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RFP/ERM-TM1-94-00011

DRAFT FINAL

TECHNICAL MEMORANDUM NO. 1

Investigations of Foundation Drains
and Other Data Compilation
Addendum to the Operable Unit 8 Work Plan

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
700 Area
(Operable Unit No. 8)

U.S. Department of Energy
Rocky Flats Environmental Technology Site
Golden, Colorado

ENVIRONMENTAL RESTORATION PROGRAM

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Approved By:

_____ ___/___/___
Director *(Date)*

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ACRONYMS AND ABBREVIATIONS

AA	atomic absorption
AES	Associated Environmental Systems
AQD	Air Quality Division
APEN	Air Pollution Emission Notice
ARAR	applicable or relevant and appropriate requirement
ASI	Advanced Sciences, Incorporated
bgs	below ground surface
BS	building sump
CB	catch basin
CCl_4	carbon tetrachloride
CCTV	closed circuit television
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CI	cast iron pipe
ComRad	Community Radiation Monitoring Program
CMP	corrugated-metal pipe
DOE	U.S. Department of Energy
EDE	effective does equivalent
EG&G	EG&G Rocky Flats, Inc.
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
EPOS	Emergency Preparedness Offsite Systems
EPM	Environmental Protection Management
FD	foundation drain
Freon TF®	trichlorotrifluoroethane
gpm	gallons per minute

GRRASP	General Radiochemistry and Routine Analytical Services Protocol
HEPA	high efficiency particulate air
HPGe	high purity germanium
HSL	hazardous substance list
HSU	hydrostratigraphic unit
IAG	Interagency Agreement
ICP	inductively coupled plasma
ID	identification
IHSS	individual hazardous substance site
IM/IRA/DD	Interim Measure/Interim Remedial Action/Decision Document
Jacobs	Jacobs Engineering Group Inc.
L	liter
MCL	Maximum Contaminant Levels
mg/L	milligrams per liter
mgy	million gallons per year
MH	manhole
min	minute
msl	mean sea level
NA	not analyzed/not applicable
NaI	sodium iodide
NAAQS	National Ambient Air Quality Standards
n/r	not reported
NOx	oxides of nitrogen
NO_3	nitrate
OU	Operable Unit
PA	Protected Area
pCi/L	picocuries per liter
pCi/M^3	picocuries per cubic meter

PM-10	particulates smaller than 10 microns
PSZ	Perimeter Security Zone
PVC	polyvinyl chloride
QA	quality assurance
RAAMP	Radiological Ambient Air Monitoring Program
RCRA	Resource Conservation and Recovery Act
RFEDS	Rocky Flats Environmental Database System
RFETS	Rocky Flats Environmental Technology Site
RFI	Remedial Facilities Investigation
RFP	Rocky Flats Plant
RI	Remedial Investigation
SAAM	Selective Alpha Air Monitor
SD	storm drain
SU	standard unit
SVOC	semivolatile organic compounds
SW	surface water
SWD	Surface Water Division
TAL	target analyte list
TCE	trichloroethene
TCL	target compound list
TRAC	Terrain-Responsive Atmospheric Code
TSP	total suspended particulates
TLA	Total Long-Lived Alpha
TLLA	total long-lined alpha
TLLB	total long-lined beta
UST	Underground Storage Tank
UTL	upper tolerance limit
VOC	volatile organic compounds

VSP	vertical soil profile
WWE	Wright Water Engineers
WWTP	Waste Water Treatment Plant
μg/L	micrograms per liter
~	approximately

1.0 INTRODUCTION

Preparation of this document meets the Stage 1 Resource Conservation and Recovery Act (RCRA) Remedial Facilities Investigation (RFI) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial Investigation (RI) work plan requirements to compile data before proceeding with Stage 2 activities for Operable Unit No. 8 (OU8) at the U.S. Department of Energy (DOE) Rocky Flats Environmental Technology Site (RFETS) located in Golden, Colorado (Figure 1-1).

The Stage 1 activities include data compilation of foundation-drain locations and sampling history, an evaluation of infiltration/exfiltration of storm- and sanitary-sewer lines, an evaluation of the site-wide air monitoring program, and additional data compilation for individual hazardous substance sites (IHSSs) 118.1, 118.2, 150.6, 150.8, 151, 172, 184, 188, and other buildings in the industrial area. The scope of the Stage 1 investigation was expanded to include other buildings within the Industrial Area at the request of the Colorado Department of Public Health and Environment (CDPHE). The intent of this expanded scope was to integrate investigative activities and reduce any duplication of effort. The Stage 1 work is being conducted under the Phase I RFI/RI for OU8. Environmental media sampling is part of a comprehensive, multistage program of site characterization, feasibility studies, and remedial/corrective actions currently in progress at RFETS. These activities are conducted according to an Interagency Agreement (IAG) among DOE, the U.S. Environmental Protection Agency (EPA), and Colorado Department of Health (now known as CDPHE) dated January 22, 1991 (DOE et al. 1991). The IAG program developed by DOE, EPA, and CDPHE addresses both RCRA and CERCLA requirements.

Additional information on the approved investigative activities for OU8 is contained in the approved *Phase I RFI/RI Work Plan, Operable Unit 8, 700 Area* (OU8 Work Plan) (EG&G Rocky Flats, Inc. [EG&G] 1992a). All quality assurance (QA) information, data quality

objectives, and investigative method requirements for the investigation of OU8 are also included in the OU8 Work Plan (EG&G 1992a).

OU8 is located in the 700 Area on approximately 150.85 acres in the northcentral industrialized area of RFETS. The boundary of OU8 is polygonal in shape and encompasses a majority of the Production (high security) Area of the plant site. Figure 1-2 presents the locations of the 24 IHSSs for which Phase I RFI/RI activities are planned.

1.1 PURPOSE AND SCOPE

The purpose of this data compilation is to identify the underdrain/foundation-drain systems for buildings and structures in the Industrial Area of RFETS and to evaluate the influence of these drain systems on groundwater and surface-water flow and constituent migration. Data for OU8 were compiled from a review of existing documentation on foundation drains, an evaluation of engineering drawings, interviews with knowledgeable personnel, and site reconnaissance. Available analytical data were also reviewed to assess the quality of foundation-drain water and the adequacy of the current monitoring program. The infiltration and exfiltration information for the sanitary and storm sewers within OU8 was also examined to determine areas where constituents may be transported into or out of OU8 IHSSs by groundwater migration.

As required by the OU8 Work Plan (EG&G 1992a), the current air monitoring conducted at RFETS was investigated and a summary is included in this technical memorandum. In addition, the histories of several IHSSs were also reviewed to determine either pavement histories or nature of releases. An evaluation of tank inspection records was also performed on some IHSSs.

1.2 BACKGROUND

The nature and extent of potentially affected media at OU8 IHSSs are not specifically known, principally because analytical data are unavailable. Historical information, presented in the *Historical Release Report* (EG&G 1992b), provides general indications of the types of constituents that may be anticipated at the IHSSs.

The boundaries of OU8 lie within the Industrial Area of RFETS (Figure 1-2), so evaluations of the influences of foundation drains and storm- and sanitary-sewer systems on constituent migration pathways in soil and groundwater are important to determine future sampling requirements. In addition, air monitoring in specific IHSSs will be important, not only from a health and safety aspect but also to predict and mitigate the dispersion of constituents from these IHSSs. Additional historical information regarding specific IHSSs will be important for determining future sampling events in these areas.

1.2.1 Foundation-Drain Location Identification

Foundation-drain systems were constructed to intercept and transport groundwater away from the foundations of many of the buildings at RFETS to prevent flooding of building basements (or to prevent groundwater infiltration into the basement). A typical foundation drain consists of a trench or series of trenches backfilled with gravel or other free-draining material. A slotted or perforated pipe is installed at the bottom of each trench, as shown in Figure 1-3. The intercepted water is discharged to either a storm sewer, sanitary sewer, building sump, or surface outfall.

The terms "foundation drain" and "footing drain" are used to describe the drains that are under buildings and along foundation footings. Although foundation drains and footing drains are basically the same and may be identified under a structure or building based on location near a

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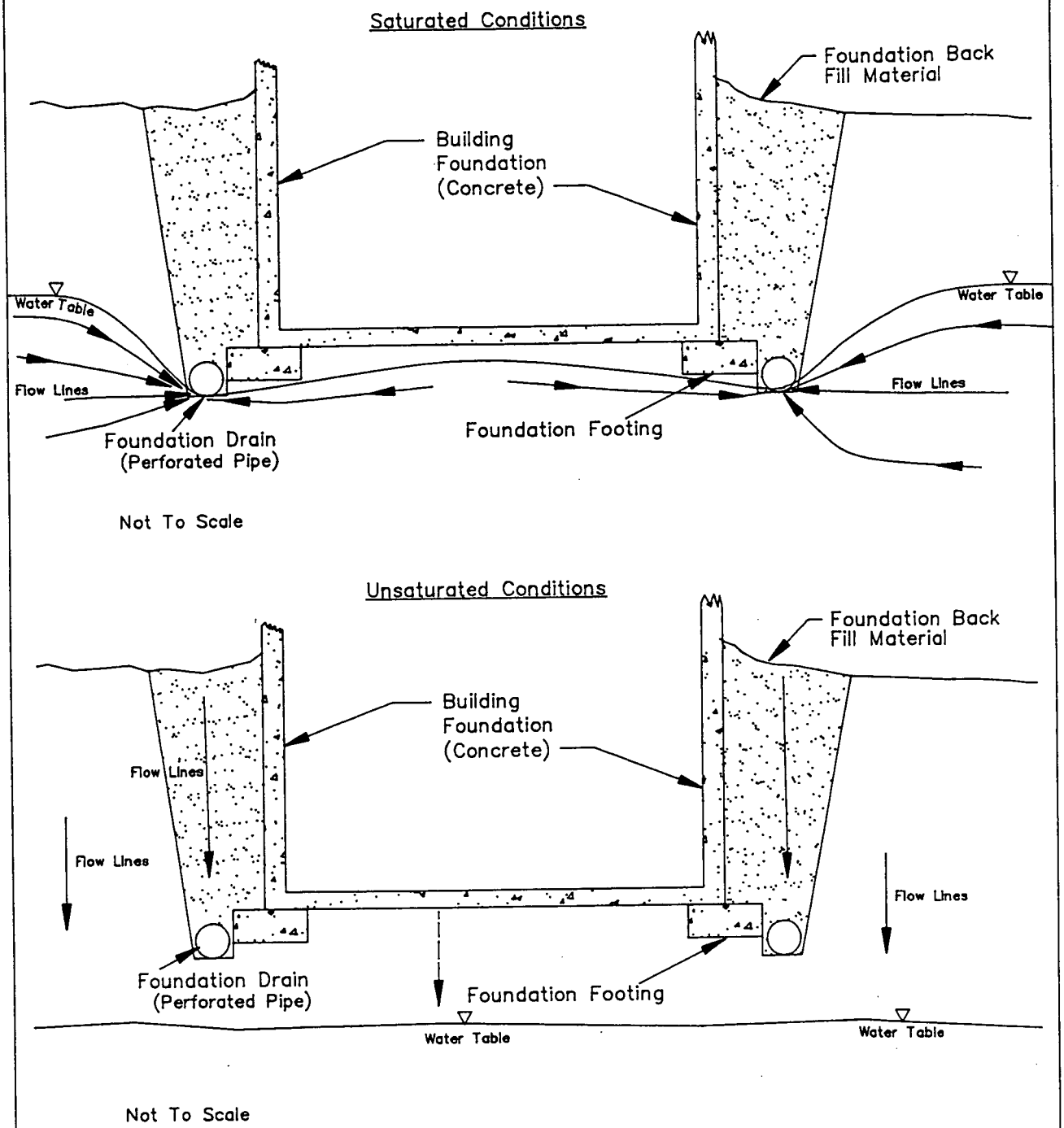

U.S. DEPARTMENT OF ENERGY
EG&G Rocky Flats Environmental Technology Site, Golden, CO

FIGURE 1–3

OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Schematic of Foundation Drain Construction and Groundwater Interaction

C:\RFLATS\OU8\FIG3.DWG 05H60208

foundation or a footing, they serve the same purpose and often interconnect. For the purpose of this report, both foundation drains and footing drains will be identified as "foundation drains."

Foundation-drain water generally originates as groundwater. However, the source of some of the foundation-drain water could be stormwater originating from the direct piping of roof drains into the foundation drains or, more probably, from stormwater infiltration through the backfill into the foundation drains.

At RFETS, foundation-drain collection sumps located within buildings are referred to as building sumps (Yashan and Barros 1992). Foundation-drain water typically drains by gravity to an outfall at a lower elevation, whereas water in sumps is generally pumped to a discharge location. Any drain that exists below a building foundation is referred to as a subdrain. A subbasement is a space below the basement of a building, typically designed for utility access, water collection, or storage.

A footing drain and building sump sampling and analysis program was initiated in 1977 and is still being implemented. A summary of the 16 existing sampling locations is contained in Table 1-1. Historically, an additional 17 footing drains and building sumps have also been sampled. The locations of those 16 sampling stations (13 foundation drains and three building sumps) and 17 historical sampling locations are shown in Figure 1-2. Table 1-2 provides narrative descriptions of both the current and historical sampling stations.

The layout of the foundation-drain systems and approximate outfall locations is contained in a series of Foundation Drain Plan drawings (Drawings 25581-1 through 25581-12) generated for several buildings in 1975. During the 1980s, the construction of several new buildings and building additions and the establishment of the Perimeter Security Zone (PSZ) resulted in both changes to the foundation-drain systems of some buildings and relocation of several outfalls.

TABLE 1-1
Summary of Current Foundation Drain and Building Sump Sampling, March 1994
Operable Unit No. 8
Rocky Flats Environmental Technology Site

Building Number	Sampling Date	Location ID	Manhole or Outfall	Estimated Flow Rate	Comments
371	3-13-94	FD-371-2	Outfall	~4 L/min	Not sampled; flow has recently increased
	3-13-94	FD-371-3	Outfall	7 L/min	10-inch pipe of unknown material
	3-13-94	FD-371-MC	Outfall	4 L/min	Sampled at end of 8-inch CMP
447	3-20-94	FD-444-460	Outfall	>75 L/min	Unable to estimate flow; sample collected from outfall on hillside south of Building 664
707	3-13-94	BS-707-2	Manhole	NA	Sample collected from water appx. 8 ft bgs and 1 ft deep
771	3-13-94	FD-771-1	Manhole	NA	Not sampled; surface grate under water
774	3-13-94	FD-774-1	Outfall	5-7 L/min	Sample collected from pond near outfall
	3-13-94	FD-774-2	Outfall	NA	Not sampled, dry
	3-13-94	FD-774-3	Outfall	~1 L/min	Not sampled, inadequate flow
779	3-13-94	FD-779-1	Outfall	~1 L/min	Not sampled as a result of low discharge rate
790	3-13-94	FD-790	Manhole	~4 L/min	Sample collected from bottom of manhole at SW corner of Building 790
865	3-20-94	BS-865-1	Manhole	NA	Sample collected from bottom of vault W of Building 865; ditch to the N of the building was dry
	3-20-94	BS-865-2	Manhole	3 L/min	Sample collected from sump on E side of Building 865
883	3-20-94	FD-883-1	Manhole	NA	Sample collected from sump near SW corner of Building 883
910	3-13-94	FD-910	Manhole	NA	Sample collected from manhole/sump located 14 ft bgs; unable to estimate flow rate
991	3-13-94	FD-991-2	Manhole	2 L/min	Sample collected from sump in utility tunnel

Note:
bgs = below ground surface
BS = building sump
CMP = corrugated metal pipe
E = East
FD = Foundation Drain
ft = feet
L = Liter
min = Minute
N = north
NA = Not Applicable
SW = southwest
W = west
~ = approximately

TABLE 1-2
Current and Historical Foundation Drain and Building Sump Sampling Stations
Operable Unit No. 8
Rocky Flats Environmental Technology Site

STATION ID	SUMMARY of STATUS
FD-111-1	Identified by Werkema (1977) and Hoffman (1981) as "probably dry." Hoffman checked the sample location in 1983 and again reported that the station is a "drain in gully outside security fence north of the northwest corner of the building halfway to Sage Avenue" (Hoffman 1983). Barros (1992) could not locate the sample station. Latest available sampling data are from May 5, 1991.
BS-111-2	Identified by Barros (1992) as a "sump located in southeast corner of the basement of Building 111." Sampled (as FD-111-1) in March 1992 (Barros 1994).
FD-371-1	Identified by Werkema (1977) and Hoffman (1981). Hoffman (1983) reports that the drain was abandoned in place, according to Drawing 25022-004.
FD-371-2	Identified by Werkema (1977) and Hoffman (1981). Hoffman (1983) field checked the location and reiterated that the drain "daylights in the gully southeast of the southeast corner of Building 374." That location was last sampled March 1981. Barros (1992) stated that the drain "was capped, [and] removed from service sometime between 1977 and 1983, and should be deleted from the sampling program." The outfall was rerouted to the northeast, and possibly connected to FD-371-3. However, water still drains from the FD-371-2 outfall and was last sampled on March 13, 1994.
FD-371-3	Identified by Werkema (1977) and Hoffman (1981). Field checked by Hoffman (1983). Barros (1992) reported that the drain "is still in service and will continue to be sampled." Currently sampled (Barros 1994).
FD-371-4	ID number was "reserved for future location" by Werkema (1977). Hoffman (1981) stated that the drain daylights southwest of FD-371-3 on the west side of the access road to the 517/518 substation. Field check revealed that station could not be located (Hoffman 1983). Never sampled.
FD-371-5	Identified by Werkema (1977) as a "storm drain grating across from the loading dock at the southwest corner of the building [371]." Hoffman (1981) stated that FD-371-5 "daylights northeast of the 517/518 substation." Could not be located in the field by Hoffman (1983). One sampling record (March 1981) exists.

TABLE 1-2
Current and Historical Foundation Drain and Building Sump Sampling Stations
Operable Unit No. 8
Rocky Flats Environmental Technology Site

STATION ID	SUMMARY of STATUS
FD-371-6	First identified by Hoffman (1981) as daylighting northeast of the 517/518 substations. Could not be located in the field (Hoffman 1983). Never sampled.
FD-371-MC	The sampling point for station FD-371-MC was described by Visocky (1993) as a metal culvert near outfall FD-371-1. The source of the water is steam condensate. Earliest record of sampling is March 1993. Currently sampled (Barros 1994).
FD-371-COMP	Identified by Barros (1992) and sampled because FD371-4, FD-371-5, and FD-371-6 were buried. Was deleted from sampling because of surface-water sampling farther downgradient from OU6. FD-371-COMP was last sampled in March 1992.
FD-444-1 FD-444-460	Identified by Werkema (1977) and Hoffman (1981) as "directly north of the southwest corner of the building...outside of the security fence." Hoffman (1983) adjusted the sampling station to "directly south of the southwest corner of the building, outside of the security fence." Renamed FD-444-460 by Barros (1992), although the sample location did not change. Currently sampled (Barros 1994).
BS-444-2	Identified by Werkema (1977) and Hoffman (1981, 1983) as a "sump inside building at the southeast corner of the 'snake pit'." Barros (1992) noted that the location is now connected to the process waste system and would no longer be sampled. The sump was last sampled in September 1980.
FD-516-1	Identified by Hoffman (1981) as a drain located on the south side of the road into the 516 power substation. Hoffman (1983) stated that the drain is slightly south and west of the current sampling location, and a culvert helps identify the location. Barros (1992) noted that the location will be moved, and the current location described in Hoffman (1983) is downgradient of the actual sump collection point. The drain was last sampled on December 17, 1989.
FD-559/561	Identified by Barros (1992) as a drain located east of Building 561, Door 1, and south of Building 559, Door 6. The drain is identified by a manhole cover. Last sampled as part of the routine sampling program on July 25, 1992.

TABLE 1-2
Current and Historical Foundation Drain and Building Sump Sampling Stations
Operable Unit No. 8
Rocky Flats Environmental Technology Site

STATION ID	SUMMARY of STATUS
FD-707-1 750-Culvert	Identified by Werkema (1977) and Hoffman (1981, 1983) as a storm drain outlet across the road from east side of the 750 parking lot. Deleted from the sampling program according to Barros (1992). The station was last sampled on March 7, 1992. This sampling location was sampled as 750 Culvert until October 7, 1993.
BS-707-2	Identified by Werkema (1977) and Hoffman (1981, 1983) as a sump in a pump pit between the cooling tower and Building 707. This sump was also identified by Barros (1992) who noted that "according to current information the sump is still in service," and the sampling point would not be changed. Currently being sampled (Barros 1994).
BS-707-3	Identified by Werkema (1977) and Hoffman (1981, 1983) as a sump in the "old" process drain manhole outside Door 3 to Building 778. Barros (1992) noted that the site requires further investigation to determine whether the process waste system has been altered; and until the determination is made, the site will not be sampled. The sump was last sampled on September 15, 1989.
FD-771-1	Identified by Werkema (1977) and Hoffman (1981) as a "drain located in the bank of the gully between the parking lots northwest of the building." Barros (1993) identifies the drain as located approximately 50 feet southwest of the southwest corner of the old 773 guard post. Currently being sampled (Barros 1994).
BS-771-2	Identified by Werkema (1977) and Hoffman (1981) as a "sump in Room 146." The sump was last sampled in June 1980.
BS-771-3	Identified by Werkema (1977) as a "sump in elevator pit." No sampling records exist.
BS-771-4	Identified by Hoffman (1981) as a "drain located on the flat ground west of FD-771-1." Barros (1992) used the ID number for the "new outfall to Building 771 footing drain" and stated that the metal grate covering the sample collection point should be removed for sampling. The drain was last sampled on December 17, 1989.

TABLE 1-2
Current and Historical Foundation Drain and Building Sump Sampling Stations
Operable Unit No. 8
Rocky Flats Environmental Technology Site

STATION ID	SUMMARY of STATUS
FD-774-1	Identified by Werkema (1977) and Hoffman (1981) as a "drain located just east of Building 770." Hoffman (1983) stated that the sample was collected from the easternmost drain, and the drain just east of Building 770 is a storm drain that should not be sampled. Barros (1992) described the drain as being located east of Building 770 and identified by the sign that marks surface water (SW) sampling location SW84. Currently being sampled (Barros 1994).
FD-774-2	Drawing 37728-002 (rev. May 9, 1990) shows outfall 774-2 as a 4-inch PVC pipe that drains the foundation of the north addition. According to Wagner (1993) and Visocky (1993), the pipe was intended to discharge to the small pond north of the building but is consistently dry. Outfall FD-774-2 has never been sampled; however, it is checked at each sampling event and is usually dry.
FD-774-3	According to Drawing 15501-013-M (rev. July 20, 1990), outfall 774-3 is a storm drain located on the hillside northeast of Building 774. The storm drain is connected to the 4-inch PVC foundation drain on the south side of the east addition. The foundation drain is usually dry and has never been sampled.
FD-779-1	Identified by Werkema (1977) and Hoffman (1981, 1983) as a drain line that runs between ponds 207C and 207A, with an outlet on the hillside. Werkema (1977) identified this location as FD-77-1. Barros (1992) described the drain as located on the hillside north of the solar ponds, identified by the broken concrete culvert with the red sandstone rocks. Barros (1992) also noted the drain was still in service, and the sampling point would not be changed. Currently being sampled (Barros 1994).
FD-790	Identified by Barros (1992) as a new drain located in the manhole on the southwest corner of Building 790. Currently being sampled (Barros 1994).
FD-850-1 FD-860-1	Identified by Hoffman (1983) as a "drain located approximately 50 feet south of Building 860 outside the Plant security fence." Barros (1992) describes the drain as located in the Buffer Zone south of the southeast corner of Building 850 and noted that the drain is still in service. Barros (1992) also noted that the drain was identified as FD-860-1 before 1986 and as FD-850-1 since then. Early laboratory summary reports, however, refer to the station as FD-850-1. The station is usually dry and has, therefore, never been sampled.

TABLE 1-2
Current and Historical Foundation Drain and Building Sump Sampling Stations
Operable Unit No. 8
Rocky Flats Environmental Technology Site

STATION ID	SUMMARY of STATUS
BS-865-1	Identified by Werkema (1977) and Hoffman (1981, 1983) as a "sump in manhole on west side of building." Barros (1992) described the sump as located in a pump pit on the west side of Building 865 and identified by a "square shape metal cover on the pump pit." The sump was last sampled on March 20, 1994 (Barros 1993). The station was identified as FD-865-1 by Barros (1994) and is currently sampled (Barros 1994).
BS-865-2	Described by Barros (1992) as a new drain located outside Door 1 of Building 865. The drain is the collection point for the Building 865 foundation drain. The drain is currently sampled (Barros 1994).
FD-881-1	Identified by Werkema (1977) and Hoffman (1981, 1985) as a "drain on hillside outside of security fence south of the middle of the building." All sources report that cattail growth identifies this location. Barros (1992) noted that the site no longer required sampling because of the installation of a french drain on the 881 Hillside. The drain was last sampled as part of the routine sampling program on May 5, 1991.
BS-881-2	Identified by Werkema (1977) and Hoffman (1981) as a "sump in elevator shaft by the boiler room." The sump was last sampled in August 1978.
BS-881-3	Identified by Werkema (1977) and Hoffman (1981, 1983) as a "sump under the stairway in the northeast corner on the first floor." Barros (1992) noted that the location would no longer be sampled because of access problems within the building to the area of the sump. The sump was last sampled on June 9, 1990.
BS-883-1 FD-883-1	Identified by Werkema (1977) and Hoffman (1981, 1983) as a "sump pump in manhole directly west of the southwest corner of the building." Barros (1992) described the drain as located in a manhole outside Door 17 on the southwest corner of Building 883 and identified by an elevated manhole approximately 2 feet above the ground. Barros (1992) also noted that the drain is still in service with the same sampling point. The station has been called FD-883-1 since 1993 and is currently being sampled (Barros 1994).
FD-886-1	Barros (1992) describes this site as a manhole at the northeast corner of Building 875 used as a collection point for the Building 886/875 tunnel foundation drain. Last sampled December 12, 1993 (Barros 1993).

TABLE 1-2
Current and Historical Foundation Drain and Building Sump Sampling Stations
Operable Unit No. 8
Rocky Flats Environmental Technology Site

STATION ID	SUMMARY of STATUS
FD-886-2	Visocky (1993) describes a 6-inch corrugated metal pipe that slopes south to collection manhole FD-886-2 located on the west side of Building 886. The manhole was last sampled on December 12, 1993.
BS-887-1	Identified by Werkema (1977) and Hoffman (1981) as a "sump in the northwest corner of the lowest section." The sump was last sampled in March 1980.
FD-910	Barros (1992) described the drain as located in a manhole on the north side of Building 910 and identified by a manhole covered by the piping on the north side of the building. Barros (1992) also noted that this location has been sampled in the past as "Building 910 manhole." Currently being sampled (Barros 1994).
FD-991-1	Identified by Werkema (1977) and Hoffman (1981) as a "drain in gully outside security fence due east of the northeast corner of the building." Hoffman (1983) states that the drain is located inside the security fence. Barros (1992) noted the discrepancy and added that the drain may have been relocated to a sump in the southeast corner of the basement. The drain was last sampled on April 26, 1993.
BS-991-2 FD-991-2	Barros (1992) described the sump as located in the southeast corner of the basement of Building 991 and identified by the metal cover bolted to the floor. Currently being sampled as FD-991-2 (Barros 1994).

Notes:

ID = identification
PVC = polyvinyl chloride
SW = stormwater

Many of these changes were not completely documented and, consequently, many of the new outfall locations are unknown.

The locations of foundation-drain and building sump sampling stations were modified in 1992. A spill of radioactive water in Building 371 (May 23 to May 25, 1992) and a chromic acid spill in Building 444 (spring 1989) caused concern within the EG&G Surface Water Division (SWD) about the potential for foundation drains and building sumps to serve as routes for transport of contaminants into soil and groundwater and discharge to the surface. Prompted by this concern, SWD attempted to pinpoint the locations of both unidentified and previously identified foundation-drain outfalls and building sumps. The updated sampling location information and plans to expand the suite of analytes to include volatile and semivolatile organics were announced in an October 5, 1992 letter by Steve Barros (SWD) (Barros 1992). Yashan and Barros (1992) provided building-by-building descriptions of the foundation-drain systems and offered explanations for several of the discrepancies between past and present sampling locations. The report stated that further investigation is necessary to adequately characterize most of the foundation drains.

1.2.2 Sampling Frequency and Analytical Suites

According to available data, sampling and analysis of foundation drain and building sump waters has been performed since the late 1970s. However, Dow Chemical, the former plant operator, may have performed sampling of some drains in the early 1950s (Blaha 1994). No results or documentation of this sampling has been found to date. A program was established in the mid-1970s to identify foundation-drain systems for buildings within the Industrial Area and to locate their outfalls. The outfalls and sumps were sampled approximately three times per year (Hoffman 1981) to provide early identification of subsurface contamination. No documentation for sampling activities of foundation drains and building sumps from 1983 through 1985 was found during this investigation.

Documentation was located that shows the foundation drains and sumps were sampled from 1985 to 1988 (Barros 1994); however, the analytical results could not be located. It is possible that the foundation drains and sumps were not sampled during that time, although Kirk (1994) recalled that the hiatus in foundation-drain sampling lasted approximately two years. Sampling of foundation-drain and building sump water was reinitiated in 1988 and continues to date.

The initial list of analytes included gross alpha, specific conductance, nitrates, pH, and total dissolved solids. Gross beta and tritium were added in 1980. Arsenic, lead, mercury, potassium, selenium, and thallium were added to the analyte list in 1988. In 1989, inductively coupled plasma (ICP) screening for 19 additional metals was initiated, and screening for organic compounds in foundation-drain and building sump samples began in 1992.

Foundation-drain and building sump samples currently are analyzed for gross alpha, gross beta, tritium, nitrate, pH, conductivity, total dissolved solids, target analyte list (TAL) metals (sometimes hazardous substance list [HSL] metals), target compound list (TCL) semivolatile organic compounds (SVOCs) and TCL volatile organic compounds (VOCs). Under the current program, the schedule for analysis of VOCs and SVOCs will be reduced to require only annual sampling if there are no detections in samples from three consecutive sampling events.

1.2.3 Infiltration/Exfiltration of Sanitary and Storm Sewers

The storm-sewer system at RFETS consists of more than 33,000 linear feet of piping and an estimated additional 33,000 linear feet of open channels (Advanced Sciences, Incorporated [ASI] 1991a). The sanitary-sewer system consists of approximately 35,000 linear feet of piping, ranging in diameter from three to twelve inches (ASI 1991b). In addition to the existing sanitary-sewer system, some of the old sewer lines have been abandoned in place and disconnected from the system (EMC Engineers, Inc. and KKBNA, Inc. 1985).

An examination of the infiltration into and exfiltration out of the storm- and sanitary-sewer lines at RFETS will yield a better understanding of the potential for migration of chemical constituents to and from groundwater and soils. ASI (1991b) characterized, to the extent possible, the presence, flow rate, and type of infiltration/inflow or exfiltration conditions that exist in the sanitary-sewer system.

Closed circuit television (CCTV) inspections of storm- and sanitary-sewer lines within the 400 Area, engineering drawings, and detailed high (spring 1992) and low (fall 1992) water level maps were used to determine areas of the sanitary- and storm-sewer system that would be prone to infiltration or exfiltration of constituents through joints, cracks, and other breaks in the closed conduit. Industrial area sanitary- and storm-sewer pipeline maps that illustrate infiltration- and exfiltration-prone areas were prepared.

In 1987, Video Sewer Renovation (VSR) Corporation conducted a video survey of the storm sewers in the Industrial Area. In addition, VSR also cleaned the storm sewers. The actual video footage of this effort has been lost; however, the field notes from the survey were found and compiled for exfiltration and infiltration information. Although this study was conducted in 1987 and some repair work on the storm sewers have been conducted, this information does provide valuable exfiltration and infiltration data.

1.2.4 Air Monitoring

Air quality monitoring within the plant boundaries has been ongoing since the 1950s. The current RFETS effluent monitoring program includes real-time screening, biweekly filter collection and screening, and a monthly filter composite analysis of beryllium and radiological constituents of concern. Study samples are also collected at a few locations for tritium analysis. Particulate samples are continuously collected at numerous locations in and around RFETS. These samples are composited monthly for laboratory analyses of specific radioisotopes.

1.2.5 Additional Data Compilation, Specific IHSSs

Pavement histories in IHSSs 118.1, 118.2, 150.6, 150.8, 172, and 184 will provide important information in determining the media for sampling in these areas. For example, if the paving occurred before a release, a sample of the asphalt that has been laboratory-analyzed for radiological constituents will be important to determine migration pathways and remediation techniques. At IHSS 151, where a release of diesel fuel from an underground storage tank occurred, evaluating the tank inspection history will determine Stage 2 tank and pipeline inspection investigations for this IHSS. Further clarification of the nature of a heavy metal release at IHSS 188 will help define the laboratory analyses for media collected at this IHSS. Additional information on the investigative activities for OU8 is included in the OU8 Work Plan (EG&G 1992a).

1.3 REPORT ORGANIZATION

This technical memorandum is organized into the following nine sections and appendices:

- Section 1.0 presents a discussion of the purpose and scope of the data compilation, the background summary, and the report organization.

- Section 2.0 provides a summary of the information sources used including existing documents, engineering drawings, aerial photographs, interviews with knowledgeable personnel, onsite reconnaissance, and analytical data.

- Section 3.0 provides a detailed, building-by-building description and map of each foundation-drain system that has been identified within the Industrial Area at RFETS.

- Section 4.0 summarizes the sampling frequency and analytical results for foundation drains and building sumps. Analytical results were compared to background concentrations in surface water and groundwater. Trends in radionuclide and metal concentrations over time were also evaluated.

- Section 5.0 is a discussion of the storm- and sanitary-sewer systems and a summary of the results of infiltration/exfiltration studies and video inspections. In addition, this section discusses proposed foundation-drain and building sump sampling.

- Section 6.0 describes the current air monitoring program at RFETS. A summary of the current site-wide air monitoring program and a map showing location and frequency of sampling are provided.

- Section 7.0 provides a discussion of the additional data compilation for specific IHSSs.

- Section 8.0 provides a summary of the findings of the additional data compilation tasks.

- Section 9.0 contains a list of references used in the preparation of this document.

- Appendix A provides a list of the engineering drawings that were reviewed for foundation-drain compilation.

- Appendix B contains VSR Corporation's Data Compilation of 1987 Storm Drain Video Survey and associated information.

- Appendix C contains selected aerial photographs of RFETS, showing the construction and routing of foundation drains.

- Appendix D contains meeting notes, letters, and memoranda that address the location and/or sampling of foundation drains and building sumps. Included in this appendix are (1) a retyped copy of a 1952 memorandum about liquid waste disposal at RFETS, (2) summary notes from a meeting between EG&G SWD, Jacobs Engineering Group Inc. (Jacobs), and Wright Water Engineering personnel, and (3) two memoranda from Mr. Steve Barros (SWD) to Mr. Andy Carpenter (Jacobs) regarding foundation-drain and building sump sampling.

- Appendix E contains field notes from the March 1994 sampling events and from site reconnaissances.

- Appendix F includes written summaries of conversations with knowledgeable personnel to support the conclusions of this technical memorandum.

- Appendix G contains graphs depicting UTL exceedances for radionuclides and metals.

- Appendix H provides a list of the engineering drawings reviewed for the IHSS data compilation.

- Appendix I consists of a table of water level and monitoring well construction information used in the creation of Figures 5 through 19.

2.0 SOURCES OF INFORMATION

Information for this report was obtained from existing documents, engineering drawings, aerial photographs, knowledgeable EG&G personnel and subcontractors, onsite reconnaissance, CCTV video footage of RFETS storm-sewer lines located in the 400 Area, field notes, reports from a CCTV survey that was performed on storm lines located in the industrial area, and the Rocky Flats Environmental Database System (RFEDS).

2.1 EXISTING DOCUMENTS

The following documents, listed in chronological order, were reviewed for information on foundation drains, building sumps, and sampling locations:

Shepherd, B.P. 1952 (June 13). Dow Chemical Company, internal memorandum, "Liquid Waste Disposal at Rocky Flats Plant." This memorandum from B.P. Shepherd to F.H. Langell outlines the various methods of waste collection and disposal at RFETS. Sanitary, storm, and process waste systems are described for Buildings 71, 81, 23, 41, 74, 44, and 95. (These were later renamed as Buildings 771, 881, 123, 441, 774, 444, and 995, respectively.)

Freiberg, K.J. 1971. (May 10). Dow Chemical Company, internal memorandum, "Health Physics Monthly Status Report Operations Group Technical and Construction April, 1971." The status report from K.J. Freiberg to E.A. Putzier provides footing drain effluent information about Building 774.

Boss, M.R. 1971 (May 17). Dow Chemical Company, internal memorandum, "Items for Further Definition." This memorandum from M.R. Boss to C.W. Piltingsrud (Boss 1971) is in response to a March 9, 1971 memorandum and provides analytical data about samples collected at outfall from Building 774 footing drains. The March 9, 1971 memorandum provides information about effluent from Buildings 771 and 774.

Werkema, G.J. 1974 (January 9). Dow Chemical Company, internal memorandum, "Rocky Flats Division Ecology Council Minutes of Meeting Held January 2, 1974." These meeting notes provide analytical data about samples collected from footing drains of Building 771/774.

Owens, J.B. 1974 (May 9). Dow Chemical Company, internal memorandum, "Water from Footing Drains, Building 771 AND 774." This memorandum from J.B. Owens to E.W. Bean provides information about the disposition of effluent collected in the holding pond from Buildings 771 and 774 footing drains.

Piltingscud, C.W. 1974 (July 12). Dow Chemical Company, internal memorandum, "Progress Report for June 1974 Environmental Sciences and Waste Control." This memorandum from C.W. Piltingscud to H.E. Bowman provides analytical results of H_3 contaminated water from the footing drains of Buildings 771-774.

Dow Chemical Company. 1975 (April 10). Internal memorandum. This memorandum to H.E. Bowman provides information about disposal of water collected in the (Building) 774 Footing Drain Pond.

Werkema, M.V. 1977 (May 19). Rockwell International, internal letter, "Locations of Building Sump and Foundation Drains." This letter from M.V. Werkema to N.E. Moody contains a table that presents building sump and foundation-drain sampling locations for the early sampling program.

Hoffman, N.D. 1981 (December 17). "Water Quality Data for Foundation Drains and Building Sumps From 1977 Through 1981." Unpublished report. This report summarizes water quality data from foundation-drain and building sump sampling from 1977 through 1981. Tables of analytical results are included.

Hoffman, N.D. 1983 (October 4). Rockwell International, internal letter, "Locations of Foundation Drains and Building Sumps - Update." This letter provides updated information on foundation-drain and building sump sampling locations, with clarifications.

Video Sewer Renovation Corporation. 1987 (July 20 to September 25). Field notes and inspection and work reports. Documents generated by VSR Corporation during the inspection and cleaning of storm drains. VSR Corporation was the subcontractor that made the 24-hour video that has been reported as lost.

Barros, Steve. 1992 (October 5). EG&G Rocky Flats, interoffice correspondence, "Footing Drains and Building Sumps." This letter provides updated information on foundation-

drain and building sump water sampling locations, including plans to expand the list of analytes.

Yashan, Dean and Steve Barros. 1992 (November 2). A Description of Rocky Flats Foundation Drains, SWD-012-92. This report summarizes the foundation-drain and building sump sampling locations, building by building, at RFETS. Maps and tables of sampling locations are included.

Advanced Sciences, Inc. 1993 (April). Video tape of the inspection of the FD-444-460 outfall. Viewing time, approximately four hours.

Hayes, Bill. 1993 (April). *Non-Storm Water Discharge Locations and Sampling at Rocky Flats*, SWD-010-93. This document defines nonstorm water discharges and identifies 90 nonstorm water discharge locations at RFETS, including 19 foundation drains or building sumps. The remaining 71 locations are utility pits. The document outlines plans to sample these stations.

In addition, RFEDS, the master database for RFETS environmental data, was queried for foundation-drain data from 1992 to the present.

2.2 ENGINEERING DRAWINGS

Engineering drawings available at the plant site were reviewed for all buildings within the Industrial Area to determine whether they were constructed with a foundation-drain system. Efforts were made to obtain original design drawings, "as built" drawings (of original building construction), and drawings for any additions or renovations to the building structure. A list of the drawings that were reviewed is provided in Appendix A. The drawings and plans reviewed will ultimately be archived in the Administrative Record.

Several assumptions were made for interpretation purposes regarding the information contained in the engineering drawings. These assumptions are listed below:

- If a drawing was stamped "as built," it was assumed that the elevations provided on the drawing had been verified and are accurate. However, this may not always be the case. Mr. Paul Grabrowski, the EG&G plant surveyor, stated that, due to budget constraints, many of the drawings for buildings were stamped "as built" with very little effort made to verify the elevations. Mr. Grabrowski reported that the drawings indicate the presence of drains and the general direction of the stormwater flow and slope of drains, but the elevations should not be used for design criteria (Grabrowski 1994). The elevations shown on the figures in this report are invert elevations, which refers to the elevation of the inside bottom of the drainage pipe.

- The elevation values are assumed to correspond to mean sea level and not the Rocky Flats Coordinate System, unless otherwise stated, based on conversations with Mr. Paul Grabrowski (1994).

2.3 VIDEO INVESTIGATIONS

The data compilation activities identified two video investigations had been performed on the storm-sewer systems. The CCTV surveys were performed by separate subcontractors at different times. In April 1993, ASI performed a CCTV inspection of outfall FD-444-460 (ASI 1993). The inspection was performed to determine the layout of the storm-sewer system and was reviewed by Jacobs in an effort to determine whether any foundation drains were tied into this system. Mr. Tyler Smart (ASI) was interviewed for information pertaining to the video (Smart 1994).

CCTV video footage existed for the storm-sewer system of the entire plant. The video tapes taken of the storm-sewer system were not located during data compilation activities and are believed to be lost. However, the contractor that conducted the video survey, VSR Corporation, was contacted. The field notes and inspection and work reports that were written during the

storm-sewer survey were acquired and reviewed. The field notes, inspection and work reports, and Jacobs' review and comments are included in Appendix B.

2.4 PHOTOGRAPH REVIEW

Another source of information reviewed during data compilation activities included historical photographs taken at RFETS. A review of historical photographs was conducted by Wright Water Engineers, Inc. to evaluate past activities that may have affected Building 124 and the 400 Area buildings. Three types of photographs were included in the review: ground level, oblique, and aerial (Appendix C).

Photographs reviewed for activities that may have affected the 400 Area buildings were primarily from the late 1980s. These photographs were reviewed to identify footing drains that were relocated. The focus of this photograph review was the outfall south of Building 440 and the hillside area south of Building 664.

2.5 PERSONAL INTERVIEWS

Several people were interviewed for information regarding the foundation drains and outfalls at RFETS including the following:

- Barros, Steve, EG&G Surface Water Division;
- Bentzinger, Jerry, EG&G (Building 776/777);
- Blaha, Frank, Wright Water Engineers;
- Burmeister, Mark, EG&G (OU1 Treatment Facility Operations);
- Dunstan, Leslie, EG&G Surface Water Division;
- Gibson, Carl, EG&G (Building 779);
- Grabrowski, Paul, EG&G (Engineering, Building 130);

- Kirk, Nancy (formerly Hoffman), EG&G (Waste Programs);
- Koelmel, James, EG&G (400 Area Operations);
- Lyons, John, EG&G (800 Area Utilities);
- Mast, Edward, EG&G (Remediation Project Manager);
- Smart, Tyler, Advanced Sciences, Inc.;
- Steckline, Ron, EG&G (400 Area Utilities);
- Wagner, Rick, EG&G (Building 774);
- Wilson, Sharon, EG&G (Building 991);
- Wistrand, Dan, EG&G Surface Water Division; and
- Yashan, Dean, EG&G Surface Water Division.

The information obtained from these interviews is summarized in the building-by-building descriptions presented in Section 3.0.

On December 22, 1993, a meeting was held with EG&G SWD and Jacobs personnel (Blaha 1994). Jacobs and SWD reviewed engineering drawings for foundation-drain outfalls that were known to exist and exchanged information about foundation-drain outfalls that had been relocated but not documented on the engineering drawings.

2.6 ONSITE RECONNAISSANCE

A number of onsite reconnaissances of the Industrial Area were conducted to locate foundation-drain outfalls and verify information that had been gathered. The objectives of those site reconnaissances were (1) to identify the outfall locations and determine whether they correspond to the locations shown on the engineering drawings, (2) to make visual observations regarding flow, (3) to evaluate the adequacy of the current sampling locations, and (4) to determine the destination of the effluent, if any.

The first site reconnaissance was conducted on November 30, 1993. Mr. Steve Barros (SWD) escorted reconnaissance personnel to most of the foundation-drain outfall and current sampling locations. A second site reconnaissance was performed on December 6, 1993. A third and final site reconnaissance occurred on February 3, 1994 inside the Protected Area (PA).

A member of the reconnaissance team also accompanied the foundation-drain sampling crew in March 1994. Observations and sketches of the sampled drains were made at that time. This information was also used to prepare the building-by-building drawings in Section 3.0 of this technical memorandum.

2.7 ANALYTICAL DATA

Available analytical data were reviewed to determine the quality of foundation-drain waters. Leslie Dunstan (SWD) provided data for the period from 1988 to 1991. No pre-1988 analytical data were found, with the exception of the results presented in a report prepared by Hoffman (1981). More recent data (1992 through 1993) were received in electronic format from RFEDS. The RFEDS information contains analytical data for building sumps and foundation drains for 1992 through 1993 only (Rigor 1994).

3.0 FOUNDATION DRAIN AND OUTFALL LOCATIONS

This section provides a detailed, building-by-building description of each foundation drain system that has been identified within the Industrial Area at RFETS. The primary use of each building is described briefly in the subsection title. Additionally, each building is shown on a map that includes foundation drain and storm drain locations; outfall locations; invert elevations; historical, current, and proposed sampling locations; OU8 IHSS locations; topography; finished floor elevations; and high (spring 1992) water table contours when that information was available. Figure 3-1 is an index map to the detailed figures for each building.

3.1 BUILDING 111 - ADMINISTRATION

The Basement Floor Plans (tabulations in Appendix A - Drawings 1-1664-11, rev. January 8, 1965 and 1-1665-11, rev. February 27, 1961) and the Foundation Drain Plan (Drawing 25581-8, rev. December 9, 1975) for Building 111, show a 4-inch tile drain around the perimeter of the basement foundation. The foundation drain, invert elevations, and the layout of the foundation drain for Building 111 are shown in Figure 3-2. The type of backfill used around the drain system and foundation was not recorded. The finished grade elevation of the basement of Building 111 is approximately 6,030 feet. The drain slopes from the center of the south wall of the basement toward the northeast corner. The outfall location may be located 130 feet north of the building in the drainage ditch as indicated on the engineering drawings (tabulations in Appendix A).

Based on all the engineering drawings reviewed and interviews conducted, a discrepancy exists about the locations of the outfall for the foundations drains from Building 111; three possible discharge locations may exist. The three possible outfall locations are (1) a manhole located west of Building 115 that discharges to an outfall northwest of Building 115, (2) a manhole located at the northeast corner of Building 111 that discharges into the sanitary sewer, and (3)

a sump located in the basement at the south end of Building 111 that discharges to an unknown location. The following text discusses each of these possible discharge locations.

Manhole west of Building 115. Werkema (1977) described the outfall for Building 111 foundation drains as being located north of the northeast corner of Building 111. However, Hoffman (1981, 1983) indicated that the outfall was located in a drainage ditch north of the northwest corner of the building. SWD personnel performed a field inspection of the drainage ditch but did not locate the outfall identified by Hoffman (Yashan and Barros 1992). A possible outfall location was identified during the December 6, 1993 Jacobs site reconnaissance. Rip-rap has been placed on the slope of the drainage ditch, north of the northwest corner of the building, for erosion control. Although a discharge pipe was not found, a slight depression of the ground leading away from this location may indicate where a trench was dug to reroute the drain pipe. This location was dry during the site reconnaissances conducted on December 6 and 7. From 1978 through 1991, surface-water samples were collected at sample station FD-111-1 in the drainage ditch near the suspected outfall. Since 1991, the station has not been sampled because it was normally dry (Barros 1992).

