303) 312-6473