The Site Utility Plans also show a manhole on the west side of Building 115 that connects into a storm drain and discharges into the drainage ditch northwest of Building 115. The area of the suspected outfall is depicted in Figure 3-2 near surface-water sample station FD-111-1. Other information suggests the foundation drain pipe may have been rerouted as a result of the construction of Building 115 in 1983 (Yashan and Barros 1992; Blaha 1994). However, the area west of Building 115 was checked during site reconnaissance in January 1994, and the manhole for the storm drain could not be located. This may indicate that the storm drain was never constructed or that it was removed and the 1983 Site Utility Plans do not reflect the change.

Manhole, northeast of Building 111. The Site Utility Plans (Drawing 15501-027-M, rev. July 20, 1990) show a manhole located north of the northeast corner of Building 111. The Building

111 foundation drain may have been rerouted to the manhole located at the northeast corner of Building 111, which is connected to a sanitary-sewer pipe extending south along the east side to a manhole located on the east side of Building 111. Removal of the manhole cover located northeast of Building 111 during the February 1994 site reconnaissance revealed that the manhole is a cleanout for the sewer. A 6-inch-diameter corrugated metal pipe connects into the north side of the manhole. It could not be determined whether the foundation drain for Building 111 was connected to the manhole located northeast of Building 111.

Sump in the basement of Building 111. A review of the basement floor plans (tabulation in Appendix A) indicates a sump is located near the southern end of the basement. There are conflicting reports about the source of sump influent. Yashan and Barros (1992) report that this sump may be the collection point for the foundation drain. The engineering drawings reviewed (tabulation in Appendix A) do not show a connection between the sump and the foundation drain. Also, it appears unlikely the foundation drain discharges to the sump, assuming that the invert elevations of the foundation drain are correct. Based on construction characteristics of other buildings of similar age at RFETS (Appendix D - Shepherd 1952), it is likely that the sump is the collection point for the floor drains in the basement of Building 111. The sump was first sampled in April 1993 as sampling station BS-111-2. Based on all information reviewed, it is not known where the sump discharges.

3.2 BUILDING 124 - POTABLE WATER TREATMENT

The Building 124 Foundation Plan (Drawing RF-24-F1-C, rev. March 19, 1953) shows a 6-inch-diameter, perforated, corrugated-metal pipe around the foundation of Building 124. Building 124 foundation drain, foundation drain invert elevations, and the layout of the foundation drain system are shown in Figure 3-3. The type of backfill used around the foundation and the drain system is unknown. The finished grade elevation of the basement of Building 124 is 6,044 feet above mean sea level (MSL) (Drawing 25581-3, rev. June 13, 1975; Drawing RF-24-Y1-B, rev.

March 19, 1953; Drawing RF-24-109-B, March 19, 1953). Foundation drain water flows from the center of the west wall of Building 124 eastward and discharges to a manhole on the east side of the building (Drawing 25581-3, rev. June 13, 1975). There appears to be conflicting information about the foundation drain discharge location. Existing information indicates two possible discharge locations: (1) the hillside south of Building 124 uphill from Woman Creek and (2) a manhole east of Building 124 that is believed to be connected to the storm sewer by a 15-inch-diameter pipe that eventually discharges south of Building 664 (located in Figure 1-2 as sample station FD-444-460). The outfall south of Building 124 has not been located and discharge from this reported outfall has not been observed (Blaha 1994, Barros 1994). The Building 124 Manager, Mr. David Webb, stated that the possible discharge point located east of Building 124 was plugged at the manhole (Webb 1994).

A sump was observed on the east side of Building 124, adjacent to the manhole; and, according to Mr. Webb (Webb 1994), the building foundation drain water collects in this sump. The sump is not shown on engineering drawings (tabulation in Appendix A), and the installation date of the sump is not known. Mr. Webb stated that the sump discharges into settling tanks that are part of the water treatment system located east of Building 124 (Webb 1994). The water from the treatment system is piped to cooling towers in the 400 Area where it is then distributed around the plant site for process needs.

No historical analytical data for the potential outfall located south of Building 124 was located. The outfall on the hillside south of Building 124 was removed or rerouted (Drawing 27006-4, rev. June 18, 1975; Photo 18333-00 - Appendix C) before the foundation drain sampling program began. Consequently, the foundation drain water for Building 124 has never been sampled.

3.3 BUILDING 371/374 AND SUBSTATIONS 517/518 - PROCESS WASTE TREATMENT FACILITY

Based on the Area Plot Plans for Foundations and Storm Drains (Drawing 25022-004, rev. August 19, 1980) for Building 371/374, two independent drain systems are located under Building 371/374: a foundation drain system located around the perimeter of the building and a drain system located beneath the subbasement of the building. The perimeter drain system is constructed of 8-inch-diameter porous concrete pipe. The subbasement foundation drain system is constructed of 6-inch-diameter porous concrete pipe and 12-inch-diameter porous concrete-asbestos pipe. Some sections of the 12-inch-diameter concrete-asbestos pipe are perforated. The drawings show the backfill material used around the pipe was compacted sand. The area plot plan for Building 371 foundation drains is shown in Figure 3-4. Substations 517/518, invert elevations, and the layout of the foundation drains are illustrated in Figure 3-5. The figures illustrate six outfalls, three for Building 371/374 and three for the 517/518 substations. The six outfalls discharge into a northeast-flowing drainage ditch that is a tributary to North Walnut Creek. The six outfalls are summarized in the following listing:

- Outfall 1, located at the site of sample station FD-371-1 (Figure 3-4), was the discharge point for the storm sewer located southeast of Building 371. This storm sewer has been abandoned in place (Drawing D25022-004). No other details relating to the abandonment were available.

- Outfall 2, located at the site of sample station FD-371-2, is approximately 150 feet southeast of Building 371 (Figure 3-4). Historically, this location has been sampled as the discharge location for the basement foundation drain system for Building 371 as shown in the Area Plot Plan (Drawing 25022-004, rev. August 19, 1980). Based on a comparison of subbasement and perimeter foundation drain elevations, it appears that Outfall 2 may have been the original discharge location of the perimeter foundation

drains. Outfall 2 was rerouted approximately 100 feet to the northeast of the original outfall during the construction of the PSZ in 1983 (Drawing 27550-002, rev. May 4, 1982). The new outfall is a 10-inch-diameter polyvinyl chloride (PVC) pipe with a gate valve on the end located at a concrete headwall. The perimeter drain system is constructed of porous-concrete pipe. The type of pipe used to construct Outfall 2 is PVC. The location of the connection between the porous-concrete and PVC pipes is not known. The observed flow rate at the current location of Outfall 2 was approximately 1 gallon per minute (gpm) during the March 1994 sampling event (Appendix E).

- Outfall 3, illustrated in Figure 3-5, is located at the site of sample station FD-371-3. Outfall 3 has been identified as the discharge location for the Building 371 subbasement foundation drain system (Drawing 25022-004, rev. August 19, 1980). Drawing 25043-049, Site Plan Development, shows the subbasement drain effluent leaving the drain system through Outfall 3. The subbasement foundation drain system discharging at Outfall 3 is constructed of several types of pipe. The initial collection system is constructed of 6-inch-diameter porous-concrete pipe. The 6-inch-diameter pipes all terminate at a central sump. The pipe exiting the sump is constructed of 12-inch-diameter concrete-asbestos. The final segment of the subbasement foundation drain is 12-inch-diameter perforated-concrete asbestos pipe (Figure 3-5).

  During the March 1994 sampling event, Outfall 3 was observed flowing at a rate of approximately 1.5 gpm (Appendix E). The perimeter basement and subbasement drain systems for Building 371 (sample stations FD-371-2 and FD-371-3) may have been connected during the construction of the PSZ in 1983, and all of the discharge may be through Outfall 3 (Appendix E).

- Outfalls 4, 5, and 6 are discharge locations for the foundation drain system around the 517/518 substations illustrated in Figure 3-5. The discharge points for Outfalls 4 and 5

are located near sampling stations FD-371-4 and FD-371-5, respectively. The foundation drain piping system for substations 517/518 that discharges at Outfalls 4 and 5 is constructed of 6-inch-diameter PVC pipes (Drawing 25022-004). The discharge point for Outfall 6 is located near sampling station FD-371-6. The foundation drain pipe discharge at Outfall 6 is shown as cast iron on Site Utility Plans drawings (Drawing 15501-011-M, rev. July 20, 1990; Drawing 15501-019-M, rev. July 20, 1990). The backfill material used around the foundation drain pipes for substation 517/518 is unknown. Outfalls 4, 5, and 6 could not be located in 1983 (Hoffman 1983). Outfall 4 is reportedly located approximately 130 feet to the south of Building 517 and may discharge into the drainage that flows through the area to the northeast. Outfalls 5 and 6 are reported to discharge about 100 feet to the northeast of Building 518 into the drainage that flows through that area to the northeast. During site reconnaissances (December 1993), water was observed flowing through a drainage channel on the hillside east of where Outfalls 5 and 6 are shown on Drawing 25022-004 (rev. August 19, 1980). The source of the water may have been surface runoff or discharge from buried outfalls. Hoffman (1981) lists analytical data for samples collected from sample station FD-371-5 (Outfall 5) in March 1981.

Personal communication with Mr. Dan Wistrand (EG&G, SWD) (Visocky 1993) suggests that the subbasement and perimeter basement foundation drain systems in Building 371 are connected and that the discharge at sampling stations FD-371-2 and FD-371-3 is from the two foundation drain systems. The location and date of connection of the two drain systems are uncertain. Mr. Wistrand stated that the roof drains for Building 371/374 are also connected to the basement foundation drain system. He has observed the discharge at Outfalls 2 and 3 during storm events and noticed a small flow increase at Outfall 2 and a significant increase in flow at Outfall 3 (Visocky 1993). The discharge from Outfall 2 is believed to be water that enters the drain system after the point of connection to Outfall 3 (Blaha 1994).

Two sampling locations are currently associated with Building 371/374:

- Station FD-371-MC (Figure 3-5) is sampled at a metal culvert near Outfall 1. According to Mr. Steve Barros, SWD, the source of the water is from steam condensate processes (Appendix F - Barros 1994). Samples collected at Station FD-371-MC are analyzed for the same parameters as foundation drain and building sump samples.

- Station FD-371-3 is located at Outfall 3. The source of water is reported to be from the perimeter foundation, subbasement, and the roof drains of Building 371/374.

Historically, water samples were also collected at sample station FD-371-COMP, which is located in the drainage ditch downgradient from Outfalls 5 and 6 near the T771 complex. Sampling station FD-371-COMP was removed from the surface-water sampling program because of the historical analytical data from locations further downgradient and the OU6 monitoring (Barros 1992).

3.4 BUILDING 440 - MODIFICATION CENTER

Based on engineering drawings (tabulations in Appendix A), a foundation drain system does not exist for Building 440. However, the Foundation Drain Plans for Drain Terminating Points (Drawing 25581-1, December 9, 1975) depicts one outfall for Building 440 on the hillside to the south. The outfall shown on Drawing 25581-1 was for a storm drain that originated north of Building 440 and ran underneath Buildings 440 and 447. That outfall no longer exists, and the pipe was rerouted to an outfall (FD-444-460) on the hillside south of Building 664 (Photographs 35127-34; 37233-00; ASI 1993; Appendix C). Figure 3-6 shows the location of sampling station FD-444-460, which is located at this outfall.

A CCTV video inspection of the storm-sewer system for the 400 Area was performed in 1993 (ASI 1993). This video footage revealed that a manhole exists in the storm-sewer lines west of the northwest corner of Building 440. Field notes state that "a 6-inch PVC [pipe] enters [the] vault at northeast corner from [the] east, possibly a foundation drain around Building 440" (Smart 1994). This pipe is not shown on the drawings (tabulations in Appendix A) but is apparently connected to a sump pump. Water was observed discharging through this pipe at a high velocity during the video inspection; however, after a short time, the discharge stopped (Smart 1994). The source of the discharge is not known and is considered a data gap for Building 440. The manhole located at the northwestern corner of Building 440 has not been sampled.

All foundation drain water from the 400 Area eventually discharges to the outfall south of Building 664 and is sampled under the current foundation drain sampling program as FD-444-460.

3.5 BUILDING 444 - MACHINING AND LABORATORIES

Based on the Foundation Plans for Building 444 (Drawing 13608-44, rev. March 3, 1953) a 6-inch-diameter foundation drain exists around the perimeter of the basement area. The location of Building 444, foundation drain invert elevations, and the foundation drains, and other data compiled from drawings and interviews are presented in Figure 3-6. The drain and backfill construction materials are not listed on any of the drawings reviewed for this report. The foundation drains slope toward the southern end of the basement to an area known as "Area Way 2."

Drawings of the process waste system for Building 444 (RF-44-127, January 18, 1952) show a pipe labeled as "footing drain" connected to the sump in the basement of the building and a 4-inch pipe extending from the sump through the basement wall south of the sump. Mr. Ron

Steckline (400 Area Utilities) confirmed that this pipe is the inlet to the sump and that this sump is the collection point for the foundation drain water (Steckline 1993; Shepherd 1952). The sump discharges to the process waste system and the water is treated at Building 374.

The foundation drain lines located south of the collection sump are lower in elevation than the foundation drain lines at the point of connection to the collection sump. The drawings reviewed for this report do not illustrate how foundation drain water that is collected at elevations beneath the collection sump influent elevation is transported to the sump. This mainly applies to the foundation drain system located in the vicinity of Area Way 2.

A discrepancy exists about the existence and location of the outfalls for the foundation drains for Building 444. As previously stated, it is believed the water from the foundation drains is collected in a sump and then pumped to Building 374 for treatment. However, two outfalls may have existed for Building 444 foundation drains, but the locations are unconfirmed (Yashan and Barros 1992). Sampling station FD-444-460 is located at the outfall that is on the hillside south of Building 664 (shown in Figure 3-6 and Figure 1-2). This outfall is the discharge point for a major storm-drain system for the 400 Area (ASI 1993). Because a connection between the Building 444 foundation drain and the storm sewer has not been identified, station FD-444-460 may be incorrectly named. Mr. Trujillo (EG&G Civil Engineering) reported that the FD-444-460 outfall was constructed in August 1987 (Trujillo 1994). The second reported outfall has not been located.

3.6 BUILDING 447 - ASSEMBLY AND WASTE PROCESSES

The Floor Trenches and Underground Piping drawing (Drawing 1-3326-47, rev. June 26, 1964) show that a 4-inch-diameter farm-tile drain exists around the western perimeter of the basement foundation. Building 447, the foundation drain invert elevations, and the layout of the foundation drain system are shown in Figure 3-6. The 4-inch-diameter farm tiles were

reportedly laid with 1/8-inch joints between the tiles. The upper half of the joints were to be covered with asphalt felt and wired in place. Next, the tiles were covered with coarse gravel backfill to 12 inches above the top of the tile (Drawing 1-3326-47). The foundation drain for Building 447 connects to the "interceptor drain line" running under the building. The interceptor line is an 8-inch corrugated-metal pipe that originates near Building 448 and slopes from north to south. The foundation drains in Building 447 slope to the east from the center of the west wall and connect to the "interceptor drain line" at both the north and south walls of the building.

The Site Utility Plans showed the interceptor drain line historically discharged to the hillside south of Building 447 (Drawing 15501-052-M, rev. July 20, 1990). Currently, the foundation drain pipe is connected to the storm-sewer system (ASI 1993) that discharges at the outfall located at sampling station FD-444-460 (as shown in Figure 3-6).

3.7 BUILDING 460 - NONNUCLEAR MANUFACTURING/STAINLESS-STEEL MACHINING

There are conflicting reports about the existence of foundations drains at Building 460. According to engineering drawings (tabulations in Appendix A), a foundation drain system does not exist for Building 460. Mr. Ron Steckline (400 Area Utilities) confirmed Building 460 contains no foundation drains (Steckline 1993). However, Yashan and Barros (1992) state that the system does exist.

Based on the Storm Drain Layout (Drawing 36010-100, rev. October 9, 1984), a storm-drain system is located around the east, west, and south sides of Building 460. The Building 460 storm-drain system is shown in Figure 3-6. The invert elevations for the Building 460 storm-drain system were not presented in drawing D-36010-100. The storm-drain outfall was originally located on the hillside south of the building but has been rerouted to discharge at the

location of sampling station 444-460, south of Building 664. Sampling station FD-444-460 is shown in Figure 3-6 (ASI 1993; Photos 35127-34; 37233-00 - Appendix C).

A video inspection of the storm sewer (ASI 1993) showed that ten 6-inch-diameter PVC roof drain pipes enter the storm sewer along the west side of Building 460 (Smart 1994). The video also revealed that a 6-inch-diameter PVC pipe enters the storm sewer on the east side of the building, west of the northwest corner of Building 447. This pipe is possibly an abandoned sanitary-sewer line or another roof drain from Building 460 or 447 (Smart 1994). This pipe is not shown on any of the engineering drawings (tabulation in Appendix A). The video also revealed groundwater infiltrating into the storm-sewer system at several locations near Building 460 through cracks in the pipes and offsets at the joints.

3.8 BUILDING 559 - ANALYTICAL LABORATORY

According to engineering drawings (tabulation in Appendix A), a foundation drain system does not exist for Building 559. However, the tunnel between Buildings 559 and 561 does have a foundation drain. The tunnels between Buildings 559 and 561, invert elevations, and the foundation drain are shown in Figure 3-7. Drawing 23452-102 (rev. January 5, 1973) shows that a pit in Building 561 was constructed with a 6-inch-diameter, perforated, corrugated-metal pipe drain around its exterior. In 1974, a similar pit was constructed in Building 559 with a foundation drain of 6-inch-diameter, perforated, corrugated-metal pipe around the exterior of the pit (Drawing 23452-203, rev. September 1974). The two pits are connected by an underground tunnel. The Building 559 drain extends along the outside of the tunnel and ties in to the existing drain for the Building 561 pit (Drawing 23452-203, rev. September 1974).

Both foundation-drain systems (Building 559 pit and Building 561 pit) discharge to a collection sump located about eight feet west of the tunnel between the two buildings near the northwest corner of the Building 561 pit. The sump formerly discharged to the storm-sewer system located

at the south and west perimeter of Building 559. The storm-sewer system turns north at the southwest corner of Building 559 and then flows northwest to the outfall located on the hillside west of Building 516. The outfall was historically identified as sample station FD-516-1 (Figure 3-5). The analytical results of effluent water collected from surface-water sampling station FD-516-1 were a combination of water collected from the foundation-drain system around the tunnel connecting Buildings 559 and 561 and the storm-sewer system around the south and west perimeter of Building 559. In 1992, the sampling-station locations were changed in an attempt to collect a discrete foundation-drain system sample. Sampling station FD-516-1, located at the outfall west of Building 516, was removed from the sampling program. The sump, located northwest of the Building 561 pit was added to the surface-water sampling program and identified as sampling station FD 559/561. This change was performed at the direction of Mr. Barros in 1991. In March 1993, the effluent from the sump was rerouted from discharging into the storm sewer to discharging into the sanitary-sewer system at Building 560 using a two-inch-diameter vinyl hose. The two-inch-diameter vinyl hose is located on the ground surface and follows the eastern perimeter of Building 559. The sump effluent discharge point was changed because carbon tetrachloride was detected in samples collected from the sump. Currently, the foundation-drain water collected at the sump is transported to the sanitary-sewer system and is treated at the Waste Water Treatment Plant (WWTP). The sump (FD 559/561) is not currently sampled (Barros 1994; Gibbs 1993).

3.9 BUILDING 707 - PLUTONIUM PROCESSING

Based on engineering drawings (Drawings RF-BZ-20451-05 through RF-BZ-20451-09, rev. November 4, 1970), a 6-inch-diameter foundation-drain system exists beneath Building 707. The pipes are surrounded by "graded filter material"; however, the drain pipe material has not been reported. The location of Building 707, invert elevations, and the layout of the foundation drains are shown in Figure 3-7. The drains beneath the building are 6-inch-diameter "subsurface pipe" and slope from the east to the west. The east-west lateral foundation drain lines connect

to an 8-inch-diameter "subsurface pipe" that slopes from the north to the south and is located along the west perimeter of Building 707. These "subsurface pipes" are placed on 6 inches of "graded fill material" with 12 inches of "graded fill material" on top and on each side of the pipe. At the southwest corner of Building 707, the foundation-drain system connects into the storm-sewer system. The storm-sewer system outfalls east of Building 707 at the 750 culvert. This outfall is located south of Building 997. The water eventually enters the B-series ponds.

Storm-sewer-system sampling is currently conducted at station BS-707-2, which is a vault located north of Building 709 and adjacent to the cooling tower located south of Building 707 (Figure 3-7). According to observations made during the March 1994 sampling event, the source of the water in the vault is likely to be surface-water runoff or groundwater infiltrating through cracks in the concrete rather than foundation-drain waters from Building 707 (Appendix D). Water from the vault discharges into the storm-sewer system located about 35 feet north. The storm-sewer system then connects to a manhole that is identified as sampling station FD-707-04 (Drawing 15501-030-M, rev. July 20, 1990).

Historically, samples were collected at sample station BS-707-3, a sump in the "old" process drain manhole located approximately 100 feet east from the northeast corner of Building 707 (Hoffman 1981). According to Mr. Steve Barros (SWD) (Barros 1994), this location is no longer sampled because the sump has been dry since approximately 1992 (Appendix F).

The storm-drain outfall identified as the 750 Culvert is illustrated in Figures 3-7 and 1-2. The 750 Culvert has been included in the sampling schedule from the beginning of the surface-water sampling program. The identification code for the samples collected at the 750 Culvert was originally FD-707-1, although the discharge includes water from Buildings 559, 750, 776, 777, 778, and 707, and surface-water runoff from the drainages located east of the buildings. Barros (1992) stated that, currently, the 750 Culvert was being sampled on a weekly basis. However, sample collection was terminated in August 1994. Furthermore, Mr. Barros stated the incorrect

sample identification number, FD-707-1, was also removed from the program. The SWD stopped sampling the 750 Culvert in August 1993 (Barros 1993 - Appendix D).

3.10 BUILDING 771 - PLUTONIUM AND AMERICIUM RECOVERY

The Foundation Drain Plan (Drawing 25581-5, rev. December 9, 1975) and Site Utility Plans (Drawings 15501-012-M and 15501-013-M, rev. July 20, 1990) show a foundation-drain system for Building 771 that has three discharge locations on the northwest side of the building. However, the Foundation Plan Section (Drawing RF-V71-10008, August 6, 1962) and Sewage and Drain Lines (Drawing RF-71-113-D, rev. May 11, 1953) drawings show only the section of foundation-drain pipe along the north wall of the building and one of the discharge locations. The drain pipe located along the north wall of the building is a 6-inch-diameter vitrified-clay pipe. The location of Building 771, invert elevations, and the layout of the foundation and storm drains are shown in Figure 3-8.

A storm-drain system containing a network of cast-iron pipes is beneath Building 771, according to Underground Plumbing Plans (Drawings RF-71-100 through RF-71-104, rev. May 11, 1953). These plans show numerous 6-inch-diameter downspouts that are presumably connected from the building roof drains to the storm-drain system located under Building 771. Numerous floor drains within the building appear to also discharge into the storm-sewer system beneath Building 771. The storm-sewer system beneath Building 771 discharges to Manhole No. 3 located approximately 100 feet northwest of the northwest corner of Building 771. A foundation-drain system is also located around the perimeter of the original building.

According to drawing D25581-1 B (December 9, 1975), a series of tunnels exists to the south and east of Building 771, south of Building 774, and between Buildings 771 and 776 (Figure 3-8). However, this drawing does not provide elevations or foundation-drain locations. All other

drawings reviewed for this technical memorandum did not indicate the existence of these tunnels or foundation drains associated with them. These tunnels are reportedly used as walkways and do not store hazardous materials. It is suspected that the foundation drains for these tunnels would connect to Buildings 707, 771, and 779.

The three discharge locations for Building 771 foundation drains and storm sewers are described below:

- Discharge location number 1 is located at Manhole No. 3 near the northwest corner of Building 771 (Figure 3-8). Effluent from the storm-sewer system beneath Building 771, the roof-drain system that is connected to the storm-sewer system, and part of the foundation-drain system discharge into Manhole No. 3. Manhole No. 3 originally discharged to ground surface north of Building 771. However, the outfall was rerouted to the storm-sewer system at a location north of the plant site on an unknown date. A construction drawing for the PSZ fence (Drawing 27550-050, rev. May 10, 1982) depicts the effluent pipe from Manhole No. 3 as being blocked, and a gate valve has been installed on the pipe connecting to the storm sewer. In a conflicting report, Mr. Dan Wistrand (SWD) stated that the effluent from Manhole No. 3 discharges to the small pond located on the north side of Building 774 (Blaha 1994). Drawings reviewed during the preparation of this report did not confirm Mr. Wistrand's report.

- Discharge location number 2 is identified as Outfall 2. Outfall 2 has not been located; however, it is depicted on the drawings as the southernmost outfall on the west side of Building 771. Outfall 2 discharges from a 6-inch-diameter corrugated-metal pipe to the ground surface west of Building 771 (Site Utility Plans Drawing 15501-013-M, rev. July 20, 1990). It is believed that this outfall may discharge foundation-drain water from the southern portion of Building 771.

- Discharge location number 3 is identified as Outfall 3. The Foundation Drain Plan (Drawing 25581-5, rev. December 9, 1975) shows Outfall 3 is a 6-inch-diameter vitrified-clay drain that discharges to the storm sewer on the west side of the building. This section of the foundation-drain system was constructed for the addition on the west side of Building 771.

The Building 771 sampling locations have been changed since the start of the sampling program. Initially, sample station FD-771-1 was located west of Building 771 and was the only foundation-drain sampling station (Werkema 1977). This sampling station probably represented the southernmost outfall on the west side of the building (Outfall 2) and may have discharged at ground surface. Hoffman (1981) identified a second foundation-drain outfall and sampling station, FD-771-4, which is located on flat ground west of FD-771-1. Hoffman (1983) stated that these outfalls no longer exist because of construction of the PSZ in 1983. However, a review of the PSZ Plan (Drawing 27550-050, rev. May 10, 1982) does not indicate that these outfalls were removed. These sampling locations were deleted from the program, and the outfalls were either rerouted to the storm-sewer system or abandoned in place.

The sampling station identification code FD-771-1 has been used for two separate locations. Before 1983, FD-771-1 referred to the outfall pipe previously described and was located on the west side of Building 771. From May 1993 to the present, FD-771-1 refers to a location "approximately 50 feet southwest of the southwest corner of the old 773 guard post" (Barros 1992). This location is a surface inlet to the storm-sewer system.

Two sumps are located in Building 771. The sampling location numbers for these sumps are BS-771-2 and BS-771-3, which have been sampled in the past. BS-771-2 was located "in Room 146" and was sampled from 1977 through 1980. BS-771-3 was located "in the Elevator Pit" (Yashan and Barros 1992). Sampling stations BS-771-2 and BS-771-3 were not shown on any of the drawings reviewed for this report. There is no record of the dates that BS-771-3 was

sampled. These stations have been deleted from the current program because the water in the sumps is pumped to the process waste collection system and sampling would require special precautions (Hoffman 1983).

3.11 BUILDING 774 - OLD PROCESS WASTE TREATMENT FACILITY

Building 774 has undergone numerous construction and foundation-drain system changes since the building was constructed in 1952. The location of Building 774, invert elevations, and the layout of foundation drains, are illustrated in Figure 3-8. The original building plans and elevations drawing (Drawing RF-74-1-G, rev. November 1953) show a 6-inch tile foundation-drain exists around the perimeter of the original building and discharges to the ground surface north of the northwest corner of the building. The discharge point may correspond to a storm-sewer outfall at sample station FD-774-1, located northwest of the building, according to the Site Utility Plans (Drawing 15501-013-M, rev. July 20, 1990). There have been several additions to Building 774, including the West Addition in approximately 1962, the East Addition in approximately 1965, the South Addition in 1973, and the Waste Treatment Addition (North) in 1990. The Foundation Drain Plan (Drawing 25581-6, rev. December 9, 1975) illustrates that a 4-inch-diameter PVC foundation-drain system was constructed for the north and east additions.

A foundation-drain outfall and a storm-drain outfall were constructed to accommodate the expanded drain system of Building 774, according to the Site Utility Plans (Drawing 15501-013-M, rev. July 20, 1990). An 8-inch-diameter, corrugated-metal pipe, foundation drain was added along the south and west walls of an addition on the south side of Building 774. During the installation of the additional 8-inch-diameter foundation drain, the system was reportedly connected to the storm-sewer system. As a result, the foundation drains for Building 774 may discharge to the 18-inch-diameter storm sewer that slopes from the south to the north and runs along the west side of Building 774.

Three outfalls exist for the foundation drains for Building 774, one of which is sampled regularly under the current program. The three outfalls are shown in Figure 3-8 and are described below:

- The outfall at sampling station FD-774-1 is a discharge pipe for the 18-inch-diameter storm-sewer line located along the west side of Building 774. A segment of this storm-sewer system is depicted as exiting at the southwest corner of Building 774 and connects to the 18-inch-diameter storm-drain line that slopes from south to north and runs along the west side of the building (Drawing 15501-013-M, rev. July 20, 1990). The drawing also depicts the supplemental foundation drain added to the southern addition of Building 774. It may be the case that the foundation drain on the southern addition of Building 774 connects to the storm-sewer line that exits from the southwestern corner of the building. Hoffman (1983) describes the storm-sewer outfall location for the 18-inch-diameter line located west of Building 774 as a sampling location, but the original foundation drains may or may not have been connected to the storm sewer. The northern addition to Building 774 was built at the location of the original storm-sewer drain discharge pipe, and the pipe may have been rerouted during the construction. Dow Chemical Company memoranda from the early 1970s (Appendix D) state that Buildings 771 and 774 footing drains discharged into a small pond located north of the buildings. (Freiberg, Piltingsrud, and Werkema). Discharge from the storm drain (at sampling station FD-774-1) flows into a small pond north of the building and eventually into North Walnut Creek. However, Yashan and Barros (1992) state that water from the pond is collected in the OU4 Interceptor Trench System where it is then treated. The outfall (at sampling station FD-774-1) was flowing during the 1994 site reconnaissances (Appendix E) and is sampled regularly under the current program.

- The outfall at sampling station FD-774-2 is a 4-inch-diameter PVC pipe that connects to the foundation-drain system for the north addition to Building 774 (Drawing 37728-002, rev. March 9, 1990). During the construction of the addition to the north side of the

building, the foundation-drain pipe was extended to discharge to the small pond north of Building 774. Reportedly, the discharge pipe is consistently dry (Wagner 1993 - Appendix F). The drain may have been blocked during construction on the north side of the building, but no documentation exists to confirm that the drain was rerouted or plugged. Mr. Rick Wagner (Building 774) stated that the drain was inspected and the outfall was free from obstructions (Wagner 1994). The outfall located at sampling station FD-774-2 has never been sampled but is inspected at each sampling event to confirm that it is dry. The March 1994 sampling event confirmed that FD-774-2 was dry (Appendix D).

- The outfall located at sampling station FD-774-3 is a 6-inch-diameter corrugated-metal pipe connected to the storm-drain system. This outfall is located on the hillside northeast of Building 774 (Drawing 15501-013-M, rev. July 20, 1990). A 4-inch-diameter PVC foundation drain located on the south side of the east addition connects to the 6-inch-diameter corrugated-metal pipe storm drain. This outfall has never been sampled and is usually dry (Appendix D). Discharge from this outfall collects in the OU4 drain system where it is then treated (Appendix D).

A subgrade drainage system was installed in Room 103 (not illustrated in Figure 3-8) to alleviate flooding problems in the basement of Building 774 after the construction of the north side addition (Waste Treatment Addition, Drawing 37728-002, rev. March 9, 1990). The subgrade drainage system consists of a sump that extends approximately 3 feet below the basement floor (Drawing 29655-470, rev. May 11, 1990). The sump consists of 10-inch-diameter well casing and screen. The bottom portion of the sump is described as a 10-inch-diameter, Johnson well screen with a standard sized screen opening. The screen section is 2 feet, 6 inches in length. A steel plate was welded onto the bottom of the screen section. A 3-feet, 9-inch section of 10-inch-diameter, seamed casing then extends from the screen section to above the finished floor. The sump pumps the groundwater from beneath the building into a holding tank at a reported

rate of approximately 3,500 to 6,000 gallons per month (Wagner 1994). The water from the tank is then transported by truck to Building 374 for treatment.

3.12 BUILDING 732 - SUPPORT; BUILDING 776 - PYROCHEMISTRY, WASTE REDUCTION, AND PREVENTIVE MAINTENANCE; BUILDING 777 - ASSEMBLY AND PRODUCTION SUPPORT LABORATORIES; BUILDING 778 - LAUNDRY, LOCKER ROOMS, AND MAINTENANCE SHOPS

During data compilation tasks performed for OU9, the following drawings that identified foundation drains for Buildings 732, 776, 777, and 778 (dates unknown) were observed.

Building Numbers	Drawing Numbers
Building 732	D25845-1 and 4
Buildings 776, 777, 778	D2545-1 Sheet 5

Preliminary efforts to obtain copies of these drawings were unsuccessful. However, it is expected that these drawings will be obtained before the finalization of this technical memorandum. The outlines of Buildings 732, 776, 777, and 778 are shown in Figure 3-9. The foundation drains will be added after the referenced drawings are obtained.

3.13 BUILDING 779 - RESEARCH AND DEVELOPMENT

Engineering drawings for the original Building 779 (tabulation in Appendix A) do not show the existence of foundation drains. However, it should be noted that the local water table was recorded at approximately 5,975 feet above MSL during the spring of 1992 and the invert elevation for the footing of the original building basement is shown as 5,959 feet above MSL. Comparing the seasonal high water table elevation in 1992 with the invert elevation of the basement footers shows the basement was about 16 feet below the local groundwater table.

During a February 3, 1994 interview, Mr. Carl Gibson (Building 779 Utilities) stated that he was not aware of any drains or sumps that would collect groundwater around the basement. He stated that the basement frequently has problems with groundwater infiltrating through the foundation during the high water table months (Gibson 1994 - Appendix F). Four large concrete tanks are located beneath the basement of the building and extend approximately 30 feet below the basement floor. Mr. Gibson stated that groundwater infiltrates into one of the tanks through cracks in the concrete (Gibson 1994 - Appendix F). These tanks are monitored daily and any water that is detected is collected and is pumped to Building 374 for treatment.

Based on the Foundation Drain Plan (Drawing 25581-7, rev. December 9, 1975), a foundation drain exists for the Building 779 addition, which was constructed in 1968. The original building and addition, invert elevations, and the layout of the foundation-drain system are shown in Figure 3-10. The Grading and Drainage Plan for the Building 779 addition (Drawing 20112-01, rev. September 12, 1968) illustrate that a 6-inch open-tile drain begins at the northern part of the western wall and continues along the northern wall of the building. The foundation drain slopes from south to north along the western wall. The foundation drain then turns to the east along the northern wall of Building 779. The Building 779 foundation drain then connects to a 10-inch-diameter vitrified-clay foundation drain that slopes from south to the north and discharges onto the hillside north of the Solar Ponds (Drawing 15501-021-M, rev. May 14, 1990).

During site reconnaissances, two outfalls were observed on the hillside northeast of Solar Pond 207C and Building 779. One of these outfalls is reportedly the discharge point for foundation-drain waters; however, it is uncertain which outfall. The westernmost outfall on the hillside is constructed of 18-inch-diameter corrugated-metal pipe and is identified as sampling station FD-779-1. Since the initiation of the sampling program, this sampling station has been identified as being representative of the foundation-drain water from Building 779. During site reconnaissances, water was observed flowing from the outfall at sampling station FD-779-1 at

an estimated flow rate of less than 0.25 gallons per minute. Water discharge at this location is reportedly collected by the OU4 drain system (Barros 1993).

During site reconnaissances performed in the area of station FD 779-1 as recently as March 1994, effluent was observed discharging from a second outfall. This outfall is shown in Figure 3-10 as proposed sampling station FD-779-2. The discharge was from a 10-inch-diameter pipe located approximately 10 feet to the east of sampling station FD-779-1. Based on the Grading and Drainage Plan for the Building 779 addition, it is believed that the easternmost outfall (proposed sampling station FD-779-2) is the discharge point for the foundation drains of Building 779. As a result, it is uncertain whether the correct outfall is currently being sampled for Building 779 foundation drain effluent. Proposed sampling station FD-779-2 is currently being sampled as SW85 in the surface-water sampling program.

3.14 BUILDING 790 - LABORATORY AND SUPPORT

Engineering drawings (tabulation in Appendix A) do not show foundation drains for Building 790, which was under construction at the time of the most recent drawings. However, Barros (1992) stated that foundation drain FD-790 is located in a manhole, which is part of the storm-sewer system near the southwest corner of the building. Beginning in March 1994, the manhole was sampled as Sampling Station FD-790.

3.15 BUILDING 850 - ADMINISTRATION

The First Floor Plan for Building 850 (Drawing 28234-106, rev. December, 12, 1985) shows a basement in the northeastern quadrant of the building and a 6-inch-diameter vitrified-clay pipe foundation drain around the perimeter of the partial basement. The backfill material used with the foundation drain is not known. The location of Building 850, invert elevations, the layout of the drain system, and the outfall location are shown in Figure 3-11. The foundation drains

in Building 850 slope from the northwestern corner toward the southeastern corner of the basement. From the southeastern corner of the building, the foundation drain discharges through 6-inch-diameter vitrified-clay pipe to an outfall on the hillside south of Building 850, approximately 50-feet south of the plant security fence.

Hoffman (1983) identified the outfall as sampling station FD-860-1. In 1986, the identification code of this sampling location was changed to FD-850-1 (Barros 1992). Barros (1992) stated that the outfall "is marked by vegetation which clogs the flow of water and makes sampling impossible" and "the vegetation will have to be removed if future sampling is desired." As a result of the vegetation, the outfall is usually dry and, therefore, has not been sampled. FD-850-1 was removed from the sampling program in 1991.

3.16 BUILDING 865 - MATERIAL AND PROCESS DEVELOPMENT LABORATORY

The Cast-In-Place Pile Plan (Drawing 21141-01, rev. June 15, 1972) shows that Building 865 has a 6-inch perforated-asbestos foundation drain in four segments. The location of Building 865, invert elevations, and the layout of each segment of foundation drain are illustrated in Figure 3-12. The four segments of the buildings foundation drain are the following:

- The southern segment slopes to the east from the southwest corner of Building 865 and connects to a 6-inch-diameter steel-pipe storm drain at the southeastern corner of the building. The storm drain flows north from the southeastern corner of the building to a building sump (sampling station BS-865-2) south of Door 1.

- At the southwestern corner of the building, a second segment of foundation drain originates and flows north along the western wall and connects to a drain line that flows from west to east.

- At the northwestern corner of the building, a third segment originates and flows south along the western wall and connects to the drain line that flows from west to east.

- The fourth segment originates at the western wall about 75 feet from the northwestern corner of the building, flows west to east under the building, and discharges to the sump (sampling station BS-865-2).

The sump effluent flows to the east through a 2-inch-diameter steel pipe (Drawing 21112-01, rev. June 12, 1972) that discharges at a low spot on the west side of the 800 Area portal guard post. The December 22, 1993 site reconnaissance observations (Appendix E) noted water flowing through this pipe. The sump located at station BS-865-2 is sampled as part of the current foundation-drain sampling program.

Another sump, identified by Mr. Steve Barros as sample station BS-865-1, was observed on the west side of Building 865 (Appendix E). The sump was not noted on engineering drawings (tabulation in Appendix A), and the source and destination of the water in the sump have not been determined. However, based on visual observations and conversations with Mr. John Lyons (EG&G, 800 Area Utilities - Appendix F), the sump at sampling station BS-865-1 probably collects groundwater and discharges to the ditch west of the building (Lyons 1994 - Appendix F). Sample station BS-865-1 is sampled as part of the current sampling program.

3.17 BUILDING 881 - RESEARCH AND GENERAL SUPPORT (PREVIOUSLY MACHINING)

Engineering drawings (tabulation in Appendix A) show that Building 881 has three separate foundation/underdrain systems that discharge to different locations. The three systems are (1) a foundation-drain system located around the exterior of the foundation, (2) a storm-drain system located underneath the building, and (3) a drain system located in the floor of the utility tunnels.

The location of Building 881 and utility tunnels, invert elevations, and layout of the foundation-drains systems are shown in Figure 3-13. The foundation drains and utility-tunnel drains are discussed in the following sections.

The Foundation Drain Plan for Building 881 (Drawing 25581-2, rev. December 9, 1975) shows that the foundation drains around Building 881 are constructed of 6-inch-diameter perforated galvanized steel, with some sections of 6-inch-diameter vitrified-clay pipe. The foundation drains slope from the northern end of the building to the south. According to the Plot Plan (Drawing 1-11609-81, rev. May 23, 1963), the foundation drain outfalls at a concrete headwall on the hillside south of the plant site. This outfall, identified as sampling station FD-881-1, had been monitored in the past as part of the routine sampling program until 1991. The discharge water from this outfall is currently sampled approximately monthly as part of the OU1 sampling program. As a result of the OU1 sampling, effluent from this outfall is not collected as part of the current surface-water or foundation-drain sampling program (Collection Gallery and Pipeline Plan, Drawing 38548-128, January 19, 1991; Cirillo 1993; Burmeister 1993 - Appendix D).

Based on the Storm and Sanitary Drains drawing (Drawing RF-81-100, rev. July 23, 1953), Building 881 has an underbuilding storm-drain system that is composed of 8-, 10-, 12-, and 15-inch-diameter cast-iron pipes. Effluent from several 6-inch-diameter downspouts connected to the building roof drains discharges to the storm drains. The water collected from the roof discharges through a 15-inch-diameter vitrified-clay pipe storm drain near the southeastern corner of the building and flows to an outfall that was previously unnamed. This previously unidentified outfall is currently the proposed sampling station shown in Figure 3-13 as FD-881-4. It is located on the hillside south of the plant. The outfall supports a localized wetland area with numerous flora (cattails). To preserve and maintain the wetland, the discharge from this system is not collected and has not been sampled. However, some of the discharge flows down the hillside and is collected and treated at OU1 (Burmeister 1993 - Appendix D).

If the cast-iron pipes have deteriorated since being installed in 1953, groundwater may be infiltrating into the storm-drain system and discharging at the outfall. In addition to the storm drains and the effluent from the roof, the basement of Building 881 has an extensive utility tunnel network (Drawing RF-81-100, rev. July 23, 1953). A separate drain system consisting of 4-inch-diameter cast-iron pipes exists beneath the utility tunnel floors. The utility tunnels contain numerous floor drains that are connected to the drain system. The cast-iron pipes discharge to a sump (BS-881-2) in the boiler room near the southern end of the building.

In the past, the two sumps in Building 881 have been included in the surface-water sampling program. The sump identified as sampling station BS-881-2 is located in an elevator shaft by the boiler room. This sampling station was deleted from the sampling program because "the sample consists mostly of oil from the elevator and this water is pumped to sanitary waste" (Hoffman 1983). A new sump was selected for sampling and identified as station BS-881-2. It is shown in Figure 3-13. A 4-inch-diameter sump pump and discharge pipe connects the utility tunnel floor-drain system to a 6-inch-diameter sanitary-sewer pipe, according to the Storm and Sanitary Drains drawing (Drawing RF-81-100, rev. July 23, 1953). Unless the cast-iron pipes have deteriorated to allow groundwater infiltration, sampling station BS-881-2 represents only water from the utility-tunnel floor drains.

Werkema (1977) first identified sample station BS-881-3 (not shown in Figure 3-13) as the sump under the stairway in the northeast corner of the first floor. BS-881-3 was sampled until 1990 when it was deleted from the sampling program because of access problems (Barros 1992).

According to the Foundation Drain Lines Plan (Drawing RF-FS-21951, March 9, 1956), a tunnel connects Buildings 883 and 881. A foundation-drain line is located on the west side of this tunnel and connects to the foundation-drain system for Building 881. The north end of the tunnel foundation-drain line was connected to a sump at the southwestern corner of Building 883 until 1984 when the sump was moved and the effluent to the sump was rerouted (Section 3.20).

However, the Foundation Drain Plan (Drawing 25581-2, rev. December 9, 1975) does not show the foundation drain that parallels the tunnel.

3.18 BUILDING 883 - ROLLING AND FORMING FACILITY

The Foundation Plan for Building 883 (Drawing 1-5373-83, rev. January 20, 1965) shows that a 6-inch-diameter perforated foundation drain exists around the perimeter of the building. The location of Building 883, the invert elevations, layout of the foundation drains, and outfalls are shown in Figure 3-14. A segment of drain pipe beneath the southeastern corner of the building is shown on the Foundation Plan but is omitted from the Foundation Drain Plan for Building 883 (Drawing 25581-9, rev. December 9, 1975).

The foundation-drain system slopes from the northeastern corner of the building and flows toward a sump at the southwestern corner of the building. The sump was connected to the Building 881 foundation-drain system, according to the Foundation Drain Lines Plan for the original building (Drawing RF-FS-21951, March 9, 1956). The sump, sampling station FD-883-1 (BS-883-1 before 1992), was relocated when an addition was constructed on the southwestern corner of Building 883 in 1984 (Drawing 28483-022, rev. February 6, 1986). The new sump, in the southwestern corner of the addition, is connected to a storm drain by a 4-inch-diameter PVC discharge pipe (Drawing 28483-022, rev. February 6, 1986). The storm drain is depicted as discharging to the ground surface west of Building T883D (Drawing 15501-043-M, rev. July 20, 1990), but the outfall was not found during site reconnaissance.

3.19 BUILDING 886 - NUCLEAR SAFETY FACILITY

Building 886 and associated tunnels have two foundation-drain segments and collection points. The location of Building 886, the tunnel, invert elevations, and the layout of the foundations are shown in Figure 3-12. On the west side of the building, the foundation-drain system consists

of a 6-inch-diameter corrugated-metal pipe that slopes from north to south to a collection manhole, FD-886-2, located near the southwestern corner of Building 886 (Drawings 15501-043-M and 15501-044-M, rev. July 20, 1990). The tunnel between Buildings 886 and 875 is also flanked by a 6-inch-diameter corrugated-metal pipe foundation-drain system (Drawing 25925-1, rev. August 30, 1977). The drain trenches around the building and tunnels were backfilled with 2 feet of class 2 structural backfill. The water collected at the manhole located southwest of Building 886 (FD-886-2) and the effluent from the tunnel foundation drain flows to a sump (FD-886-1) east of Building 875 (Drawing 15501-043-M, rev. July 20, 1990). Historically, the sump (FD-886-1) effluent flowed through a 1.25-inch-diameter pipe (Drawing 17242, September 27, 1965) and discharged to the ditch located south and east of the sump (Drawing 23482-302, rev. March 1975; Drawing 17242, September 27, 1965). However, discharge from the sump to the ditch was not observed during any site reconnaissance.

Both the sump and manhole were sampled regularly until 1993. Because of radiological analytical results that indicated elevated uranium levels, the water is now pumped from the manhole and sump by a vacuum truck and transported to Building 374 for treatment (Appendix E). The sump and manhole have been pumped one to two times each week since approximately May 1993, according to Mr. Steve Barros (Appendix F).

3.20 BUILDING 887 - BUILDING 881 SUPPORT

Building 887, located south of Building 881, was constructed in 1952 with a foundation-drain system consisting of 6-inch-diameter perforated corrugated-metal pipe (Drawing RF-81-F9-E, rev. July 1978). The location of Building 887, invert elevations, and the layout of the foundation drains are shown Figure 3-13. This foundation-drain system is connected to the Building 881 discharge line. The foundation drains for Building 887 slope from the northwestern corner of the building toward the middle of the east wall. From this point, the

foundation-drain effluent from Building 887 intersects the foundation-drain discharge pipe from Building 881 and discharges at station FD-881-1 (Section 3.19).

3.21 BUILDING 910 - OU4 EVAPORATION TREATMENT FACILITY

Yashan and Barros (1992) alluded to a foundation-drain discharge point for Building 910. However, the foundation-drain discharge point has not been located nor identified on engineering drawings or site utility drawings (tabulation in Appendix A). Building 910 and the foundation-drain system are shown in Figure 3-15. As reported by Yashan and Barros (1992) the foundation-drain effluent reportedly collects at a sump, identified as sample station FD-910, located at the northwestern corner of Building 910 and is then discharged to the ground surface northeast of the building (Appendix E).

3.22 BUILDINGS 991 AND 998 - PRODUCT WAREHOUSE

According to the Plot Plan (Drawing 15708-1, rev. February 24, 1967), Building 998, an underground storage vault (Drawing 25581-11, rev. December 9, 1975), and Building 991 are connected by a tunnel. The tunnel was constructed with a foundation-drain system. The location of Buildings 991 and 998, the invert elevations, and the layout of foundation and storm drains are presented in Figure 3-16. The foundation drain for Building 998 originates at the northeastern corner of the structure, slopes west, south, and east around the perimeter of the structure, then slopes south along the west wall of the tunnel and connects to the Building 991 foundation-drain system (Plot Plan Drawing 15708-1, rev. February 24, 1967).

The Building 991 foundation drain consists of a 6-inch-diameter, asphalt-coated, perforated drain pipe that originates at the northwestern corner of the building and slopes east along the north wall of the building. The western section of the foundation drain slopes south, then west, and

connects to a storm drain that discharges to a ditch on the western side of Building 991. Recent efforts to locate this pipe have been unsuccessful (Appendix E).

An 8-inch-diameter storm drain beneath the floor of the utility tunnel located in the northern half of Building 991 is also connected to the northernmost foundation drain (Drawing 1-3354-91, rev. August 29, 1952; Drawing 1-7084-91A, rev. July 10, 1959). A 6-inch-diameter downspout, possibly from a roof drain, connects to the storm drain at the western end of the tunnel. In 1959, an addition was constructed on the northeast corner of Building 991. A 6-inch-diameter, perforated, corrugated-steel foundation-drain pipe was installed around the exterior of the addition and backfilled with coarse gravel. This drain was connected to the old foundation-drain system at the southeastern corner of the addition. There is conflicting information about the location of the discharge for the foundation drains for Buildings 991 and 998. A drawing of Building 991 shows the foundation-drain outfall located at an open ditch approximately 170 feet east of Building 991 (Drawing 1-7084-91A, rev. July 10, 1959). The results of several site reconnaissances indicate the open-ditch discharge area depicted in the drawings as a wetlands area just inside the security fence. This area was sampled and identified as sample station FD-991-1 until 1992 when the station was removed from the foundations drain sampling program. The pipe outfall has not been located during site reconnaissances because surface visibility and access were obstructed by the existing flora and standing water of the wetlands area. Hoffman (1983) stated that the sampling location was a manhole inside the security fence although, in 1981, Hoffman described the location as a gully outside the security fence (Hoffman 1981). According to Ms. Sharon Wilson, Building 991 manager (Wilson 1993), the outfall for the building had been rerouted to the 8-inch-diameter sanitary-sewer pipe east of the northeastern corner of Building 991.

A building sump, sample station BS-991-2 (illustrated in Figure 3-16), is located in the southeastern corner of Building 991 and was added to the sampling program in 1992. Building 991 personnel report that the foundation-drain system was rerouted to this sump (Yashan and

Barros 1992), although this has not been verified by the building drawings (tabulation in Appendix A) or building manager (Wilson 1993). Most of the underground structure for Building 991 is at an elevation of 5- to 10-feet below the elevation of the foundation drain. Yashan and Barros (1992) state that the sump discharges to the sanitary sewer.

3.23 BUILDING 995 - SANITARY TREATMENT PLANT

The Piping Plan (Drawing 20722-61, rev. September 2, 1970) shows a 6-inch-diameter vitrified-clay pipe around one digester, aerator clarifier, and beneath the sludge beds in Building 995. Building 995, ancillary structures, and the suspected layout of the foundation drains are shown in Figure 3-17. The original building construction drawings could not be found, but drawings for additions to the facility are available (tabulation in Appendix A). Huffman (1993) stated that leachate collected from under the sludge beds is recirculated and treated with the rest of the wastewater. The foundation-drain effluent may also be treated by the wastewater-treatment system around the digester and aerator clarifier, but the existing drawings are unclear.

According to the Site Utility Plans (Drawing 15501-024-M, rev. June 14, 1990), three foundation drains discharge on the hillside south of the wastewater-treatment facility. Mr. Frank Huffman, Building 995 Shift Supervisor, is not aware of the outfalls (Huffman 1993). The outfalls could not be located during the November 1993 site reconnaissance (Appendix E). It is possible that the outfalls shown on the utility drawing were constructed for the original facility and have since been removed or rerouted. None of the Building 995 foundation drains has been sampled.

3.24 BUILDINGS 996, 997 AND 999 VAULTS AND TUNNELS - STORAGE

Buildings 996, 997, and 999 are underground storage vaults located north and west of Building 991. All three vaults and Building 991 are interconnected by tunnels. The storage vaults, invert

elevations and layout of the foundation drains are shown in Figure 3-15. The three buildings were constructed with foundation drains consisting of 6-inch-diameter, asphalt-coated, perforated pipe (Drawing 13812-3, rev. March 11, 1968 and Drawing RF-99-17701, rev. June 6, 1956) and backfilled with gravel.

Buildings 996 and 997 and the associated foundation drains were constructed in 1952. Building 999 was constructed in 1956, and the foundation drains were connected to the existing drain system for Buildings 996 and 997 (Drawing RF-99-17701, rev. June 6, 1956). However, the Foundation Drain Plan for Buildings 996, 997, and 999 (Drawing 25581-12, rev. December 9, 1975) does not show a drain around Building 999, based on Drawing RF-99-17701 (rev. June 6, 1956).

The Concrete Plans and Section Drawing for Building 999 (Drawing RF-99-17701, rev. June 6, 1956) indicate that the drain is approximately 2 feet below the finished floor elevation (5939.83 feet above MSL). Assuming that all drains are approximately 2 feet below the finished floor elevation, the drain invert elevations can be estimated. The finished grade elevation varies above the structures and tunnel. The finished grade elevation above Building 999 is approximately 24 feet above the invert elevation of the drains for that structure.

The Tunnel Plan for Buildings 996 and 997 (Drawing 13812-3, rev. March 11, 1968) indicates that the interconnected drain pipes converge at a location approximately 62 feet west of the northwestern corner of Building 991. The interconnected foundation-drain then slopes southward along the west side of the north-south tunnel connecting Buildings 991 and 996 (Drawing 25581-12, rev. December 9, 1975). The outfall location for the tunnel foundation-drain system is not shown on the drawings and has not been located by SWD personnel. The location of this outfall is believed to correspond to a perforated-drain pipe located on the west side of Building 991 based on the area plot plan drawing for Building 991 and 998 (Drawing Number 15708-1, rev. February 24, 1967). This perforated-drain pipe identified on the area plot plan may connect to

the storm sewer south of Building 991. It is not known if the drain pipe still exists because of construction activities associated with Buildings 991 and 985, either of which may have resulted in the perforated-drain pipe being rerouted, blocked, or removed completely.

4.0 WATER QUALITY RESULTS

This section presents a summary of both historical and recent water quality data available for foundation drains and building sumps for the entire Industrial Area at RFETS. Section 4.1 provides a summary of the frequency of sampling of the foundation drains and building sumps. Analytical results observed during these sampling efforts are provided in Section 4.2. (References for all data cited in Section 4.2 can be found in Sections 2.0 and 9.0.) Section 4.3 provides an evaluation of the trends observed in the data for each specific building area incorporated within OU8. Finally, recommendations are provided in Section 4.4 regarding changes to the existing monitoring program as performed by EG&G's Surface Water Division and additional one-time sampling efforts to be included as part of the OU8 Phase I Stage 2 RFI/RI field work. Analytical results of foundation-drain sampling for 1994 were not available for review and evaluation for this report.

4.1 SAMPLING FREQUENCY

Analytical results from samples collected from foundation-drain and building-sump monitoring are available from 1977 to the present. These data are summarized in Section 4.2. Very limited data are available from sampling events before August 1977. Dow Chemical Company sampled foundation drains before 1977, as indicated in several internal memoranda included in Appendix D. These memoranda provide qualitative results, such as "...less than 50,000 pCi of tritium..."; however, supporting documentation such as laboratory analytical data sheets, sample collection location, data validation, or analytical methods could not be located. Table 4-1 summarizes the frequency of foundation-drain and building-sump sampling, according to available information.

The pre-1977 documents show that the foundation drains of Building 774 were sampled twice in 1971, and footing drains of Buildings 771 and 774 were sampled once in 1974. Records

TABLE 4-1
Foundation Drain and Building Sump Sampling Frequency 1971-1993
Operable Unit 8
Rocky Flats Environmental Technology Site

1971		1974		1977		1978		1979		1980		1981	
Station	Date	Station	Date	Station	Date	Station	Date	Station	Date	Station	Date	Station	Date
Bld 771	05-71	Bld 771	01-74	FD 371-1	06-77	FD 111-1	05-78	FD 371-1	01-79	FD 371-1	09-80	FD 111-1	03-81
Bld 774	05-71	Bld 774	01-74	FD 371-2	06-77	FD 371-1	05-78	FD 371-2	01-79	FD 371-2	03-80	FD 111-1	09-81
				FD 444-1	06-77	FD 371-1	06-78	FD 444-1	06-79	FD 371-2	06-80	FD 371-2	03-81
				BS 444-2	06-77	FD 371-2	05-78	FD 444-1	07-79	FD 444-1	03-80	FD 371-3	03-81
				FD 516-1	06-77	FD 371-2	06-78	BS 444-2	01-79	FD 444-1	06-80	FD 371-3	09-81
				FD 707-1	06-77	FD 444-1	05-78	FD 516-1	01-79	FD 444-1	09-80	FD 371-5	03-81
				BS 707-2	06-77	FD 444-1	06-78	FD 707-1	01-79	BS 444-2	03-80	FD 707-1	03-81
				BS 771-2	06-77	BS 444-2	05-78	BS 707-2	01-79	BS 444-2	06-80	BS 707-2	03-81
				FD 771-4	06-77	BS 444-2	06-78	BS 707-2	07-79	BS 444-2	09-80	BS 707-2	09-81
				FD 779-1	06-77	FD 516-1	05-78	FD 771-1	06-79	BS 707-2	06-80	BS 707-3	03-81
				BS 865-1	06-77	FD 516-1	06-78	FD 771-4	01-79	BS 707-2	09-80	BS 707-3	09-81
				FD 883-1	06-77	FD 707-1	05-78	FD 771-4	06-79	FD 516-1	03-80	FD 774-1	09-81
				BS 881-3	06-77	FD 707-1	06-78	FD 881-1	01-79	FD 516-1	06-80	BS 865-1	03-81
				FD 881-1	06-77	BS 707-2	05-78	FD 881-1	07-79	FD 516-1	09-80	FD 883-1	03-81
						BS 707-2	06-78	BS 881-3	01-79	FD 707-1	03-80	FD 883-1	09-81
						FD 771-1	05-78	FD 883-1	07-79	FD 707-1	06-80	FD 881-1	03-81
						FD 771-1	06-78	BS 887-1	07-79	FD 707-1	09-80	FD 881-1	09-81
						BS 771-2	05-78			BS 707-3	09-80	BS 881-3	03-81
						FD 771-4	05-78			BS 771-2	06-80	BS 881-3	09-81
						FD 771-4	06-78			FD 771-4	03-80		
						FD 779-1	05-78			FD 771-4	09-80		
						FD 779-1	06-78			FD 774-1	03-80		
						BS 865-1	05-78			FD 774-1	06-80		
						FD 881-1	05-78			FD 779-1	03-80		
						FD 881-1	06-78			BS 865-1	03-80		
						BS 881-2	06-78			BS 865-1	06-80		
						BS 881-3	05-78			BS 881-3	03-80		
						BS 881-3	06-78			BS 881-3	06-80		
						FD 883-1	05-78			BS 881-3	09-80		
						FD 991-1	05-78			FD 881-1	03-80		
										FD 881-1	06-80		
										FD 881-1	09-80		
										FD 883-1	03-80		
										FD 883-1	06-80		
										FD 883-1	09-80		
										BS 887-1	03-80		
										FD 991-1	03-80		
										FD 991-1	06-80		
										FD 991-1	09-80		

TABLE 4-1
Foundation Drain and Building Sump Sampling Frequency 1971-1993
Operable Unit 8
Rocky Flats Environmental Technology Site

1988		1989		1990		1991		1992		1993		1994	
Station	Date	Station	Date	Station	Date	Station	Date	Station	Date	Station	Date	Station	Date
FD 111-1	04-12-88	FD 111-1	04-26-89	FD 371 COMP	06-09-90	FD 111-1	05-05-91	BS 707-2	3-7-92	BS 111-2	4-26-93	FD371-3	3-13-94
FD 111-1	07-26-88	FD 111-1	06-21-89	FD 371-3	06-09-90	FD 371 COMP	06-15-91	BS 865-1	3-7-92	BS 707-2	3-27-93	FD 371-MC	3-13-94
FD 111-1	10-10-88	FD 371 COMP	04-26-89	FD 444	05-03-90	FD 371-2	06-15-91	BS 883-1	3-7-92	BS 865-1	3-27-93	BS 707	3-13-94
FD 371 COMP	04-12-88	FD 371 COMP	09-15-89	FD 444-460	06-09-90	BS 444	01-22-91	FD 111-1	3-7-92	BS 865-2	3-27-93	FD 771-1	3-13-94
FD 371 COMP	07-26-88	FD 371 COMP	12-17-89	BS 707-2	06-09-90	FD 444-460	05-05-91	FD 371-3	3-7-92	FD 371-3	3-27-93	FD 774-1	3-13-94
FD 371 COMP	10-10-88	FD 371-3	04-26-89	FD 707-1	06-09-90	BS 707-2	06-15-91	FD 371-COMP	3-7-92	FD 371-MC	3-27-93	FD 779-1	3-13-94
FD 371 COMP	1988	FD 371-3	06-21-89	865 TRENCH	01-16-90	FD 707-1	06-15-91	FD 444-460	3-7-92	FD 444-460	3-27-93	FD 790	3-13-94
FD 371-3	04-12-88	FD 371-3	09-15-89	865 E. DITCH	03-14-90	BS 865-1	02-23-91	FD 559-561	7-25-92	FD 771-1	5-1-93	FD 910	3-13-94
FD 371-3	10-10-88	FD 371-3	12-17-89	865 W. DITCH	03-14-90	BS 865-1	05-05-91	FD 707-1	3-7-92	FD 774-1	3-27-93	FD 991-2	3-14-94
FD 371-3	12-15-88	FD 374	04-13-89	865 PIT	04-05-90	FD 881-1	02-23-91			FD 883-1	5-1-93	FD 111-2	3-14-94
FD 516-1	07-26-88	DET POND 374	04-13-89	BS 865-1	06-09-90	FD 881-1	05-05-91			FD 886-1	5-1-93	FD 444-460	3-20-94
FD 516-1	10-10-88	374 S. DITCH	04-13-89	FD 881-1	06-09-90	BS 883-1	05-05-91			FD 886-2	5-1-93	BS 865	3-20-94
FD 516-1	12-15-88	BS 374	05-24-89	BS 881-3	06-09-90					FD 910	5-1-93	FD 371-3	9-16-94
FD 707-1	04-12-88	FD 444-460	04-26-89							FD 991-1	4-26-93	FD 371-MC	9-16-94
FD 707-1	07-26-88	FD 444	04-25-89									BS 707-2	9-16-94
FD 707-1	10-10-88	FD 444-460	06-21-89									FD 774-1	9-16-94
FD 707-1	12-15-88	FD 444-460	09-15-89									FD 790	9-16-94
BS 707-2	07-26-88	FD 444-460	12-17-89									FD 910	9-16-94
BS 707-3	04-12-88	FD 516-1	04-26-89									FD 771-1	9-16-94
BS 707-3	07-26-88	FD 516-1	06-21-89									FD 779-1	9-16-94
BS 707-3	10-04-88	FD 516-1	09-15-89									FD 111-1	9-21-94
BS 707-3	12-15-88	FD 516-1	12-17-89									FD 444-460	9-26-94
FD 774	05-06-88	CULVERT 559	04-13-89									FD 883-1	9-26-94
FD 779-1	07-26-88	FD 707-2	06-21-89									FD 865-2	9-26-94
FD 865-1	04-12-88	BS 707-2	09-15-89									BS 865-1	9-26-94
BS 865-1	07-26-88	BS 707-3	04-26-89									FD 371-3	11-6-94
BS 865-1	10-04-88	BS 707-3	09-15-89									FD 371-MC	11-6-94
BS 865-1	12-15-88	FD 707-1	04-26-89									BS 707-2	11-6-94
FD 881-1	04-12-88	FD 707-1	06-21-89									FD 771-1	11-6-94
FD 881-1	07-26-88	FD 707-1	09-15-89									FD 774-1	11-6-94
FD 881-1	10-10-88	BS 707-2	12-17-89									FD 779-1	11-6-94
FD 881-1	12-15-88	FD 707-1	12-17-89									FD 790	11-6-94
BS 881-3	04-12-88	FD 774-1	04-26-89									FD 910	11-6-94
BS 881-3	07-26-88	FD 774-1	06-21-89									FD 444-460	11-13-94
BS 881-3	10-04-88	FD 774-1	09-15-89									FD 883-1	11-13-94
BS 881-3	12-15-88	FD 774-1	12-17-89									FD 865-2	11-13-94
BS 883-1	04-12-88	FD 779-1	09-15-89										
BS 883-1	07-26-88	BS 865-1	04-26-89										
BS 883-1	10-04-88	FD 865-1	06-21-89										
		BS 865-1	09-15-89										
		FD 881-1	04-26-89										
		FD 881-1	06-21-89										
		FD 881-1	09-15-89										
		BS 881-3	04-26-89										
		BS 881-3	06-21-89										
		BS 881-3	09-15-89										
		BS 881-3	12-17-89										
		BS 883-1	09-15-89										
		BS 883-1	12-17-89										
		991 DRAINS	05-02-89										
		995 EFF	05-02-89										
		995 EFF	05-12-89										

indicate that the foundation drains and building sumps were sampled once in 1977, twice in 1978, three times in 1979 and in 1980, and twice in 1981. The results were not subject to regulatory standards but were compared to internally established levels (referred to as administrative control guides) set for gross alpha, gross beta, conductivity, nitrate as nitrogen, pH, total dissolved solids, and tritium.

During this investigation, the period from late-1981 through 1988 was identified as a data gap. Limited documentation exists to verify that samples may have been collected; however, no analytical data for this period were obtained for this data compilation effort (Appendix D). For example, the documentation that exists shows that sampling of foundation drains and building sumps from 1981 through 1985 may have occurred. It is possible that the foundation drains and sumps were not sampled during that time, although Ms. Kirk (1994) recalled that she sampled the foundation-drain outfalls and building sumps from 1980 through 1984. In addition, Ms. Kirk also recalled that the building sumps and foundation drains were not sampled for approximately two years. Mr. Steve Barros (1994) stated that a SWD logbook exists that shows foundation drains and sumps were sampled from 1985 to 1988; however, the analytical results of the samples are lost. The reasons for inconsistent sampling activities are not known.

The sampling program referred to above was reinstated in 1988. Thirty-nine samples were collected at 13 stations during the sampling events in April, July, October, and December of that year. The sampling program continued in 1989; a total of 50 foundation-drain and building-sump samples were collected at 19 stations in April, June, September, and December. In 1990, 14 samples were collected at six foundation drains, three building sumps, two ditches, and one seep. The building-sump and foundation-drain samples were collected primarily in June. Records from 1991 indicate that a total of 12 samples were collected from six foundation drains and four building sumps that year.

In recent years, documents and personnel state that sampling has or will occur quarterly. However, records researched during this investigation indicate that most stations are sampled one to two times each year. The *Catalogue of Monitoring Activities* (EG&G 1991) states that samples will be collected quarterly at five sumps (BS-707-2, BS-707-3, BS-865-1, BS-881-3, and BS[FD]-883-1) and 10 foundation drains (FD-111-1, FD-371-3, FD-371-COMP, FD-444-460, FD-516-1, FD-707-1, FD-774-1, FD-779-1, FD-850-1, and FD-881-1) and analyzed for gross alpha, gross beta, tritium, nitrate, pH, conductivity, total dissolved solids, and TAL metals. An internal letter (Barros 1992) recommended that semivolatile and volatile organic analyses also be performed to characterize each building-sump or foundation-drain station. A minimum of three sampling events was proposed to establish a statistical baseline, after which selected sites could be sampled annually or deleted from the sampling program.

Despite these recommendations, foundation-drain and building-sump sampling has been limited. Available data indicate that three building sumps and six foundation drains were sampled for metals, water quality parameters, and radionuclides in March 1992. One foundation drain (FD-559-561) was sampled for VOCs in July 1992.

In 1993, four building sumps and 10 foundation drains were sampled for SVOCs and/or VOCs. Most of this sampling took place in March, April, and May 1993. Four building sumps and 10 foundation drains were sampled for radionuclides and metals that year. Foundation-drain and building-sump sampling was performed again in March 1994. Fourteen stations were slated for sampling, but at least two of those were dry or inaccessible.

Several sampling stations are commonly dry during the year. Table 4-2 documents sampling stations where samples could not be obtained because of lack of water or inability to access the sampling station. This information was considered during the development of the recommendations for sampling locations for OU8.

TABLE 4-2
Foundation Drains and Building Sumps Not Sampled
Operable Unit 8
Rocky Flats Environmental Technology Site

LAB BATCH	DATE	LOCATION	REASON NOT SAMPLED
	02-23-91	FD 444-460	Too much mud
	02-23-91	FD 111-1	Dry
	02-23-91	FD 850-1	Dry
	02-23-91	BS 881-3	No access
	02-23-91	BS 883-1	Dry
88-ENV-03608	12-15-88	FD 371-2	Dry
"	12-15-88	FD 774-1	Dry
"	12-15-88	FD 779-1	Dry
"	12-15-88	FD 850-1	Dry
"	12-15-88	BS 707-2	Dry
"	12-15-88	FD 111-1	Dry
88-ENV-03334	10-10-88	FD 371-2	Dry
"	10-10-88	FD 707-2	Dry
"	10-10-88	FD 774-1	Dry
"	10-10-88	FD 779-1	Dry
"	10-10-88	FD 850-1	Dry
88-ENV-02999	07-26-88	FD 371-2	Dry
"	07-26-88	FD 371-3	Dry
"	07-26-88	FD 774-1	Dry
"	07-26-88	FD 850-1	Dry
89-ENV-03097	12-17-89	BS 707-3	Frozen
"	12-17-89	BS 865-1	Dry
"	12-17-89	FD 111-1	Dry
"	12-17-89	FD 779-1	Dry
"	12-17-89	FD 850-1	Dry
"	12-17-89	FD 881-1	No access
89-ENV-00822	04-26-89	FD 779-1	Dry
"	04-26-89	BS 707-2	Dry
"	04-26-89	FD 850-1	Dry
91-ENV-00972	05-05-91	FD 850-1	No reason given
90-ENV-01076	06-09-90	BS 707-3	Dry
"	06-09-90	BS 883-1	Dry
"	06-09-90	FD 111-1	Dry
"	06-09-90	FD 516-1	Dry
"	06-09-90	FD 774-1	Dry
"	06-09-90	FD 779-1	Dry
"	06-09-90	FD 850-1	Dry
89-ENV-01662	09-15-89	FD 850-1	Dry
"	09-15-89	FD 111-1	Dry
"	09-15-89	FD 371-2	Pipe caved in

4.2 SAMPLING RESULTS

Analytical results from sampling events occurring from 1977 through 1991 and 1992 through May 1993 are summarized in Table 4-3 and Table 4-4, respectively. Graphs showing the upper tolerance limit (UTL) exceedances for selected radionuclides and metals at various sampling stations are presented in Appendix G (Graphs Depicting UTL Exceedances for Radionuclides and Metals). Sampling station data were compared to 99/99 UTLs for groundwater, surface water, and seeps and springs. Only those sample stations with multiple and reliable data sets were illustrated in these graphs.

Radionuclide graphs depict gross alpha and gross beta concentrations detected in foundation drains and building sumps. Individual graphs compare concentrations for gross alpha and gross beta with the UTLs for each source.

Graphs showing metal concentrations detected in foundation drains and building sumps individually present arsenic, lead, mercury, aluminum, beryllium, cadmium, chromium, copper, and manganese. These metal concentrations are also compared with the appropriate UTL for each metal and for each source.

The pre-1977 references to analytical results from samples collected at the footing drains have not been included in this summary. The reasons for excluding these data are that (1) the foundation-drains sampling was sporadic at two buildings, (2) QA/QC data are not available for review, (3) laboratory data sheets are not available, (4) laboratory methodology is unknown, and (5) the sampling locations cannot be identified. Memoranda referring to these data are available for review in Appendix D.

Numerical standards for foundation-drain and building-sump samples have not been developed. In this section, metal and radionuclide results are compared to the UTLs for groundwater and

TABLE 4-3
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 111-1 05-78	FD 111-1 03-81	FD 111-1 09-81	FD 111-1 04-12-88	FD 111-1 07-26-88	FD 111-1 10-10-88	FD 111-1 04-26-89	FD 111-1 06-21-89	FD 111-1 05-05-91
RADIONUCLIDES									
Gross Alpha (pCi/L)	9	3	13	31[±21]	3[±8]	5[±14]	7[±12]	9[±14]	2[±1]
Gross Beta (pCi/L)	NA	50	27	-12[±46]	0[±23]	6[±22]	42[±26]	-8[±16]	6[±1]
Tritium (pCi/L)	NA	25	571	NA	NA	NA	NA	NA	NA
WATER QUALITY PARAMETERS									
Conductivity (µS/cm)	258	355	113	374	400	426	111	381	146
Total Dissolved Solids (mg/L)	166	159	84	233	228	234	89	243	102
pH	7.0	6.7	6.1	7.7	NA	7.4	6.6	7.5	NA
Nitrate as Nitrogen (mg/L)	3	3.4	5.4	1.7	3.92	1.56	1.79	1.39	0.74
METALS BY AA									
Arsenic	NA	NA	NA	NA	<5	<5	<10	<10	NA
Lead	NA	NA	NA	NA	<5	<5	13	5	NA
Mercury	NA	NA	NA	NA	0.4	<0.2	0.3	<0.2	NA
Potassium	NA	NA	NA	NA	2,900	2,800	3,800	4,520	NA
Selenium	NA	NA	NA	NA	<5	<5	<5	<5	NA
Thallium	NA	NA	NA	NA	<10	<10	<1	<10	NA
HSL METALS BY ICP									
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Total	Total	Unknown	Unknown	Total
Aluminum	NA	NA	NA	NA	NA	NA	1,400	590	<6.0
Antimony	NA	NA	NA	NA	NA	NA	<34.0	<50.0	510
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	<131
Barium	NA	NA	NA	NA	NA	NA	59	150	46
Beryllium	NA	NA	NA	NA	NA	NA	<1.0	<2.0	<1.0
Cadmium	NA	NA	NA	NA	NA	NA	<5.0	<5.0	<3.0
Calcium	NA	NA	NA	NA	NA	NA	14,000	130,000	15,000
Chromium	NA	NA	NA	NA	NA	NA	<10.0	<9.0	<4.0
Cobalt	NA	NA	NA	NA	NA	NA	<0.20	<29.0	<7.0
Copper	NA	NA	NA	NA	NA	NA	11	31	<9.0
Iron	NA	NA	NA	NA	NA	NA	5,000	2,900	490
Lead	NA	NA	NA	NA	NA	NA	NA	NA	<73.0
Magnesium	NA	NA	NA	NA	NA	NA	1,900	8,000	1,800
Manganese	NA	NA	NA	NA	NA	NA	320	430	56
Molybdenum	NA	NA	NA	NA	NA	NA	<22.0	<27.0	<9.0
Nickel	NA	NA	NA	NA	NA	NA	<37.0	<22.0	11,000
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	<9.0
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	2,500
Silver	NA	NA	NA	NA	NA	NA	<76	<4.0	<76.0
Sodium	NA	NA	NA	NA	NA	NA	6,700	25,000	<34.0
Strontium	NA	NA	NA	NA	NA	NA	78	350	64
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	<164
Vanadium	NA	NA	NA	NA	NA	NA	42	<34.0	<10.0
Zinc	NA	NA	NA	NA	NA	NA	340	140	68

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 371 COMP 04-12-88	FD 371 COMP 07-26-88	FD 371 COMP 10-10-88	FD 371 COMP 12-15-88	FD 371 COMP 04-26-89	FD 371 COMP 09-15-89	FD 371 COMP 12-17-89	FD 371 COMP 06-09-90	FD 371 COMP 06-15-91	FD 371-1 08-77	FD 371-1 05-78
RADIONUCLIDES											
Gross Alpha (pCi/L)	42[±21]	41[±19]	33[±23]	9[±15]	14[±18]	50[±22]	10[±11]	12[±3]	11[±4]	31	41
Gross Beta (pCi/L)	34[±25]	20[±26]	0[±22]	10[±19]	20[±21]	20[±18]	24[±20]	16[±5]	4[±5]	NA	NA
Tritium (pCi/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	544	503	686	601	470	563	686	627	664	654	422
Total Dissolved Solids (mg/L)	340	306	399	293	432	366	456	400	390	432	299
pH	7.9	NA	7.8	7.9	7.9	7.8	7.8	NA	NA	7.1	7.4
Nitrate as Nitrogen (mg/L)	1.78	1.72	1.29	1.88	1.47	4.37	2.2	1.65	1.6	1	2
METALS BY AA											
Arsenic	NA	<5	<5	<5	<5	<1.0	1,200	1,400	<1.0	NA	NA
Lead	NA	<5	6	<5	8.1	1.8	5.7	7.3	<1.0	NA	NA
Mercury	NA	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<2.0	NA	NA
Potassium	NA	2,800	3,400	3,700	2,800	4,190	4,890	3,180	NA	NA	NA
Selenium	NA	<5	<5	<5	<5	<1.0	<1.0	<0.2	<2.0	NA	NA
Thallium	NA	<10	<10	<5	<1	<1.0	<1.0	<1.0	<1.0	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Total	Total	Total	Unknown	Total	Total	Unknown	Total	Unknown	Unknown
Aluminum	NA	NA	NA	460	6,300	1,900	2,600	140	61	NA	NA
Antimony	NA	NA	NA	<34.0	41	<50.0	<55.0	<45.0	<34.0	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	<130	NA	NA
Barium	NA	NA	NA	130	150	130	190	130	160	NA	NA
Beryllium	NA	NA	NA	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	NA	NA
Cadmium	NA	NA	NA	<5.0	<5.0	<5.0	<4.0	<5.0	<3.0	NA	NA
Calcium	NA	NA	NA	83,000	76,000	73,000	90,000	79,000	93,000	NA	NA
Chromium	NA	NA	NA	16	10	<9.0	<7.0	<7.0	<7.0	NA	NA
Cobalt	NA	NA	NA	<22.0	<0.20	<29.0	<13.0	<10	<4.0	NA	NA
Copper	NA	NA	NA	<6.3	7.0	16	31	<2.0	<9.0	NA	NA
Iron	NA	NA	NA	600	5,300	1,300	4,100	230	1,300	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	<73.0	NA	NA
Magnesium	NA	NA	NA	15,000	14,000	12,000	18,000	15,000	16,000	NA	NA
Manganese	NA	NA	NA	340	270	110	1,100	110	650	NA	NA
Molybdenum	NA	NA	NA	<22.0	<22.0	<27.0	<24.0	<17.0	<9.0	NA	NA
Nickel	NA	NA	NA	<37.0	<37.0	<22.0	<36.0	<36.0	<9.0	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	3,600	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	<76.0	NA	NA
Silver	NA	NA	NA	<7.6	<76	<4.0	<6.0	<3.0	<6.0	NA	NA
Sodium	NA	NA	NA	31,000	24,000	27,000	32,000	27,000	23,000	NA	NA
Strontium	NA	NA	NA	500	440	400	540	450	560	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	<164	NA	NA
Vanadium	NA	NA	NA	<36.0	<36.0	<34.0	17	<17.0	<10.0	NA	NA
Zinc	NA	NA	NA	44	81	67	76	35	11	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 371-1 08-78	FD 371-1 01-79	FD 371-1 09-80	FD 371-2 08-77	FD 371-2 05-78	FD 371-2 08-78	FD 371-2 01-79	FD 371-2 03-80	FD 371-2 06-80	FD 371-2 03-81	FD 371-2 06-15-91
RADIONUCLIDES											
Gross Alpha (pCi/L)	17	35	19	27	13	31	33	17	8	9	27[±2]
Gross Beta (pCi/L)	NA	NA	41	NA	NA	NA	NA	9	26	-19	4[±1]
Tritium (pCi/L)	NA	NA	512	NA	NA	NA	NA	526	488	205	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	426	476	208	231	357	847	667	588	625	735	700
Total Dissolved Solids (mg/L)	265	316	191	141	236	583	424	380	412	340	427
pH	6.8	7.0	6.6	7.1	7.5	7.2	7.2	7.1	7.6	7.7	NA
Nitrate as Nitrogen (mg/L)	1	0.7	1	1	1	2	0.7	3.3	1	1.7	1.46
METALS BY AA											
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<2.0
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<2.0
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Total
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	88
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<34.0
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<130
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	140
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<3.0
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65,000
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<7.0
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<4.0
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<9.0
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,100
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<73.0
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	14,000
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	370
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<9.0
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<9.0
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,200
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<76.0
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<6.0
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	54,000
Strontium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	440
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<164
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10.0
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	150

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 371-3 03-81	FD 371-3 09-81	FD 371-3 04-12-88	FD 371-3 10-10-88	FD 371-3 12-15-88	FD 371-3 04-26-89	FD 371-3 06-21-89	FD 371-3 09-15-89	FD 371-3 12-17-89	FD 371-3 06-09-90	FD 371-5 03-81
RADIONUCLIDES											
Gross Alpha (pCi/L)	12	22	54[±25]	34[±21]	49[±26]	10[±18]	49[±22]	14[±12]	31[±18]	17[±2]	27
Gross Beta (pCi/L)	0	11	26[±25]	5[±22]	52[±24]	25[±23]	24[±20]	10[±20]	17[±19]	20[±4]	-6
Tritium (pCi/L)	768	-99	NA	NA	NA	NA	NA	NA	NA	NA	911
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	543	732	522	693	743	592	564	622	742	621	331
Total Dissolved Solids (mg/L)	281	471	309	400	315	407	385	398	518	382	139
pH	7.8	7.7	7.9	7.4	7.5	7.7	8.3	7.1	7.7	NA	8.9
Nitrate as Nitrogen (mg/L)	6.6	1.4	1.29	0.72	0.43	1.03	1.7	2.65	1.46	1.08	2.0
METALS BY AA											
Arsenic	NA	NA	NA	<5	12.5	<5	<10	37.8	19	1.4	NA
Lead	NA	NA	NA	16	5	2.5	110	11.3	6.9	4.4	NA
Mercury	NA	NA	NA	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	NA
Potassium	NA	NA	NA	5,000	5,700	3,500	4,570	2,840	8,150	3,600	NA
Selenium	NA	NA	NA	<5	<5	<5	<5	3.4	<1.0	<0.2	NA
Thallium	NA	NA	NA	<10	<5	<1	<10	<1.0	<1.0	<1.0	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Total	Total	Unknown	Unknown	Total	Total	Unknown	Unknown
Aluminum	NA	NA	NA	NA	11,000	160	4,700	1,800	640	NA	NA
Antimony	NA	NA	NA	NA	<34.0	34.6	<50.0	<50.0	<55.0	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	790	140	170	1,700	560	NA	NA
Beryllium	NA	NA	NA	NA	<1.0	<1.0	<2.0	<2.0	<1.0	NA	NA
Cadmium	NA	NA	NA	NA	<5.0	<5.0	<5.0	<5.0	<4.0	NA	NA
Calcium	NA	NA	NA	NA	170,000	83,000	77,000	110,000	100,000	NA	NA
Chromium	NA	NA	NA	NA	33	<10.0	<9.0	15	<7.0	NA	NA
Cobalt	NA	NA	NA	NA	<22.0	<0.20	<29.0	<29.0	<13.0	NA	NA
Copper	NA	NA	NA	NA	12	<6.3	6.7	11	20	NA	NA
Iron	NA	NA	NA	NA	64,000	1,500	6,000	740,000	95,000	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	28,000	15,000	15,000	15,000	19,000	NA	NA
Manganese	NA	NA	NA	NA	14,000	270	240	3,200	3,200	NA	NA
Molybdenum	NA	NA	NA	NA	<22.0	<22.0	<27.0	66	<24.0	NA	NA
Nickel	NA	NA	NA	NA	<37.0	<37.0	<22.0	<22.0	<36.0	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	<7.6	<76	<4.0	<4.0	<6.0	NA	NA
Sodium	NA	NA	NA	NA	27,000	29,000	29,000	17,000	40,000	NA	NA
Strontium	NA	NA	NA	NA	1,100	540	470	950	730	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	<36.0	<36.0	<34.0	76	<15.0	NA	NA
Zinc	NA	NA	NA	NA	82	49	220	170	140	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 374 04-13-89	DET POND 374 04-13-89	374 S. DITCH 04-13-89	BS 374 05-24-89	FD 444-1 08-77	FD 444-1 05-78	FD 444-1 08-78	FD 444-1 06-79	FD 444-1 07-79	FD 444-1 03-80	FD 444-1 06-80
RADIONUCLIDES											
Gross Alpha (pCi/L)	24[±14]	0[±8]	10[±10]	17[±15]	31	13	23	5	5	2	13
Gross Beta (pCi/L)	31[±17]	34[±17]	13[±15]	100[±30]	NA	NA	NA	5	NA	6	8
Tritium (pCi/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	518	483
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	NA	NA	NA	NA	513	382	228	476	541	500	465
Total Dissolved Solids (mg/L)	NA	NA	NA	NA	342	259	164	354	386	343	354
pH	NA	NA	NA	NA	6.8	7.7	6.6	7.5	6.9	7.8	7.1
Nitrate as Nitrogen (mg/L)	0.98	NA	NA	25 - 30	4	6	3	5	5.2	5.5	4.5
METALS BY AA											
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	<0.1	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	<0.02	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 444-1 09-80	BS 444-2 08-77	BS 444-2 05-78	BS 444-2 08-78	BS 444-2 01-79	BS 444-2 03-80	BS 444-2 06-80	BS 444-2 09-80	BS 444 01-22-91	FD 444-460 04-26-89	FD 444 04-25-89
RADIONUCLIDES											
Gross Alpha (pCi/L)	6	34	58	28	17	14	18	18	350 ±20	1[±9]	NA
Gross Beta (pCi/L)	2	NA	NA	NA	NA	43	22	-5	760 ±40	4[±19]	NA
Tritium (pCi/L)	430	NA	NA	NA	NA	528	740	438	NA	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	308	241	370	559	400	625	690	1,180	NA	275	NA
Total Dissolved Solids (mg/L)	211	190	313	422	290	411	524	1,028	NA	203	NA
pH	6.9	7.0	7.3	7.5	7.4	8.0	8.3	9.2	NA	7.5	NA
Nitrate as Nitrogen (mg/L)	1	5	7	6	1	6.1	14.9	53.8	8.28	3.36	NA
METALS BY AA											
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	278	19	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	<0.2	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,700	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	<1.0	<1	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,600	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	<34.0	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	87	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5.0	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	42,000	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	130	13,000
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.20	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	81	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,600	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	4,800	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	89	NA
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA	NA	<22.0	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	<37.0	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	<76	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	18,000	NA
Strontium	NA	NA	NA	NA	NA	NA	NA	NA	NA	200	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	<36.0	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,700	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 444 05-03-90	FD 444-460 06-21-89	FD 444-460 09-15-89	FD 444-460 12-17-89	FD 444-460 06-09-90	FD 444-460 05-05-91	FD 516-1 08-77	FD 516-1 05-78	FD 516-1 08-78	FD 516-1 01-79	FD 516-1 03-80
RADIONUCLIDES											
Gross Alpha (pCi/L)	25[±3]	1[±10]	32[±16]	16[±15]	2[±2]	3[±1]	21	12	20	14	18
Gross Beta (pCi/L)	12[±3]	4[±18]	1[±16]	19[±19]	7[±4]	6[±1]	NA	NA	NA	NA	28
Tritium (pCi/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	549
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	470	489	547	523	600	25.5	375	408	427	1,429	540
Total Dissolved Solids (mg/L)	NA	431	408	398	450	11	276	326	346	832	359
pH	7.9	8.7	8.4	8.5	NA	NA	6.8	7.5	7.2	7.1	8.3
Nitrate as Nitrogen (mg/L)	5.94	7.3	7.39	7.26	7.34	0.31	5	14	9	4.1	6.8
METALS BY AA											
Arsenic	1.1	<10	<1.0	<1.0	<1.0	NA	NA	NA	NA	NA	NA
Lead	3.3	8	9.1	20	5.1	NA	NA	NA	NA	NA	NA
Mercury	<0.2	<0.2	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA
Potassium	11,000	1,560	2,860	1540	1,440	NA	NA	NA	NA	NA	NA
Selenium	<2.0	<5	<1.0	<1.0	<0.2	NA	NA	NA	NA	NA	NA
Thallium	<1.0	<10	<1.0	<1.0	<1.0	NA	NA	NA	NA	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	NA	Unknown	Total	Total	Unknown	Total	Unknown	Unknown	Unknown	Unknown	Unknown
Aluminum	NA	970	1,900	1,800	48	27	NA	NA	NA	NA	NA
Antimony	NA	<50.0	<50.0	<55.0	<45.0	<34.0	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	<131	NA	NA	NA	NA	NA
Barium	NA	150	150	170	140	11	NA	NA	NA	NA	NA
Beryllium	NA	<2.0	<2.0	<1.0	<1.0	2.5	NA	NA	NA	NA	NA
Cadmium	NA	<5.0	<5.0	<4.0	<5.0	<3.0	NA	NA	NA	NA	NA
Calcium	NA	84,000	88,000	88,000	89,000	2,700	NA	NA	NA	NA	NA
Chromium	NA	<9.0	<9.0	8.3	<7.0	<7.0	NA	NA	NA	NA	NA
Cobalt	NA	<29.0	<29.0	<13.0	<10	<4.0	NA	NA	NA	NA	NA
Copper	NA	130	47	190	<2.0	15	NA	NA	NA	NA	NA
Iron	NA	3,400	1,500	4,100	71	230	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	<73.0	NA	NA	NA	NA	NA
Magnesium	NA	11,000	11,000	12,000	12,000	380	NA	NA	NA	NA	NA
Manganese	NA	66	38	100	3.8	10	NA	NA	NA	NA	NA
Molybdenum	NA	<27.0	<27.0	<24.0	<17.0	<9.0	NA	NA	NA	NA	NA
Nickel	NA	<22.0	<22.0	36	<36.0	<9.0	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	1,200	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	<76.0	NA	NA	NA	NA	NA
Silver	NA	<4.0	<4.0	<6.0	<3.0	<6.0	NA	NA	NA	NA	NA
Sodium	NA	13,000	14,000	14,000	11,000	2,700	NA	NA	NA	NA	NA
Strontium	NA	380	380	410	390	13	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	<164	NA	NA	NA	NA	NA
Vanadium	NA	<34.0	<34.0	<15.0	<17.0	<10.0	NA	NA	NA	NA	NA
Zinc	NA	600	480	1,100	160	370	NA	NA	NA	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 516-1 06-80	FD 516-1 09-80	FD 516-1 07-26-88	FD 516-1 10-10-88	FD 516-1 12-15-88	FD 516-1 04-26-89	FD 516-1 06-21-89	FD 516-1 09-15-89	FD 516-1 12-17-89	CULVERT 559 04-13-89	FD 707-1 08-77
RADIONUCLIDES											
Gross Alpha (pCi/L)	3	4	3[±9]	0[±14]	5[±12]	12[±17]	10[±12]	7[±12]	10[±12]	9[±10]	64
Gross Beta (pCi/L)	43	16	6[±23]	-5[±27]	6[±13]	13[±21]	3[±18]	-8[±16]	14[±17]	34[±19]	NA
Tritium (pCi/L)	1,308	728	NA	NA	NA	NA	NA	NA	NA	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	525	476	412	605	548	482	488	519	547	NA	699
Total Dissolved Solids (mg/L)	462	341	258	357	403	361	354	331	378	NA	514
pH	7.8	7.9	NA	7.9	8.2	8.0	8.4	8.4	8.3	NA	7.6
Nitrate as Nitrogen (mg/L)	5	6.2	3.42	3.19	5.14	4.34	5.70	6.65	4.94	4.15	19
METALS BY AA											
Arsenic	NA	NA	<5	<5	<5	4	<10	1	<1.0	NA	NA
Lead	NA	NA	<5	62	<5	48	15	2.1	10.4	NA	NA
Mercury	NA	NA	0.7	80	3.4	14	1.4	0.6	2.1	NA	NA
Potassium	NA	NA	1,700	4,800	1,400	4,900	1,760	1,400	1,860	NA	NA
Selenium	NA	NA	<5	<5	<5	<5	<5	<1.0	<1.0	NA	NA
Thallium	NA	NA	<10	<10	<5	<1	<10	<1.0	<1.0	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Total	Total	Total	Unknown	Unknown	Total	Total	Unknown	Unknown
Aluminum	NA	NA	NA	19,000	1,600	26,000	2,300	57	3,500	NA	NA
Antimony	NA	NA	NA	<34.0	<34.0	34	<50.0	<50.0	<55.0	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	310	130	320	120	950	140	NA	NA
Beryllium	NA	NA	NA	<1.0	<1.0	>1.0	<2.0	<2.0	<1.0	NA	NA
Cadmium	NA	NA	NA	<5.0	<5.0	<5.0	<5.0	<5.0	<4.0	NA	NA
Calcium	NA	NA	NA	200,000	94,000	130,000	72,000	72,000	85,000	NA	NA
Chromium	NA	NA	NA	35	24	0.0308	<9.0	<9.0	9.4	NA	NA
Cobalt	NA	NA	NA	<22.0	<22.0	<0.20	<29.0	<29.0	<13.0	NA	NA
Copper	NA	NA	NA	32	7.0	58	5.8	<4.0	18	NA	NA
Iron	NA	NA	NA	15,000	1,300	24,000	2,100	110	3,200	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	15,000	13,000	18,000	11,000	9,800	13,000	NA	NA
Manganese	NA	NA	NA	290	29	330	71	<2.0	81	NA	NA
Molybdenum	NA	NA	NA	<22.0	<22.0	<22.0	<27.0	<27.0	<24.0	NA	NA
Nickel	NA	NA	NA	<37.0	<37.0	<37.0	<22.0	<22.0	<36.0	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	<7.6	<7.6	<76	<4.0	<4.0	<6.0	NA	NA
Sodium	NA	NA	NA	20,000	25,000	22,000	18,000	20,000	21,000	NA	NA
Strontium	NA	NA	NA	600	460	50	350	330	400.00	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	50	<36.0	68	<34.0	<34.0	<15.0	NA	NA
Zinc	NA	NA	NA	1,400	140	1,900	200.00	62	180	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 707-1 05-78	FD 707-1 08-78	FD 707-1 01-79	FD 707-1 03-80	FD 707-1 06-80	FD 707-1 09-80	FD 707-1 03-81	FD 707-1 04-12-88	FD 707-1 07-26-88	FD 707-1 10-10-88	FD 707-1 12-15-88
RADIONUCLIDES											
Gross Alpha (pCi/L)	26	29	33	9	13	9	-8	29[±18]	6[±11]	14[±17]	5[±11]
Gross Beta (pCi/L)	NA	NA	NA	12	31	5	10	43[±27]	4[±24]	1[±22]	3[±18]
Tritium (pCi/L)	NA	NA	NA	1,248	596	514	719	NA	NA	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	513	763	1,282	757	555	392	560	741	647	787	684
Total Dissolved Solids (mg/L)	348	493	731	440	324	276	507	453	387	477	450
pH	7.6	7.0	7.0	7.8	7.8	7.0	8.2	8.0	NA	7.9	8.0
Nitrate as Nitrogen (mg/L)	4	2	1.5	1.4	1.4	1	1.2	1.92	1.27	1.12	1.10
METALS BY AA											
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	6
Lead	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	<5
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	<0.2	<0.2
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	3,200	4,000	5,100
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	<5
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	<10	<10	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Total	Total	Total
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	450
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<34.0
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	130
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5.0
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65,000
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<22.0
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<6.3
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1800
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	15,000
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	740
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<22.0
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<37.0
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<7.6
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	70,000
Strontium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	570
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<36.0
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	130

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 707-1 04-26-89	FD 707-1 06-21-89	FD 707-1 09-15-89	FD 707-1 12-17-89	FD 707-1 06-09-90	FD 707-1 06-15-91	BS 707-2 08-77	BS 707-2 05-78	BS 707-2 08-78	BS 707-2 01-79	BS 707-2 07-79
RADIONUCLIDES											
Gross Alpha (pCi/L)	15[±17]	7[±12]	18[±13]	10[±13]	9[±4]	5[±3]	31	40	63	44	29
Gross Beta (pCi/L)	9[±21]	29[±22]	11[±18]	17[±19]	26[±9]	8[±4]	NA	NA	NA	NA	NA
Tritium (pCi/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	853	709	553	775	2380	733	667	667	952	909	800
Total Dissolved Solids (mg/L)	484	458	342	520	1,440	436	482	516	682	695	563
pH	7.8	8.3	8.2	7.9	NA	NA	7.5	8.0	7.7	7.3	8.3
Nitrate as Nitrogen (mg/L)	2.3	2.85	3.55	1.76	9.06	3.64	2	1	3	1.2	1.8
METALS BY AA											
Arsenic	<5	<10	1.2	1.2	6.3	1.8	NA	NA	NA	NA	NA
Lead	2.5	<5	5.4	4.1	7.0	<1.0	NA	NA	NA	NA	NA
Mercury	<0.2	<0.2	<0.2	<0.2	<0.2	<2.0	NA	NA	NA	NA	NA
Potassium	2,800	4,100	4,120	15,400	29,000	NA	NA	NA	NA	NA	NA
Selenium	<5	<5	<1.0	<1.0	3.2	<2.0	NA	NA	NA	NA	NA
Thallium	<1	<10	<1.0	<1.0	<1.0	<1.0	NA	NA	NA	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Total	Total	Unknown	Total	Unknown	Unknown	Unknown	Unknown	Unknown
Aluminum	170	170	540	960	210	74	NA	NA	NA	NA	NA
Antimony	45	<50.0	<50.0	<55.0	<45.0	<34.0	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	<130	NA	NA	NA	NA	NA
Barium	180	130	150	110	310	140	NA	NA	NA	NA	NA
Beryllium	<1.0	<2.0	<2.0	<1.0	<1.0	<1.0	NA	NA	NA	NA	NA
Cadmium	<5.0	<5.0	<5.0	<4.0	<5.0	<3.0	NA	NA	NA	NA	NA
Calcium	100,000	65,000	71,000	74,000	110,000	81,000	NA	NA	NA	NA	NA
Chromium	<10.0	<9.0	<9.0	<7.0	<7.0	<7.0	NA	NA	NA	NA	NA
Cobalt	<0.20	<29.0	<29.0	<13.0	<10	<4.0	NA	NA	NA	NA	NA
Copper	<6.3	4.9	4.3	19	<2.0	<9.0	NA	NA	NA	NA	NA
Iron	1,700	790	750	2,100	2,200	77	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	<73.0	NA	NA	NA	NA	NA
Magnesium	24,000	18,000	14,000	11,000	18,000	14,000	NA	NA	NA	NA	NA
Manganese	1,000	270	250	500	480	110	NA	NA	NA	NA	NA
Molybdenum	<22.0	<27.0	<27.0	<24.0	29	<9.0	NA	NA	NA	NA	NA
Nickel	<37.0	<22.0	<22.0	36	<36.0	<9.0	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	3,000	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	<76.0	NA	NA	NA	NA	NA
Silver	<76	<4.0	<4.0	<6.0	<3.0	<6.0	NA	NA	NA	NA	NA
Sodium	70,000	62,000	40,000	61,000	360,000	30,000	NA	NA	NA	NA	NA
Strontium	790	580	500	870	1,100	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	<164	NA	NA	NA	NA	NA
Vanadium	<36.0	<34.0	42	17	23	<10.0	NA	NA	NA	NA	NA
Zinc	240	78	110	150	200	20	NA	NA	NA	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	BS 707-2 06-80	BS 707-2 09-80	BS 707-2 03-81	BS 707-2 09-81	BS 707-2 07-26-88	FD 707-2 06-21-89	BS 707-2 09-15-89	BS 707-2 12-17-89	BS 707-2 06-09-90	BS 707-2 06-15-91	BS 707-3 09-80
RADIONUCLIDES											
Gross Alpha (pCi/L)	16	2	33	20	18[±13]	6[±11]	5[±9]	9[±14]	12[±12]	3[±2]	68
Gross Beta (pCi/L)	34	34	63	28	41[±27]	12[±19]	32[±20]	29[±15]	29[±4]	4[±3]	182
Tritium (pCi/L)	573	467	652	174	NA	NA	NA	NA	NA	NA	522
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	1,250	1,820	1,250	402	501	340	354	544	985	327	2,220
Total Dissolved Solids (mg/L)	976	1,527	793	298	332	254	246	440	738	224	1,328
pH	6.4	7.7	8.0	7.8	NA	8.8	9	8.3	NA	NA	9.61
Nitrate as Nitrogen (mg/L)	5.2	16.0	2.5	2.7	12.7	1.97	1.96	2.17	3.45	1.05	2.2
METALS BY AA											
Arsenic	NA	NA	NA	NA	43	26	26.7	222	97.2	19	NA
Lead	NA	NA	NA	NA	15	63	6.1	3	17.2	<1	NA
Mercury	NA	NA	NA	NA	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	NA
Potassium	NA	NA	NA	NA	32,000	37,840	41,900	14,900	26,600	NA	NA
Selenium	NA	NA	NA	NA	<5	<5	<1.0	3.1	<0.2	<2	NA
Thallium	NA	NA	NA	NA	<10	<10	<1.0	1.1	<1.0	<1	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Total	Unknown	Total	Total	Unknown	Unknown	Unknown
Aluminum	NA	NA	NA	NA	NA	2,900	100	590	1,500	96	NA
Antimony	NA	NA	NA	NA	NA	<50.0	<50.0	<55.0	<45.0	<34.0	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	<130	NA
Barium	NA	NA	NA	NA	NA	89	7.8	20	47	6.9	NA
Beryllium	NA	NA	NA	NA	NA	<2.0	<2.0	<1.0	<1.0	<1.0	NA
Cadmium	NA	NA	NA	NA	NA	12	<5.0	<4.0	6.5	<3.0	NA
Calcium	NA	NA	NA	NA	NA	20,000	14,000	42,000	93,000	16,000	NA
Chromium	NA	NA	NA	NA	NA	15	<9.0	13	<7.0	<7.0	NA
Cobalt	NA	NA	NA	NA	NA	<29.0	<29.0	<13.0	<10	<4.0	NA
Copper	NA	NA	NA	NA	NA	110	27	99	70	15	NA
Iron	NA	NA	NA	NA	NA	4,200	100	470	1,500	58	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	<73.0	NA
Magnesium	NA	NA	NA	NA	NA	2,800	1,700	9,900	22,000	2,500	NA
Manganese	NA	NA	NA	NA	NA	170	6.4	27	87	4.8	NA
Molybdenum	NA	NA	NA	NA	NA	<27.0	<27.0	<24.0	22	<9.0	NA
Nickel	NA	NA	NA	NA	NA	<22.0	<22.0	<36.0	<36.0	<9.0	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	24,000	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	<76.0	NA
Silver	NA	NA	NA	NA	NA	<4.0	<4.0	<6.0	<3.0	<6.0	NA
Sodium	NA	NA	NA	NA	NA	45,000	40,000	54,000	88,000	38,000	NA
Strontium	NA	NA	NA	NA	NA	100	74	210	440	70	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	<164	NA
Vanadium	NA	NA	NA	NA	NA	<34.0	<34.0	<15.0	<17.0	<10.0	NA
Zinc	NA	NA	NA	NA	NA	1,500	54	45	250	42	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	BS 707-3 03-81	BS 707-3 09-81	BS 707-3 04-12-88	BS 707-3 07-26-88	BS 707-3 10-04-88	BS 707-3 12-15-88	BS 707-3 04-26-89	BS 707-3 09-15-89	FD 771-1 05-78	FD 771-1 08-78	FD 771-1 06-79
RADIONUCLIDES											
Gross Alpha (pCi/L)	66	7,900	9[±18]	20[±13]	22[±23]	1[±10]	20[±19]	16[±16]	44	24	31
Gross Beta (pCi/L)	26	199	37[±43]	93[±33]	82[±29]	80[±26]	58[±26]	53[±23]	NA	NA	5
Tritium (pCi/L)	532	548	NA	NA	NA	NA	NA	NA	NA	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	990	1,336	728	737	779	857	1,150	13,450	77	1,612	1,818
Total Dissolved Solids (mg/L)	493	806	354	332	335	449	697	697	48	1,157	1,433
pH	9.3	9.7	10.7	NA	10.9	5.41	10.8	11	7.4	7.2	8.3
Nitrate as Nitrogen (mg/L)	1.8	5.9	NA	4.07	0.62	0.55	0.23	0.47	1	13	11
METALS BY AA											
Arsenic	NA	NA	NA	<5	<5	<5	<5	<10	NA	NA	NA
Lead	NA	NA	NA	10	6	<5	9.3	10.2	NA	NA	NA
Mercury	NA	NA	NA	0.2	<0.2	<0.2	<0.2	0.4	NA	NA	NA
Potassium	NA	NA	NA	62,000	68,000	7,500	66,000	83,100	NA	NA	NA
Selenium	NA	NA	NA	<5	<5	<5	<5	<1.0	NA	NA	NA
Thallium	NA	NA	NA	<10	<10	<10	<1	<1.0	NA	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Total	Total	Total	Unknown	Total	Unknown	Unknown	Unknown
Aluminum	NA	NA	NA	NA	830	1,000	1,100	720	NA	NA	NA
Antimony	NA	NA	NA	NA	<34.0	<34.0	<34.0	<50.0	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	<100	<10.0	21	8.8	NA	NA	NA
Beryllium	NA	NA	NA	NA	<1.0	<1.0	<1.0	<2.0	NA	NA	NA
Cadmium	NA	NA	NA	NA	<5.0	<5.0	<5.0	<5.0	NA	NA	NA
Calcium	NA	NA	NA	NA	6,800	6,400	9,300	4,600	NA	NA	NA
Chromium	NA	NA	NA	NA	15	<10.0	<10.0	<9.0	NA	NA	NA
Cobalt	NA	NA	NA	NA	<22.0	<22.0	<0.20	<29.0	NA	NA	NA
Copper	NA	NA	NA	NA	12	9.3	15	9.6	NA	NA	NA
Iron	NA	NA	NA	NA	1,200	1,500	3,400	1,100	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	140	190	330	110	NA	NA	NA
Manganese	NA	NA	NA	NA	12	17	42	13	NA	NA	NA
Molybdenum	NA	NA	NA	NA	<22.0	<22.0	<22.0	<27.0	NA	NA	NA
Nickel	NA	NA	NA	NA	<37.0	<37.0	<37.0	<22.0	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	<7.6	<7.6	<76	<4.0	NA	NA	NA
Sodium	NA	NA	NA	NA	83,000	120,000	230,000	190,000	NA	NA	NA
Strontium	NA	NA	NA	NA	210	200	240	170	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	<36.0	<36.0	41	<34.0	NA	NA	NA
Zinc	NA	NA	NA	NA	310	120	330	150	NA	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	BS 771-2 08-77	BS 771-2 05-78	BS 771-2 06-80	FD 771-4 08-77	FD 771-4 05-78	FD 771-4 08-78	FD 771-4 01-79	FD 771-4 06-79	FD 771-4 03-80	FD 771-4 09-80	FD 774-1 03-80
RADIONUCLIDES											
Gross Alpha (pCi/L)	24	12	18	51	9	17	18	15	2	2	19
Gross Beta (pCi/L)	NA	NA	10	NA	NA	NA	NA	12	13	31	39
Tritium (pCi/L)	NA	NA	926	NA	NA	NA	NA	NA	676	539	839
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	588	588	910	800	355	909	400	800	833	667	1,250
Total Dissolved Solids (mg/L)	415	382	727	566	261	696	256	561	667	426	1,021
pH	7.1	8.0	7.8	7.4	7.1	7.4	7.2	7.3	8.2	7.3	8.1
Nitrate as Nitrogen (mg/L)	10	9	6.1	5	13	4	1	5	7.7	1	47
METALS BY AA											
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 774-1 06-80	FD 774-1 09-81	FD 774-1 05-06-88	FD 774-1 04-26-89	FD 774-1 06-21-89	FD 774-1 09-15-89	FD 774-1 12-17-89	FD 779-1 08-77	FD 779-1 05-78	FD 779-1 08-78	FD 779-1 03-80
RADIONUCLIDES											
Gross Alpha (pCi/L)	42	3	39[±23]	38[±22]	6[±10]	20[±14]	13[±12]	42	17	33	31
Gross Beta (pCi/L)	53	21	NA	39[±27]	14[±19]	19[±20]	22[±20]	NA	NA	NA	33
Tritium (pCi/L)	4,881	3,368	NA	NA	NA	NA	NA	NA	NA	NA	3640
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	1,430	665	NA	538	717	7,055	307	870	431	1,000	1,020
Total Dissolved Solids (mg/L)	359	558	NA	443	550	519	199	633	274	690	695
pH	6.7	7.4	NA	7.7	8.4	7.8	8.3	7.5	7.5	7.4	8.3
Nitrate as Nitrogen (mg/L)	108.5	14.8	14.7	12.1	19.3	17.4	5.73	19	10	20	14.2
METALS BY AA											
Arsenic	NA	NA	NA	5	<10	<1.0	1.9	NA	NA	NA	NA
Lead	NA	NA	NA	363	11	9	33.2	NA	NA	NA	NA
Mercury	NA	NA	NA	0.6	<0.2	<0.2	<0.2	NA	NA	NA	NA
Potassium	NA	NA	NA	7,800	7,610	11,380	3,450	NA	NA	NA	NA
Selenium	NA	NA	NA	<5	6	3.7	2.1	NA	NA	NA	NA
Thallium	NA	NA	NA	<1	<10	<1.0	<1.0	NA	NA	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Unknown	Total	Total	Unknown	Unknown	Unknown	Unknown
Aluminum	NA	NA	NA	14,000	5,900	220	3,700	NA	NA	NA	NA
Antimony	NA	NA	NA	<34.0	<50.0	<50.0	<55.0	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	450	170	130	94	NA	NA	NA	NA
Beryllium	NA	NA	NA	2.4	<2.0	<2.0	<1.0	NA	NA	NA	NA
Cadmium	NA	NA	NA	20	<5.0	<5.0	<4.0	NA	NA	NA	NA
Calcium	NA	NA	NA	220,000	120,000	93,000	41,000	NA	NA	NA	NA
Chromium	NA	NA	NA	54	12	12	23	NA	NA	NA	NA
Cobalt	NA	NA	NA	<0.20	<29.0	<29.0	<13.0	NA	NA	NA	NA
Copper	NA	NA	NA	360	7.6	10	33	NA	NA	NA	NA
Iron	NA	NA	NA	20,000	4,400	210	3,600	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	17,000	14,000	12,000	5,800	NA	NA	NA	NA
Manganese	NA	NA	NA	61	51	17	57	NA	NA	NA	NA
Molybdenum	NA	NA	NA	<22.0	<27.0	<27.0	<24.0	NA	NA	NA	NA
Nickel	NA	NA	NA	71	<22.0	<22.0	36	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	<76	<4.0	<4.0	<6.0	NA	NA	NA	NA
Sodium	NA	NA	NA	43,000	47,000	42,000	18,000	NA	NA	NA	NA
Strontium	NA	NA	NA	700	470	400	190	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	68	<34.0	<34.0	<15.0	NA	NA	NA	NA
Zinc	NA	NA	NA	7,300	180	150	240	NA	NA	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 779-1 07-26-88	FD 779-1 09-15-89	BS 865-1 08-77	BS 865-1 05-78	BS 865-1 03-80	BS 865-1 06-80	BS 865-1 03-81	FD 865-1 04-12-88	BS 865-1 07-26-88	BS 865-1 10-04-88	BS 865-1 12-15-88
RADIONUCLIDES											
Gross Alpha (pCi/L)	47[±22]	25[±15]	23	27	29	23	79	11[±15]	10[±11]	15[±18]	-4[±10]
Gross Beta (pCi/L)	41[±28]	12[±19]	NA	NA	22	38	29	3[±31]	6[±23]	-2[±23]	2[±16]
Tritium (pCi/L)	NA	NA	NA	NA	1,205	1,355	149	NA	NA	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	3,110	664	426	382	400	515	442	514	430	629	264
Total Dissolved Solids (mg/L)	2,762	429	282	246	242	329	197	292	267	366	190
pH	NA	8.3	7.1	7.5	8.5	7.9	7.8	7.9	NA	8.6	7.4
Nitrate as Nitrogen (mg/L)	281	NA	2	4	2.6	5.3	1.2	1.1	8.39	5.95	7.35
METALS BY AA											
Arsenic	<5	1.5	NA	NA	NA	NA	NA	NA	<5	<5	<5
Lead	<5	2.1	NA	NA	NA	NA	NA	NA	22	13	<5
Mercury	<0.2	<0.2	NA	NA	NA	NA	NA	NA	0.2	<0.2	<0.2
Potassium	19,000	7,500	NA	NA	NA	NA	NA	NA	6,500	8,200	5,300
Selenium	<5	<1.0	NA	NA	NA	NA	NA	NA	<5	<5	<5
Thallium	<10	<1.0	NA	NA	NA	NA	NA	NA	<10	<10	<10
HSL METALS BY ICP											
Total or Dissolved Conc.	Total	Total	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Total	Total	Total
Aluminum	NA	270	NA	NA	NA	NA	NA	NA	NA	1,200	590
Antimony	NA	<50.0	NA	NA	NA	NA	NA	NA	NA	<34.0	<34.0
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	120	NA	NA	NA	NA	NA	NA	NA	140	55
Beryllium	NA	<2.0	NA	NA	NA	NA	NA	NA	NA	<1.0	<1.0
Cadmium	NA	<5.0	NA	NA	NA	NA	NA	NA	NA	7.4	<5.0
Calcium	NA	71,000	NA	NA	NA	NA	NA	NA	NA	72,000	29,000
Chromium	NA	<9.0	NA	NA	NA	NA	NA	NA	NA	15	18
Cobalt	NA	<29.0	NA	NA	NA	NA	NA	NA	NA	<22.0	<22.0
Copper	NA	4.4	NA	NA	NA	NA	NA	NA	NA	17	<6.3
Iron	NA	310	NA	NA	NA	NA	NA	NA	NA	1,300	600
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	12,000	NA	NA	NA	NA	NA	NA	NA	14,000	5,800
Manganese	NA	17	NA	NA	NA	NA	NA	NA	NA	24	13
Molybdenum	NA	<27.0	NA	NA	NA	NA	NA	NA	NA	<22.0	<22.0
Nickel	NA	<22.0	NA	NA	NA	NA	NA	NA	NA	<37.0	<37.0
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	<4.0	NA	NA	NA	NA	NA	NA	NA	<7.6	<7.6
Sodium	NA	59,000	NA	NA	NA	NA	NA	NA	NA	37,000	20,000
Strontium	NA	440	NA	NA	NA	NA	NA	NA	NA	600	230
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	<34.0	NA	NA	NA	NA	NA	NA	NA	<36.0	<36.0
Zinc	NA	360	NA	NA	NA	NA	NA	NA	NA	430	37

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	BS 865-1 04-26-89	FD 865-1 06-21-89	BS 865-1 09-15-89	865 TRENCH 01-16-90	865 E. DITCH 03-14-90	865 W. DITCH 03-14-90	865 PIT 04-05-90	BS 865-1 06-09-90	BS 865-1 02-23-91	BS 865-1 05-05-91	FD 881-1 08-77
RADIONUCLIDES											
Gross Alpha (pCi/L)	6[±14]	9[±11]	14[±12]	215[±60]	7[±10]	16[±14]	48[±22]	9[±2]	12[±3]	5[±1]	30
Gross Beta (pCi/L)	4[±21]	-2[±17]	4[±18]	305[±72]	20[±20]	12[±18]	82[±25]	11[±2]	17[±4]	6[±1]	NA
Tritium (pCi/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	500	246	487	NA	NA	NA	NA	551	775	398	241
Total Dissolved Solids (mg/L)	404	181	314	NA	NA	NA	NA	331	524	242	476
pH	8.3	7.8	7.5	NA	7.7	7.6	NA	NA	NA	NA	7.2
Nitrate as Nitrogen (mg/L)	5.96	2.81	0.03	16	3.57	2.91	0.62	5.33	10.7	3.62	7
METALS BY AA											
Arsenic	<5	<10	2.6	NA	NA	NA	NA	1.1	2.2	NA	NA
Lead	21	5	11.8	NA	NA	NA	NA	21.8	12.5	NA	NA
Mercury	<0.2	<0.2	<0.2	NA	NA	NA	NA	0.5	<2.2	NA	NA
Potassium	5,000	4,020	5,760	NA	NA	NA	NA	6,820	NA	NA	NA
Selenium	<5	<5	<1.0	NA	NA	NA	NA	<0.2	4	NA	NA
Thallium	<1	<10	<1.0	NA	NA	NA	NA	<1.0	<1	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Total	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Total	Unknown
Aluminum	1,700	970	800	NA	NA	NA	NA	370	310	230	NA
Antimony	<34.0	<50.0	<50.0	NA	NA	NA	NA	<45.0	<23.0	<34.0	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	<103	<131	NA
Barium	120	69	130	NA	NA	NA	NA	130	200	85	NA
Beryllium	<1.0	<2.0	<2.0	NA	NA	NA	NA	<1.0	<1.0	<1.0	NA
Cadmium	23	71	8.2	NA	NA	NA	NA	7	<4.0	3.1	NA
Calcium	60,000	30,000	72,000	NA	NA	NA	NA	56,000	94,000	44,000	NA
Chromium	<10.0	<9.0	<9.0	NA	NA	NA	NA	<7.0	<6.0	<7.0	NA
Cobalt	<0.20	<29.0	<29.0	NA	NA	NA	NA	<10	<6.0	<4.0	NA
Copper	26	7.1	18	NA	NA	NA	NA	12	25	<9.0	NA
Iron	2,100	860	4,100	NA	NA	NA	NA	1,000	520	220	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	<69.0	<73.0	NA
Magnesium	11,000	5,800	12,000	NA	NA	NA	NA	10,000	20,000	8,400	NA
Manganese	51	12	970	NA	NA	NA	NA	95	30	14	NA
Molybdenum	<22.0	<27.0	<27.0	NA	NA	NA	NA	<17.0	<13.0	<9.0	NA
Nickel	<37.0	<22.0	<22.0	NA	NA	NA	NA	<36.0	<14.0	<9.0	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	11,000	3,200	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	<52.0	<76.0	NA
Silver	<76	<4.0	<4.0	NA	NA	NA	NA	<3.0	<4.0	<6.0	NA
Sodium	39,000	17,000	26,000	NA	NA	NA	NA	35,000	24,000	26,000	NA
Strontium	470	240	520	NA	NA	NA	NA	420	880	340	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	<139	<164	NA
Vanadium	<36.0	<34.0	<34.0	NA	NA	NA	NA	<17.0	<8.0	<10.0	NA
Zinc	300	28	190	NA	NA	NA	NA	240	300	50	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 881-1 05-78	FD 881-1 08-78	FD 881-1 01-79	FD 881-1 07-79	FD 881-1 03-80	FD 881-1 06-80	FD 881-1 09-80	FD 881-1 03-81	FD 881-1 09-81	FD 881-1 04-12-88	FD 881-1 07-26-88
RADIONUCLIDES											
Gross Alpha (pCi/L)	21	37	34	28	6	22	13	15	17	10[±14]	20[±14]
Gross Beta (pCi/L)	NA	NA	NA	NA	38	26	4	41	10	5[±31]	8[±23]
Tritium (pCi/L)	NA	NA	NA	NA	1,401	1,150	963	1,253	623	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	562	699	667	690	606	715	606	169	561	764	747
Total Dissolved Solids (mg/L)	359	465	434	430	375	477	392	32	353	508	440
pH	8.1	7.6	7.6	7.3	8.3	7.7	7.6	6.5	8.1	8.3	NA
Nitrate as Nitrogen (mg/L)	8	10	9.0	7.7	9.4	11.1	8.2	1	8.7	4.9	4.55
METALS BY AA											
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4,100
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Total
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 881-1 10-10-88	FD 881-1 12-15-88	FD 881-1 04-26-89	FD 881-1 06-21-89	FD 881-1 09-15-89	FD 881-1 06-09-90	FD 881-1 02-23-91	FD 881-1 05-05-91	BS 881-2 08-78	BS 881-3 08-77	BS 881-3 05-78
RADIONUCLIDES											
Gross Alpha (pCi/L)	15[±13]	10[±10]	12[±14]	15[±13]	21[±15]	8[±1]	2[±1]	8[±2]	7	9	16
Gross Beta (pCi/L)	4[±13]	16[±13]	4[±21]	25[±21]	8[±19]	8[±2]	7[±1]	5[±1]	NA	NA	NA
Tritium (pCi/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	864	663	693	773	646	677	422	743	202	500	431
Total Dissolved Solids (mg/L)	535	529	519	520	407	436	250	469	144	329	268
pH	7.9	8.2	8.0	8.2	8.6	NA	NA	NA	6.7	7.1	8.2
Nitrate as Nitrogen (mg/L)	3.54	6.28	6.02	6.93	NA	5.56	1.65	5.73	3	3	5
METALS BY AA											
Arsenic	<5	<5	<5	<10	4.6	<1.0	2.5	NA	NA	NA	NA
Lead	<5	<5	3	<3.	2.2	6.4	1.6	NA	NA	NA	NA
Mercury	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	NA	NA	NA	NA
Potassium	3,900	3,500	1,400	4,200	3,990	3,740	NA	NA	NA	NA	NA
Selenium	<5	<5	<5	4	3.7	4.1	2.6	NA	NA	NA	NA
Thallium	<10	<5	<1	<10	<1.0	<1.0	<1	NA	NA	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Total	Total	Unknown	Unknown	Total	Unknown	Unknown	Total	Unknown	Unknown	Unknown
Aluminum	240	270	150	420	330	72	86	170	NA	NA	NA
Antimony	<34.0	<34.0	35	<50.0	<50.0	<45.0	<23.0	<34.0	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	<103	<131	NA	NA	NA
Barium	160	140	130	200	180	110	82	130	NA	NA	NA
Beryllium	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0	<1.0	<1.0	NA	NA	NA
Cadmium	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<4.0	<3.0	NA	NA	NA
Calcium	89000	89000	83,000	130,000	85,000	61,000	41,000	82,000	NA	NA	NA
Chromium	11	10	<10.0	<9.0	<9.0	<7.0	<6.0	<7.0	NA	NA	NA
Cobalt	<22.0	<22.0	<0.20	<29.0	<29.0	<10	<6.0	<4.0	NA	NA	NA
Copper	<6.3	11	<6.3	4.2	4.2	<2.0	15	<9.0	NA	NA	NA
Iron	180	210	160	350	230	49	98	100	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	<69.0	<73.0	NA	NA	NA
Magnesium	20000	20000	20,000	22,000	19,000	18,000	9,000	17,000	NA	NA	NA
Manganese	12	13	<5.1	25	6.2	3.3	12	8.2	NA	NA	NA
Molybdenum	<22.0	<22.0	<22.0	<27.0	<27.0	<17.0	<13.0	<9.0	NA	NA	NA
Nickel	<37.0	<37.0	<37.0	<22.0	<22.0	<36.0	<14.0	<9.0	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	5,800	3,200	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	<52.0	<76.0	NA	NA	NA
Silver	<7.6	<7.6	<76	<4.0	<4.0	<3.0	<4.0	<6.0	NA	NA	NA
Sodium	45,000	41,000	48,000	50,000	42,000	41,000	24,000	40,000	NA	NA	NA
Strontium	710	670	670	780	640	520	280	550	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	<139	<164	NA	NA	NA
Vanadium	<36.0	<36.0	<36.0	<34.0	<34.0	<17.0	<8.0	<10.0	NA	NA	NA
Zinc	85	34	210	200	84	23	110	45	NA	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	BS 881-3 08-78	BS 881-3 01-79	BS 881-3 03-80	BS 881-3 06-80	BS 881-3 09-80	BS 881-3 03-81	BS 881-3 09-81	BS 881-3 04-12-88	BS 881-3 07-26-88	BS 881-3 10-04-88	BS 881-3 12-15-88
RADIONUCLIDES											
Gross Alpha (pCi/L)	21	48	-2	33	16	22	7	15[±16]	20[±14]	7[±18]	5[±11]
Gross Beta (pCi/L)	NA	NA	17	11	-6	12	8	4[±31]	10[±23]	5[±25]	31[±20]
Tritium (pCi/L)	NA	NA	1,442	1,388	1,109	474	328	NA	NA	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	476	385	377	425	400	549	177	705	603	559	610
Total Dissolved Solids (mg/L)	314	233	238	277	248	209	150	407	341	293	412
pH	7.2	7.4	8.0	8.0	7.5	7.8	6.7	7.9	NA	7.9	7.9
Nitrate as Nitrogen (mg/L)	4	2.6	2.9	3.1	2.3	1	1.7	3.1	0.49	3.04	3.46
METALS BY AA											
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	<5
Lead	NA	NA	NA	NA	NA	NA	NA	NA	<5	11	<5
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	0.3	<0.2	<0.2
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	3,800	5,500	4,800
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	<5
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	<10	<10	<10
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Total	Total	Total
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	210	130
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	<34.0	<34.0
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	150	140
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0	<1.0
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5.0	<5.0
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	63,000	64,000
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	23	14
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	<22.0	<22.0
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	69	36
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	310	310
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	16,000	18,000
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	13	5.6
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA	NA	<22.0	<22.0
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	<37.0	<37.0
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	<7.6	<7.6
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	55,000	51,000
Strontium	NA	NA	NA	NA	NA	NA	NA	NA	NA	610	610
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	<36.0	<36.0
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	52	43

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	BS 881-3 04-26-89	BS 881-3 06-21-89	BS 881-3 09-15-89	BS 881-3 12-17-89	BS 881-3 06-09-90	SEEP N OF 881 05-25-90	FD 883-1 08-77	FD 883-1 05-78	FD 883-1 07-79	FD 883-1 03-80	FD 883-1 06-80
RADIONUCLIDES											
Gross Alpha (pCi/L)	15[±19]	0[±9]	20[±15]	9[±8]	7[±1]	3[±1]	38	11	5	-5	24
Gross Beta (pCi/L)	1[±19]	-4[±17]	6[±18]	8[±13]	10[±2]	17[±3]	NA	NA	NA	17	0
Tritium (pCi/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	527	699
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	517	600	566	623	630	NA	167	105	182	95	190
Total Dissolved Solids (mg/L)	398	406	353	393	371	NA	100	61	155	55	147
pH	7.8	7.8	7.9	7.9	NA	7.5	7.4	7.4	7.1	7.7	6.2
Nitrate as Nitrogen (mg/L)	3.74	6.82	7.56	3.92	6.6	1.1	2	1	1	1.3	4.6
METALS BY AA											
Arsenic	<5	17	<1.0	2.6	1.6	NA	NA	NA	NA	NA	NA
Lead	4.2	4	4	2.7	12.4	NA	NA	NA	NA	NA	NA
Mercury	<0.2	0.2	<0.2	<0.2	0.3	NA	NA	NA	NA	NA	NA
Potassium	2,200	5,110	4,850	5,650	5,620	NA	NA	NA	NA	NA	NA
Selenium	<5	3	2.6	2.7	3.4	NA	NA	NA	NA	NA	NA
Thallium	<1	<10	<1.0	<1.0	<1.0	NA	NA	NA	NA	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Total	Total	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Aluminum	80	52	38	210	68	NA	NA	NA	NA	NA	NA
Antimony	36	<50.0	<50.0	<55.0	<45.0	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	130	140	140	160	150	NA	NA	NA	NA	NA	NA
Beryllium	<1.0	<2.0	<2.0	<1.0	<1.0	NA	NA	NA	NA	NA	NA
Cadmium	<5.0	<5.0	<5.0	<4.0	<5.0	NA	NA	NA	NA	NA	NA
Calcium	61,000	63,000	64,000	66000	65000	NA	NA	NA	NA	NA	NA
Chromium	<10.0	<9.0	<9.0	<7.0	<7.0	NA	NA	NA	NA	NA	NA
Cobalt	<0.20	<29.0	<29.0	<13.0	<10	NA	NA	NA	NA	NA	NA
Copper	44	23	26	31	26	NA	NA	NA	NA	NA	NA
Iron	280	57	69	190	100	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	14,000	15,000	15,000	18,000	16,000	NA	NA	NA	NA	NA	NA
Manganese	8.8	4.7	5.1	5.7	4.9	NA	NA	NA	NA	NA	NA
Molybdenum	<22.0	<27.0	<27.0	<24.0	<17.0	NA	NA	NA	NA	NA	NA
Nickel	<37.0	<22.0	<22.0	45	<36.0	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	<76	<4.0	<4.0	<6.0	<3.0	NA	NA	NA	NA	NA	NA
Sodium	44,000	45,000	35,000	50,000	45,000	NA	NA	NA	NA	NA	NA
Strontium	53	510	500	590	510	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	<36.0	<34.0	<34.0	16	<17.0	NA	NA	NA	NA	NA	NA
Zinc	41	19	38	50	49	NA	NA	NA	NA	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 883-1 09-80	FD 883-1 03-81	FD 883-1 09-81	FD 883-1 04-12-88	FD 883-1 07-26-88	FD 883-1 10-04-88	FD 883-1 09-15-89	FD 883-1 12-17-89	FD 883-1 05-05-91	BS 887-1 07-79	BS 887-1 03-80
RADIONUCLIDES											
Gross Alpha (pCi/L)	34	38	7	20[±16]	18[±13]	18[±20]	10[±14]	20[±14]	5[±1]	674	220
Gross Beta (pCi/L)	2	23	8	18[±29]	12[±25]	14[±22]	1[±17]	3[±16]	8[±1]	NA	324
Tritium (pCi/L)	1,040	881	328	NA	NA	NA	NA	NA	NA	NA	NA
WATER QUALITY PARAMETERS											
Conductivity (µS/cm)	576	297	177	1,055	456	548	11,300	501	519	182	2,600
Total Dissolved Solids (mg/L)	408	122	150	664	290	314	854	322	304	1,339	1,951
pH	7.0	6.9	6.7	7.8	NA	8.7	7.7	7.8	NA	8.1	9.4
Nitrate as Nitrogen (mg/L)	13.2	2.9	1.7	4.4	0.98	2.37	7.4	2.48	2.94	4.7	2.5
METALS BY AA											
Arsenic	NA	NA	NA	NA	<5	<5	6.8	1.8	NA	NA	NA
Lead	NA	NA	NA	NA	6	17	3.2	34	NA	NA	NA
Mercury	NA	NA	NA	NA	1.7	<0.2	<0.2	<0.2	NA	NA	NA
Potassium	NA	NA	NA	NA	5,000	5,500	4,020	9,550	NA	NA	NA
Selenium	NA	NA	NA	NA	<5	<5	1.1	7.3	NA	NA	NA
Thallium	NA	NA	NA	NA	<10	<10	<1.0	<1.0	NA	NA	NA
HSL METALS BY ICP											
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Total	Total	Total	Total	Total	Unknown	Unknown
Aluminum	NA	NA	NA	NA	NA	1,300	1,300	2,700	520	NA	NA
Antimony	NA	NA	NA	NA	NA	<34.0	<50.0	<55.0	<34.0	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	<131	NA	NA
Barium	NA	NA	NA	NA	NA	120	230	140	94	NA	NA
Beryllium	NA	NA	NA	NA	NA	<1.0	<2.0	<1.0	<1.0	NA	NA
Cadmium	NA	NA	NA	NA	NA	<5.0	<5.0	9.1	3.7	NA	NA
Calcium	NA	NA	NA	NA	NA	63,000	140,000	50,000	55,000	NA	NA
Chromium	NA	NA	NA	NA	NA	18	<9.0	16	<7.0	NA	NA
Cobalt	NA	NA	NA	NA	NA	<22.0	<29.0	<13.0	<4.0	NA	NA
Copper	NA	NA	NA	NA	NA	16	8.9	29	11	NA	NA
Iron	NA	NA	NA	NA	NA	1,400	1,000	2,800	370	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	<73.0	NA	NA
Magnesium	NA	NA	NA	NA	NA	18,000	27,000	14,000	12,000	NA	NA
Manganese	NA	NA	NA	NA	NA	180	26	180	31	NA	NA
Molybdenum	NA	NA	NA	NA	NA	<22.0	<27.0	<24.0	<9.0	NA	NA
Nickel	NA	NA	NA	NA	NA	<37.0	<22.0	<36.0	<9.0	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	4,200	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	<76.0	NA	NA
Silver	NA	NA	NA	NA	NA	<7.6	<4.0	<6.0	<6.0	NA	NA
Sodium	NA	NA	NA	NA	NA	44,000	63,000	53,000	32,000	NA	NA
Strontium	NA	NA	NA	NA	NA	630	1,000	480	420	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	<164	NA	NA
Vanadium	NA	NA	NA	NA	NA	<36.0	<34.0	<15.0	<10.0	NA	NA
Zinc	NA	NA	NA	NA	NA	820	93	1,300	200	NA	NA

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD 991-1 05-78	FD 991-1 03-80	FD 991-1 06-80	FD 991-1 09-80	991 DRAINS 05-02-89	995 EFF 05-02-89	995 EFF 05-12-89	Background 99/99 UTL Groundwater Upper HSU	Background 99/99 UTL Surface Water (Sitewide)	Background 99/99 UTL Seeps/Springs Upper HSU
RADIONUCLIDES										
Gross Alpha (pCi/L)	14	24	15	16	20[±15]	NA	NA	390.6	28.1	340.1
Gross Beta (pCi/L)	NA	-2	37	16	36[±25]	NA	NA	221.3	30.4	9.7
Tritium (pCi/L)	NA	550	562	872	NA	NA	NA	13,539.2	711.9	4,277.8
WATER QUALITY PARAMETERS										
Conductivity (µS/cm)	455	770	235	147	NA	NA	NA	n/r	n/r	n/r
Total Dissolved Solids (mg/L)	293	492	136	98	NA	NA	NA	1,082,479.4	302,280.7	813,806.8
pH	7.4	7.6	6.9	6.3	NA	NA	NA	--	9.3	8.6
Nitrate as Nitrogen (mg/L)	1	1	1.2	2.3	0.86	NA	NA	n/r	n/r	n/r
METALS BY AA										
Arsenic	NA	NA	NA	NA	NA	NA	NA	5.9	5.8	675.7
Lead	NA	NA	NA	NA	NA	NA	NA	11.8	7.4	745.1
Mercury	NA	NA	NA	NA	NA	NA	NA	0.2	n/r	n/r
Potassium	NA	NA	NA	NA	NA	NA	NA	4,472.7	4,167.1	13,071.5
Selenium	NA	NA	NA	NA	NA	NA	NA	48.0	6.3	15.6
Thallium	NA	NA	NA	NA	NA	NA	NA	5.8	n/r	n/r
HSL METALS BY ICP										
Total or Dissolved Conc.	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Total	Total	Total
Aluminum	NA	NA	NA	NA	3,130	160	300	12,642.3	3,892.8	166,871.0
Antimony	NA	NA	NA	NA	<34.0	<34.0	<34.0	49.1	n/r	411.9
Arsenic	NA	NA	NA	NA	NA	NA	NA	5.9	5.8	675.7
Barium	NA	NA	NA	NA	570	20	11	208.1	138.1	6,252.0
Beryllium	NA	NA	NA	NA	2.1	<1.0	<1.0	n/r	n/r	13.9
Cadmium	NA	NA	NA	NA	32.1	9.5	<5.0	n/r	n/r	67.3
Calcium	NA	NA	NA	NA	96,000	NA	NA	128,816.2	49,464.7	500,177.2
Chromium	NA	NA	NA	NA	15	18	<10.0	22.6	n/r	183.7
Cobalt	NA	NA	NA	NA	<0.20	<0.20	<0.20	n/r	n/r	346.7
Copper	NA	NA	NA	NA	23	<6.3	<6.3	39.1	17.0	359.2
Iron	NA	NA	NA	NA	15,000	160	150	14,654.5	7,926.8	1,811,483.7
Lead	NA	NA	NA	NA	NA	NA	NA	11.8	7.4	745.1
Magnesium	NA	NA	NA	NA	13,000	NA	NA	28,854.1	9,812.7	34,488.6
Manganese	NA	NA	NA	NA	630	31	22	331.6	885.3	17,658.3
Molybdenum	NA	NA	NA	NA	<22.0	<22.0	<22.0	116.0	n/r	165.5
Nickel	NA	NA	NA	NA	100	58	<37.0	32.7	n/r	438.8
Potassium	NA	NA	NA	NA	NA	NA	NA	4,472.7	4,167.1	13,017.5
Selenium	NA	NA	NA	NA	NA	NA	NA	48.0	6.3	15.6
Silver	NA	NA	NA	NA	<76	<76	<76	n/r	n/r	97.4
Sodium	NA	NA	NA	NA	20,000	NA	NA	123,327.8	33,817.2	27,834.1
Strontium	NA	NA	NA	NA	410	170	130	994.3	590.1	2,009.1
Thallium	NA	NA	NA	NA	NA	NA	NA	5.8	n/r	n/r
Vanadium	NA	NA	NA	NA	<36.0	<36.0	<36.0	46.6	28.8	1,002.9
Zinc	NA	NA	NA	NA	970	72	51	153.2	175.6	1,556.4

TABLE 4-3 (continued)
Foundation Drain and Building Sump Analytical Results
1977-1991
RADIONUCLIDES AND METALS
Rocky Flats Environmental Technology Site

LEGEND

NOTES: All results reported in micrograms per liter (µg/L).
< = Not detected; value shown is instrument detection limit.
n/r = not reported
B = Result is less than method detection limit but greater than instrument detection limit.
None of the data were validated.
UTL = Upper Tolerance Limit
Groundwater UTL is given for background groundwater from the upper hydrostratigraphic unit.

= Exceeds 99/99 UTL for surface water (sitewide)

= Exceeds 99/99 UTL for background groundwater, upper hydrostratigraphic unit and surface water (sitewide)

= Exceeds 99/99 UTL for background groundwater, upper hydrostratigraphic unit

= Exceeds 99/99 UTL for seeps/springs

= Exceeds 99/99 UTL for all three criteria

= Exceeds 99/99 UTL for background groundwater, upper hydrostratigraphic unit and seeps/springs

= Exceeds 99/99 UTL for surface water (sitewide) and seeps/springs

TABLE 4-4
Foundation Drain and Building Sump Analytical Results
1992-1993
METALS
Rocky Flats Environmental Technology Site

Sample ID	BS-111-2	BS-707-2	BS-707-2	BS-865-1	BS-865-1	BS-865-2	FD-883-1	FD-111-1	FD-371-3	FD-371-3	FD-371COMP
Date Collected	04-26-93	03-07-92	03-27-93	03-07-92	03-27-93	03-27-93	03-07-92	03-07-92	03-07-92	03-27-93	03-07-92
ALUMINUM	453	123 B	68 B	176 B	232	564	1,790	139 B	122 B	86 B	175 B
ANTIMONY	<24	<25	<24	<25	<24	<24	<25	<25	<25	<24	<25
ARSENIC	<1	19	18	<1	<1	<1	1 B	2 B	1 B	<1	<1
BARIUM	56 B	8 B	8 B	115 B	100 B	125 B	57 B	87 B	116 B	204	111 B
BERYLLIUM	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CADMIUM	<3	<4	<3	<4	4 B	<3	<4	<4	<4	<3	<4
CALCIUM	23,800	16,300	15,900	55,200	52,500	59,000	23,400	46,500	59,300	167,000	59,000
CHROMIUM	30	10	6 B	<7	<5	<5	10 B	<7	<7	<5	<7
COBALT	15 B	<7	<5	<7	<5	<5	<7	<7	<7	<5	<7
COPPER	49	18 B	19 B	6 B	12 B	12 B	7 B	<4	7 B	6 B	<4
IRON	3,290	168	77 B	125	314	835	1,450	632	441	3,110	195
LEAD	3	2 B	2 B	2 B	3	36	1 B	1 B	7	<1	7
MAGNESIUM	3,830 B	2,530 B	2,520 B	10,000	9,240	29,500	6,740	7,440	11,000	22,900	10,700
MANGANESE	18	3 B	4 B	21	8 B	93	56	125	230	957	163
MERCURY	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0	0	0	<0.2	0
MOLYBDENUM	<10	<12	<10	<12	<10	<10	<12	<12	<12	<10	<12
NICKEL	<13	<19	<13	<19	<13	<13	<19	<19	<19	<13	<19
POTASSIUM	39,000	49,300	61,000	4,230 B	5,900	2,100 B	4,220 B	2,710 B	4,690 B	6,880	3,310 B
SELENIUM	5 B	<1	<3	2 B	<3	<3	2 B	<1	1 B	<3	1 B
SILVER	320	<5	<5	<5	<5	<0.2	<5	<5	<5	<5	<5
SODIUM	19,500	70,100	79,500	31,400	40,500	54,800	19,300	28,500	26,900	29,500	27,000
STRONTIUM	143 B	78 B	79 B	414	385	789	214	229	365	1,040	338
THALLIUM	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
VANADIUM	<7	<11	<7	<11	<7	<7	<11	<11	<11	<7	<11
ZINC	108	42	30	31	35	77	257	45	39	9 B	44

TABLE 4-4
Foundation Drain and Building Sump Analytical Results
1992-1993
METALS
Rocky Flats Environmental Technology Site

Sample ID	FD-371MC	FD-444-460	FD-444-460	FD-559-561	FD-707-1	FD-771-1	FD-774-1	FD-883-1	FD-886-1	FD-886-2	FD-910
Date Collected	03-27-93	03-07-92	03-27-93	07-25-92	03-07-92	05-01-93	03-27-93	05-01-93	05-01-93	05-01-93	05-01-93
ALUMINUM	97 B	166 B	1,710	72 B	290	619	2,580	202	100 B	60 B	88 B
ANTIMONY	<24	<25	24	<21	<25	<24	<24	<24	<24	<24	<24
ARSENIC	20	<1	<1	<1	2 B	<1	2 B	<1	<1	<1	2 B
BARIUM	67 B	139 B	190 B	113 B	127 B	147 B	91 B	169 B	95 B	112 B	72 B
BERYLLIUM	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CADMIUM	<3	<4	<3	<5	<4	<3	<3	<2	<3	<3	<3
CALCIUM	24,300	85,900	88,200	89,500	67,800	76,100	53,100	115,000	52,400	56,100	60,900
CHROMIUM	<5	8 B	7 B	<5	<7	5 B	<5	<5	<5	<5	<5
COBALT	<5	<7	<5	<3	<7	<5	<5	<5	<5	<5	<5
COPPER	4 B	7 B	63	<5	5 B	3 B	12 B	<2	<2	<2	<2
IRON	37 B	113	918	32 B	812	498	1,840	110	119	25 B	39 B
LEAD	2 B	2 B	7	5	1 B	<1	6	2 B	2 B	<1	3 B
MAGNESIUM	1,900 B	11,500	12,400	12,500	14,400	14,000	9,540	27,000	19,900	18,000	15,000
MANGANESE	35	6 B	41	3 B	301	11 B	40	4 B	2 B	<1	7 B
MERCURY	<0.2	<0.2	<0.2	1	0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
MOLYBDENUM	16 B	<12	<10	<13	<12	<10	<10	<10	<10	<10	<10
NICKEL	<13	<19	<13	<24	<19	<13	<13	<13	<13	<13	<13
POTASSIUM	4,330 B	2,250 B	1,390 B	<966	4,340 B	14,300	10,500	2,160 B	3,930 B	4,080 B	2,070 B
SELENIUM	<3	<1	<3	<1	1 B	2 B	<3	2 B	5 B	4 B	2 B
SILVER	<5	<5	5	<2	<5	<5	<5	<5	<5	<5	<5
SODIUM	13,000	16,000	15,200	21,300	57,400	27,400	37,500	58,400	50,700	41,400	37,000
STRONTIUM	121 B	383	410	405	468	423	274	879	554	524	472
THALLIUM	<1	<1	<1	<1	<1	<1	2 B	<1	<1	<1	<1
VANADIUM	<7	<11	<7	<8	<11	<7	<7	<7	<7	<7	<7
ZINC	26	166	<399	22	233	88	154	61	93	72	12 B

TABLE 4-4
Foundation Drain and Building Sump Analytical Results
1992-1993
METALS
Rocky Flats Environmental Technology Site

Sample ID	FD-991-1		Groundwater	Surface Water	Seeps/Springs
Date Collected	04-26-93		99/99 UTL	99/99 UTL	99/99 UTL
ALUMINUM	99	B	12,642	3,893	166,871
ANTIMONY	<24		49	n/r	411.9
ARSENIC	<1		6	6	657.7
BARIUM	122	B	208	138	6,252.00
BERYLLIUM	<1		n/r	n/r	13.9
CADMIUM	<3		n/r	n/r	67.3
CALCIUM	82,300		128,816	49,465	500,177.20
CHROMIUM	<5		23	n/r	183.7
COBALT	<5		n/r	n/r	346.7
COPPER	17	B	39	17	359.2
IRON	138		14,655	7,927	1,811,483.70
LEAD	3		12	7	745.1
MAGNESIUM	24,100		28,854	9,813	34,488.60
MANGANESE	2	B	312	885	17,658.30
MERCURY	<0.2		0.2	n/r	n/r
MOLYBDENUM	<10		116	n/r	165.5
NICKEL	<13		33	n/r	438.3
POTASSIUM	8,180		4,473	4,167	13,017.50
SELENIUM	5	B	48	6	15.6
SILVER	<5		n/r	n/r	97.4
SODIUM	89,800		123,328	33,817	27,834.10
STRONTIUM	747		994	590	2,009.10
THALLIUM	<1		6	n/r	n/r
VANADIUM	7	B	47	29	1,002.90
ZINC	41		153	176	1,556.4

LEGEND

NOTES:
All results reported in micrograms per liter (µg/L).
< = Not detected; value shown is instrument detection limit.
n/r = not reported
B = Result is less than method detection limit but greater than instrument detection limit.
None of the data were validated.
UTL = Upper Tolerance Limit
Groundwater UTL is given for background groundwater from the upper hydrostratigraphic unit.

= Exceeds 99/99 UTL for surface water (sitewide)

= Exceeds 99/99 UTL for background groundwater, upper hydrostratigraphic unit and surface water (sitewide)

= Exceeds 99/99 UTL for background groundwater, upper hydrostratigraphic unit

= Exceeds 99/99 UTL for seeps/springs

= Exceeds 99/99 UTL for all three criteria

= Exceeds 99/99 UTL for background groundwater, upper hydrostratigraphic unit and seeps/springs

= Exceeds 99/99 UTL for surface water (sitewide) and seeps/springs

surface water as reported in the *Background Geochemical Characterization Report* (EG&G 1993a). Specifically, metal concentrations observed during the sampling events will be compared to the 99/99 UTLs. The 99/99 UTLs indicate the concentration below which 99 percent of the background surface water or groundwater samples will fall, given a 99 percent probability. This comparison may be useful for identifying storm drains and foundation drains that collect background water and those that collect affected groundwater or surface water.

The following discussions present a brief summary of the data observed from the foundation-drain and building-sump samples collected from 1977 to 1993. These data are color coded on Tables 4-3 and 4-4 to depict exceedances of the background groundwater, surface water, and seeps and springs UTLs.

4.2.1 Metals

Laboratory analysis for metals (arsenic, lead, mercury, potassium, selenium, and thallium) in foundation-drain and building-sump samples was first performed in 1988 using the atomic absorption furnace (AA) method. In 1989, the ICP screening method for aluminum, antimony, barium, beryllium, calcium, cadmium, cobalt, chromium, copper, iron, magnesium, manganese, molybdenum, nickel, silver, sodium, strontium, vanadium, and zinc was added to comprise the total analytical suite.

Most of the available records do not indicate whether the analytical results are for total or dissolved (unfiltered or filtered) metals. Most of the foundation-drain samples were probably analyzed for total metals, based on the fact that the reported metals concentrations are relatively consistent, total dissolved solids concentrations are relatively consistent, and all of the documented samples were analyzed for total metals. Table 4-3 notes whether each sample was analyzed for total or dissolved metals, if known. Foundation-drain samples are currently analyzed for total metals.

Aluminum was detected in all of 100 samples analyzed from 1988 to 1993, at values ranging from 38 to 26,000 micrograms per liter (μg/L). Aluminum concentrations exceeded the background surface water 99/99 UTL (3,893 μg/L) several times during this period as illustrated in Tables 4-3 and 4-4. The background groundwater 99/99 UTL (12,642 μg/L) was also exceeded three times during this period. The background seeps and springs 99/99 UTL (166,871 μg/L) was not exceeded. Aluminum can be derived from corrugated pipe or other anthropogenic materials.

Antimony was detected in seven of 100 samples collected from 1988 to 1993, at concentrations ranging from 24 to 45 μg/L. The background groundwater 99/99 UTL was not exceeded, and a 99/99 UTL for background surface water was not available for comparison. None of the observed concentrations exceeded the seeps and springs UTL (411.9 μg/L).

Arsenic was detected in 41 of 109 samples collected from 1988 to 1993. Arsenic values ranged from 1 to 1,400 μg/L. Eighteen of the arsenic concentrations exceeded the 99/99 UTLs for background surface water (5.84 μg/L) and 17 values exceeded the groundwater 99/99 UTL (5.93 μg/L). Two of the observed concentrations for arsenic exceeded the 99/99 UTL for seeps and springs (657.7 μg/L).

Barium was detected in all of the 100 samples collected from 1977 to 1993. Of the 100 samples, 44 of the values exceeded the background surface water 99/99 UTL (138 μg/L). Nine of these concentrations exceeded the background groundwater 99/99 UTL (208 μg/L), but none exceeded the seeps and springs UTL (6,252 μg/L).

Beryllium was detected in three of 100 samples from 1988 to 1993. No 99/99 UTLs for groundwater or surface water were available in the *Background Geochemical Characterization Report* (EG&G 1993a) for comparison. None of the observed concentrations for beryllium exceeded the 99/99 UTL for seeps and springs (13.9 μg/L).

Cadmium concentrations were also generally low. This metal was detected in 14 of 100 samples collected from 1988 to 1993 at concentrations ranging from 3.1 to 32.1 μg/L. No 99/99 UTLs for groundwater or surface water were available for cadmium in the *Background Geochemical Characterization Report* (EG&G 1993a) for comparison. The 99/99 UTL for seeps and springs was exceeded once at FD-865-1 (71 μg/L, June 1989).

Chromium was detected at concentrations ranging from 0.03 to 13,000 μg/L in 35 of 102 samples collected from 1988 to 1993. Nine chromium concentrations exceeded 99/99 UTLs for background groundwater (22.58 μg/L). The background UTL (183.7 μg/L) for seeps and springs was exceeded once at FD-444-460 (13,000 μg/L, April 1989). Background surface water 99/99 UTLs were not available for comparison.

During the 1993 sampling event, cobalt was detected once in the 100 samples collected from 1988 to 1993 at 14.7 μg/L in BS-111-2 . However, cobalt was also detected in the laboratory blank for this sample. The *Background Geochemical Characterization Report* (EG&G 1993a) did not report 99/99 UTLs for cobalt in background surface water or groundwater. The 99/99 UTL (346.7 μg/L) for seeps and springs was not exceeded.

Copper was detected in 74 of 100 samples collected from 1977 through 1993, in concentrations ranging from 3.0 to 360 μg/L. Background surface water (16.95 μg/L) and groundwater (39.12 μg/L) 99/99 UTLs were exceeded 34 and 13 times, respectively, during this time period. The background 99/99 UTL for seeps and springs was exceeded once at FD-774-1 (360 μg/6, April 1989).

Iron has been ubiquitous in building-sump and foundation-drain waters. It was detected in all of the 78 samples analyzed from 1988 to 1991, at concentrations ranging from 49 to 740,000 μg/L. Iron concentrations exceeded 99/99 UTLs for background surface water (7,927 μg/L) and groundwater (14,655 μg/L) at FD-371-3 (64,000 μg/L, December 1988; 740,000 μg/L,

September 1989; 95,000 μg/L, December 1989), at FD-516-1 (15,000 μg/L, October 1988; 24,000 μg/L, April 1989), and at FD-774-1 (20,000 μg/L, April 1989) and at 991 Drains (15,000 μg/L, May 1989). The element was also detected in all samples analyzed from 1992 to 1993. Iron concentrations in foundation-drain and building-sump samples ranged from 25.4 to 3,290 μg/L and did not exceed background 99/99 UTLs.

Lead was not detected in any of the 11 samples analyzed by ICP from 1989 to 1991 but was detected in 65 of the 88 samples analyzed by AA from that period. Concentrations ranged from 1.6 to 363 μg/L. Lead was also detected in 20 of 23 samples from 1992 to 1993, with the highest concentration (36 μg/L) at BS-865-2 (March 1993). Other samples collected during this period contained less than 7 μg/L lead. The background surface water (7.36 μg/L) and groundwater (11.75 μg/L) 99/99 UTLs were exceeded 30 and 19 times, respectively. The background seeps and springs 99/99 UTL was never exceeded.

Manganese was detected in all except two of the samples analyzed during the 1977 to 1993 period. Concentrations ranged from 3.3 to 14,000 μg/L. Seven manganese concentrations exceeded the 99/99 UTLs for background surface water (885 μg/L) and 15 concentrations exceeded the groundwater 99/99 UTL (332 μg/L). No manganese concentrations exceeded the background seeps and springs UTL (17,658.3 μg/L).

Mercury was detected in 20 of 109 samples collected from 1977 to 1993. Mercury values ranged from 0.2 to 80 μg/L. Mercury concentrations exceeded the 99/99 UTL for groundwater 18 times during this time. No surface water or seeps and springs 99/99 UTL was available for comparison.

Molybdenum was detected in only three of the 100 samples from 1988 to 1993, at concentrations ranging from 22 to 66 μg/L. The 99/99 UTL for background groundwater (116.04 μg/L) and background seeps and springs (165.5 μg/L) were not exceeded. In addition, the seeps and

springs UTL (165.5 μg/L) was not exceeded. No surface water UTL was available for comparison.

Nickel was detected in seven of 100 samples collected from 1977 to 1993, at concentrations ranging from 36 to 100 μg/L. The background groundwater 99/99 UTL (33 μg/L) was exceeded six times during this period. The seeps and springs UTL (438.3 μg/L) was not exceeded. No surface water UTL exists for this compound.

Selenium was not detected in any of the 11 samples analyzed by ICP from 1989 to 1991 but was detected in 17 of the 87 samples analyzed by AA during that period. All results were well below the 99/99 UTLs for background groundwater (47.99 μg/L) and background seeps and springs (15.6 μg/L). The background surface water 99/99 UTL (6.33 μg/L) was exceeded only at BS-883-1 (7.3 μg/L, December 1989). Selenium was detected in 12 of 23 samples from 1992 to 1993, at concentrations ranging from 1 μg/L to 4.7 μg/L.

Silver was detected only twice in the 101 foundation-drain and building-sump samples analyzed during the 1988 to 1993 period (Tables 4-3 and 4-4). Silver was detected in water from two samples (BS-111-2, 320 μg/L and FD-444-460, 5 μg/L). The *Background Geochemical Characterization Report* (EG&G 1993a) did not report 99/99 UTLs for silver in background surface water or groundwater. However, the background 99/99 UTL for silver in seeps and springs (97.4 μg/L) was exceeded at BS-111-2 (320 μg/L, April 1993).

Strontium was observed in all of the 100 samples collected from 1977 to 1993 in concentrations ranging from 13 to 1,100 μg/L. The background surface water 99/99 UTL (590 μg/L) was exceeded 22 times during this period, and the groundwater UTL (994 μg/L) was exceeded three times. None of the reported values exceeded the background seeps and springs UTL (2,009.1 μg/L).

Thallium was detected in one of 87 samples collected from 1988 to 1991 and analyzed by AA. Sample BS-707-2 (December 1989) contained 1.1 μg/L, well below the background groundwater 99/99 UTL (5.77 μg/L). None of the 11 samples analyzed from 1988 to 1991 by ICP contained detectable concentrations of thallium. One of 23 samples collected from 1992 to 1993 contained detectable thallium. Sample FD-774-1 contained 2 μg/L, but the metal was also detected in the laboratory blank associated with this sample. The *Background Geochemical Characterization Report* (EG&G 1993a) did not report UTLs for thallium in background surface water or seeps and springs.

Vanadium was detected 12 times in the 100 samples collected from 1977 to 1993. The vanadium was detected in concentrations ranging from 16 to 76 μg/L. The background surface water 99/99 UTL (29 μg/L) was exceeded six times during this period, and the groundwater UTL (47 μg/L) was exceeded only three times. The seeps and springs UTL (1,002.9 μg/L) was not exceeded for this compound.

Zinc was detected in every sample for which it was analyzed from 1988 to 1993. Zinc concentrations ranged from 11 to 7,300 μg/L. The background surface water (176 μg/L) and groundwater (153 μg/L) 99/99 UTLs were exceeded at 35 and 36 times, respectively. The background seeps and springs UTL (1,556.4 μg/L) was exceeded three times at FD-444-460 (1,700 μg/L, April 1989), at FD-516-1 (1,900 μg/L, June 1989), and at FD-774-1 (7,300 μg/L, April 1989).

Foundation-drain and building-sump samples commonly exceeded background 99/99 UTLs for calcium (approximately 75 percent were above), sodium (approximately 60 percent were above), potassium, and magnesium (approximately 75 percent were above), as indicated in Tables 4-3 and 4-4.

4.2.2 Radionuclides

Screening analyses for radionuclides have been performed on building-sump and foundation-drain samples since at least 1977. From 1988 to 1991, gross alpha counts ranged from -8 to 7,900 picocuries per liter (pCi/L) in 234 samples collected from building sumps, foundation drains, and trenches (Table 4-3). Gross beta values ranged from -19 to 760 pCi/L in 174 samples, and tritium counts ranged from -99 to 4,681 pCi/L in 57 samples collected during that period.

Foundation-drain and building-sump samples collected during 1992 and 1993 yielded gross alpha counts ranging from 0.20 ($\pm$0.6) to 16 ($\pm$2) pCi/L and gross beta from 1.50 ($\pm$1.5) to 61 ($\pm$4) pCi/L. Samples apparently were not analyzed for tritium during this period. The results are summarized in Table 4-5 and the maximum radionuclide measurements observed in March through May 1993 are plotted in Figure 4-1.

Background groundwater (391 pCi/L) and background seeps and springs (340 pCi/L) UTLs were exceeded at BS-707-3 (7,900 pCi/L, September 1981) and at BS-887-1 (674 pCi/L, July 1979). The background seeps and springs UTL (340 pCi/L) was also exceeded at BS-444 (350 pCi/L, January 22, 1991). The 99/99 UTL for gross alpha counts in background surface water (28 pCi/L) was exceeded in 57 of 234 samples collected from 1977 to 1991 (Table 4-3). Samples collected during 1992 and 1993 did not exceed the groundwater, seeps and springs, and surface water 99/99 UTLs for gross alpha. Gross beta counts exceeded background surface water 99/99 UTL at BS-111-2 (32 pCi/L, April 1993) and at BS-707-2 (45 pCi/L, March 1992; 61 pCi/L, March 1993). The background groundwater 99/99 UTL for gross beta was not exceeded in foundation-drain and building-sump samples collected during 1992 and 1993. The 99/99 UTL for gross beta counts in background seeps and springs (9.74 pCi/L) was exceeded in 106 of 174 samples collected from 1971 to 1991 (Table 4-3).

TABLE 4-5
Foundation Drain and Building Sump Analytical Results
1992-1993
RADIONUCLIDES
Rocky Flats Environmental Technology Site

LOCATION	BS-111-2	BS-707-2	BS-707-2	BS-865-1	BS-865-1	BS-865-2	BS-883-1	FD-111-1	FD-371-3
DATE	04-26-93	03-07-92	03-27-93	03-07-92	03-27-93	03-27-93	03-07-92	03-07-92	03-07-92
GROSS ALPHA (pCi/L)	0.50	4.00	5.00	4.00	6.00	12.00	6.00	1.00	7.00
ERROR	1.2	1	2	1	2	2	1	1	2
GROSS BETA (pCi/L)	32.00	45.00	61.00	6.00	8.00	9.00	8.00	4.00	6.00
ERROR	4	3	4	1	2	2	1	1	2

LOCATION	FD-371-3	FD-371-3	FD-371-3	FD-371-3	FD-371-3	FD-371-3	FD-371-3	FD-371-3	FD-371-3
DATE	06-05-92	06-06-92	06-07-92	06-08-92	06-09-92	06-17-92	06-24-92	07-01-92	07-08-92
GROSS ALPHA (pCi/L)	4.90	4.40	4.70	3.10	1.30	1.70	0.58	1.40	1.20
ERROR	3	2.9	3.1	2.9	2.6	2.7	2.5	2.6	2.7
QUALIFIER	X	X	X	UX	UX	U	U	U	U
DETECTION LIMIT	3	3	4	4	4	4	4		4
GROSS BETA (pCi/L)	1.50	4.00	4.80	2.50	5.40	3.80	6.10	4.70	6.60
ERROR	1.5	1.6	1.4	1.6	1.5	1.5	1.6	1.5	1.5
QUALIFIER	UX	X	X	JX		J			
DETECTION LIMIT	2	2	2	2	2	2	2	2	2
NOTES						dissolved	dissolved	dissolved	dissolved

LOCATION	FD-371-3	FD-371COMP	FD-371MC	FD-444-460	FD-444-460	FD-559-561	FD-707-1	FD-771-1	FD-774-1
DATE	03-27-93	03-07-92	03-27-93	03-07-92	03-27-93	07-25-92	03-07-92	05-01-93	03-27-93
GROSS ALPHA (pCi/L)	8.00	6.00	0.20	2.00	2.00	3.00	6.00	5.00	9.00
ERROR	3	2	0.6	1	1	1	3	2	2
GROSS BETA (pCi/L)	10.00	6.00	4.00	3.00	2.00	2.00	8.00	16.00	15.00
ERROR	4	2	1	1	2	1	6	4	2

LOCATION	FD-883-1	FD-886-1	FD-886-2	FD-910	FD-991-1
DATE	05-01-93	05-01-93	05-01-93	05-01-93	04-26-93
GROSS ALPHA (pCi/L)	8.00	16.00	12.00	5.00	9.00
ERROR	2	2	2	1	4
GROSS BETA (pCi/L)	5.00	6.00	5.00	4.00	9.00
ERROR	2	2	1	2	8

NOTES:

GRRASP = General Radiochemistry and Routine Analytical Services Protocol

J = Estimated value, less than sample detection limit

U = Undetected: result was below the instrument detection limit

X = Result by calculation-GRRASP

= Exceeds 99/99 Upper Tolerance Limit for background surface water and seeps/springs

4.2.3 Volatile and Semivolatile Organic Compounds

Most foundation-drains and building-sump samples had been analyzed for VOCs and SVOCs only once before November 1993. VOCs were detected in samples from 11 of 19 sampling stations. Analytical results for VOCs and SVOCs for samples collected from 1990 through 1993 are given in Tables 4-6 and 4-7, respectively. Figure 4-2 illustrates the VOC and SVOC concentrations observed for sampling events conducted in March and June 1993.

The analytical result for acetone exceeded the range of the laboratory instrument for a sample from BS-111-2 (490 μg/L, April 1993). Bis(2-ethylhexyl)phthalate was detected in nine samples, at values ranging from 1 (estimated and detected in the laboratory blank) to 22 μg/L. However, the compound was also detected in the associated trip blank (FD-910-TB) at 23 μg/L. Carbon tetrachloride was detected in samples from FD-559-561 in July 1992 (220 μg/L) and March 1993 (320 μg/L), and from FD-771-1 (43 μg/L, May 1993). The VOC chloroform was detected in foundation-drain water from stations BS-111-2 (30 μg/L, April 1993), FD-559-561 (6 μg/L, July 1992; 8 μg/L, March 1993), FD-771-1 (45 μg/L, May 1993), and FD-910 (20 μg/L, May 1993). Methylene chloride was detected in low concentrations in samples collected from BS-111-2 (1 μg/L, March 1993), BS-865-2 (0.4 μg/L, March 1993), FD-371-3 (0.4 μg/L, March 1993), FD-371-MC (0.5 μg/L, March 1993), FD-444-460 (0.5 μg/L, March 1993), FD-559-561 (2 μg/L, March 1993), FD-771-1 (1 μg/L, May 1993), FD-886-1 (0.2 μg/L, June 1993), and FD-991-1 (1 μg/L, April 1993). In every case, methylene chloride was also detected in the laboratory blank sample and detected below the method detection limit in these samples. Tetrachloroethene was detected in samples collected from FD-883-1 (6 μg/L, May 1993), FD-771-1 (1 μg/L, May 1993), and FD-559-561 (15 μg/L, July 1992).

Volatile compounds including 1,1,1-trichloroethane (13 μg/L, July 1992; 20 μg/L, March 1993); 1,1,2,2-tetrachloroethane (23 μg/L, March 1993); 1,1-dichloroethane (3 μg/L, July 1992; 6 μg/L, March 1993); 1,1-dichloroethene (48 μg/L, July 1992; 74 μg/L, March 1993);

TABLE 4-6
Foundation Drain and Building Sump Analytical Results 1990-1993
Volatile Organic Compounds
Operable Unit 8
Rocky Flats Environmental Technology Site

SAMPLE ID	BS-111-2	BS-707-2	BS-865-1	BS-865-2	FD-371MC	FD-371-3	FD-444-460
DATE COLLECTED	04-26-93	03-27-93	03-27-93	03-27-93	03-27-93	03-27-93	03-27-93
1,1,1,2-TETRACHLOROETHANE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,1,1-TRICHLOROETHANE	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	<5	<5	<5	<5	<5	<5	<5
1,1,2-TRICHLOROETHANE	<5	<5	<5	<5	<5	<5	<5
1,1-DICHLOROETHANE	<5	<5	<5	<5	<5	<5	<5
1,1-DICHLOROETHENE	<5	<5	<5	<5	<5	<5	<5
1,1-DICHLOROPROPENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2,3-TRICHLOROBENZENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2,3-TRICHLOROPROPANE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2-DIBROMOETHANE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2-DICHLOROETHANE	<5	<5	<5	<5	<5	<5	<5
1,2-DICHLOROETHENE	<5	<5	<5	<5	<5	<5	<5
1,2-DICHLOROPROPANE	<5	<5	<5	<5	<5	<5	<5
1,3-DICHLOROPROPANE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,2-DICHLOROPROPANE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-BUTANONE	<10	<10	<10	<10	<10	<10	<10
2-HEXANONE	<10	<10	<10	<10	<10	<10	<10
4-METHYL-2-PENTANONE	<10	<10	<10	<10	<10	<10	<10
ACETONE	490 E	<10	<10	<10	<10	<10	<10
BENZENE	<5	<5	<5	<5	<5	<5	<5
BENZENE, 1,2,4-TRIMETHYL	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BENZENE, 1,3,5-TRIMETHYL	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BROMOBENZENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BROMOCHLOROMETHANE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BROMODICHLOROMETHANE	2 J	<5	<5	<5	<5	<5	<5
BROMOFORM	<5	<5	<5	<5	<5	<5	<5
BROMOMETHANE	<10	<10	<10	<10	<10	<10	<10
CARBON DISULFIDE	<5	<5	<5	<5	<5	<5	<5
CARBON TETRACHLORIDE	<5	<5	<5	<5	<5	<5	<5
CHLOROBENZENE	<5	<5	<5	<5	<5	<5	<5
CHLOROETHANE	<10	<10	<10	<10	<10	<10	<10
CHLOROFORM	30	<5	<5	<5	<5	<5	<5
CHLOROMETHANE	<10	<10	<10	<10	<10	<10	<10
cis-1,2-DICHLOROETHENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
cis-1,3-DICHLOROPROPENE	<5	<5	<5	<5	<5	<5	<5
CUMENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DIBROMOCHLOROMETHANE	<5	<5	<5	<5	<5	<5	<5
DIBROMOMETHANE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DICHLORODIFLUOROMETHANE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ETHYLBENZENE	<5	<5	<5	<5	<5	<5	<5
METHYLENE CHLORIDE	1 BJ	<5	<5	0.4 BJ	0.5 BJ	0.4 BJ	0.5 BJ
m + *p* XYLENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
n-BUTYLBENZENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
n-PROPYLBENZENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
o-CHLOROTOLUENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
o-XYLENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PROPANE, 1,2-DIBROMO-3-CHLORO	N/A	N/A	N/A	N/A	N/A	N/A	N/A
p-CHLOROTOLUENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
p-CYMENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
sec-BUTYLBENZENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STYRENE	<5	<5	<5	<5	<5	<5	<5
tert-BUTYLBENZENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TETRACHLOROETHENE	<5	<5	<5	<5	<5	<5	<5
TOLUENE	<5	<5	<5	<5	<5	<5	<5
TOTAL XYLENES	<5	<5	<5	<5	<5	<5	<5
trans-1,2-DICHLOROETHENE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
trans-1,3-DICHLOROPROPENE	<5	<5	<5	<5	<5	<5	<5
TRICHLOROETHENE	<5	<5	<5	<5	<5	<5	<5
TRICHLOROFLUOROMETHANE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VINYL ACETATE	<10	<10	<10	<10	<10	<10	<10
VINYL CHLORIDE	<10	<10	<10	<10	<10	<10	<10

TABLE 4-6
Foundation Drain and Building Sump Analytical Results 1990-1993
Volatile Organic Compounds
Operable Unit 8
Rocky Flats Environmental Technology Site

SAMPLE ID	FD-559-561	FD-559-561	FD-771-1	FD-774-1	FD-883-1	FD-886-1	FD-886-1
DATE COLLECTED	07-25-92	03-09-93	05-01-93	03-27-93	05-01-93	06-25-93	05-01-93
1,1,1,2-TETRACHLOROETHANE	N/A	N/A	N/A	N/A	N/A	<1	N/A
1,1,1-TRICHLOROETHANE	13	20	<5	<5	<5	<1	<5
1,1,2,2-TETRACHLOROETHANE	<5	23	<5	<5	<5	<1	<5
1,1,2-TRICHLOROETHANE	<5	<5	<5	<5	<5	<1	<5
1,1-DICHLOROETHANE	3 J	6 J	<5	<5	<5	<1	<5
1,1-DICHLOROETHENE	48	74	<5	<5	<5	<1	<5
1,1-DICHLOROPROPENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
1,2,3-TRICHLOROBENZENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
1,2,3-TRICHLOROPROPANE	N/A	N/A	N/A	N/A	N/A	<1	N/A
1,2-DIBROMOETHANE	N/A	N/A	N/A	N/A	N/A	<1	N/A
1,2-DICHLOROETHANE	<5	<5	<5	<5	<5	<1	<5
1,2-DICHLOROETHENE	<5	17 J	<5	<5	<5	N/A	<5
1,2-DICHLOROPROPANE	<5	<5	<5	<5	<5	<1	<5
1,3-DICHLOROPROPANE	N/A	N/A	N/A	N/A	N/A	<1	N/A
2,2-DICHLOROPROPANE	N/A	N/A	N/A	N/A	N/A	<1	N/A
2-BUTANONE	<10	<10	<10	<10	<10	N/A	<10
2-HEXANONE	<10	<10	<10	<10	<10	N/A	<10
4-METHYL-2-PENTANONE	<10	<10	<10	<10	<10	N/A	<10
ACETONE	<10	<10	<10	<10	<10	N/A	<10
BENZENE	<5	<5	<5	<5	<5	<1	<5
BENZENE, 1,2,4-TRIMETHYL	N/A	N/A	N/A	N/A	N/A	<1	N/A
BENZENE, 1,3,5-TRIMETHYL	N/A	N/A	N/A	N/A	N/A	<1	N/A
BROMOBENZENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
BROMOCHLOROMETHANE	N/A	N/A	N/A	N/A	N/A	<1	N/A
BROMODICHLOROMETHANE	<5	<5	<5	<5	<5	<1	<5
BROMOFORM	<5	<5	<5	<5	<5	<1	<5
BROMOMETHANE	<10	<10	<10	<10	<10	<1	<10
CARBON DISULFIDE	<5	<5	<5	<5	<5	N/A	<5
CARBON TETRACHLORIDE	220	320	43	<5	<5	<1	<5
CHLOROBENZENE	<5	<5	<5	<5	<5	<1	<5
CHLOROETHANE	<10	<10	<10	<10	<10	<1	<10
CHLOROFORM	6	8 J	45	<5	<5	<1	<5
CHLOROMETHANE	<10	<10	<10	<10	<10	<1	<10
cis-1,2-DICHLOROETHENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
cis-1,3-DICHLOROPROPENE	<5	<5	<5	<5	<5	<1	<5
CUMENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
DIBROMOCHLOROMETHANE	<5	<5	<5	<5	<5	<1	<5
DIBROMOMETHANE	N/A	N/A	N/A	N/A	N/A	<1	N/A
DICHLORODIFLUOROMETHANE	N/A	N/A	N/A	N/A	N/A	<1	N/A
ETHYLBENZENE	<5	<5	<5	<5	<5	<1	<5
METHYLENE CHLORIDE	<5	2 BJ	1 BJ	<5	<5	0.2 BJ	<5
m+p XYLENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
n-BUTYLBENZENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
n-PROPYLBENZENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
o-CHLOROTOLUENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
o-XYLENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
PROPANE, 1,2-DIBROMO-3-CHLORO	N/A	N/A	N/A	N/A	N/A	<1	N/A
p-CHLOROTOLUENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
p-CYMENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
sec-BUTYLBENZENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
STYRENE	<5	<5	<5	<5	<5	<1	<5
tert-BUTYLBENZENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
TETRACHLOROETHENE	15	<5	1 J	<5	6	<1	<5
TOLUENE	<5	<5	<5	<5	<5	<1	<5
TOTAL XYLENES	<5	<5	<5	<5	<5	N/A	<5
trans-1,2-DICHLOROETHENE	N/A	N/A	N/A	N/A	N/A	<1	N/A
trans-1,3-DICHLOROPROPENE	<5	<5	<5	<5	<5	<1	<5
TRICHLOROETHENE	160	160	<5	<5	<5	<1	<5
TRICHLOROFLUOROMETHANE	N/A	N/A	N/A	N/A	N/A	<1	N/A
VINYL ACETATE	<10	<10	<10	<10	<10	N/A	<10
VINYL CHLORIDE	<10	<10	<10	<10	<10	<1	<10

TABLE 4-6
Foundation Drain and Building Sump Analytical Results 1990-1993
Volatile Organic Compounds
Operable Unit 8
Rocky Flats Environmental Technology Site

SAMPLE ID	FD-886-2	FD-886-2	FD-910	FD-991-1	DSUMP
DATE COLLECTED	05-01-93	06-25-93	05-01-93	04-26-93	05-03-90
1,1,1,2-TETRACHLOROETHANE	N/A	<1	N/A	N/A	<5
1,1,1-TRICHLOROETHANE	<5	<1	<5	<5	N/A
1,1,2,2-TETRACHLOROETHANE	<5	<1	<5	<5	<5
1,1,2-TRICHLOROETHANE	<5	<1	<5	<5	<5
1,1-DICHLOROETHANE	<5	<1	<5	<5	<5
1,1-DICHLOROETHENE	<5	<1	<5	<5	<5
1,1-DICHLOROPROPENE	N/A	<1	N/A	N/A	N/A
1,2,3-TRICHLOROBENZENE	N/A	<1	N/A	N/A	N/A
1,2,3-TRICHLOROPROPANE	N/A	<1	N/A	N/A	N/A
1,2-DIBROMOETHANE	N/A	<1	N/A	N/A	N/A
1,2-DICHLOROETHANE	<5	<1	<5	<5	<5
1,2-DICHLOROETHENE	<5	N/A	<5	<5	250 E
1,2-DICHLOROPROPANE	<5	<1	<5	<5	<5
1,3-DICHLOROPROPANE	N/A	<1	N/A	N/A	N/A
2,2-DICHLOROPROPANE	N/A	<1	N/A	N/A	N/A
2-BUTANONE	<10	N/A	<10	<10	<10
2-HEXANONE	<10	N/A	<10	<10	<10
4-METHYL-2-PENTANONE	<10	N/A	<10	<10	<10
ACETONE	<10	N/A	<10	<10	<10
BENZENE	<5	<1	<5	<5	<5
BENZENE, 1,2,4-TRIMETHYL	N/A	<1	N/A	N/A	N/A
BENZENE, 1,3,5-TRIMETHYL	N/A	<1	N/A	N/A	N/A
BROMOBENZENE	N/A	<1	N/A	N/A	N/A
BROMOCHLOROMETHANE	N/A	<1	N/A	N/A	N/A
BROMODICHLOROMETHANE	<5	<1	1 J	<5	<5
BROMOFORM	<5	<1	<5	<5	<5
BROMOMETHANE	<10	<1	<10	<10	<10
CARBON DISULFIDE	<5	N/A	<5	<5	<5
CARBON TETRACHLORIDE	<5	<1	<5	<5	<5
CHLOROBENZENE	<5	<1	<5	<5	<5
CHLOROETHANE	<10	<1	<10	<10	<10
CHLOROFORM	<5	<1	20	<5	<5
CHLOROMETHANE	<10	<1	<10	<10	<10
cis-1,2-DICHLOROETHENE	N/A	<1	N/A	N/A	N/A
cis-1,3-DICHLOROPROPENE	<5	<1	<5	<5	<5
CUMENE	N/A	<1	N/A	N/A	N/A
DIBROMOCHLOROMETHANE	<5	<1	<5	<5	<5
DIBROMOMETHANE	N/A	<1	N/A	N/A	N/A
DICHLORODIFLUOROMETHANE	N/A	<1	N/A	N/A	N/A
ETHYLBENZENE	<5	<1	<5	<5	<5
METHYLENE CHLORIDE	<5	<1	<5	1 BJ	<5
m+p XYLENE	N/A	<1	N/A	N/A	N/A
n-BUTYLBENZENE	N/A	<1	N/A	N/A	N/A
n-PROPYLBENZENE	N/A	<1	N/A	N/A	N/A
o-CHLOROTOLUENE	N/A	<1	N/A	N/A	N/A
o-XYLENE	N/A	<1	N/A	N/A	N/A
PROPANE, 1,2-DIBROMO-3-CHLORO	N/A	<1	N/A	N/A	N/A
p-CHLOROTOLUENE	N/A	<1	N/A	N/A	N/A
p-CYMENE	N/A	<1	N/A	N/A	N/A
sec-BUTYLBENZENE	N/A	<1	N/A	N/A	N/A
STYRENE	<5	<1	<5	<5	<5
tert-BUTYLBENZENE	N/A	<1	N/A	N/A	N/A
TETRACHLOROETHENE	<5	<1	<5	<5	7
TOLUENE	<5	<1	<5	<5	<5
TOTAL XYLENES	<5	N/A	<5	<5	<5
trans-1,2-DICHLOROETHENE	N/A	<1	N/A	N/A	N/A
trans-1,3-DICHLOROPROPENE	<5	<1	<5	<5	<5
TRICHLOROETHENE	<5	<1	<5	<5	<5
TRICHLOROFLUOROMETHANE	N/A	<1	N/A	N/A	N/A
VINYL ACETATE	<10	N/A	<10	<10	<10
VINYL CHLORIDE	<10	<1	<10	<10	<10

Notes:
E = concentration exceeds calibration range of instrument
B = detected in blank
J = detected below method detection limit
< = Compound was analyzed but not detected. Value shown is the instrument detection limit.

All results in micrograms per liter.

Data were not validated; qualifiers were assigned by the laboratory.

TABLE 4-7
Foundation Drain and Building Sump Analytical Results 1990-1993
Semivolatile Organic Compounds
Operable Unit 8
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	BS-111-2 04-26-93	BS-707-2 03-27-93	BS-865-1 03-27-93	BS-865-2 03-27-93	FD-371MC 03-27-93	FD-371-3 03-27-93	FD-444-460 03-27-93
1,2,4-TRICHLOROBENZENE	N/A	<5	<5	<5	<5	<5	<5
1,2-DICHLOROBENZENE	N/A	<5	<5	<5	<5	<5	<5
1,3-DICHLOROBENZENE	N/A	<5	<5	<5	<5	<5	<5
1,4-DICHLOROBENZENE	N/A	<5	<5	<5	<5	<5	<5
2,4,5-TRICHLOROPHENOL	N/A	<25	<25	<25	<25	<25	<25
2,4,6-TRICHLOROPHENOL	N/A	<5	<5	<5	<5	<5	<5
2,4-DICHLOROPHENOL	N/A	<5	<5	<5	<5	<5	<5
2,4-DIMETHYLPHENOL	N/A	<5	<5	<5	<5	<5	<5
2,4-DINITROPHENOL	N/A	<25	<25	<25	<25	<25	<25
2,4-DINITROTOLUENE	N/A	<5	<5	<5	<5	<5	<5
2,6-DINITROTOLUENE	N/A	<5	<5	<5	<5	<5	<5
2-CHLORONAPHTHALENE	N/A	<5	<5	<5	<5	<5	<5
2-CHLOROPHENOL	N/A	<5	<5	<5	<5	<5	<5
2-METHYLNAPHTHALENE	N/A	<5	<5	<5	<5	<5	<5
2-METHYLPHENOL	N/A	<5	<5	<5	<5	<5	<5
2-NITROANILINE	N/A	<25	<25	<25	<25	<25	<25
2-NITROPHENOL	N/A	<5	<5	<5	<5	<5	<5
3,3'-DICHLOROBENZIDINE	N/A	<10	<10	<10	<10	<10	<10
3-NITROANILINE	N/A	<25	<25	<25	<25	<25	<25
4,6-DINITRO-2-METHYLPHENOL	N/A	<25	<25	<25	<25	<25	<25
4-BROMOPHENYL PHENYL ETHER	N/A	<5	<5	<5	<5	<5	<5
4-CHLOROANILINE	N/A	<5	<5	<5	<5	<5	<5
4-CHLOROPHENYL PHENYL ETHER	N/A	<5	<5	<5	<5	<5	<5
4-CHLORO-3-METHYLPHENOL	N/A	<5	<5	<5	<5	<5	<5
4-METHYLPHENOL	N/A	<5	<5	<5	<5	<5	<5
4-NITROANILINE	N/A	<25	<25	<25	<25	<25	<25
4-NITROPHENOL	N/A	<25	<25	<25	<25	<25	<25
ACENAPHTHENE	N/A	<5	<5	<5	<5	0.5 J	<5
ACENAPHTHYLENE	N/A	<5	<5	<5	<5	<5	<5
ANTHRACENE	N/A	<5	<5	<5	<5	<5	<5
BENZOIC ACID	N/A	<25	<25	<25	<25	<25	<25
BENZO(a)ANTHRACENE	N/A	<5	<5	<5	<5	<5	<5
BENZO(a)PYRENE	N/A	<5	<5	<5	<5	<5	<5
BENZO(b)FLUORANTHENE	N/A	<5	<5	<5	<5	<5	<5
BENZO(ghi)PERYLENE	N/A	<5	<5	<5	<5	<5	<5
BENZO(k)FLUORANTHENE	N/A	<5	<5	<5	<5	<5	<5
BENZYL ALCOHOL	N/A	<5	<5	<5	<5	<5	<5
BIS(2-CHLOROETHOXY)METHANE	N/A	<5	<5	<5	<5	<5	<5
BIS(2-CHLOROETHYL)ETHER	N/A	<5	<5	<5	<5	<5	<5
BIS(2-CHLOROISOPROPYL)ETHER	N/A	<5	<5	<5	<5	<5	<5
BIS(2-ETHYLHEXYL)PHTHALATE	N/A	2 BJ	1 BJ	1 BJ	22 B	6 B	3 BJ
BUTYL BENZYL PHTHALATE	N/A	<5	0.6 J	0.6 J	<5	<5	<5
CHRYSENE	N/A	<5	<5	<5	<5	<5	<5
DIBENZOFURAN	N/A	<5	<5	<5	<5	<5	<5
DIBENZO(a,h)ANTHRACENE	N/A	<5	<5	<5	<5	<5	<5
DIETHYL PHTHALATE	N/A	<5	<5	<5	<5	<5	<5
DIMETHYL PHTHALATE	N/A	<5	<5	<5	<5	<5	<5
DI-n-BUTYL PHTHALATE	N/A	<5	<5	<5	<5	<5	<5
DI-n-OCTYL PHTHALATE	N/A	<5	<5	<5	<5	<5	<5
FLUORANTHENE	N/A	<5	<5	<5	<5	<5	<5
FLUORENE	N/A	<5	<5	<5	<5	<5	<5
HEXACHLOROBENZENE	N/A	<5	<5	<5	<5	<5	<5
HEXACHLOROBUTADIENE	N/A	<5	<5	<5	<5	<5	<5
HEXACHLOROCYCLOPENTADIENE	N/A	<5	<5	<5	<5	<5	<5
HEXACHLOROETHANE	N/A	<5	<5	<5	<5	<5	<5
INDENO(1,2,3-cd)PYRENE	N/A	<5	<5	<5	<5	<5	<5
ISOPHORONE	N/A	<5	<5	<5	<5	<5	<5
NAPHTHALENE	N/A	<5	<5	<5	<5	<5	<5
NITROBENZENE	N/A	<5	<5	<5	<5	<5	<5
N-NITROSODIPHENYLAMINE	N/A	<5	<5	<5	<5	<5	<5
N-NITROSO-DI-n-PROPYLAMINE	N/A	<5	<5	<5	<5	<5	<5
PENTACHLOROPHENOL	N/A	<25	<25	<25	<25	<25	<25
PHENANTHRENE	N/A	<5	<5	<5	<5	<5	<5
PHENOL	N/A	<5	<5	<5	<5	<5	<5
PYRENE	N/A	<5	<5	<5	<5	<5	<5

TABLE 4-7
Foundation Drain and Building Sump Analytical Results 1990-1993
Semivolatile Organic Compounds
Operable Unit 8
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD-559-561 07-25-92	FD-559-561 03-09-93	FD-771-1 05-01-93	FD-774-1 03-27-93	FD-883-1 05-01-93	FD-886-1 06-25-93	FD-886-1 05-01-93
1,2,4-TRICHLOROBENZENE	<5	N/A	<5	<5	<5	<1	<5
1,2-DICHLOROBENZENE	<5	N/A	<5	<5	<5	<1	<5
1,3-DICHLOROBENZENE	<5	N/A	<5	<5	<5	<1	<5
1,4-DICHLOROBENZENE	<5	N/A	<5	<5	<5	<1	<5
2,4,5-TRICHLOROPHENOL	<25	N/A	<25	<25	<25	N/A	<25
2,4,6-TRICHLOROPHENOL	<5	N/A	<5	<5	<5	N/A	<5
2,4-DICHLOROPHENOL	<5	N/A	<5	<5	<5	N/A	<5
2,4-DIMETHYLPHENOL	<5	N/A	<5	<5	<5	N/A	<5
2,4-DINITROPHENOL	<25	N/A	<25	<25	<25	N/A	<25
2,4-DINITROTOLUENE	<5	N/A	<5	<5	<5	N/A	<5
2,6-DINITROTOLUENE	<5	N/A	<5	<5	<5	N/A	<5
2-CHLORONAPHTHALENE	<5	N/A	<5	<5	<5	N/A	<5
2-CHLOROPHENOL	<5	N/A	<5	<5	<5	N/A	<5
2-METHYLNAPHTHALENE	<5	N/A	<5	<5	<5	N/A	<5
2-METHYLPHENOL	<5	N/A	<5	<5	<5	N/A	<5
2-NITROANILINE	<25	N/A	<25	<25	<25	N/A	<25
2-NITROPHENOL	<5	N/A	<5	<5	<5	N/A	<5
3,3'-DICHLOROBENZIDINE	<10	N/A	<10	<10	<10	N/A	<10
3-NITROANILINE	<25	N/A	<25	<25	<25	N/A	<25
4,6-DINITRO-2-METHYLPHENOL	<25	N/A	<25	<25	<25	N/A	<25
4-BROMOPHENYL PHENYL ETHER	<5	N/A	<5	<5	<5	N/A	<5
4-CHLOROANILINE	<5	N/A	<5	<5	<5	N/A	<5
4-CHLOROPHENYL PHENYL ETHER	<5	N/A	<5	<5	<5	N/A	<5
4-CHLORO-3-METHYLPHENOL	<5	N/A	<5	<5	<5	N/A	<5
4-METHYLPHENOL	<5	N/A	<5	<5	<5	N/A	<5
4-NITROANILINE	<25	N/A	<25	<25	<25	N/A	<25
4-NITROPHENOL	<25	N/A	<25	<25	<25	N/A	<25
ACENAPHTHENE	<5	N/A	<5	<5	<5	N/A	<5
ACENAPHTHYLENE	<5	N/A	<5	<5	<5	N/A	<5
ANTHRACENE	<5	N/A	<5	<5	<5	N/A	<5
BENZOIC ACID	<25	N/A	<25	<25	<25	N/A	<25
BENZO(a)ANTHRACENE	<5	N/A	<5	<5	<5	N/A	<5
BENZO(a)PYRENE	<5	N/A	<5	<5	<5	N/A	<5
BENZO(b)FLUORANTHENE	<5	N/A	<5	<5	<5	N/A	<5
BENZO(ghi)PERYLENE	<5	N/A	<5	<5	<5	N/A	<5
BENZO(k)FLUORANTHENE	<5	N/A	<5	<5	<5	N/A	<5
BENZYL ALCOHOL	<5	N/A	<5	<5	<5	N/A	<5
BIS(2-CHLOROETHOXY)METHANE	<5	N/A	<5	<5	<5	N/A	<5
BIS(2-CHLOROETHYL)ETHER	<5	N/A	<5	<5	<5	N/A	<5
BIS(2-CHLOROISOPROPYL)ETHER	<5	N/A	<5	<5	<5	N/A	<5
BIS(2-ETHYLHEXYL)PHTHALATE	<5	N/A	<5	2 BJ	2 J	N/A	2 J
BUTYL BENZYL PHTHALATE	<5	N/A	<5	<5	<5	N/A	<5
CHRYSENE	<5	N/A	<5	<5	<5	N/A	<5
DIBENZOFURAN	<5	N/A	<5	<5	<5	N/A	<5
DIBENZO(a,h)ANTHRACENE	<5	N/A	<5	<5	<5	N/A	<5
DIETHYL PHTHALATE	<5	N/A	<5	<5	<5	N/A	<5
DIMETHYL PHTHALATE	<5	N/A	<5	<5	<5	N/A	<5
DI-n-BUTYL PHTHALATE	<5	N/A	<5	<5	<5	N/A	<5
DI-n-OCTYL PHTHALATE	<5	N/A	<5	<5	<5	N/A	<5
FLUORANTHENE	<5	N/A	<5	<5	<5	N/A	<5
FLUORENE	<5	N/A	<5	<5	<5	N/A	<5
HEXACHLOROBENZENE	<5	N/A	<5	<5	<5	N/A	<5
HEXACHLOROBUTADIENE	<5	N/A	<5	<5	<5	<1	<5
HEXACHLOROCYCLOPENTADIENE	<5	N/A	<5	<5	<5	N/A	<5
HEXACHLOROETHANE	<5	N/A	<5	<5	<5	N/A	<5
INDENO(1,2,3-cd)PYRENE	<5	N/A	<5	<5	<5	N/A	<5
ISOPHORONE	<5	N/A	<5	<5	<5	N/A	<5
NAPHTHALENE	<5	N/A	<5	<5	<5	<1	<5
NITROBENZENE	<5	N/A	<5	<5	<5	N/A	<5
N-NITROSODIPHENYLAMINE	<5	N/A	<5	<5	<5	N/A	<5
N-NITROSO-DI-n-PROPYLAMINE	<5	N/A	<5	<5	<5	N/A	<5
PENTACHLOROPHENOL	<25	N/A	<25	<25	<25	N/A	<25
PHENANTHRENE	<5	N/A	<5	<5	<5	N/A	<5
PHENOL	<5	N/A	<5	<5	<5	N/A	<5
PYRENE	<5	N/A	<5	<5	<5	N/A	<5

TABLE 4-7
Foundation Drain and Building Sump Analytical Results 1990-1993
Semivolatile Organic Compounds
Operable Unit 8
Rocky Flats Environmental Technology Site

SAMPLE ID DATE COLLECTED	FD-886-2 05-01-93	FD-886-2 06-25-93	FD-910 05-01-93	FD-991-1 04-26-93	DSUMP 05-03-90
1,2,4-TRICHLOROBENZENE	<5	<1	<5	<5	N/A
1,2-DICHLOROBENZENE	<5	<1	<5	<5	N/A
1,3-DICHLOROBENZENE	<5	<1	<5	<5	N/A
1,4-DICHLOROBENZENE	<5	<1	<5	<5	N/A
2,4,5-TRICHLOROPHENOL	<25	N/A	<25	<25	N/A
2,4,6-TRICHLOROPHENOL	<5	N/A	<5	<5	N/A
2,4-DICHLOROPHENOL	<5	N/A	<5	<5	N/A
2,4-DIMETHYLPHENOL	<5	N/A	<5	<5	N/A
2,4-DINITROPHENOL	<25	N/A	<25	<25	N/A
2,4-DINITROTOLUENE	<5	N/A	<5	<5	N/A
2,6-DINITROTOLUENE	<5	N/A	<5	<5	N/A
2-CHLORONAPHTHALENE	<5	N/A	<5	<5	N/A
2-CHLOROPHENOL	<5	N/A	<5	<5	N/A
2-METHYLNAPHTHALENE	<5	N/A	<5	<5	N/A
2-METHYLPHENOL	<5	N/A	<5	<5	N/A
2-NITROANILINE	<25	N/A	<25	<25	N/A
2-NITROPHENOL	<5	N/A	<5	<5	N/A
3,3'-DICHLOROBENZIDINE	<10	N/A	<10	<10	N/A
3-NITROANILINE	<25	N/A	<25	<25	N/A
4,6-DINITRO-2-METHYLPHENOL	<25	N/A	<25	<25	N/A
4-BROMOPHENYL PHENYL ETHER	<5	N/A	<5	<5	N/A
4-CHLOROANILINE	<5	N/A	<5	<5	N/A
4-CHLOROPHENYL PHENYL ETHER	<5	N/A	<5	<5	N/A
4-CHLORO-3-METHYLPHENOL	<5	N/A	<5	<5	N/A
4-METHYLPHENOL	<5	N/A	<5	<5	N/A
4-NITROANILINE	<25	N/A	<25	<25	N/A
4-NITROPHENOL	<25	N/A	<25	<25	N/A
ACENAPHTHENE	<5	N/A	<5	<5	N/A
ACENAPHTHYLENE	<5	N/A	<5	<5	N/A
ANTHRACENE	<5	N/A	<5	<5	N/A
BENZOIC ACID	<25	N/A	<25	<25	N/A
BENZO(a)ANTHRACENE	<5	N/A	<5	<5	N/A
BENZO(a)PYRENE	<5	N/A	<5	<5	N/A
BENZO(b)FLUORANTHENE	<5	N/A	<5	<5	N/A
BENZO(ghi)PERYLENE	<5	N/A	<5	<5	N/A
BENZO(k)FLUORANTHENE	<5	N/A	<5	<5	N/A
BENZYL ALCOHOL	<5	N/A	<5	<5	N/A
BIS(2-CHLOROETHOXY)METHANE	<5	N/A	<5	<5	N/A
BIS(2-CHLOROETHYL)ETHER	<5	N/A	<5	<5	N/A
BIS(2-CHLOROISOPROPYL)ETHER	<5	N/A	<5	<5	N/A
BIS(2-ETHYLHEXYL)PHTHALATE	<5	N/A	<5	<5	N/A
BUTYL BENZYL PHTHALATE	<5	N/A	<5	<5	N/A
CHRYSENE	<5	N/A	<5	<5	N/A
DIBENZOFURAN	<5	N/A	<5	<5	N/A
DIBENZO(a,h)ANTHRACENE	<5	N/A	<5	<5	N/A
DIETHYL PHTHALATE	<5	N/A	<5	<5	N/A
DIMETHYL PHTHALATE	<5	N/A	<5	<5	N/A
DI-n-BUTYL PHTHALATE	<5	N/A	<5	<5	N/A
DI-n-OCTYL PHTHALATE	<5	N/A	<5	<5	N/A
FLUORANTHENE	<5	N/A	<5	<5	N/A
FLUORENE	<5	N/A	<5	<5	N/A
HEXACHLOROBENZENE	<5	N/A	<5	<5	N/A
HEXACHLOROBUTADIENE	<5	<1	<5	<5	N/A
HEXACHLOROCYCLOPENTADIENE	<5	N/A	<5	<5	N/A
HEXACHLOROETHANE	<5	N/A	<5	<5	N/A
INDENO(1,2,3-cd)PYRENE	<5	N/A	<5	<5	N/A
ISOPHORONE	<5	N/A	<5	<5	N/A
NAPHTHALENE	<5	<1	<5	<5	N/A
NITROBENZENE	<5	N/A	<5	<5	N/A
N-NITROSODIPHENYLAMINE	<5	N/A	<5	<5	N/A
N-NITROSO-DI-n-PROPYLAMINE	<5	N/A	<5	<5	N/A
PENTACHLOROPHENOL	<25	N/A	<25	<25	N/A
PHENANTHRENE	<5	N/A	<5	<5	N/A
PHENOL	<5	N/A	<5	<5	N/A
PYRENE	<5	N/A	<5	<5	N/A

NOTES:

All results in micrograms per liter.
Data were not validated.
B = compound detected in the blank
J = concentration is below method detection limits
N/A = not analyzed
< = Compound was analyzed but n detected. Value shown is the instrument detection limit.

1,2-dichloroethene (17 μg/L, March 1993); and trichloroethene (TCE) (160 μg/L, July 1992; 160 μg/L, March 1993) were detected in the foundation drain at sample station FD-559-561.

Low concentrations of bromodichloromethane (BS-111-2, 2 μg/L, April 1993; FD-910, 1 μg/L, May 1993), acenaphthene (FD-371-3, 0.5 μg/L, March 1993), and butyl benzyl phthalate (BS-865-1, 0.6 μg/L, March 1993; BS-865-2, 0.6 μg/L, March 1993) were also reported.

4.2.4 Water Quality Parameters

Samples collected from the foundation drains and building sumps discussed above were also analyzed for water quality parameters. Nitrate, specific conductivity, pH, and total dissolved solids have been analyzed for these samples during the 1977-1991 sampling events (Table 4-3). For the 1992-1993 sampling events, the water quality parameters included nitrate, nitrate/nitrite, specific conductivity, and total dissolved solids. Water quality sample results for 1992-1993 are presented in Table 4-8.

4.3 TREND ANALYSIS

Analytical results for gross alpha, gross beta, and selected metals (as shown in Table 4-3) were plotted to evaluate any trends in analytical results over time. Only compounds showing notable or consistent exceedances were selected for plotting, and only data from those sample stations with reliable data sets are being used. It should be noted, however, that analytical technologies and procedures have evolved considerably during the time frame of these sampling events (1970s through 1990s). These changes could have more impact on the reported results than actual concentration of analytes. Many analytes were not assessed because of the lack of data points. Nevertheless, temporal evaluations (where observed) are discussed in this section. The accompanying graphs for selected sampling stations are presented in Appendix G.

TABLE 4-8
Foundation Drain and Building Sump Analytical Results 1992-1993
Water Quality Parameters
Operable Unit 8
Rocky Flats Environmental Technology Site

Sample ID	BS-111-2	BS-707-2	BS-707-2	BS-865-1	BS-865-1	BS-865-2	BS-865-2-D	BS-883-1
Date Collected	04-26-93	03-07-92	03-27-93	03-07-92	03-27-93	03-27-93	03-27-93	03-07-92
Nitrate	1.01	N/A	1.65	3.12	1.33	3.61	3.65	1.51
Nitrate/Nitrite	N/A	1.33	N/A	N/A	N/A	N/A	N/A	N/A
Specific Conductivity	N/A	445	N/A	436	N/A	N/A	N/A	214
Total Dissolved Solids	205	335	398	293	316	436	437	157

Sample ID	FD-111-1	FD-371COMP	FD-371MC	FD-371-3	FD-371-3	FD-444-460	FD-444-460	FD-559-561	FD-707-1
Date Collected	03-07-92	03-07-92	03-27-93	03-07-92	03-27-93	03-07-92	03-27-93	07-25-92	03-07-92
Nitrate	N/A	N/A	0.85	N/A	0.53	N/A	7.9	3.45	1.98
Nitrate/Nitrite	1.84	2.11	N/A	1.56	N/A	7.73	N/A	N/A	N/A
Specific Conductivity	372	457	N/A	467	N/A	510	N/A	N/A	638
Total Dissolved Solids	270	320	169	313	744	417	408	269	413

Sample ID	FD-771-1	FD-774-1	FD-883-1	FD-886-1	FD-886-1-D	FD-886-2	FD-910	FD-910-D	FD-991-1
Date Collected	05-01-93	03-27-93	05-01-93	05-01-93	05-01-93	05-01-93	05-01-93	05-01-93	04-26-93
Nitrate	5.31	7.64	5.84	3.93	N/A	3.79	3.92	N/A	1.65
Nitrate/Nitrite	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Specific Conductivity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Dissolved Solids	367	354	586	371	368	345	413	404	612

NOTES: N/A = Not Analyzed.
Results in mg/l (milligrams per liter), except specific conductivity (in micromhos).

In general, the trend analysis indicates that the reported gross alpha and gross beta results generally exhibit relatively constant concentrations from 1977 to 1993. Trends in metal concentrations are more difficult to recognize. Seasonal variations often account for the appearance of increasing or decreasing trends. Those few trends that were observed in the data are discussed in further detail below.

4.3.1 Concentration Trends - 100 Area

As illustrated in Figure G-1 (Appendix G) gross alpha and gross beta concentrations generally decreased at Station FD-111-1, from 1978 to 1992. Aluminum and manganese concentrations also decreased from 1989 to 1991, based on three sampling events (Figures G-3 and G-8). Trend analysis for other analytes at FD-111-1 was inconclusive.

4.3.2 Concentration Trends - 300 Area

Gross alpha and gross beta concentrations at sample station FD-371-1 and FD-371-2 exhibited inconclusive trends from 1977 through 1991 (Figures G-9 through G-12). Sample station FD-371-3 exhibited a trend of increasing gross alpha and gross beta concentrations between 1981 and 1988, followed by generally decreasing concentrations through 1990 (Figures G-13 and G-14). Gross alpha and gross beta concentrations at station FD-371-COMP appear to have decreased from April to December 1988, increased in 1988 and 1989, then decreased through 1991 (Figures G-24 and G-25). Samples collected at station FD-371-COMP exhibited decreasing aluminum concentrations from 1989 through 1991 (Figure G-26).

4.3.3 Concentration Trends - 400 Area

Gross alpha and gross beta concentrations in samples collected from FD-444-1 and FD-444-2 (1977 through 1980) are presented in Figures G-32 through G-35. Radionuclide concentrations

in foundation-drain waters generally decreased during that period. Sample station FD-444-460 exhibited an increase in gross alpha and gross beta concentrations in 1989, followed by decreasing concentrations (Figures G-36 and G-37). Similarly, aluminum, chromium, copper, and manganese exhibited decreasing concentrations at FD-444-460 from 1989 to 1991 (Figures G-38, G-41 through G-43).

4.3.4 Concentration Trends - 500 Area

Figures G-44 and G-45 illustrate the changes in gross alpha and gross beta concentrations in samples from station FD-516-1, respectively, from 1977 through 1989. Generally, radionuclide concentrations decreased at FD-516-1, although trends were inconsistent.

4.3.5 Concentration Trends - 700 Area

Gross alpha concentrations in samples from station FD-707-1 generally decreased from 1977 to 1991 (Figure G-46). Gross beta concentrations at FD-707-1 do not show consistent trends from 1980 to 1991 (Figure G-47). Gross alpha concentrations at station FD-707-2 peaked at 63 pCi/L in 1978, declined to 2 pCi/L by 1980, peaked again at 33 pCi/L in 1981 and declined in the late 1980s (Figure G-54). Gross beta concentrations at FD-707-2 were variable from 1980 to 1991 (Figure G-55).

Metals concentrations observed at FD-707-1 varied over time, but decreases in aluminum, manganese, and copper occurred from December 1989 to June 1991. The concentrations of selected metals at FD-707-1 are presented in Figures G-48 through G-53. Similar trends were observed for copper at station FD-707-2. Aluminum and manganese concentrations gradually increased from September 1989 to June 1990 and showed sharp decreases in June 1991 (Figures G-59 through G-64).

4.3.6 Concentration Trends - 800 Area

Gross alpha and gross beta concentrations in samples from station FD-881-1 exhibit variable trends, but the concentration generally decreased from 1977 to 1991 (Figures G-75 and G-76). Gross alpha concentrations at station BS-881-3 from 1977 through 1990 ranged from 5 to 22 pCi/L, with the exception of peaks in 1979 (48 pCi/L) and 1980 (33 pCi/L) (Figure G-28). Gross beta concentrations from that period ranged from 1 to 17 pCi/L, with the exception of a peak concentration of 31 pCi/L in 1988. Gross alpha and gross beta concentrations at station BS-883-1 peaked in 1981 and varied around means of 14 pCi/L (gross alpha) and 9 pCi/L (gross beta) in the following decade (Figures G-88 and G-89).

Metals concentrations at FD-881-1 (Figures G-77 through G-82), BS-881-3 (Figures G-85 through G-87), and BS-883-1 (Figures G-90 through G-95) did not exhibit consistent trends during the 1988 to 1991 period.

4.4 SAMPLING RECOMMENDATIONS

To fulfill the objectives of the Stage 1, Phase 1 activities presented in the OU8 RI/RFI Work Plan (EG&G 1992a), recommendations for the optimum sampling locations for foundation drains located adjacent to or downgradient of OU8 IHSSs are proposed. These recommendations are based on the location of the foundation drain in relation to an OU8 IHSS, the type of material the foundation drain is composed of (perforated or solid), whether the foundation drain is downgradient or upgradient groundwater flow direction from an OU8 IHSS, the nature of the release resulting from the OU8 IHSS, and the type and level of detected consitutents from past sampling of foundation-drain water. Based on this data compilation effort, if more appropriate locations were identified for foundation drain sampling, recommendations are made for updating the current foundation-drain sampling program conducted by EG&G Surface Water Division. It is also recommended that the EG&G Surface Water Division foundation-drain sampling be

TABLE 4-9
Summary of Recommended Foundation Drain Sampling
Operable Unit 8
Rocky Flats Environmental Technology Site

BUILDING	CURRENT SAMPLING STATION	SWD SAMPLING MODIFICATION	OU8 STAGE 2 ADDITIONAL SAMPLING	OU8 ANALYTICAL*
111	BS-111-2	Not a foundation drain	No sampling recommended	None
124	None	No change	Sample sump east of building	VOCs, SVOCs, Metals, Rads
371/374	FD-371-3	No change; continue to sample FD-371-3	Sample FD-371-2 if flow is observed. Collect sediment samples at FD-371-2 and FD-371-3	Water - VOCs, SVOCs, Metals, Rads Sediment- SVOCs, Rads
	FD-371-MC	Delete from program; currently sampling steam condensate	No sampling recommended	None
444/447/460	FD-444-460	Continue to Sample FD-444-460 for 4 quarters, add sample location FD-447-1	No sampling recommended	None
559	None	No change	Collect sediment sample from FD-516-1	SVOCs, Rads
707	BS-707-2	Collect samples at new location FD-707-4 on a quarterly basis	No sampling recommended	None
771	FD-771-1	Collect samples at new location FD-771-4	Collect at FD-771-4	VOCs, SVOCs, Metals, Rads
774	FD-774-1 FD-774-2	No change	Collect sediment samples at outfalls FD-774-1 and FD 774-2	SVOCs, Rads

TABLE 4-9
Summary of Recommended Foundation Drain Sampling
Operable Unit 8
Rocky Flats Environmental Technology Site

BUILDING	CURRENT SAMPLING STATION	SWD SAMPLING MODIFICATION	OU8 STAGE 2 ADDITIONAL SAMPLING	OU8 ANALYTICAL*
779	FD-779-1	Collect sample at new location FD-779-2 on a quarterly basis	No sampling recommended	None
850	None	No change	No sampling recommended	None
865	BS-865-1 BS-865-2	Delete BS-865-1, continue to sample BS-865-2 on a quarterly basis	No sampling recommended	None
886	None	No change	No sampling recommended	None
881	None	None	Sample FD-881-4, once	VOCs, SVOCs, Metals, Rads
883	FD-883-1	Collect quarterly for rads, metals, SVOCs	No sampling recommended	None
991/998	FD-991-2	None	No sampling recommended	None
910	None	No change	No sampling recommended	None
995	None	None	No sampling recommended	None
996/997/999	None	None	No sampling recommended	None

Notes:
SVOCs = Semi-Volatile Organic Compounds
VOCs = Volatile Organic Compounds
Rads = Radionuclide isotopes
* Refer to Table 4-10 for full list of recommended analytical parameters.
SWD = EG&G Surface Water Division

conducted on a consistent and quarterly basis. Recommendations summarized in Table 4-9 include (1) general recommendations designed to fill known data gaps in the foundation-drain survey that affect OU8 IHSSs before proceeding with OU8 Phase I Stage 3 RFI/RI investigations and (2) recommendations designed to improve the current EG&G surface water sampling program.

Recommendations for OU8 Phase I Stage 3 activities based on data compilation results for foundation drains near or adjacent to OU8 IHSSs may include the following:

- Ground-penetrating radar or dye testing to locate outfalls at buildings near or adjacent to OU8 IHSSs with known foundation drains or storm drains under buildings with suspected outfalls that have not been located.

- Dye testing of foundations or storm drains of buildings that have sumps that may serve as collection points for foundation drains or underlying storm drains near or adjacent to OU8 IHSSs.

BUILDING RECOMMENDATIONS

Building 111 EG&G SWD currently samples a sump (BS-111-2) in the basement of the building. This sump is probably not connected to the foundation drains. The foundation-drain outfall, located to the north of Building 111 and west of Building 115 (Figure 3-2), could not be located during the site reconnaissance. Based on an evaluation of the analytical data, no further sampling of this location is recommended.

Building 124

Historically, the foundation drains for this building have not been sampled. It is recommended that the sump located east of the building (Figure 3-3) be sampled once under OU8 RI/RFI for the comprehensive analyte list (Table 4-10). An evaluation of the analytical results from this sampling will determine whether sampling should continue and how frequently.

Buildings 371/374

EG&G SWD should continue to sample FD-371-3. Outfall FD-371-2 should be sampled if sufficient flow is observed. (Based on field observations, FD-371-2 will likely discharge sufficient water for sampling.) Sediment samples should be collected at both FD-371-2 and FD-371-3 (Figures 3-4 and 3-5) for OU8 RI/RFI investigations. FD-371-MC (metal culvert) collects steam condensate near Building 371/374 and should be removed from the sampling program.

Buildings 444/447/460

The current sampling station, FD-444-460, collects water from the storm-sewer system and foundation drains of Building 444. Establishment of a new sampling station, FD-447-1, at a manhole on the hillside outside of the fence and closer to the foundation drains, is recommended. This newly proposed location is closer to the foundation drain of Building 447 and collects less storm water from the 400 Area. The current sampling location, FD-444-460, should be sampled by SWD concurrently for several sampling events for comparison to the new station.

Building 559

The foundation-drain water is currently collected and transported through a vinyl hose to the sanitary wastewater treatment facility. The vinyl hose is not appropriate for a long-term solution and should be upgraded as soon as practicable. If conditions change so that the water is not collected for

TABLE 4-10
Recommended Comprehensive Analyte List
Foundation Drain Monitoring
Operable Unit 8
Rocky Flats Environmental Technology Site

Metals	1,1,2,2,-Tetrachloroethane	4-Nitrophenol
	1,2-Dichloropropane	Acenaphthene
Lithium	trans-1,3-Dichloropropene	Acenaphthylene
Aluminum	Trichloroethene	Anthracene
Antimony	Dibromochloromethane	Benzoic Acid
Arsenic	1,1,2-Trichloroethane	Beno(a)Anthracene
Barium	Benzene	Benzo(a)Pyrene
Beryllium	cis-1,3-Dichloropropene	Benzo(b)Fluoranthene
Cadmium	Bromoform	Benzo(g,h,i)perylene
Calcium	2-Hexanone	Benzo(k)Fluoranthene
Chromium	4-Mehthyl-2-pentanone	Benzyl Alcohol
Cobalt	Tetrachlorethene	Bis(2-Chloroethoxy)Methane
Iron	Toluene	Bis(2-Chloroisopropyl)Ether
Lead	Chlorobenzene	Bis(2-Ethylhexyl)Phthalate
Magnesium	Ethyl Benzene	Butyl Benzyl Phthalate
Manganese	Styrene	Chrysene
Mercury	Total Xylenes	Dibenzofuran
Nickel		Dibenzo(a,h)Anthracene
Potassium	**Semi-Volatile Orgainics**	Diethylphthalate
Selenium		Dimethylphthalate
Silver	1,2,4-Trichlorobenzene	Di-n-Butyl Phthalate
Sodium	1,2-Dichlorobenzene	Di-n-Octyl Phthalate
Thallium	1,3-Dichlorobenzene	Fluoranthene
Vanadium	1,4-dichlorobenzene	Fluorene
Zinc	2,4,5-Trichlorophenol	Hexachloroethane
	2,4,6-Trichlorophenol	Hexachlorobutadiene
Volatile Organics	2,4-Dichlorophenol	Hexachlorocyclopentadiene
	2,4-Dimethylphenol	Indeno(1,2,3-cd)Pyrene
Chloromethane	2,4-Dinitrophenol	Isophorone
Bromomethane	2,4-Dinitrotoluene	Naphthalene
Vinyl Chloride	2,6-Dinitrotoluene	Nitrobenzene
Chloroethane	2-Chloronaphthalene	Phenanthrene
Methylene Chloride	2-Chlorophenol	Phenol
Acetone	2-Methylnapthalene	Pyrene
Carbon Disulfide	2-Methylphenol	
1,1-Dichloroethane	2-Nitrophenol	**Radionuclides**
1,1-Dichloroethene	3-Nitrophenol	
1,2-Dichloroethene	3,3-Dichlorobenzidine	Gross Alpha
Chloroform	4,6-Dinitro-2-Methylphenol	Gross Beta
1,2-dichloroethane	4-Bromophenyl Phenyl Ether	Uranium-233,-234,-235, and -238
2-Butanone	4-Chloroaniline	Americium-241
1,1,1-Trichloroethane	4-Chlorophenyl Phenyl Ether	Plutonium-239,-240
Carbon Tetrachloride	4-Chloro-3-Methylphenol	Strontium-89,-90
Vinyl Acetate	4-Methylphenol	Cesium-137
Bromodichloromethane	4-Nitroaniline	Tritium
		Radium-226, -228

treatment, the discharge should be incorporated into the routine sampling program. Historically, foundation-drain water from Building 559 emptied into the storm-sewer system and was released at outfall FD-516-1 (Figure 3-5). A sediment sample under the OU8 RI/RFI investigation should be collected at this location and laboratory-analyzed for semivolatile constituents and radionuclides.

Building 707

The current sampling location (BS-707-2) is a vault north of Cooling Tower 709. A new sampling station, FD-707-4, is proposed at the storm-drain manhole near the southeast corner of Building 707 (Figure 3-7). The western inlet to the manhole should be sampled, if possible, to isolate the foundation-drain waters from storm-sewer discharge. The SWD should sample FD-707-4 on a quarterly basis.

Building 771

The current sampling station, FD-771-1 (Figure 3-8), collects only a portion of the foundation-drain waters for Building 771. It is proposed that a new sampling point (FD-771-4) be located at Manhole No. 3, near the northwest corner of Building 771 (Figure 3-8). This station would be more representative of the foundation-drain water for Building 771. It is recommended that the OU8 RI/RFI Stage 2 investigation sample FD-771-4 for VOCs, SVOCs, radionuclides, and metals.

Building 774

No changes to the current SWD sampling program for Building 774 foundation drain waters are proposed at this time. The sediment at outfalls FD-774-1 and FD-774-2 (Figure 3-8) should be sampled under the OU8 Stage 2 remedial investigation for SVOCs, radionuclides, and tritium based on the analytical data from the historical samples from OU8 IHSSs at these locations (EG&G 1992a).

Building 779

Based on the data compilation, the current sample location FD-779-1 is a storm drain, rather than a foundation-drain outfall. The correct sampling station for Building 779 foundation drains is located ten feet east of the current station (Figure 3-10). Station FD-779-1 should be dropped from the current program, and the appropriate station should be named FD-779-2. This renaming is necessary for data continuity. SWD should collect samples at this location on a quarterly basis.

Building 850

FD-850-1 (formerly FD-860-1) has never been sampled and, historically, has been dry (Figure 3-11). Because Building 860 contains administrative offices and no production or manufacturing work has ever been performed here, the building foundation drains are not recommended for sampling either under the OU8 RI/RFI or SWD quarterly sampling.

Building 865

Samples from BS-865-1 (Figure 3-12) do not represent foundation-drain waters. Therefore, station BS-865-1 should be deleted from the SWD sampling program. Sampling of foundation-drain waters at location BS-865-2 should continue. SWD should collect samples from BS-865-2 on a quarterly basis.

Building 886

Currently, foundation-drain water for this building collects in a sump (Figure 3-12) and is sent to the Process Waste Treatment System (Building 374). No recommendations are proposed for this building as long as the water is continued to be treated as process waste.

Building 881

A new sampling station, FD-881-4 (Figure 3-13) should be sampled once for the complete analytical list (Table 4-10) as part of the OU8 Stage 2

activities. If no elevated levels are noted, then this location should not be sampled further.

Building 883 Elevated levels of metals commonly associated with galvanized piping have been detected at sample station FD-883-1 (formerly BS-883-1) (Figure 3-14). However, elevated readings of gross beta have consistently been detected. This sampling station should continue to be monitored by EG&G SWD for radionuclides, metals, and SVOC analyses.

Building 910 No recommendations are made at this time.

Buildings 998/991 It is recommended that the sump cover near FD-991-2 at the southeast corner of the building be removed to determine whether a foundation drain connects to the sanitary sewer at that location (Figure 3-16). If a connection exists, the foundation-drain water is routed through the manhole to the sanitary sewer and processed in the Waste Water Treatment Plant (WWTP). In this case, there is no need for further sampling. If a connection does not exist, routine sampling at FD-991-2 should continue (under SWD quarterly sampling program) until the routing of the foundation drain system can be determined.

Building 995 No recommendations are made at this time.

Buildings 996/997/999 No recommendations are made at this time. However, sampling may be recommended when the foundation-drain outfalls are located because these buildings store radionuclides and because the foundation drains have never been sampled.

5.0 INFILTRATION/EXFILTRATION

The potential occurrences of infiltration into and exfiltration out of storm-sewer and sanitary-sewer lines at RFETS were analyzed based on the limited information available. This section - identifies, on a macro scale, the locations where infiltration and exfiltration may occur from sanitary and storm sewers during different seasonal water levels. A comparison of the invert elevations of the sanitary and storm sewers against spring (high) and fall (low) 1992 water-table elevations for the alluvial portion of the upper hydrostratigraphic unit is presented. This information was used in conjunction with previous studies and camera inspections to determine areas of the sanitary- and storm-sewer system that would be prone to infiltration or exfiltration of constituents through joints, cracks, and other breaks in the closed conduit. Industrial area sanitary- and storm-sewer pipeline maps were prepared to illustrate infiltration- and exfiltration-prone areas.

This section also includes a summary of previous documents and research performed for RFETS concerning infiltration and exfiltration in the storm-sewer and sanitary-sewer systems. A four-hour CCTV video tape of the 400 Area storm-sewer lines was analyzed for possible deteriorated areas of the foundation drains where infiltration or exfiltration could occur. A CCTV video footage recording of the storm-sewer system for the entire plant was conducted by VSR Corporation in 1987 as part of a subcontract with Rockwell International. It has been determined that, since that time, the video recording and supporting documentation have been lost. Limited details about this video effort are available. VSR Corporation has retained copies of the field reports and field notes taken by the crews in 1987. Copies of the video footage and supporting documentation were not available. Appendix B contains VSR's sewer inspection forms, typed copies of VSR's field notes, a summary of the available information, and an evaluation report comparing VSR's notes with known information about the current storm-drain system at RFETS.

5.1 INFILTRATION/EXFILTRATION PROCESSES

For purposes of this report, exfiltration is defined as the process of any liquid contained in a pipeline (such as precipitation runoff or sanitary-sewer discharge) flowing out of the pipeline through cracks, offset joints, or deteriorated areas into the surrounding fill material or soil. Infiltration is defined as when a liquid flows into a pipeline from the surrounding materials.

Infiltration into or exfiltration out of a pipeline can occur when the structural integrity or continuity of buried pipelines has been compromised. Factors that compromise the pipeline integrity include shifting or settling of joints, material deterioration as a result of age or other circumstances, misalignment, or damage to the storm- or sanitary-sewer systems during excavation activities or use. As groundwater levels fluctuate, these pipeline discontinuities may allow flow of liquids either into or out of the pipe and surrounding fill material.

5.2 REVIEW OF EXISTING DOCUMENTS

Several reports containing information about infiltration and exfiltration studies for the storm- and sanitary-sewer systems at RFETS were reviewed. *Sanitary Sewer Infiltration/Inflow and Exfiltration Study: Task 1 of the Zero-Offsite Water-Discharge Study* (ASI 1991b) characterized, to the extent possible, the presence, flow rate, and type of infiltration/inflow or exfiltration conditions that exist in the sanitary-sewer system. *Non-Point Source Assessment and Storm-Sewer Infiltration/Inflow and Exfiltration Study: Tasks 2 and 3 of the Zero-Offsite Water-Discharge Study* (ASI 1991a) describes the preliminary results of two interrelated studies involving quantity and quality analyses of storm sewer infiltration and exfiltration and of a non-point source assessment. Additionally, CCTV video footage (ASI 1993) from the 400 Area and field notes from the CCTV video survey of the Industrial Area storm drains were reviewed for information relating to possible areas of infiltration and exfiltration.

According to the *Sanitary Sewer Infiltration/Inflow and Exfiltration Study: Task 1 of the Zero-Offsite Water-Discharge Study* (ASI 1991b), approximately 6.5 million gallons per year (mgy) of infiltration and 6.4 mgy of inflow into the sanitary-sewer system is estimated. ASI additionally reported that approximately 3.8 mgy exfiltrates from the system. These estimated numbers include flow measurement errors of approximately 10 to 15 percent and waste water production rate errors (which affect the amount of exfiltration from the system) of approximately 10 to 20 percent. Combined with the uncertainty resulting from cooling tower water discharges (frequency and amount of discharge unquantifiable), these infiltration/inflow and exfiltration estimates should not be considered reliable (ASI 1991b). The study concluded that rehabilitating the sanitary-sewer system would not be cost effective and would be very difficult because of problems with excavation in known IHSSs, utility and electric cables, and decreases in hydraulic capacity of the system. The sanitary-sewer system was rehabilitated in 1985 and during previous years (ASI 1991b). Many existing sanitary-sewer lines have been abandoned in place (Barros 1993).

The *Non-Point Source Assessment and Storm-Sewer Infiltration/Inflow and Exfiltration Study: Tasks 2 and 3 of the Zero-Offsite Water-Discharge Study* (ASI 1991a) report estimates that the annual infiltration into the storm-sewer system is approximately 26.2 mgy. No estimates of exfiltration from the storm-sewer system were made. The storm-sewer system consists of more than 33,000 linear feet of piping and an estimated additional 33,000 linear feet of open channels. Historically, no discharge measurements have been made within the storm-sewer system. Water quality in the storm-sewer system varies and has no specific trend (ASI 1991a). To develop a better understanding of the storm-sewer system, ASI recommended that further analyses and investigations be performed when additional data become available.

A four-hour CCTV video footage (ASI 1993) traced the storm drains in the 400 Area and nearby buffer zone. The storm-sewer pipes in the 400 Area are primarily made from reinforced concrete. Several segments had hairline cracks, roots, and offset joints that were visible on the

CCTV. Additionally, connections to other pipes and roof drains were noted. The drawings in Sections 3.0 and 4.0 were modified to reflect the observations. Generally, the storm-sewer pipes in the 400 Area are in fair condiion but may be interrupted by sand, roots, or debris in the pipeline. Sections of severe cracks or offset joints and areas of corrosion indicate that the pipes need repair.

The VSR Corporation's sewer inspection reports and corresponding field notes from the 1987 storm sewer cleaning effort described earlier and included in Appendix B were reviewed for their content. These reports and notes were, at times, vague and inconsistent with current knowledge of the storm drains in the Industrial Area when compared to the field-verified map of the storm drains performed by Wright Water Engineers in 1993 (Plate B-1). It is assumed that some areas (i.e., 440 Area, 991 Area, 707/750 Area) have been rerouted or reconstructed since the VSR data were accumulated, although no documentation verified that repairs have been made. Most of the sewer inspection reports mentioned cracks, offset joints, rusted areas, and generally deteriorated pipelines. Assuming that most of the pipelines surveyed by VSR have not been replaced, the storm sewer system in the RFETS Industrial Area is in poor condition.

5.3 APPROACH

A preliminary assessment of the areas of infiltration and exfiltration was made for the RFETS sanitary-sewer system based on the limited information available. Invert elevations of the sanitary-sewer system manholes were compared to the local (spring and fall 1992) groundwater elevations.

The elevations and locations of the sanitary-sewer and storm-sewer systems were obtained from engineering drawings (tabulation in Appendix A), a field-verified drawing of the locations of the storm-sewer system obtained from Wright Water Engineers (Plate B-1), the EG&G Plant Engineering CADVision database, and existing reports (ASI 1991a,b). Inconsistencies among

these sources were resolved by assuming that the CADVision data files were most accurate for the sanitary-sewer line locations. ASI manhole elevations that had been field checked were added to the CADVision maps for the sanitary-sewer system. The Wright Water Engineers drawing provided the most accurate locations for the storm-sewer system.

Figures 5-1 and 5-2 compare the high- and low-water table elevations from 1992 to the invert elevations of the sanitary-sewer system. The various colored areas indicate general zones of potential infiltration to and exfiltration from the sanitary-sewer system. Zones of potential infiltration to the sanitary-sewer system occur in the central portion of RFETS and toward the eastern perimeter of the Industrial Area. Buildings in the vicinity of these zones of infiltration include Buildings 551, 552, 561, 707, 708, 709, 994, and 998, and 989.

Insufficient elevation data were available to assess potential infiltration and exfiltration for the storm-sewer system. Generally, many of the storm-sewer segments are culverts or pipes buried within a few feet of land surface and should not extend below the water table. For this reason, most of the storm sewers should not be subject to significant amounts of infiltration; however, they can be considered potential sources of exfiltration.

5.4 CONCLUSIONS

Based on the four-hour CCTV video of the 400 Area (ASI 1993) and the notes from the Industrial Area cleaning (VSR 1987), the storm-sewer system for RFETS does have exfiltration potential and limited infiltration potential. Several areas of cracked, offset, or leaking segments of pipe were visible on the ASI video. Assuming the 400 Area video and the notes from VSR are representative of the entire storm-sewer system and considering the age of the system, there is reason to believe that exfiltration and limited infiltration from precipitation are occurring in the Industrial Area storm drain system. Potential exfiltration zones from the storm-sewer

system are highly variable. In many areas, the storm-sewer system consists of culverts located near the land surface. These segments are unlikely to transport constituents from OU8 IHSSs to groundwater. In other areas, deeper storm-sewer lines and foundation drains that connect to storm-sewer lines may be potential pathways of constituent migration from OU8 IHSSs.

It is important to note the VSR data were generated in 1987, and it was sometimes difficult to determine the exact locations of storm-sewer lines described. The review, evaluations, and recommendations discussed in this report do not reflect any replacement or repairs of storm sewers in the industrial area since the VSR data were accumulated. Additional data from EG&G Engineering or Construction that describe new storm-sewer construction or storm sewer repairs may be required to fully evaluate this potential contaminant source.

The integrity of the sanitary-sewer system could not be determined. However, it has been documented that the sanitary-sewer lines are subject to infiltration and exfiltration (ASI 1991b). The sanitary-sewer system was rehabilitated in 1985 (ASI 1991b) as well as during previous years.

6.0 AIR MONITORING

As required by the OU8 Work Plan (EG&G 1992a), an evaluation of the site-wide air monitoring program was made to determine the location and frequency of air monitoring sites at RFETS. Effluent and ambient air measurements of radioactive and particulate concentrations were performed in and near the research and production areas. The RFETS monitoring program included real-time screening, biweekly filter collection and screening, and a monthly filter composite analysis of radiological particle concentrations in effluent air. In addition, radiological and beryllium air effluent emissions from plant operations were continually measured or calculated at representative locations in the Industrial Area. Additional information on RFETS air monitoring is contained in the *Interim Measure/Interim Remedial Action/Decision Document* (IM/IRA/DD) (EG&G 1994a).

6.1 EXISTING PROGRAMS

At RFETS, emphasis is placed on continuous air monitoring programs for radiological stack effluent emissions, gaseous radiological effluent emissions, and radioactive and nonradioactive particulates in ambient air. These programs were designed to collect data for the entire facility. Potential radioactive air pollutant emissions included plutonium, americium, uranium, and tritium. Nonradioactive air pollutants potentially emitted and monitored at the plant are beryllium, oxides of nitrogen (NO_x), total suspended particulates (TSP), and particulate matter less than 10 microns in diameter (PM-10). Chemicals of concern that could be emitted from past and current plant operations are carbon tetrachloride, Freon 113, hydrogen fluoride, nitric acid, phosphoric acid, sulfuric acid, and 1,1,1-trichloroethane. The primary types of emission sources are stacks, vents, tanks, ponds, landfills, and other diffuse sources.

Because production operations at RFETS have stopped and the mission has changed, some associated emissions have been reduced or eliminated entirely; however, potential air emissions

are still being controlled. All former production and research facilities at RFETS are equipped with ventilation/filtration exhaust systems for effluent emissions control. Both radioactive and nonradioactive particles are contained by glove boxes and multiple banks of high efficiency particulate air (HEPA) filters (filter plenum systems). Particles are removed from the air effluent stream by these HEPA filters. Other controls at RFETS include cyclones, baghouses, and electrostatic precipitators. Acids and other chemical emissions are controlled by scrubbers and charcoal filters; efficient low-oxygen burners for gas-fired steam generation are used to reduce NO_x emissions.

The RFETS air monitoring system consists of four subprograms: radiological effluent emissions, nonradiological effluent emissions, radiological ambient monitoring, and nonradiological ambient monitoring. RFETS meteorological monitoring, weather forecasting, and air dispersion modeling are also components of the air monitoring program. Operating procedures, calibration, maintenance, and analytical procedures for air monitoring systems at RFETS are documented in RFETS Air Quality Sampling Standard Operating Procedures.

6.1.1 Radiological Emissions Monitoring

RFETS continuously monitors and samples radionuclide air effluent emissions as required by DOE Order 5400.1 and EPA 40 CFR 61, Subpart H. Subpart H establishes the limit for the effective dose equivalent (EDE) of 10 millirem per year to any member of the public from air emissions of radioactive materials from RFETS. Both requirements mandate continuous monitoring of radionuclide air emissions at all release points that have uncontrolled potential of discharging radionuclides into the air in quantities that could result in an EDE greater than 0.1 mrem/yr. However, effluent discharged from RFETS buildings is filtered using HEPA filter plenums, and discharges are controlled (EG&G 1993d).

Although the fabrication and recovery operations have ceased, these facilities are still equipped with functioning ventilation/filtration exhaust systems for particulate control. Building air is filtered with several stages of HEPA filters before being discharged into the outside atmosphere. Generally, two stages are used to filter air from uranium processes, and four stages are used in plutonium processing areas. The HEPA filters are individually bench tested and certified to be no less than 99.97 percent efficient for a nominal 0.3 micrometer particle size. Filters are tested for leaks after installation into a filter plenum (EG&G 1993d).

There are currently 133 emissions samplers in 63 air exhaust ducts located within 17 buildings. The samplers are located downstream of the HEPA filter plenum. Particulate samples from each exhaust system are composited into monthly samples for specific laboratory analysis of the plutonium, americium, and uranium isotopes following total long-lived alpha (TLLA) and total long-lived beta (TLLB) activity screening. These samples are also used for beryllium analyses.

6.1.1.1 Selective Alpha Air Monitors

Protection of the environment, the public, and workers from impacts due to the air pathway involves a three-tier approach composed of selective alpha air monitors (SAAMs), TLLA, and TLLB particle screening of routine air duct effluent emission sample filters, and radiochemical analysis of individual isotopes collected from air duct effluent emission samples. This approach balances both sensitivity of detection and timeliness of response for each tier.

Thirty-nine SAAMs in the building notification program measure alpha activity in air effluent ducts at RFETS and provide real-time notifications. The primary function of the SAAMs is to provide early warning to plant personnel that an alpha release may have occurred. SAAMs initiate visible and audible alarms if the alpha particle activity in the effluent air reaches the plant's internal operating alert levels. These in-stack monitors are positioned downstream of HEPA filter plenums and are set to detect plutonium-239/240. SAAMs are not designed to

provide quantitative measurements of routine plutonium concentrations in air effluent, and no data record is maintained for continuous detected count rates. They are the least sensitive, but most timely, of the three tiers of the effluent monitoring program (EG&G 1989). SAAMs are connected to a system in the radiation monitoring offices and selected utilities offices that provides remote alarm, readout, and recording of real-time data when an alarm occurs. These offices are staffed 24 hours a day, seven days a week. SAAM operations and any related QA functions are performed by Radiological Operations and are not the responsibility of the Air Quality Division (AQD). SAAM operations and QA functions are not intended to meet the monitoring and QA requirements of 40 CFR 61, Subpart H (EG&G 1993d). As previously stated, SAAMs are designed to warn personnel of potential alpha release.

6.1.1.2 Particulate Emissions Monitoring

Tiers two and three involve particulate monitoring of filters collected from the 133 in-stack samplers. Currently, particulate emission samplers extract samples in either a subisokinetic or superisokinetic manner. After extensive comparisons between Rocky Flats sampling methodology and EPA methodology, with EPA concurrence, all samplers will be adjusted to operate at a subisokinetic rate of extraction (i.e., in a manner where the linear velocity of the gas entering the sample nozzle is less than that of the undisturbed gas stream at the sample point). This method tends to bias toward the excess collection of large particles (greater than 5 microns) and yields a measured concentration of particles greater than the actual concentration in the duct effluent (EG&G 1993d).

The second tier of duct effluent monitoring involves TLLA and TLLB radioactivity screening of routine particulate samples. Sample filters from continuous routine air sampling of effluents are normally collected twice a week and screened for TLLA and TLLB. Alpha radiation is the principal radiation associated with RFETS air effluents. However, naturally occurring, short-lived radionuclides, such as radon decay products, also give off alpha radiation and can

contribute to the total alpha activity measured. This contribution can be quantified by taking a count of the samples 24 to 48 hours after collection to allow for the decay of this short-lived radioactivity. The concentration of long-lived alpha emitters is indicative of effluent quality and overall performance of the HEPA filtration system.

TLLA screening is more sensitive than the SAAMs, but can require a minimum of three days for results to become available. Preparation, collection, and disposition of particulate filters follow RFETS air quality sampling, standard operation procedure 4-C83-ENV-AQ.03, Effluent Air Radioparticulate Sample Collection. If a sample exceeds the RFETS internal emissions action limit of 0.02 picocuries per cubic meter (pCi/m^3), an investigation is initiated to determine the cause of the off-normal concentration and to evaluate the need for corrective action (EG&G 1993d).

TLLB screening provides verification that no significant beta radionuclide emissions are occurring. If a sample concentration exceeds the RFETS internal emissions action limit of 0.1 pCi/m^3, an investigation is initiated to determine the cause of the off-normal concentration and to evaluate the need for corrective action.

The third tier of the duct effluent evaluation program consists of compositing the screened samples on a monthly basis and analyzing the composite sample by radiochemical analysis. The radiochemical analysis is the most sensitive measurement available for determining extremely low levels of radioactive isotopes that might be present in duct effluents under routine operations. Because of the cost and time required for sample analysis and because the amount of radioactive material collected on the biweekly sample filter is normally below the detection limit of the radiochemical method, a monthly composite sample is used for analysis rather than the individual biweekly samples. The analysis is time-intensive and is completed approximately six weeks following compositing. The radiochemical analysis of routine effluent monitoring samples is completed for the following radioisotopes: plutonium-238, plutonium-239/240,

uranium-233/234, uranium-238, and americium-241. The analysis does not differentiate plutonium-239 from plutonium-240, nor does it differentiate uranium-233 from uranium-234. The procedures followed for these analyses are listed in Table 4-2 of the *Rocky Flats Plant Radionuclide Air Effluent Emissions Monitoring Program Plan* (EG&G 1993d). Effluent monitoring data are reported in RFETS *Monthly Environmental Monitoring Report* (EG&G 1994c), which provides a forum for exchanging and discussing data with public and regulatory representatives. Annual averages are included in the *Rocky Flats Plant Site Environmental Report, January through December 1992* (EG&G 1993b).

6.1.1.3 Gas Monitoring

Tritium is the only gaseous radioactive emission material that is routinely monitored at RFETS. Although tritium is typically not generated at RFETS, a material shipment was received from another facility in 1973 that, unknown to RFETS' personnel, was contaminated with this material at another facility. Tritium monitoring was initiated in response to this incident. The monitoring system is designed to detect and quantify potential tritium emissions.

6.1.2 Nonradiological Emissions Monitoring

Nonradiological emissions monitoring for beryllium and VOCs is performed at RFETS and is described in the following sections.

6.1.2.1 Beryllium

Beryllium is the only nonradiological particulate emission from stationary sources monitored at RFETS. Sixty-three filters from stack samplers are continuously sampled for beryllium emissions. Samples are collected from the same filters used for radiological analyses (Section 6.1.1.2). The emission standard for beryllium is a concentration less than 10 grams in a 24-hour

period. The total quantity of beryllium discharged from RFETS ventilation exhaust systems in 1992 was 3.399 grams (EG&G 1993b).

6.1.2.2 Volatile Organic Compound Emissions

VOC emissions in building effluent are not currently monitored by EG&G at RFP. However, VOC emissions are estimated from chemical inventories and quantities used, and these emissions are reported in the Air Pollution Emission Notices (APENs). The RFP Waste Technical Support Group monitors VOC concentrations at appropriate tanks and piping for RCRA permit compliance.

The Industrial Area includes the following VOC sources:

- building stacks and ventilation systems from VOC process and storage areas;
- outdoor solvent and fuel tanks;
- painting operations;
- maintenance operations;
- treatment, storage, and disposal facilities;
- vehicle emissions and other combustion sources; and
- volatilization from surface soils and sediments.

6.1.3 Radiological Ambient Air Monitoring Programs

The integrated Radiological Ambient Air Monitoring Program (RAAMP) includes general RFETS and the OU-specific special air quality monitoring programs; the samplers are similar but the rationales for sampler location and use differ between the programs.

The CDPHE Radiation Control Division Surveillance Program monitors ambient air concentrations of long-lived gross alpha and gross beta radioactivity, as well as plutonium-

239/240, uranium, and americium-241 in suspended particulate material. These measurements are made on samples collected from 13 samplers numbered D1-11, D13, and E-1, as shown in Figure 6-1. Analytical results are summarized in the CDPHE Environmental SurveillanceReport distributed at the Monthly Environmental Monitoring Information Exchange Meetings.

6.1.4 Nonradiological Ambient Monitoring

Ambient particulates are regulated by EPA and CDPHE under the Clean Air Act and its amendments, as defined by the National Ambient Air Quality Standards and Colorado Air Quality Control Commission Ambient Air Standards. Both TSP and PM-10 are monitored by RFETS at one nonradiological particulate air sampling location. Two PM-10 and two TSP samplers are located at this one monitoring station. PM-10 replaced TSP as the EPA-designated reference method (40 Code of Federal Regulations [CFR] 50.6) for ambient particulate matter, but TSP sampling has been continued because the results have several applications. Sampling for a broad particulate size range serves the following purposes: (1) internal management tool, (2) baseline data record, and (3) cross-comparisons with nonroutine, ambient radiological particulate sampling studies.

The commercially available air samplers operate at a volumetric flow rate between 1.1 and 1.7 cubic meters per minute, entraining particle sizes up to 50 microns in diameter on the filter surface of the TSP unit and respirable fractions less than 10 microns for the PM-10 sampler. Samplers are operated on a standard statewide sampling schedule of one day every sixth day. Siting for the samplers follows *EPA Guidelines for Air Quality Monitoring Network Design and Instrument Siting* (EPA 1975).

The CDPHE Air Pollution Control Division Surveillance Program maintains monitors that are instrumented to measure NO_x, suspended particulate material (TSP and PM-10), metals, and VOCs in air at RFETS (locations labeled with a D, E, or X in Figure 6-1). Nitrogen oxides are

monitored at sampler X-3 only. RFETS does not have a program to monitor VOC concentrations in ambient air. CDPHE maintains three ambient air monitoring stations east and northeast of the Industrial Area that monitor VOC concentrations (Figure 6-1). The CDPHE stations are identified with an "X" prefix. Samples are analyzed in the CDPHE laboratory using EPA Method TO-1. Analytical results are summarized in the CDPHE Environmental Surveillance Report distributed at the Monthly Environmental Monitoring Information Exchange Meetings. To date, only a limited number of VOC species have been detected at these sites, including compounds common to large urban areas.

7.0 ADDITIONAL DATA COMPILATION, IHSSs 118.1, 118.2, 150.6, 150.8, 151, 172, 184, and 188

Additional data compilation tasks for IHSSs 118.1, 118.2, 150.6, 150.8, 151, 172, 184, and 188 were identified in the OU8 Work Plan (EG&G 1992a). The objective of this data compilation effort is to determine whether the proposed sampling as outlined in the field sampling plan is complete based on this additional information. The following sections present a summary of the additional information by IHSS. In addition, a brief description of the proposed Stage 2 sampling efforts as summarized from the OU8 Work Plan (EG&G 1992a) is included with additional sampling recommendations if appropriate. Information reviewed to compile the data include aerial photography (high- and low-altitude), engineering drawings, major and minor construction contracts, the *Historical Release Report* (EG&G 1992b), and interviews with Rocky Flats personnel.

7.1 SOLVENT SPILLS (IHSS 118.1)

IHSS 118.1 is related to a 5,000-gallon underground steel storage tank that contained carbon tetrachloride. The tank was located adjacent to the west side of Building 730, just north of Building 776. A spill of 100 to 200 gallons of carbon tetrachloride north of Building 776 occurred sometime before 1970. On February 26, 1976, corroded pipes leaked an unknown quantity of carbon tetrachloride into the tank's valve pit. On June 18, 1981, the tank failed, releasing an unknown quantity of carbon tetrachloride into the valve pit. Following this failure, the tank was removed. The OU8 Work Plan (EG&G 1992a) indicates that the Stage 1 activities will determine whether the concrete containment was removed when the tank was removed. This information will aid in determining the Stage 3 investigations. These investigations require a soil boring be placed where the valve pit was located to determine whether the valve pit was removed.

Information regarding the concrete containment was not found before the completion of this draft of the document. Given the construction of the tank, if the tank was removed, the valve pit likely was removed at the same time. All surface evidence indicates the concrete was removed. However, the concrete could also have been demolished and covered with backfill material so the concrete may be below grade.

7.2 SOLVENT SPILLS (IHSS 118.2)

In June 1981, a 5,000 gallon, aboveground carbon tetrachloride tank located within a bermed area between the north side of Building 707 and the alleyway south of Building 778 ruptured and leaked an unknown quantity of carbon tetrachloride onto the ground. The OU8 Work Plan (EG&G 1992a) indicates that the Stage 1 activity for this IHSS is to determine whether the tank was removed from the site and whether unknown access problems exist at this time. Based on conversations with Mr. Fiore, EG&G Technical Support for Operations at Building 707 (Fiore 1994), the tank has not been removed and currently contains approximately 3,500 gallons of carbon tetrachloride. Based on the new information collected for this report, it is apparent that pavement existed before the 1981 carbon tetrachloride release. This information will be used when determining the investigative activities proposed for Stage 3 of this RFI/RI.

7.3 RADIOACTIVE SITES (IHSS 150.6 AND IHSS 150.8)

In 1969, an empty drum with plutonium-contaminated residual waste oil was cut apart near a dock at Building 779, and the waste oil was spread by pedestrian tracking to the east of Building 779. The main dock for Building 779 is located along the northern half of the east side of the building. The surface in this area is currently relatively flat and mostly paved. Stage 1 activities as identified in the OU8 Work Plan (EG&G 1992a) include determining the pavement history of this IHSS.

Review of aerial photographs and engineering drawings indicates that the areas affected by IHSSs 150.6 and 150.8 consist of both paved and unpaved areas. The eastern portion of the area outside Building 779 was paved before the 1969 incident. Portions of the IHSS that were unpaved or covered by gravel include the northernmost strip of the IHSS area, the area immediately adjacent to the north side of the building, and the southern portion of the IHSS directly adjacent to the southern side of the building. The remainder of the IHSS includes paved roads and walkways north and south of the building. Some pavement to the south and the east of the area was removed in 1979. Appendix G lists the engineering drawings reviewed for determining the pavement history.

A number of aerial photographs were reviewed to recount the pavement history of the area surrounding Building 779. In general, the paved area at the time of the June 22, 1969 release appears to be similar to the current paved area identified in the photographs of the IHSS submitted with the OU8 Work Plan (EG&G 1992a). Low-angle aerial photography from June 5, 1969 and July 11, 1969 indicate that the area north of the building appears to be a mixture of paved and gravel areas. Specifically, a walkway/driveway adjacent to the northern side of the building appears paved; the northern abutting courtyard-type area appears to be gravel or dirt. This dirt area is flanked on the north by a paved road. In all of the aerial photographs reviewed since 1968, the area on the eastern side of the building appears paved. A June 5, 1969 aerial photograph indicates that the paved roadway continues along the eastern side of the building and curves around to the southern side of the building. An April 29, 1967 aerial photograph suggests that a gravel area exists adjacent to the south side of the building with a paved roadway area to the south of the gravel. May 15, 1971 and May 25, 1971 aerial photographs also show the southern side of the building with the paved roadway along the southern side of the building. In these two photographs, the southeastern portion of the building appears to have several feet of gravel between the building and the roadway.

The following aerial photographs of these IHSSs were reviewed:

Date	Rocky Flats Number	Photo Type
April 29, 1967	(CAPs Reorder #16965, Frame 127-207)	aerial
June 5, 1969	13676-03	low-angle
June 5, 1969	13676-09	aerial
July 11, 1969	13771-07	aerial
May 15, 1970	14444-08	aerial
May 25, 1971	15334-09	low-angle

The following is the pavement history of IHSSs 150.6 and 150.8 as identified in the engineering drawings.

Date	Description
1964	The roadway east of the building is paved and some areas immediately adjacent to the eastern side of the building are concrete; the loading dock ramp north of the building is mostly concrete with some asphalt on the eastern end; gravel is adjacent to the southern side of the building with a paved roadway to the south of the gravel. Engineering drawings referenced were those used for the initial construction of the building (RF-W/79-C) (Norman Engineering 1964).
1968	Building 79A was constructed and the courtyard area north of the loading dock was gravel-surfaced as shown in engineering drawing RF-B5-20111-01 (Lovell-Osnes-Nisbet Co 1968).

1976 In a 1976 engineering drawing (25682-XC2), the roadway is rerouted on its western end but the new route is significantly altered far enough west so it does not affect the IHSS boundaries (Rockwell 1976).

1979 The paved areas east and south of Building 779 were removed to improve surface drainage as shown in engineering drawing 27673-XO4A-4 (Rockwell 1979).

1984 Engineering drawing 28842-XO2 indicates that South 79 Drive, which runs north-south along the eastern side of the building, was repaved in 1984 (Rockwell 1984).

Stage 2 investigative activities as defined in the OU8 Work Plan (DOE 1992a) include conducting an in-situ surface radiological survey, a soil-gas survey, and surface soil sampling below pavement. Therefore, it is proposed that three asphalt samples be added to the Stage 2 activities and analyzed by laboratory High Purity Germanium (HPGe) (Figure 7-1). This figure also includes other sample types and locations previously proposed in the OU8 Work Plan (EG&G 1992a).

7.4 FUEL OIL LEAK (IHSS 151)

While a 47,500 gallon underground storage tank (UST) was being filled in August 1981, approximately 196 gallons of No. 2 diesel fuel were spilled on the surface soil north of Building 374. The tank had been installed in 1980. This tank supplies diesel fuel to two emergency generators in Buildings 371 and 373. A second release of approximately 50 gallons of No. 2 diesel fuel occurred in July 1982. A third spill of approximately 126 gallons of No. 2 diesel also occurred in this area in October 1982. A final spill of 20 gallons of No. 2 diesel occurred in September 1988 when a valve was left open. The degree of cleanup performed as a result

of these releases is uncertain (EG&G 1992a). Stage 1 activities as defined in the OU8 Work Plan (EG&G 1992a) indicate that a document review of the tank inspection records is required to determine whether the tank has recently been tested and the results of these tests.

Tank D262 is referred to as Tank 381 N and Tank No. 4 in recent reports prepared for EG&G regarding UST studies at RFETS (Table 7-1). The following reports refer to the IHSS 151 tank:

1988 In the Phase I UST study, it was recommended that the tank be replaced and that six 20-foot soil borings be drilled around the tank and piping. Three samples were collected at each boring and were analyzed for benzene, toluene, xylene, and oil and grease (Parsons 1988). No analytical data were located confirming that this sampling occurred.

In 1988, the tank was not able to be tested by either the Associated Environmental Systems (AES) or the Heath Petro-Tite tank tightness testing systems because of the poor condition of the tanks. Multiple system abovegrade leaks prevented the use of high-level testing, and low-level testing required more sensitive equipment because of large surface areas in multiple manwells. It was recommended that the system be retested after repairing the fuel lines and pumps or when more sensitive equipment became available. It was expected that this equipment would become available three to four weeks after the date of the report. The report also suggested replacing the tank system as an alternate to repairing it (Engineering Science and Ralph M. Parsons 1988).

1990 AES tests could not be conducted until repairs were made. A test was performed on October 26, 1989, but the results were inconclusive because of excessive air in the tank system. After taking measures to bleed all air from the system, a tank

TABLE 7-1
IHSS 151 Report Review
Operable Unit 8
Rocky Flats Environmental Technology Site

Date	Title of Report	Contractor
April 1988	*Task I Report of Underground Storage Tank Study, Rocky Flats Plant, Golden, Colorado*	Ralph M. Parsons Company
September 1988	*Underground Storage Tank Testing Results, Phase II Report*	Engineering-Science, Inc. and Ralph M. Parsons Co.
April 1990	*Underground Storage Tank Study, Phase II Tank Testing Results*	Engineering-Science, Inc. and Ralph M. Parsons Co.
June 17, 1990	*Annual Underground Storage Tank Tightness Testing - 1990*	Merrick & Company
March 27, 1992	*Underground Storage Tank Tightness Testing - 1991*	Merrick & Company
March 1992	*Underground Storage Tank Enhanced Conceptual Design Report*	Fluor Daniel, Inc.

tightness test was conducted on November 8, 1989. The system passed (Engineering Science and Ralph M. Parsons 1990).

1991 On December 4, 1990, the tank and piping passed the tank tightness test with no recommendations. A hydrostatic product line test was conducted on the piping on December 22, 1990; the piping passed with no recommendations (Merrick 1991).

1992 On February 20, 1992, both the tank and the associated piping passed the tank tightness test. A test of the 2-foot product line was conducted on February 17, 1992, and the product line passed (Merrick 1992).

Because of regulatory requirements that require all existing UST systems to either meet the new UST system standards or meet the upgrade requirements by December 22, 1998, the *Underground Storage Tank Enhanced Conceptual Design Report* of March 1992 recommended that the tank be replaced with a new tank (Fluor Daniel 1992). The Fluor Daniel report identified this tank as a fiberglass-reinforced plastic tank that was installed in 1977.

The OU8 Work Plan (DOE 1992a) indicates that, if the records are out of date, a pressure test of the tank and ancillary lines be performed in the Stage 2 investigations. The latest pressure test was conducted in 1992; therefore, no further testing is recommended at this time.

7.5 CENTRAL AVENUE WASTE SPILL (IHSS 172)

IHSS 172 follows a path formerly used by vehicles to transport drums of waste between the 903 Pad where the drums were stored and the waste treatment facility in Building 774. In June 1968, one or two drums of oil containing plutonium leaked along Central Avenue. The leak

resulted from the drum contents sloshing through an improperly sealed bung during transport. The OU8 Work Plan (EG&G 1992a) indicates that Stage 1 activities for this IHSS will include clarifying the paving history of the contaminated section of the roadway and investigating the location of the old ditch.

Based on the visibility of dashed, white, center lines in aerial photographs from 1966 and 1968, Central Avenue was paved at the time of the June 11, 1968 spill. A brief review of engineering drawings was made with regard to Central Avenue. The following summarizes the information obtained from the drawings:

Date	Description
1952	Central Avenue was one of the original primary roads constructed at the plant, as shown in 1952 engineering drawings (Appendix H, Austin 1952).
1963	Engineering drawings (RF-AH/202) indicate that the "A Road" (Central Avenue) was seal-coated in late 1963 (Appendix H, Dow 1963).
1965	Sidewalks were installed along the "A Road" (Appendix H, Rockwell 1987).
1972	New sidewalks were installed along the north side of Central Avenue (Appendix H, Dow 1972).
1975	Eighth Avenue including its intersection with Central Avenue was repaired (Appendix H, Rockwell 1975).
1976	A portion of Central Avenue north of the 400 Area buildings was replaced (Appendix H, Rockwell 1976).

1982 Road repairs were made to Central Avenue based on engineering drawing 27956 (Appendix H, Rockwell 1982).

1984 Central Avenue was upgraded based on engineering drawing 28842 (Appendix H, Rockwell 1984).

Based on review of aerial photographs from 1953 to the present and review of major and minor work orders and contracts since plant inception, no *obvious* realignment of the Central Avenue Ditch has taken place along the main portion of Central Avenue. Conversations with Tom Trujillo, who has been in the Civil Engineering Department at RFETS since the early 1970s, indicated that it was unlikely that realignments of the Central Avenue Ditch had taken place before the early 1980s (Trujillo 1994). In 1982, it is likely that the far eastern portion of the ditch was realigned during the construction of the PSZ. An October 5, 1983 aerial photograph shows the southeastern corner of PSZ and its probable influence on the Central Avenue Ditch alignment.

The following aerial photographs pertaining to Central Avenue and the Central Avenue Ditch were reviewed:

Date of Photograph	CAPs Reorder Number
April 15, 1966	Frame 123-263, #16965
April 10, 1968	Frame 129-386, #16965
October 5, 1983	(RFP PIC No. 88760, Frame 483-26)

Various other annual aerial photographs from 1955 to the present were also reviewed.

Stage 2 activities as defined in the OU8 Work Plan (EG&G 1992a) include in-situ radiological surveys using HPGe and sodium iodide (NaI) detectors and vertical soil profile samples collected below the pavement. Based on the data compilation prepared for this report, it appears that portions of Central Avenue and the path the forklift took when carrying the leaking drum have been replaced. Other sections of Central Avenue, however, appear unchanged since the 1968 incident. Therefore, it is recommended that surface-soil samples, vertical-soil samples, and asphalt samples also be collected and analyzed for laboratory HPGe (Figure 7-2). These asphalt samples will be located based on HPGe and NaI test results.

7.6 RADIOACTIVE SITE (IHSS 184)

The area southwest of Building 991, near Building 992, was used between 1953 and 1978 to steam clean radioactively contaminated equipment and drums. The rinse water was collected in a sump for treatment in the RFETS's process waste system. No documentation exists that delineates the location of washing activities; however, the paved area between Building 992 and the south dock may have been used for steam cleaning. The OU8 Work Plan indicates that, as part of Stage 1 activities, the pavement history for the paved area between Building 992 and the south dock will be investigated (EG&G 1992a).

The pavement history of the area west and southwest of Building 991 was confirmed by review of the following engineering drawings (Appendix H):

1951 The area east of Building 91 and north of Building 92 was paved at the time of building construction, as shown in drawing RF-91&98-Y-1 (Dow 1951).

1960 An addition was made to the west dock, as shown in engineering drawing 1-6517-91 (Dow 1960).

1968 The area between Building 991 and Building 992 was re-paved in 1968 (Rockwell 1987).

1986 The pavement west and north of the west dock and a strip southwest of the dock was removed, as shown in engineering drawing 28738-XO1 (Rockwell 1986). Engineering drawing 28738-X03 suggests that a new asphalt surface cover was replaced in areas where the asphalt was removed (Rockwell 1986).

The area is currently paved. In annual aerial photographs from the mid-fifties to the present, the area appears paved. Appendix H lists the engineering drawings reviewed for completion of this task.

Because the pavement in the dock area had been removed and replaced in 1986, well after the steam cleaning activities, the initial Stage 2 recommendations as outlined in the OU8 Work Plan should be followed (EG&G 1992a). These include an in-situ radiological survey and collection of vertical soil profile samples.

7.7 ACID LEAK (IHSS 188)

In 1983, a 55-gallon steel drum located near the eastern gate of Building 374, and reportedly containing nitric and hydrochloric acid, leaked. It is suspected that the mixture was a waste metal leaching solution originating from the 400 Area, which suggests that it might have contained some trace heavy metals. The OU8 Work Plan indicates that Stage 1 activities will include further investigation of which heavy metals may have been present in the drum (EG&G 1992a).

Because the source of the drum containing the acid is unknown, the trace metals potentially present in the acid cannot be definitively identified. The following discussion identifies possible

metals that could have been in the acid if the original source was any of the 400 Buildings or Building 371, which all used acid in their operations.

Nitric acid was used in Buildings 444 and 445 for production etching and plating, titanium stripping, and assembly etching. War Reserve and special order parts fabricated from copper, steel, and stainless steel, were etched and plated using nitric acid. Assembly etching was performed on uranium parts using an ultrasonic etching bath with a solution of nitric acid, hydrogen peroxide, and deionized water. Titanium stripping involved immersing titanium-coated fixtures in an acid solution. Hydrochloric acid was not specifically identified as being used in these buildings (ChemRisk 1992). Nitric acid was used for stainless-steel passivation in other buildings, including Building 881.

Metals identified as being used in Buildings 444, 445, 447, 448, 450, and 451 but not mentioned in the context of acid-related processes included depleted uranium, depleted uranium alloys, silver, aluminum, copper, beryllium, and trace quantities of iron and other cast metals (ChemRisk 1992). Building 460 was not constructed until 1984; therefore, it is not considered a possible source for the material spilled at this IHSS.

One final possible source of the hydrochloric and nitric acids is Building 371, which used both hydrocholoric and nitric acid in its plutonium analytical support and chemical standards laboratories. The acids were used for sample preparation, presumably for plutonium samples. No mention is made of trace metals in context of this use nor is a waste metal leaching solution mentioned (ChemRisk 1992).

Stage 2 investigations for this IHSS include the collection of surficial soil samples below pavement to be laboratory analyzed for pH, nitrate, and TAL metals. In addition to the TAL metal list, it is recommended that the soil samples be laboratory analyzed for titanium, tritium, and uranium.

8.0 SUMMARY

The OU8 Stage 1 data compilation activities included onsite reconnaissance, interviews with knowledgeable personnel, evaluation of pertinent engineering drawings, evaluation of aerial photography, a review of tank-inspection records, evaluation of analytical data, evaluation of groundwater-elevation data, a review of CCTV video footage of the storm sewers in the 400 Area, and review of log sheets and inspection forms generated during a cleaning and inspection of the storm sewers conducted in the entire Industrial Area in 1987. The locations of foundation drains were compiled, and maps were prepared. Analytical data from foundation-drain and building-sump sampling events at RFETS were compiled and evaluated. An evaluation of exfiltration and infiltration from sanitary and storm sewers was also performed based on available data. A review of the current air monitoring program conducted at RFETS was summarized from the IM/IRA/DD (EG&G 1994a). Finally, the history of several IHSSs within OU8 was reviewed to supplement the OU8 RI/RFI Work Plan (EG&G 1992a) information. The following is a brief summary of the major findings of these data-compilation tasks.

8.1 LOCATION OF FOUNDATION DRAINS

An evaluation of the location of foundation drains was performed on a building-by-building basis. Comparisons were made to the current known locations of foundation drains supplied by EG&G SWD. In some instances, current sampling locations were representative of stormwater rather than foundation-drain water. In other instances, information established locations of previously unknown drains. These findings are summarized on a building-by-building basis:

111 The current sampling location (BS-111-2) is a sump in the south end of the Building 111 basement. The sump probably is not a collection point for the foundation drains of the building. The foundation-drain outfall for Building 111 has not been located. It is suspected that the drains discharge at an outfall (which

is currently buried) to the north of the building. Samples were collected from Station FD-111-1, which is located in the drainage ditch north of Building 111, from 1978 to 1991. The station is not currently sampled because the outfall cannot be located.

124 The foundation drains for this building were located around the exterior of the foundation. This water collects in a sump on the eastern side of the building and then discharges to settling tanks that are part of the backwash treatment system. This drain has never been sampled.

371/374; 517/518 The foundation drains for these buildings are located around the perimeter and beneath the foundations. Foundation-drain water discharges at six outfalls, three for each building complex. These outfalls drain to a northward-flowing drainage ditch that contributes water to North Walnut Creek. Samples are currently collected from one of these foundation drains, Station FD-371-3.

440 No foundation drains exist for this building.

444 The foundation drain for this building drains the southern end of the basement and leads to a sump. The sump discharges to the process-waste system and is treated in Building 374. The foundation drains for Building 444 have never been sampled.

447 A foundation drain exists on the western half of the basement foundation and joins a storm drain that runs underneath the building. This water discharges to an outfall to the south of Building 664. This outfall is currently being sampled.

559 No foundation drain was found for Building 559; however, there is a drain for the tunnel that connects Building 559 to Building 561. Pits located in both buildings also have foundation drains that connect to the tunnel drain. These waters are discharged to a sump located between the two buildings near the northwestern corner of the 561 pit. The sump historically discharged to the storm sewer, which led to an outfall on the hillside west of Substation 516. Currently, the water is pumped from the sump to the sanitary-sewer system. Historically, both the sump (FD-559-1) and the outfall (FD-561-1) have been sampled.

707 Foundation drains exist under Building 707 and tie into the storm-sewer system at the southwest corner of the building. The storm sewer discharges east of Building 707, at the 750 culvert, and the water eventually enters the B-series ponds. Sampling is currently conducted at BS-707-2, a vault next to the cooling tower south of the building. The source of water in the vault is likely to be surface-water runoff and/or groundwater infiltrating through cracks in the concrete rather than foundation-drain water.

771 The foundation-drain system for this building has three discharge locations on the northwest side of the building. The first is a pipe that discharges to Manhole No. 3 near the northwestern corner of the building. This manhole is connected to the storm sewer, which discharges to a small pond on the northern side of Building 774. The second outfall is located on the western side of Building 771, and it discharges to the ground surface. The third and last outfall discharges to the storm sewer near the western addition and is currently sampled as FD-771-1. A series of tunnels also exist to the south and east of Building 771, south of Building 774, and between Buildings 771 and 776. No foundation-drain locations were found for these tunnels, which presumably exist. It is suspected that the foundation drains for these tunnels connect to Buildings 707, 771, and 779.

774 Foundation drains located around the perimeter of this building drain to three outfalls. The first outfall discharges from a storm drain and flows into a small pond north of the building and then into North Walnut Creek, or possibly the OU4 Interceptor Trench System. The second outfall also discharges to the pond. However, because of recent construction, this drain has likely been blocked. The last outfall discharges through a storm drain located on the hillside northeast of the building. The first outfall (FD-774-1) is the only one that has been sampled.

776/777 and 778 Foundation data will be included, as necessary, as they are received.

779 A foundation drain was constructed for this building addition. The drain is connected to a storm drain that discharges to the hillside north of the Solar Evaporation Ponds, which in turn is collected by the OU4 treatment system. Sampling is currently conducted at FD-779-1, an outfall north of the Solar Evaporation Ponds. The source of this water is likely to be stormwater rather than Building 779 foundation-drain water.

850 The foundation drains for this building discharge to an outfall on the hillside south of the building. This outfall was selected for sampling in the past; however, it is often dry and is not part of the current sampling program.

865 Foundation drains for Building 865 flow to a sump on the western side of the building. The sump discharges to the east to an outfall located behind the 800 Area guard post. The sump (BS-865-1) is sampled under the current program.

881 This building has three separate foundation/underdrain systems that discharge to different locations. The first is a foundation-drain system that is located around

hillside south of the 800 Area. The second system collects roof-drain water and ties into a subbasement storm-drain system, which discharges to a wetland south of the building. This foundation-drain water goes to a sump and pump station that pumps to the OU1 Interim Measure/Interim Remedial Action treatment facility. The third discharge is from the utility tunnel network and floor drains, which discharge to a sump in the boiler room near the southern end of the building. The sump discharges to the sanitary-sewer system. Historically, first and third discharges have been sampled.

883 The foundation-drain system discharges to a sump at the southwestern corner of the building, which in turn is connected to a storm drain that discharges to the ground surface west of Building T883D. The sump is currently sampled as FD-883-1, but the outfall has never been sampled.

887 The foundation-drain system for this building is connected to Building 881.

910 The foundation-drain system for this building collects at a sump and discharges to the ground surface northeast of the building. This sump is currently sampled as FD-910.

991/998 These two buildings are connected by a tunnel that has a foundation-drain system. These drains slope to the east and, historically, discharged to a ditch on the eastern side of Building 991. Historically, this outfall has been sampled as FD-991-1.

995 Drains from this facility likely discharge to three outfalls south of the facility. However, these drains were sludge bed underdrains that may not have existed or

may have been altered by the relining of the sludge beds. These outfalls were not observed during site reconnaissance. None of these outfalls has been sampled.

996, 997, 999 Foundation drains for these structures are believed to be connected to a storm sewer east of Building 991. These drains have never been sampled.

8.2 FOUNDATION-DRAIN WATER QUALITY

Analytical laboratory data for the foundation-drain water were located and evaluated. Analytical results from foundation-drain samples were available for 1977 through 1993. The following are significant findings of the analyses:

- In general, the trend analysis discussed in Section 4.3 indicates that the reported gross alpha and gross beta results generally exhibit relatively constant concentrations from 1877 to 1993. It is not known how changes in analytical technologies and methods may have affected these results.

- Trends observed in the metal concentrations are more difficult to recognize. This may be a result of the inconsistency of sample collection because the analytical reports before 1991 do not clearly differentiate between the analysis of total and dissolved metals. The few trends that were observed is the metal concentrations may be influenced by seasonal variations.

Recommendations for both OU8 Stage 2 field activities and changes to the current SWD sampling program were developed based on the analysis of locations of foundation drains and the laboratory analytical results. These recommendations are summarized in Table 4-9.

8.3 INFILTRATION/EXFILTRATION

The infiltration into and exfiltration from the storm-sewer and sanitary-sewer lines at RFETS were analyzed based on the limited information available. Areas of infiltration and exfiltration were identified based on invert elevations of the sanitary sewers and groundwater elevations obtained from the spring (high) and fall (low) 1992 data. An evaluation of the data from the 1987 cleaning and inspection of the storm sewers of the entire Industrial Area revealed that, at the time of the inspection, the piping was in poor condition. Therefore, all storm drains, unless they have been repaired since 1987, are areas of possible exfiltration into the unsaturated zone.

Several sources of information were used to create infiltration and exfiltration maps of the site. These included discharge study reports, 4-hour CCTV coverage of the storm-sewer system in the 400 Area, and 1987 cleaning and inspection notes of the storm sewers of the entire Industrial Area. In addition, elevations of the sanitary-sewer and storm-sewer systems were obtained from engineering drawings, a field-verified drawing of the storm-sewer system, the EG&G Plant Engineering CADVision database, and existing reports.

Based on the limited information available, areas of infiltration and exfiltration were identified. Zones of potential infiltration to the sanitary-sewer system occur in the central portion of RFETS and toward the eastern perimeter of the site. Buildings in the vicinity of these zones of infiltration include Buildings 551, 552, 561, 707, 708, 709, 989, 991, 994, and 998.

8.4 AIR MONITORING

Information regarding the current air monitoring program at RFETS was summarized from the IM/IRA/DD (EG&G 1994a). The following briefly presents the major findings of this data compilation:

- Air effluent emissions from plant operations are continually measured and characterized for the Industrial Area, and ambient air in and around RFETS is continuously monitored for radiological and nonradiological particulates.

- The primary types of emission sources are stacks, vents, tanks, ponds, landfills, and other diffuse sources. Air monitoring is performed continuously on stack effluent emissions, gaseous effluent emissions, ambient radioactive particulates, and ambient nonradioactive particulates. This monitoring is designed to collect data about the entire facility.

- As a result of the change in the plant mission from nuclear weapons production to environmental restoration, many operations have been reduced or stopped. Potential air emissions, however, are still being monitored.

- Radionuclide air effluent emissions are continuously sampled and monitored. This is performed in a three-tiered approach and consists of SAAMs, TLLA, and TLLB particle screening and radiochemical analysis of isotopes collected from air duct effluent emission samples. There are approximately 130 emissions samplers in 63 air exhaust ducts within 17 buildings at RFETS.

- Tritium is the only gaseous radioactive emission material that is routinely monitored at RFETS. Tritium is monitored at six locations.

- Beryllium is the only nonradiological particulate emission from stationary sources monitored at RFETS. VOC emissions are not monitored by EG&G at RFETS. However, VOC emissions are estimated from chemical inventories and quantities used.

- RFETS participates in an ambient air monitoring program, the RAAMP program, which includes general and OU-specific monitoring programs. The objectives of the RAAMP are to track the dispersion of airborne radioactive materials from RFETS into the surrounding environment and communities and to establish baseline concentrations. The CDPHE Radiation Control Division Surveillance Program monitors ambient air concentrations of gross alpha and gross beta radioactivity in suspended particulate material.

- Based on environmental investigations at 16 Operable Units at RFETS, air monitoring is being developed or is developed for the investigation of these sites. Monitoring programs are designed for planned activities, potential exposure pathways, constituents of concern, worker protection, and for measuring concentrations leaving the work area.

8.5 ADDITIONAL DATA COMPILATION, IHSSs 118.1, 118.2, 150.6, 150.8, 151, 172, 184, AND 188

Additional data compilation tasks for the above mentioned IHSSs were identified in the Stage 1 activities in the OU8 Work Plan (DOE 1992a). The following briefly summarizes the findings of the data compilation activities by IHSS:

118.1 The data compilation task was to identify whether the concrete containment was removed when the 5,000-gallon underground steel storage tank was removed. Based on surface evidence and the nature of the construction design, it is likely that the containment structure was removed with the tank. However, the concrete could also have been demolished and covered with backfill material. Recommendations have been proposed in Section 7.1 to advance a soil boring in

this area (as part of Stage 3 activities) to confirm the presence or absence of the structure.

118.2 The data compilation task for this IHSS was to determine whether a 5,000 gallon aboveground carbon tetrachloride tank near Building 707 was removed. Based on interviews with knowledgeable personnel, this tank still exists.

150.6, 150.8 The data compilation task for these IHSSs consisted of a review of the pavement history before, during, and after a spill of residual waste oil. Based on a review of available information, pavement has been removed and replaced many times since the incident. In other instances, information established locations of previously unknown drains. Based on the information presented in Section 7.3, three asphalt samples will be added to the Stage 2 activities and analyzed by laboratory HPGe.

151 The data compilation task for this IHSS consisted of a review of the pertinent records related to the tank and ancillary lines. If the records were out of date, a pressure test would be performed as part of Stage 2 activities. An evaluation of the tank-inspection records for a 47,500-gallon UST in this IHSS was performed for this report. Based on a review of records (Table 7-1), this tank has been tested on several occasions (1988, 1990, 1991, and 1992). As a result, no further pressure testing of this tank is recommended for Stage 2 activities.

172 Clarification of the pavement history before, during, and after a spill of radioactive material in this IHSS (Central Avenue) was identified as a Stage 1 activity. Stage 1 activities also include an investigation of the location of the old ditch. Based on a review of available information, some pavement sections along Central Avenue have been replaced but other sections are still intact. Therefore,

it is recommended that asphalt samples be collected and radiometrically analyzed for plutonium using laboratory HPGe procedures as part of Stage 2 activities. In addition, one vertical soil profile (VSP) sample will be collected. One below-pavement grab sample will be collected from the west loading dock area and be laboratory analyzed for radionuclides, SVOCs and TAL metals.

184 Data compilation for this IHSS includes an investigation of the pavement history for an area of steam-cleaning activities near Building 992. Based on a review of available information, the pavement was removed and replaced in 1986, after the steam-cleaning activities took place. No further investigative activities other than those recommended in the OU8 Work Plan (DOE 1992) are recommended for this IHSS.

188 Stage 1 data compilation for this IHSS included an investigation to identify which heavy metals may have been released from a spill of a 55-gallon steel drum containing nitric and hydrochloric acid near the eastern gate of Building 374. Based on a review of available information, the heavy metals, plutonium, depleted uranium, depleted uranium alloys, silver, aluminum, copper, titanium, beryllium, and trace quantities of iron and other cast metals may have been present. Based on this information, it is recommended that surficial-soil samples collected below pavement be analyzed in a laboratory for titanium, tritium, and uranium in addition to TAL metals.

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APPENDIX A

List of Engineering Drawings Reviewed for Foundation Drain Data Compilation

Appendix A
Rocky Flats Plant
Operable Unit 8 Data Compilation

Building No. 111

Drawing No.	Original Date	Latest Rev. Date	Title
RF-11-F-1-C	1-6-51	N/R	Foundation and Basement Plan - Schedule and Details
RF-11-S-1-C	1-6-51	N/R	First Floor Plan (South) and Foundation Plan
1-1664-11	10-8-51	1-8-65	Basement Floor Plan (South)
1-1665-11	10-8-51	2-27-61	Basement Floor Plan (North)
14140-1	5-18-66	4-9-68	Meeting Room Addition - Foundation and First Floor Plan and Foundation Details
25581-8	12-9-75	N/R	Foundation Drain Plan
15501-026-M	7-20-83	7-20-90	Site Utility Plans
15501-027-M	7-20-83	7-20-90	Site Utility Plans
11508-11, 21, and 22	N/L	N/L	Grading Plan

Building No. 122

Drawing No.	Original Date	Latest Rev. Date	Title
1-13122-21, 22	11-6-51	N/L	Foundation Plan and Details
21641-11	8-18-69	10-28-71	Building 122 Addition and Renovations Foundation Plan
15501-040-M	7-20-83	7-20-90	Utility Layout

N/R = Not Recorded N/L = Not Legible * = No Drawings Found

Building No. 123			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
1-11588-23	10-31-51	2-7-52	Foundation Plan
1-11589-23	10-31-51	2-7-52	Foundation Details
1-11571-23	11-6-51	2-7-52	Toilet Room Layout and Source Vault Details
RF-23-101	11-30-51	9-11-53	Plumbing and Service Piping - Drains
20712-02	5-17-68	12-21-70	Plot and Drainage Plan
15501-040-M	7-20-83	7-20-90	Utility Layout

Building No. 124			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
RF-24-F1-C	3-24-52	3-19-53	Foundation Plan
RF-24-Y1-B	3-26-52	3-19-53	Plot Plan - Grading
RF-24-109-B	3-26-52	3-19-53	Outfall Sewer
27006-4	5-15-74	6-18-75	Backwash Storage Tanks Layout
25581-3	6-13-75	12-9-75	Foundation Drain Plan
15501-051-M	7-20-83	7-20-90	Site Utility Plans

Building No. 125			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
14482-1	1-8-64	7-27-65	Foundation and Floor Plan and Details
14482-2	1-8-64	3-17-65	Foundation and Slab Details
20712-16	5-15-68	12-21-70	Plot and Drainage Plan
15501-040-M	7-20-83	7-20-90	Utility Layout
28540-004	6-29-84	6-5-86	Site Plan - Drainage - Addition
28540-008	6-29-84	N/R	Foundation Plan - Addition
28540-010	6-29-84	6-5-86	Foundation Sections and Details

Building No. 331			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
RF-31-F1-C	8-30-51	2-25-53	Ground Floor and Foundation Plan
RF-31-S2-C	9-27-51	2-25-53	Footings and Details
15972-3	6-21-67	3-5-69	Addition - Foundation and Second Floor Framing Plans
15501-028-M	7-20-83	7-20-90	Site Utility Plans

Building No. 371/374			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
25042-049	12-13-72	9-10-73	Subdrain Plan and Profile
25042-050	12-13-72	9-10-73	Subdrain Details
25032-023	5-23-73	2-3-76	Plutonium Recovery Plan Subdrains
25032-029	5-24-73	2-3-76	Subdrain and Earth Fill Sections
25032-030	5-23-73	2-3-76	Subdrain and Earth Fill Sections
25032-031	5-24-73	2-3-76	Subdrain and Earth Fill Sections
25032-032	5-18-73	1-5-76	Subdrain and Earth Fill Sections
25032-033	5-15-73	1-5-76	Subdrain and Earth Fill Sections and Details
25032-035	7-2-73	2-3-76	Waste Treatment Details
25025-015	3-4-76	N/R	Subbasement Floor Plan, Plumbing Drawing Index
25022-004	2-2-77	8-19-80	Area Plot Plan, Foundation and Storm Drains
15501-011-M	7-20-83	7-20-90	Site Utility Plans
15501-019-M	7-20-83	7-20-90	Site Utility Plans
37487-200	7-11-86	12-4-87	Cemented Salt Storage - Foundation Plan
30371-001-1E	7-4-87	12-11-90	Subbasement Floor Plan
30371-002-1H	7-27-87	8-7-90	Basement Floor Plan

Building No. 439			
Drawing No.	Original Date	Latest Rev. Date	Title
21341-11	9-4-68	N/R	Foundation and Floor Slab Plan
21341-12	9-5-68	N/R	Foundation and Floor Slab Sections and Details
15501-052-M	7-20-83	7-20-90	Site Utility Plans

Building No. 440			
Drawing No.	Original Date	Latest Rev. Date	Title
21341-01	8-22-68	N/R	Foundation and Floor Slab Plan
21341-02	9-4-68	N/R	Foundation Wall Elevations
21341-03	9-5-68	N/R	Foundation and Floor Slab Sections and Details
21341-04	9-18-68	N/R	Foundation Sections
21341-05	9-20-68	N/R	Miscellaneous Sections and Details
15501-051-M	7-20-83	7-20-90	Site Utility Plans
15501-052-M	7-20-83	7-20-90	Site Utility Plans

Building No. 441			
Drawing No.	Original Date	Latest Rev. Date	Title
RF-41-F1-B	1-28-51	4-10-53	Foundation Plan and Details
RF-41-F2-B	1-28-51	4-10-53	Foundation Details and Sections
RF-41-Y1-B	2-10-52	4-10-53	Plot Plan
21641-31	8-18-69	10-28-71	Addition and Renovation Foundation Plan
21641-32	8-18-69	10-28-71	Addition and Renovation Foundation Sections and Details
15501-040-M	7-20-83	7-20-90	Utility Layout

Building No. 442			
Drawing No.	Original Date	Latest Rev. Date	Title
RF-42-F1-B	1-11-52	3-5-53	Columns and Foundation Plan
RF-42-Y1-B	2-8-52	3-5-53	Plot Plan
15501-041-M	7-20-83	7-20-90	Site Utility Plans
26693-005	5-15-84	11-14-85	HEPA Building Plan and Foundation

Building No. 444			
Drawing No.	Original Date	Latest Rev. Date	Title
RF-44-F1	3-7-52	N/L	Foundation Plans and Details
(13608-44)*		3-3-53	Foundation Plans and Details
RF-44-F2	3-7-52	3-3-53	Foundation Schedule and Details
RF-44-F3	3-7-52	3-3-53	Foundation Details
RF-44-Y1	3-7-52	N/L	Plot Plan
RF-44-109-F	5-28-52	N/L	Sump Pumps - Details and Sections
RF-44-126-G	9-?-52	7-22-53	Process and Service Piping - Rooms 1 & 2
RF-44-127	1-18-52	N/L	Process Waste Details - Basement Level
RF-44-127-E	9-7-52	4-?-53	Process and Service Piping
(1-6540-44)*			Process and Serving Piping
1-3184-44	7-11-55	N/R	Process Waste and Filtration System
25581-4	6-13-75	12-9-75	Foundation Drain Plan
15501-052-M	7-20-83	7-20-90	Site Utility Plans
15501-041-M	7-20-85	7-20-90	Site Utility Plans
RF-44-107*			Process Waste Details, Basement Bldg. 444

Building No. 447			
Drawing No.	Original Date	Latest Rev. Date	Title
RF-47-F1	6-1-55	N/L	Foundation and Mezzanine Plans and Details
1-3326-47	6-1-55	6-26-64	Floor Trenches and Underground Piping
15501-052-M	7-20-83	7-20-90	Site Utility Plans

N/R = Not Recorded N/L = Not Legible * = No Drawings Found

Building No. 460			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
36001-304	4-22-83	7-22-83	Foundation Layout
36001-305	4-28-83	7-22-83	Foundations, Sections
15501-040-M	7-20-83	7-20-90	Area Layout
15501-051-M	7-20-83	7-20-90	Site Utility Plans
28646-3	10-14-83	10-21-83	Area Utilities Location
36010-100	11-18-83	10-9-84	Storm Drain Layout
36010-300	10-30-83	1-12-84	Foundation Layout
36010-301	10-28-83	1-12-84	Foundation Layout (continued)
36010-302	10-28-83	1-12-84	Foundation Schedule and Details
36010-304	12-1-83	1-12-84	Vault Plans
36010-452	3-23-84	3-5-85	Underground Piping
36010-453	3-23-84	3-5-85	Mechanical Piping
36010-459	3-23-84	3-5-85	Mechanical Piping

Building No. 559			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
RF-AY-14027-3	8-17-65	5-8-68	Site Details - Sheet No. 1
RF-AY-14027-6	8-17-65	5-8-68	Site Details - Sheet No. 4
RF-AY-14028-1	8-17-65	5-8-68	Foundation Plan
RF-AY-14028-3	8-17-65	5-8-68	Foundation and Roof Details
RF-AY-14028-4	8-17-65	5-8-68	Tunnel Plan and Details
RF-AY-14028-7	8-17-65	5-8-68	Schedules
21412-01	12-?-68	10-4-71	Plot and Drainage Plan
15501-020-M	7-20-83	7-20-90	Site Utility Plans
23452-102*		1-5-73	
23452-203*		9-?-74	

Building No. 701			
Drawing No.	Original Date	Latest Rev. Date	Title
17940-1	3-13-68	6-26-69	Maintenance Shops - Plan and Details
17940-3	4-4-68	6-26-69	Maintenance Shops - Miscellaneous Details
15501-013-M	7-20-83	7-20-90	Site Utility Plans

Building No. 707			
Drawing No.	Original Date	Latest Rev. Date	Title
20220-06	3-21-67	8-4-71	Utility Plans
20220-08	9-21-67	2-19-75	Utility Plans
20220-12	9-21-67	1-5-75	Utility Plans
RF-BZ-20451-05	2-16-68	11-4-70	Plumbing Plan - Underground - Part A
RF-BZ-20451-06	2-19-68	11-4-70	Plumbing Plan - Underground - Part B
RF-BZ-20451-07	2-23-68	11-4-70	Plumbing Plan - Underground - Part C
RF-BZ-20451-08	2-13-68	11-4-70	Plumbing Plan - Underground - Part D
RF-BZ-20451-09	3-15-68	11-4-70	Plumbing Plan Details
15501-021-M	7-20-83	5-14-90	Site Utility Plans
15501-030-M	7-20-83	7-20-90	Site Utility Plans
15501-030-01L	12-20-89	N/R	Shelters for Pondcrete/Saltcrete T904A Trailer Site Plan

Building No. 731			
Drawing No.	Original Date	Latest Rev. Date	Title
50095-101	2-19-92	3-3-92	Details Building 731 Waste Pit

Building No. 770			
Drawing No.	Original Date	Latest Rev. Date	Title
13554-1	10-9-64	12-7-64	Modifications to Building Structural Details

N/R = Not Recorded N/L = Not Legible • = No Drawings Found

Building No. 771			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
7387-2	12-10-51	5-12-70	Underground Plumbing
RF-71-103	12-10-51	N/L	Southwest Area First Floor Underground Plumbing
RF-71-104-G	12-19-51	5-11-53	Southeast Area First Floor Underground Plumbing
RF-71-F1	N/L	5-11-53	Foundation Plan
RF-71-S7	1-17-52	5-11-53	Foundation Plan Details
RF-71-101	1-14-52	11-6-65	Northwest Area First Floor Underground Plumbing
RF-71-102-E	1-14-52	5-11-53	Northeast Area First Floor Underground Plumbing
RF-71-113-D	2-8-52	5-11-53	Sewer and Drainage Lines
2-4185	3-31-59	N/R	Underground Utilities Layout - Zones G-6, G-7, H-6, and H-7
RF-V71-10008	8-6-62	N/R	Foundation Plan Sections and Details - Addition
15754-1	11-15-66	6-25-69	West Dock Extension - Foundation Plan and Details
19604-1	11-8-70	2-5-72	Floor Plan
RF-71-111-C	3-12-75	5-11-53	Sanitary, Process, and Storm Drains - Profiles
25581-5	6-13-75	12-9-75	Foundation Drain Plan
15501-012-M	7-20-83	11-20-90	Site Utility Plans
15501-013-M	7-20-83	7-20-90	Site Utility Plans
RF-71-100*		5-11-53	Underground Plumbing Plans
RF-71-116-C*			Arrangement of Holding Tanks

N/R = Not Recorded N/L = Not Legible * = No Drawings Found

Building No. 774			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
RF-74-1-G	5-29-52	11-?-53	Plans and Elevations
RF-74-S1-D	6-6-52	11-?-53	Foundation - Floor-Roof Plan - Beam and Girder Details
2-4185	3-31-59	N/R	Underground Utilities Layout - Zones G-6, G-7, H-6, and H-7
RF-V74-10012	8-6-62	N/R	Bldg. 74 Addition - Foundation Plan
14773-2	12-3-65	3-15-67	Waste Disposal Facility Plot Plan
23542-103	3-29-72	9-?-74	Excavation and Grading Plan
23542-202	1-28-72	5-24-72	Grading and Utility Plan
25581-6	6-13-75	12-9-75	Foundation Drain Plan, Bldg. 774
15501-013-M	7-20-83	7-20-90	Site Utility Plans
37728-002	9-17-86	3-9-90	Waste Treatment Addition - Bldg. 774
37728-014	9-17-86	3-4-90	Waste Treatment Addition Foundation and Wall Sections
29655-470	10-30-89	5-11-90	Bldg. 774 Subgrade Drain Pump Casing Details
38544-X10*			Utility Demolition Plan

Building No. 776			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
1-13324	12-2-55	6-4-66	Foundation Plan
RF-76-17202	12-9-55	9-19-57	Footing Schedule and Details
12571-2	1-19-56	3-18-70	Basement Plan and Sections
15232-1	4-9-64	4-2-66	Additions and Alterations Foundation Plan
15232-2	4-15-64	N/R	Additions and Alterations Foundation Sect. and Details
15501-013-M	7-20-83	7-20-90	Site Utility Plans
15501-021-M	7-20-83	5-14-90	Site Utility Plans
2545-1*			

N/R = Not Recorded N/L = Not Legible * = No Drawings Found

Building No. 777			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
1-11142-77	12-30-55	7-16-63	Miscellaneous Foundation Details - Sheet 1
1-11143-77	1-3-56	N/L	Miscellaneous Foundation Details - Sheet 2
RF-77-17305-4	2-20-56	3-10-62	Concrete First Floor Plan
RF-AP-77-B1	7-9-64	5-27-65	East Addition Foundation and First Floor Plan
(14504-1)	7-9-64	5-27-65	East Addition Foundation and First Floor Plan
RF-AP-77-B4	7-9-64	4-27-65	Foundation and Floor Plan Sections, Remodel and Addition
(14505-1)	7-9-64	4-29-65	Foundation and Floor Plan Sections, Remodel and Addition
15501-013-M	7-20-83	7-20-90	Site Utility Plans
15501-021-M	7-20-83	5-14-65	Site Utility Plans

Building No. 778			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
11324-8	12-15-61	N/R	Office and Cafeteen Building - Foundation Plan
11324-9	12-15-61	N/R	Office and Cafeteen Building - Foundation Plan (cont.)
14991-1	4-23-64	4-15-65	Addition - Site Plan, Foundation Plan and Details
15501-021-M	7-20-83	5-14-90	Site Utility Plans
2545-1*			

N/R = Not Recorded N/L = Not Legible * = No Drawings Found

Building No. 779			
Drawing No.	Original Date	Latest Rev. Date	Title
14607-2	N/L	12-14-64	Foundation and First Floor Plan
14608-1	N/L	12-14-64	Column and Footing Schedules
14608-2	N/L	12-14-64	Basement Slabs, Sections and Details
20112-01	6-19-67	9-12-68	Grading and Drainage Plan - Addition
20142-01	6-19-67	9-12-68	Foundation and First Floor Plan - Addition
20143-01	6-13-67	9-12-68	Footing Schedule and Details
20143-02	6-19-67	9-12-68	Foundation Details - Addition
20143-03	6-19-67	9-12-68	Foundation Details - Addition
25581-7	6-13-75	12-9-75	Foundation Drain Plan
15501-021-M	7-20-83	5-14-90	Site Utility Plans
15501-013-M	7-20-83	7-20-90	Site Utility Plans
20112-04*			Grading and Drainage Plan

Building No. 788			
Drawing No.	Original Date	Latest Rev. Date	Title
28883-003			Site Grading Plan
28883-007			Plan and Foundations
28883-008			Elevations and Sections
28883-009			Sectional Elevations
28883-020			Foundation Plan and Details
28883-021			Foundation Plan and Details
28883-051-01D			General Piping Arrangement
37665-040			Foundation Plan - Bldg. 788 Expansion
37665-041			Foundation Sections and Details - Bldg. 788 Expansion
37665-101			Architectural Elevations - Bldg. 788 Expansion
39041-107			Roof Framing/Foundation Plan - Mustang Pumper Shelter

Building No. 850			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
28234-103	2-15-82	12-16-85	Site Plan
28234-106	2-15-82	12-16-85	First Floor Plan
28234-309	3-20-82	12-16-85	Plumbing Site Plan
15501-053-M	7-20-83	7-20-90	Site Utility Plans

Building No. 865			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
21112-01	8-?-68	6-12-72	Plot and Drainage Plan
21112-02	8-?-68	6-12-72	Plot and Drainage Plan
21112-03	8-?-68	6-12-72	Plot and Drainage Plan
21141-01	6-21-68	6-15-72	Cast-in-Place Pile Plan
21141-03	8-1-68	6-15-72	Foundation and Floor Slab Plan - Part A
21141-04	8-1-68	8-2-72	Foundation and Floor Slab Plan - Part B
21141-05	8-2-68	6-15-72	Foundation and Floor Slab Plan - Part C
21141-06	8-2-68	6-15-72	Foundation and Floor Slab Plan - Part D
21141-07	8-2-68	6-15-72	Foundation and Floor Slab Plan - Part E
21141-08	8-3-68	6-15-72	Foundation and Floor Slab Plan - Part F
21143-07-A	11-2-68	6-14-72	Process Waste Pit Plan and Sections
21151-03-C	11-22-68	9-11-75	Office Above Ground Plumbing Plan
21151-04-A	11-22-68	6-14-72	General Shop Area Underground Plan
21151-05-B	2-28-69	7-10-72	General Shop Area Above Ground Plumbing Plan
15501-043-M	7-20-83	7-20-90	Site Utility Plans

Building No. 881			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
RF-81-Y2-B	12-14-51	7-23-53	Excavation Plan
1-11609-81	1-24-52	5-23-63	Plot Plan
RF-81-F1	1-24-52	10-8-53	Foundation Plan, Bldg. 81
RF-81-F2-C	1-24-52	7-23-53	Foundation Schedule and Details
RF-81-100	3-12-52	7-23-53	Storm and Sanitary Drains
RF-81-F7-K	4-4-52	7-23-53	Foundation Details, Bldg. 81
RF-81-109-B	5-16-52	7-23-53	Mezzanine Equipment Drains and Water Supply
RF-FS-21951*	3-9-56		Foundation Drain Lines for 883 and 881
25581-2	6-13-75	12-9-75	Foundation Drain Plan
15501-054-M	7-20-83	7-20-90	Site Utility Plans
38548-128	1-18-91	1-18-91	Collection Gallery and Pipeline Location Plan
38548-137	1-14-91	1-18-91	Civil Details
50026-100	10-28-91	N/L	Drainage Ditch Improvements

Building No. 883			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
1-5373-83	12-9-55	1-20-65	Foundation Plan
RF-FS-21951	3-9-56	N/R	Foundation Drain Lines for 883 and 881
1-5162-83	5-28-58	6-5-58	Foundations Floor Plan and Details - Addition
1-5169-83	5-22-58	6-5-58	Electric, Sprinklers, Lightning Prot. and Details - Addition
RF-14250-2	8-10-65	6-30-67	Area Drainage Plan
20612-41-A	11-?-68	10-19-71	Plot and Drainage Plan
25581-9	6-13-75	12-9-75	Foundation Drain Plan
15501-043-M	7-20-83	7-20-90	Site Utility Plans
28483-204	11-21-83	4-6-86	Foundation Sections - Addition
28483-022	7-6-84	2-6-86	Sump Discharge Line

N/R = Not Recorded N/L = Not Legible * = No Drawings Found

Building No. 886			
Drawing No.	Original Date	Latest Rev. Date	Title
14825-4	11-12-63	5-19-63	Miscellaneous Sections and Details
14825-1	3-12-64	5-19-65	Foundation Plan and Sections
17242	9-27-65	N/R	Sump Pump Installation
18497-2	1-17-68	3-5-69	Foundation Plan and Details
23482-302	8-28-72	3-?-75	Grading Plan
23482-304	8-28-72	3-?-75	Drainage Plan and Details
25925-1	7-15-77	8-30-77	Subsurface Drainage Control (Underground Drains)
25925-2	7-15-77	8-30-77	Subsurface Drainage Control (Profile and Sections)
25925-3	5-11-77	8-30-77	Subsurface Drainage Control (Grading and Drainage Plan)
25925-X01	8-2-77	8-30-77	Subsurface Drainage Control (Title Sheet)
25925-X02	8-2-77	8-30-77	Subsurface Drainage Control (Area Plot Plan)
15501-043-M	7-20-83	7-20-90	Site Utility Plans
15501-044-M	7-20-83	7-20-90	Site Utility Plans

Building No. 887			
Drawing No.	Original Date	Latest Rev. Date	Title
RF-81-F9-E	5-29-52	7-?-78	Foundation Plan - Sections and Details Bldg. 81
RF-81-F10-G	5-29-52	7-?-79	Sections and Details Bldg. 81
15501-054-M	7-20-83	7-20-90	Site Utility Plans
50026-100	10-28-91	N/L	Drainage Ditch Improvements
50498-401	11-25-92	3-31-93	Sewage Life Pump Piping Plans and Details

Building No. 889			
Drawing No.	Original Date	Latest Rev. Date	Title
RF-BP-14286-2	5-7-66	9-15-67	Foundation and Framing Plans

N/R = Not Recorded N/L = Not Legible * = No Drawings Found

Building No. 910			
Drawing No.	Original Date	Latest Rev. Date	Title
15501-022-M	7-20-83	7-20-90	Site Utility Plans
39365-X011	5-15-93	5-20-93	Basement Floor Piping Plan Demolition

Building No. 991			
Drawing No.	Original Date	Latest Rev. Date	Title
1-3354-91	7-31-51	8-29-52	Plumbing and Service Pipeline - Utility Tunnel Plan
RF-91-F1-C	7-27-51	9-24-51	Footing and Foundation Plan
RF-91-F2-C	7-23-51	N/L	Column and Footing Schedule and Details
RF-91-S9-C	8-8-51	9-24-51	Wall Sections
15708-1	8-15-51	2-24-67	Plot Plan
1-7084-91A	6-15-59	7-10-59	Access Door Details
RF-BY-15928-2-B	8-21-67	3-6-68	Grading and Location Plan
15928-8-B	10-31-67	3-6-68	Repave Dock Area, Bldg. 91 Subdrainage System
25581-10	6-13-75	12-9-75	Foundation Drain Plan
15501-023-M	7-20-83	6-14-90	Site Utility Plans
15501-032-M	7-20-83	7-20-90	Site Utility Plans

Building No. 995			
Drawing No.	Original Date	Latest Rev. Date	Title
20741-30	6-21-68	9-2-70	Sludge Drying Bed Plan and Sections
20741-31	5-17-68	9-2-70	Sewage Plant Addition Clarifier and Digester Plans
20741-32	5-17-68	9-2-70	Sewage Plant Addition Sections
20741-33	8-29-68	9-2-70	Sewage Plant Addition - Sections and Details
20712-61	7-?-68	9-11-70	Plot and Grading
20722-61	9-?-68	9-2-70	Piping Plan
15501-024-M	7-20-83	6-14-90	Site Utility Plans
38922-101	10-19-89	10-25-89	Foundation Plan

N/R = Not Recorded N/L = Not Legible * = No Drawings Found

Building No. 996/997/999			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
RF-99-17701	1-13-56	6-6-56	Concrete - Plans and Sections
RF-99-17702	1-13-56	6-6-56	Concrete - Sections and Details
13812-1	N/R	3-11-68	Floor Plan - Floor Slab - Roof Slab and Wall Sections
13812-3	N/R	3-11-68	Tunnel Plan - Elevations and Sections Bldg. 96 and 97
13812-5	N/R	3-11-68	Floor Plan - Sections Bldg. 96 and 97
25581-12	6-13-75	12-9-75	Foundation Drain Plan
15501-022-M	7-20-83	7-20-90	Site Utility Plans
15501-023-M	7-20-83	6-14-90	Site Utility Plans

Building No. 998			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
RF-98-A1	7-30-51	9-28-52	Plan and Details
RF-98-S2	9-13-51	9-28-52	Concrete Tunnel Details to Bldg. 98
15708-1	8-15-51	2-24-67	Plot Plan
25581-11	6-13-75	12-9-75	Foundation Drain Plan
15501-023-M	7-20-83	6-14-90	Site Utility Plans

Miscellaneous Drawings			
Drawing No.	**Original Date**	**Latest Rev. Date**	**Title**
25581-1	12-9-75	12-9-75	Foundation Drain Plan - Drain Terminating Points
27550-002	8-25-80	5-4-82	Perimeter Security Zone
27550-024	9-18-80	5-6-82	Perimeter Security Zone
27550-033	9-18-80	4-30-82	Perimeter Security Zone
27550-040	9-18-80	5-10-82	Perimeter Security Zone
27550-050	8-25-80	5-10-82	Perimeter Security Zone
27550-098	8-25-80	5-10-82	Perimeter Security Zone
27550-112	9-18-80	5-11-82	Perimeter Security Zone

N/R = Not Recorded N/L = Not Legible * = No Drawings Found

APPENDIX B

VSR Corporation Data Compilation of 1987 Storm Drain Video Survey

APPENDIX B
VSR CORPORATION
1987 STORM SEWER CLEANING, INSPECTION, AND VIDEO SURVEY

Appendix B presents the results of the VSR Corporation video survey and inspection conducted in 1987 at the Rocky Flats Environmental Technology Site (RFETS, formerly Rocky Flats Nuclear Weapons Plant). This inspection and video survey were not immediately accessible at RFETS. An exhaustive search for the video and results was conducted for approximately eight months. An EG&G memorandum was discovered that discussed limited findings of the video survey and inspection and identified VSR Corporation as the subcontractor that conducted the video survey. VSR Corporation is a local company (Lafayette, Colorado) and officials of the company were contacted to ascertain the existence and condition of any records pertaining to the survey and inspection conducted at RFETS. Results of interviews conducted by Jacobs personnel with VSR personnel provided the following:

- In 1987, VSR was contracted by Rockwell International Inc. to clean and inspect all of the storm sewers in the industrial area. Once the storm sewers had been successfully cleaned, VSR conducted a video survey of the storm-sewer lines to determine the conditions of each sewer line.

- VSR delivered to Rockwell the video tape containing the results of the storm sewers survey along with field notes and inspection forms.

- VSR had archived the field notes and inspection forms from the RFETS project at their offices. However, at the request of Rockwell, VSR did not retain copies of the video tape survey. To date, a copy of the video tape survey has not been located.

The copies of VSR field notes that were provided to Jacobs were in very poor condition. (The handwriting was difficult to read and the information provided is vague.) A typed copy of the field notes was made. These notes are presented as Attachment 1 to this appendix. It is important to understand that, at best, the field notes provide qualitative information only.

Table B-1 presents a summary of the information in the VSR field notes (Attachment 1). The information presented in the table includes the linear footage of the storm sewer inspected, the estimated linear footage of the pipelines with suspected failures in the structural integrity (this assumes each defect noted in the VSR reports represents a five-foot-linear segment of storm-sewer pipe), the approximate location of the storm sewer based on landmarks noted in the VSR report forms, and any significant comments noted on the VSR report forms. Examples of some of the comments included identification of numerous sections of storm sewer with unknown substances in the pipe. These substances, as described in the VSR Inspection and Report forms, included tar-like substances, grease deposits, and a "white solidified substance about 1/4-inch thick" located at the invert of the pipe.

Table B-2 presents a qualitative evaluation of the VSR field notes and Storm Sewer Inspection and Report forms. The following criteria were developed and used to systematically evaluate the VSR information: (1) location of the storm sewer in OU8 for inclusion in Technical Memorandum No. 2, Results of Stage 2 Remedial Investigation, (2) confidence in the validity of the VSR information compared to other existing information, and (3) recommendations for additional data collection and/or sampling. Also, the locations of the storm sewers described in the VSR field notes were compared to Plate B-1 to verify storm-sewer locations. Plate B-1, which was originally prepared by Wright Water Engineers, identifies field-verified locations of current Industrial Area storm-drain lines.

Attachment 1 contains a typed copy of the VSR field notes. The field notes generally indicate information about the daily activities of the field personnel. This included the amount of debris that was removed and bagged for disposal, activities associated with cleaning operations, and conditions associated with video taping.

Attachment 2 presents copies of VSR's Inspection and Work Report forms. These forms contain information about the conditions of the storm sewers, video taping information, landmarks, manhole locations and conditions, linear footage of storm-sewer lines, and pipe material type.

Abbreviations Used in Appendix B

Ave	Avenue
Bld, Bild, Bldg	building
BZ	Buffer Zone
C	cracked pipe
CCP	composite concrete pipe
CLP	collapsed pipe
CMP	corrugated-metal pipe
FD	foundation drains
Ft	feet
IHSS	Individual Hazardous Substance Site
L	leak
LA	low area
MH	manhole
No	Number
OJ	offset joint
OU	Operable Unit
PSC	Perimeter Security Zone
PVC	polyvinyl chloride pipe
R	roots
RCP	reinforced concrete pipe
Rd	road
Rpt	report
P-lot	parking lot
Pz	Perimeter Zone
SD	storm drain
St.	Street
T	taps
T.V., TV, or Tving	video survey
VSR	Video Sewer Renovations
WJ	wide joint
Y	Y joint in pipe

TABLE B-1
Summary of VSR Corporation Information
Storm Sewers Cleaning and Inspection 1987

VSR Rpt No.	No. Ft of SD Insp'd	Estimated No. Ft of SD with Flaws	Storm Drain Location from VSR Notes and Reports	Notes or Comments from VSR Reports
1	56	56	West side Bldg. 460 going south	
2	174.6	135.9	West side Bldg. 460 going south	
3	173.9	173.9	West side Bldg. 460 going south	
4	156.7	156.7	West side Bldg. 460 going south	
5	231.9	231.9	East side Bldg. 460 at north corner to south	
6	33.9	13	East side Bldg. 460 to southwest	
7	155	155	East side Bldg. 460 to south	
8	40.1	40.1	East side Bldg. 460 at southeast corner to south	
9	79.5	79.5	South end Bldg. 460 to west	
10	36	20	East side Bldg. 440 to west	
11	41.5	•	West side Bldg. 440 to west	
12	80.7	•	Southwest corner of Bldg. 447 to east	
13	171.6	•	Unable to identify location	
14	10	•	Southeast of Bldg. 447 door 14 north to south	
15	92.8	60	Southeast of Bldg. 444 dock going east	
16	48.4	25	Roof drain on north side of Bldg. 444 going south on Central Ave.	
17	51.6	35	Roof drain west of #16 on north side of Bldg. 444 going south	
18	19.8	10	In front of Bldg. 444 guard house going west	
19	22.2	22.2	North side of Bldg. 444 on west side of guard shack going south	
20	81.5	81.5	East side of Bldg. 460 retape of #6	

TABLE B-1
Summary of VSR Corporation Information
Storm Sewers Cleaning and Inspection 1987

VSR Rpt No.	No. Ft of SD Insp'd	Estimated No. Ft of SD with Flaws	Storm Drain Location from VSR Notes and Reports	Notes or Comments from VSR Reports
21	68.9	68.9	South side of Bldgs. 444 to 447 running south	
22	78	78	South of Bldg. 460 running east-west	
23	204.9	204.9	South of Bldg. 460 running south	
24	56	56	Possibly under Bldg. 461; unable to identify exact location	
25	109	20	Continuation of storm drain from #23	
26	91.6	15	Runs north-south in parking lot just west of south entrance to Bldg. 400 area	
27	245	245	Parking lot west of south entrance Bldg. 400 area	
28	349.3	10	Parking lot 3rd St. southwest of Bldg. 406	
29	160.8	160.8	Parking lot southwest of Bldg. 460 west of 3rd	
30	237.4	30	Runs north from parking lot southwest of Bldg. 460 west of 3rd to west side of 124	
31	86.7	30	West of Bldg. 125 going southwest	
32	37.3	•	Southwest of Bldg. 125 going northwest	
33	27	•	Northeast of Bldg. 124 across entrance road	
34	260	20	West of Bldg. 125 going north	
35	223.8	12	West of Bldg. 125	
36	63	15	Between Bldgs. 127 and 128	
37	253.3	127	Start 3rd St. to Central	
38	27.7	•	North side of Bldg. 444 pushing north under Cottonwood Ave.	
39		•	North of Cottonwood Ave., southeast of Bldg. 444, west of 6th	

TABLE B-1
Summary of VSR Corporation Information
Storm Sewers Cleaning and Inspection 1987

VSR Rpt No.	No. Ft of SD Insp'd	Estimated No. Ft of SD with Flaws	Storm Drain Location from VSR Notes and Reports	Notes or Comments from VSR Reports
40	60.3	20	Northeast acid tanks west of railroad tracks on Cottonwood Ave.	12" line steel at 3:00 ± 45 feet
41	24.8	24.8	Northeast acid tanks east of railroad tracks on Cottonwood Ave.	
42	15	•	T452G driveway going east on Central, west of 6th	
43	17.2	•	South side Bldg. 442 at door 2	Blk tar or grease in line
44	104	•	South side Bldg. 442 - line east to west	
45	25	25	East Bldg. 443 going under 5th St. to door 2	45° bend going down ± 25 feet
46	39.4	•	Foot of gate at Portal 1 near guard shack	
47	180.5	•	10th St. (Portal 1) south of Spruce on 10th (or 9th)	
48	106.1	•	10th St. to north	Lines look good
49	95.2	50	West side Bldg. 750, door 3 north-south	Rust spots
50	268.0	40	West side Bldg. 750, door 3 north-south	Rust spots
51	123.8	20	112 feet north from gate at Portal 1 west	Rust spots
52	45.4	45.5	To east on south side of B707	Looks cracked on top
53	48.5	•	Going west on southwest side of Bldg. 707	
54	72.3	•	Front of Portal 1 going southeast	Loaded with tar
55	39	19	To southeast into MH located at Portal 1 west of 764	
56	552.6	200	South side Bldg. 764 to west	
57	306.7	200	South side Bldg. 778 going east	
58	249.8	70	South of locker room 78, south side Bldg. 778 going south	Rust at taps, holes near MH3
59	116.7	30	10th St. north of Sage to open place to the northeast-east	

TABLE B-1
Summary of VSR Corporation Information
Storm Sewers Cleaning and Inspection 1987

VSR Rpt No.	No. Ft of SD Insp'd	Estimated No. Ft of SD with Flaws	Storm Drain Location from VSR Notes and Reports	Notes or Comments from VSR Reports
60	25.8	10	North side Bldg. 727 to northeast	
61	93.6	•	North side Bldg. 727 going north past ponds	
62	289.4	30	West of 773 door 1 going northeast	
63	219.9	•	Northwest corner Bldg. 559 going southeast	
64	66.3	•	Northwest corner Bldg. 559 going south	
65	51.5	•	Southwest side of Bldg. 559 going south	
66	14.4	•	South Bldg. 559 going west	
67	30.9	•	North side of Bldg. 773 inside fence past guard shack going southwest	
68	79	•	Northwest guard shack Bldg. 773 outside of fence going southeast	
69	31.6	•	South side Bldg. 559 to north	
70	21.5	21.5	South side Bldg. 778 going north	
71	20	•	South side Bldg. 778 going west	
72	21.5	•	South side Bldg. 778 going west	
73	7	•	West of guard post Bldg. 750 going west	
74	30.1	•	West of guard post Bldg. 750 going east to line going south	
75	30.7	•	West of Bldg. 750 going east	
76		•	West of Bldg. 750 going east	Line smashed in
77	15.7	•	South Bldg. 707 in front of door 7 going north	
79	47	47	Southwest corner Bldg. 564 by Patrol Rd.	Pipe should be replaced soon
80	5	5	Southwest side Bldg. 559 outside fence by Patrol Rd.	

TABLE B-1
Summary of VSR Corporation Information
Storm Sewers Cleaning and Inspection 1987

VSR Rpt No.	No. Ft of SD Insp'd	Estimated No. Ft of SD with Flaws	Storm Drain Location from VSR Notes and Reports	Notes or Comments from VSR Reports
81	50	20	Road 71 running west	
82		*	Dirt road south of guard post 773 running north-south	
83	24	*	Southwest of guard post 773 under Rd 71 east	Coated with tar
84	30	30	Southeast corner of Bldg. 774 going northeast	
85	55	*	South side Bldg. 774 going northeast just east of chimney tower	
86	20	20	West side Bldg. 776 going southeast	
87	11.6	*	North Portal 1 going north	
88	71	30	North of Portal 1 going east	
89	11	11	North Portal 1 just past guard post going north	Big rock at 11:00
90	2	2	South side Bldg. 778 at dock door 5-D going southeast	Weeds and rocks plugging
91	232.6	20	East side of 10th St. north of PSZ fenced area going northeast	Rocks and gaps between joints
92	56	20	East side Bldg. 750 east of cafeteria	
93	103	30	North end 10th St. west side of RD going south	Cracked with dirt seeping in
94	181	10	North side of Bldg. 371 north of Bldg. 381 door 2 going east	
95	28.8	*	North side Bldg. 374 going south	
96	27	20	North side of Bldg. 374 going east to holding pond	Cracked at 20 feet
97	69	*	West side of Bldg. 317 going south	Full of sand
98	25	*	West side Bldg. 371 going north - same line as 97	
99	120	0	Northeast corner holding pond going northeast	
100	95	30	West side of Portal 2 going east	
101	177	177	North of Portal 2 going east under asphalt	Dented and holes

TABLE B-1
Summary of VSR Corporation Information
Storm Sewers Cleaning and Inspection 1987

VSR Rpt No.	No. Ft of SD Insp'd	Estimated No. Ft of SD with Flaws	Storm Drain Location from VSR Notes and Reports	Notes or Comments from VSR Reports
102	71.6	30	In front of guard tower 550 ±200 feet west of 559 along Patrol Rd.	
103	130	*	Northwest of Substation 517-518, same as 99	
104	182	182	Ditch east of guard tower 375 running north-south same as 62	48" pipe cracks and joints up to 3"
105	155	155	In front of Bldg. 371 going east	Dents, low areas, etc.
106	105	105	Ditch southeast of Bldg. 374 going southwest	
107	40	*	Southeast side Bldg. 371 outside fence going south	
108	48.6	*	Southeast corner Bldg. 375 - guard tower	
109	40	*	North side Bldg. 371 under east and west dirt road	
110	345	150	Continued from sheet 106 going southwest	
111	147	*	Going north in 48" pipe west of Rd. 71	Tar coated
112	249.6	166	Southwest side Bldg. 111 west of door 1 going east	
113	216	10	Southeast side Bldg. 112 going east	Line blocked at 69 feet
114	79	30	4th and Sage south of intersection west to east	
115	40	10	South side Sage Ave. going east	
116	41	*	South side Sage along road going east	
117(S)	121.8	121.8	South side Bldg. 333 going east	Wide joints and dents
117(FN)		*	Corner of 6th and Sage going north	
118	19.4	10	Ditch between Central and Bldg. 334 going east	Line blocked at 20 feet
119	89.5	50	West of Bldg. 901 going northeast	Big dents
120	62	*	Patrol Road north of Bldg. 901 going north	

TABLE B-1
Summary of VSR Corporation Information
Storm Sewers Cleaning and Inspection 1987

VSR Rpt No.	No. Ft of SD Insp'd	Estimated No. Ft of SD with Flaws	Storm Drain Location from VSR Notes and Reports	Notes or Comments from VSR Reports
121	84.9	10	South side Bldg. 761 next to road going west	
122	101	35	Bldg. 750 to south side of Central east side of parking lot	
123	40	•	Bldg. 750 south of PSZ north of Central east side of parking lot	
124	208.5	164	South side of guard tower 901 going northeast	
125	56	56	North of gate 9 going across Perim. Rd.	
126	42	20	North of gate 9 going north	Jointed
127	75	35	North of gate 9 going east	Bent
128	68	20	South side of Bldg. 334 going east	Full of sand
129	33	•	7th Ave. east of Bldg. 556	
130	40	•	7th going north under driveway to parking lot on east side 7th	
131	43	•	West side 7th east of Bldg. 559 going northeast	
132	200	40	South side Bldg. 334 going east	
133	139.7	40	South side Bldg. 551 going east	
134	203.1	10	Southeast side Bldg. 551 going east	
135		•	Southeast side of Bldg. 551 going east then turning northeast	
136	153.5	10	Going west under parking lot west end of Bldg. 750	
137	139.6	50	West side Bldg. 750 parking lot going west	
138	115.4	20	Northwest side Bldg. 334 going northeast	
139	823	50	70" CMP running east southeast side of PSZ	
139A	296	•	Southeast side of PSZ	
139B	641	60	Southeast side of PSZ	

TABLE B-1
Summary of VSR Corporation Information
Storm Sewers Cleaning and Inspection 1987

VSR Rpt No.	No. Ft of SD Insp'd	Estimated No. Ft of SD with Flaws	Storm Drain Location from VSR Notes and Reports	Notes or Comments from VSR Reports
140	49	•	West of 111 ditch going east	
141	115	20	620 feet north of Bldg. 130 going northwest	
142	33	•	1/2 mile north Bldg. 130, in Buffer Zone going north	
143	95	•	North of Bldg. 130 in Buffer Zone	
144	305	•	No location given	
145	100	20	No location given	
146	61	•	Two lines running east fron of Portal 1 south side	
147	102	102	South side Central Ave. northeast corner parking lot 86 going east	Line is crushed
148	41.6	20	North side parking lot 86 south side Central Ave. going east	
149	44	30	North side Bldg. 888 parking lot going east	
150	84	•	North of 690 going east	No bad spills in line
151	41	•	South side Central Ave. east of 7th going east	
152	45	•	7th and Central Ave. going east under 7th	
153	70	•	North side Bldg. 334 in rock bed area going south	
154	89.6	•	North of door 3 Bldg. 334 going northeast	
155	76	•	North side 334 going east to 6th	
156	51	•	South of Portal 2 going east	
157		•	South of Portal 2 on Sage going east	
158	1500	•	Northwest corner parking lot Portal 3 going east	72" pipe
158A	322	30	Northwest corner parking lot Portal 3 going east	72" pipe
159	39.6	39.6	East side Bldg. 881 running east to open area	

TABLE B-1
Summary of VSR Corporation Information
Storm Sewers Cleaning and Inspection 1987

VSR Rpt No.	No. Ft of SD Insp'd	Estimated No. Ft of SD with Flaws	Storm Drain Location from VSR Notes and Reports	Notes or Comments from VSR Reports
160	223	30	West of 991 going east	
161	518	30	West of 991	White solidified substance 1/2 deep
162	1098	350	West of 991	
163	116	116	West of 991	
164	41	20	South side Bldg. 888 going north to open pit	
165	302	20	North Bldg. 991 going northeast	Tap - 16" pipe
166	57	57	North side Bldg. 888 going south	Section of pipe missing
167	226	20	Northeast side 900 Area going northeast	
168	250	50	Northwest of Bldg. 778 running northeast under PSZ	Full of rocks
169	132	20	North PSZ going northeast	
170		•	By Bldg. 888 running north inside swinging gate	
171	51.4	20	Corner 7th and Cactus Ave. east of 7th going south	
172	64.2	20	North side Cactus Ave. west side 7th	
173	36.3	•	Southwest corner Bldg. 850 going south under Cactus Ave.	
174	40	•	Southeast parking lot 86 going northeast to open area	
175	25	•	Southeast corner Bldg. 440 running south then west under Cactus Ave.	
176	31	31	Cactus Ave. north to Bldg. 850	
179	143.8	30	North side Bldg. 883 going east	
180	56.9	40	Northwest corner Bldg. 111 outside fence going southeast	
181	91.1	•	Northwest corner Bldg. 111 running northeast	

TABLE B-1
Summary of VSR Corporation Information
Storm Sewers Cleaning and Inspection 1987

VSR Rpt No.	No. Ft of SD Insp'd	Estimated No. Ft of SD with Flaws	Storm Drain Location from VSR Notes and Reports	Notes or Comments from VSR Reports
182	40.2	*	North side Bldg. 334 running west under walkway	
183	37.8	37.8	North side Bldg. 334 along 6th under road going south	Rust all over
184	68.3	20	East of 6th and Sage going north under Sage	Wide joints, smashed
185	59	30	West of 6th and Sage running north under Sage	
186	50	20	Southeast corner Bldg. 881 to northwest	
187	80	20	Southeast side Bldg. 881 running west	
188	151	30	Southeast corner Bldg. 881 going south	
189	58	10	South side Bldg. 865 going east under asphalt	
190	94	30	South side of Bldg. 883 going east	No longer exists
191	60	*	Southeast side Bldg. 664 outside fence under Cactus Ave. going southeast	
192	33.6	*	Southwest corner Bldg. 850 southeast corner of parking lot going east	
193	93	93	Northeast corner T886A to northeast toward Central Ave.	Cracks all around pipe, wide joints
194	23	20	Northeast corner Bldg. 112 on 4th going south	Cracks all around pipe
195	445	100	South side Bldg. 440 outside fenced area going north	Wide joints, lots of low areas
196	66	50	North side Bldg. 448 going south	

* no information reported
PSZ = Perimeter Security Zone
SD = storm drain

TABLE B-2

Summary of VSR Corporation "Inspection and Work Reports"
Storm Sewer Cleaning and Inspection 1987
Rocky Flats Environmental Technology Site

Table B-1 contains Jacobs' review of the VSR field notes and Sewer Inspection Report and work forms (Attachments 1 and 2 of this appendix). Table B-2 is the information from Attachment 1 applied to other available storm-sewer information. The storm drain locations were field verified by Wright Water Engineers in the spring of 1993. The VSR information was unavailable when Wright Water Engineers conducted their field inspection. Plate B-1 is the result of the Wright Water Engineers field verification of the storm drains.

It is important to note that the VSR information was generated in 1987. The recommendations presented in Table B-2 must be compared to more recent documentation before implementing or finalizing these recommendations because storm-sewer lines may have been replaced, repaired, or rerouted since 1987. The following table explains the criteria used to evaluate VSR's information.

Explanation of Table B-2 Information

	A	B	C
1. LOCATION OF SD IN OU8	A. Entire length of the SD line is not located in, adjacent to*, or downgradient from** an IHSS or building with a foundation drain.	B. A portion of the SD line is adjacent to or downgradient from an OU8 IHSS or building with a foundation drain, or the SD line is a suspected outfall of a building with a foundation drain.	C. A portion of the SD line is located in an OU8 IHSS, and/or located adjacent to or downgradient from a building with a foundation drain and/or it is suspected that a foundation drain attaches to an SD line.
2. CONFIDENCE OF VSR DATA COMPARED TO OTHER EXISTING INFORMATION	A. No confidence. The SD line was not video surveyed, and notes or reports do not clearly reveal the condition or structural integrity of the SD line.	B. Limited confidence. The line was video surveyed, and notes provide limited insight to the structural condition of the SD line.	C. Confident. The SD line was video surveyed, and the notes and reports provide clear and valued information about the structural integrity of the SD line.
3. RECOM-MENDATIONS FOR ADDITIONAL DATA COLLECTION AND/OR SAMPLING	A. None.	B. Conduct a video survey of the SD line to determine the structural integrity and identify potential foundation drain outfalls.	C. Include data in the OU8 Technical Memorandum No. 2 to adjust the intrusive Stage 3 sampling plan to include SD line as a potential pathway for contaminant migration.

Table B-2 contains VSR report numbers, a map with the approximate location of the storm sewer identified, the potentially affected OU8 IHSS, an evaluation of the VSR information, and the nearest building number.

* adjacent to = within 100 feet in any direction

** downgradient = within 100 feet in the generalized direction of suspected groundwater flow based on spring 1992 data

TABLE B-2

Summary of VSR Corporation "Inspection and Work Reports"
Storm Sewer Cleaning and Inspection 1987
Rocky Flats Environmental Technology Site

VSR Report Number	Locations from Storm Drain Map on Plate B1	OU8 IHSS Number	Evaluation			Storm Drain General Location
			#1	#2	#3	
1	YY10-YY9	-	B	B	C	
2	YY9-YY8	-	B	B	C	
3	YY8-YY7	-	B	B	C	
4	YY7-YY6	-	B	B	C	
5	VG5-VG4	-	C	C	C	
6	VG4-YG3	-	C	C	C	
7	YG3-YG2	-	C	C	C	
8	YG2-YG1	-	C	C	C	
9	Exact storm-drain location unknown	-	C	C	C	
10	YA1-YY3	-	B	B	C	
11	Exact storm-drain location unknown	-	B	B	C	
12	RR6-RR5	-	C	A	B	
13	RR5-RR2	-	C	A	B	
14	RA1-RR3	-	C	A	B	
15	WWE-6	-	C	A	B	
16	FFF-1 Area	-	C	B	C	
17	FFF-1 Area	-	C	B	C	
18	HHH2-HHH1	-	C	B	C	
19	HHH2-HHH3	-	C	B	C	
20	Retape of Sheet 6	-	-	-	-	
21	C143; Exact storm-drain location unknown		C	A	B	
22	YY5-YG1	None	C	C	A	
23	YY5-YY3	None	C	C	A	

TABLE B-2

Summary of VSR Corporation "Inspection and Work Reports"
Storm Sewer Cleaning and Inspection 1987
Rocky Flats Environmental Technology Site

VSR Report Number	Locations from Storm Drain Map on Plate B1	OU8 IHSS Number	Evaluation			Storm Drain General Location
			#1	#2	#3	
24	Exact storm drain location unknown	None	B	B	-	
25	YY3-YY2	None	B	B	-	
26	YO1-YC1	None	A	B	B/C	
27	YY2-YC3	None	A	B	B/C	
28	YC3-YC4	None	A	B	A	
29	YC4-YE1	None	A	C	A	
30	YC4-YF1	None	A	C	A	
31	ZZ2-ZZ1	None	A	A	A	100 Area
32	C-25	None	A	A	A	100 Area
33	C-24	None	A	C	A	100 Area
34	ZZ2-ZZ5	None	A	A	A	100 Area
35	ZZ5-ZA1 or ZZ5-ZZ6; Exact storm-drain location unknown	None	A	A	A	100 Area
36	AAA7-AAA6	None	A	C	A	100 Area
37	S-1020	-	A	C	A	
38	Exact storm-drain location unknown	-	B	B	A	
39	WWE-6 OR C-10; exact storm-drain location unknown	-	C	A	B	
40	C-17	-	C	A	B	
41	C-16	-	C	A	A	
42	S-1034	-	B	A	A	Bldg. 452G
43	UU3-UA1	-	C	A	A	Tar 442
44	UU3-UU4	-	C	A	A	Bldg. 442
45	UU2-UU3	-	B	A	B	Bldg. 443/442
46	EC1-EF1	123.1	B	A	B	Portal 1

TABLE B-2

Summary of VSR Corporation "Inspection and Work Reports"
Storm Sewer Cleaning and Inspection 1987
Rocky Flats Environmental Technology Site

VSR Report Number	Locations from Storm Drain Map on Plate B1	OU8 IHSS Number	Evaluation			Storm Drain General Location
			#1	#2	#3	
47	Exact storm drain location unknown	123.1	B	A	B	Portal 1?
48	Exact storm drain location unknown	-	B	A	B	10th St.
49	Exact storm drain location unknown	-	-	-	-	See 50
50	Exact storm drain location unknown	-	B	A/B	B/C	Bldg. 750
51	Exact storm drain location unknown	123.1	B	A	B/C	Portal 1
52	S-2000	-	C	C	B/C	Bldg. 707
53	S-2000	-	C	C	B/C	Bldg. 707
54	to EE3	None	A	B	B	Portal 1
55	to EE3	None	A	B	A	Bldg. 764
56	EE3-EE2	None	A	B	A	Bldg. 764
57	EE12-EE10	118.2/ 150.7	C	C	B/C	Bldg. 778/707
58	Exact storm drain location unknown	118.1	B	B	B	Bldg. 778/707
59	EE2-EE1	-	C	B	B/C	Bldg. 750 culvert?
60	S-2009 to DDD4	138	C	C	C	Bldg. 727/779
61	DDD4-DDD1	-	C	C	C	Bldg. 727/779
62	to JJ5	150.2, 172	B	C	C	Bldg. 773/771
63	GG1-GG2	-	C	C	C	Bldg. 559
64	GG2-GA1	-	C	C	C	Bldg. 559
65	GA1-GG4	-	C	C	C	Bldg. 559
66	GG6-GG5	None	C	B	B/C	Bldg. 559
67	JD1-JE1	150.1, 172	C	C	B/C	Bldg. 773/771

TABLE B-2

Summary of VSR Corporation "Inspection and Work Reports"
Storm Sewer Cleaning and Inspection 1987
Rocky Flats Environmental Technology Site

VSR Report Number	Locations from Storm Drain Map on Plate B1	OU8 IHSS Number	Evaluation			Storm Drain General Location
			#1	#2	#3	
68	JE1-JE2	172/ 150.1/ 150.2	C	B	B/C	Bldg. 773/771
69	GG5-GB1	-	C	C	C	Bldg. 559
70	EO1-EE12	150.7	B	A	A	Bldg. 778
71	EE12-EE13	-	B	A	A	Bldg. 778
72	EE13-EE14	-	B	A	A	Bldg. 778
73	EN1; Exact storm drain location unknown	None	B	A	A	Bldg. 750
74	EM1; Exact storm drain location unknown	None	B	A	A	Bldg. 750
75	ELI; Exact storm drain location unknown	None	A	A	A	Bldg. 750
76	EKI; Exact storm drain location unknown	None	A	A	B	Bldg. 750
77	ELI-EH1	None	A	C	A	Bldg. 707
78	Missing	-				
79	S-2030	-	B	B	A	Patrol Rd.
80	C-80	-	C	C	A	Patrol Rd.
81	C-132; Exact storm drain location unknown	-	B/C	A	A	Rd 71
82	Exact storm drain location unknown	150.2/ 172	C	A	B	Bldg. 773/771
83	Exact storm drain location unknown	172	C	B	B/C	Bldg. 773/771
84	111-112	163.1	C	C	C	Bldg. 774
85	Exact storm drain location unknown	163.1	B	A	B	Bldg. 774
86	Exact storm drain location unknown	150.2	C	A	B	Bldg. 776

TABLE B-2

Summary of VSR Corporation "Inspection and Work Reports"
Storm Sewer Cleaning and Inspection 1987
Rocky Flats Environmental Technology Site

VSR Report Number	Locations from Storm Drain Map on Plate B1	OU8 IHSS Number	Evaluation			Storm Drain General Location
			#1	#2	#3	
87	EB1-EB2	123.1	A	A	A	Portal 1
88	EF1-EE3	-	B	A	A	Portal 1
89	Exact storm drain location unknown	-	B	A	A	Portal 1
90	Exact storm drain location unknown	150.2	B	A	A	Bldg. 778
91	JE1-JE2	None	A	C	A	Bldg. 750 Culvert
92	S-2012	None	A	B	A	Bldg. 750
93	Exact storm drain location unknown	?	?	A	-	10th St
94	KK6-KK4	151	B	C	A	Bldg. 381/371/374
95	KK3-KK2	151	C	C	A	Bldg. 371/374
96	KK2-KK1	151	C	C	A	Bldg. 371/374
97	C-39	-	C	B	-	Bldg. 371FD
98	C-39	-	C	B	-	Bldg. 371FD
99	C-128	135	C	A	B/C	Bldg. 374
100	S-2029	None	A	B	A	Bldg. 374/ Portal 2
101	C-47	None	A	B	A	Portal 2
102	C-81	-	C	B	A	500 Area PZ
103	C-128 - other end of #99	135	C	A	-	Bldg. 517/518
104	JU5-JC2 - #62 walked thru	150.2/ 172	B	C	C	Bldg. 771
105	Exact storm drain location unknown		B	A	B	Bldg. 371
106	C52?	-	B	A	A	Bldg. 374/ 550 Tower
107	S-2026	-	C	A	A	Bldg. 371/Patrol Rd

TABLE B-2

Summary of VSR Corporation "Inspection and Work Reports"
Storm Sewer Cleaning and Inspection 1987
Rocky Flats Environmental Technology Site

VSR Report Number	Locations from Storm Drain Map on Plate B1	OU8 IHSS Number	Evaluation			Storm Drain General Location
			#1	#2	#3	
108	S-2035	None	A	B	A	Bldg. 375 Tower
109	C-130; Exact storm drain location unknown	None	A	A	A	Bldg. 371
110	C52 - continued from #106	-	B	A	A	Bldg. 374/ 550 Tower
111	To JC2 - walked other end of #62	150.2/ 172	B	C	C	Bldg. 771
112	AAA-4 to AAA-3	None	B	A	B	Bldg. 111
113	AAA3-AAA2	None	A	A	A	Bldg. 112
114	S-1026	-	B	A	A	4th & Sage
115	Exact storm drain location unknown	-	C	A	A	4th & Sage
116	Exact storm drain location unknown	-	C	A	A	4th & Sage
117	C57 or C58	172	C	A	A	6th & Sage
118	CCC5-CCC3	172	C	A	B	Bldg. 334
119	C-100	-	B	B	A	901 Tower
120	Exact storm drain location unknown			A		901 Tower
121	S-2049	None	A	B	A	761 Tower
122	C-76	172	B	A	A	Portal 1 Parking
123	Top CCC-1; Exact storm drain location unknown	None	A	A	A	Portal 1 Parking
124	C-136; Exact storm drain location unknown	-	C	B	A	901 Tower
125	C105 or C104; Exact storm drain location unknown	-	B	A	A	Gate 9
126	Exact storm drain location unknown	-	C	A	A	Gate 9
127	Exact storm drain location unknown	-	B	A	A	Gate 9
128	CCC5-CCC4	-	C	A	A	Bldg. 334

TABLE B-2

Summary of VSR Corporation "Inspection and Work Reports"
Storm Sewer Cleaning and Inspection 1987
Rocky Flats Environmental Technology Site

VSR Report Number	Locations from Storm Drain Map on Plate B1	OU8 IHSS Number	Evaluation			Storm Drain General Location
			#1	#2	#3	
129	Exact storm drain location unknown	?		A		Bldg. 556
130	Exact storm drain location unknown	None	A	A	A	7th Ave.
131	Exact storm drain location unknown	?		A		Bldg. 559
132	CCC5-CCC4	-	C	B	A	Bldg. 334
133	CCC4-CCC3	-	C	B	C	Bldg. 334/551
134	CCC3-CCC2	-	C	B	C	Bldg. 334/551
135	CCC2-CCC1	172	C	A	B	Bldg. 551
136	Exact storm drain location unknown	150.4	B	A	B	Bldg. 750
137	C-75	-	B	A	A	750 P-lot
138	BBB4-BBB3	None	A	C	A	Bldg. 334
139	No location given			A		?
139A	No location given			A		?
139B	No location given			A		?
140	C-29 and C-28	None	A	C	A	Bldg. 111
141	C-30	None	A	C	A	Bldg. 130
142	Not on map	None	A	A	A	BZ N. of 130
143	Exact storm drain location unknown	None	A	A	A	BZ N. of 130
144	No location given			A		
145	No location given			A		
146	C-82	None	A	A	A	Portal 1
147	Exact storm drain location unknown	172	B/C	A		P-lot 86
148	C-85	-	C	C	A	P-lot 86
149	C-86	-	C	B	A	P-lot 86
150		-	B	A	A	Bldg. 690

TABLE B-2

Summary of VSR Corporation "Inspection and Work Reports"
Storm Sewer Cleaning and Inspection 1987
Rocky Flats Environmental Technology Site

VSR Report Number	Locations from Storm Drain Map on Plate B1	OU8 IHSS Number	Evaluation			Storm Drain General Location
			#1	#2	#3	
151	C-70	172	C	A	A	7th & Central
152	S-1036	172	C	A	A	7th & Central
153	BBB4-BBB5	None	A	B	A	Bldg. 334
154	BBB3-BBB2	None	A	B	A	Bldg. 334
155	BBB2-BBB1	None	A	B	A	Bldg. 334
156	C-46	-	C	B	A	Portal 2
157	C-44	-	C	A	A	Portal 2
158	JJ6-JJ1	None	A	C	A	Portal 3
158A	See #158	----	-	-	-	----
159	Exact storm drain location unknown	None	A	A	A	Bldg. 881
160	Exact storm drain location unknown	-	C	A	-	Bldg. 991
161	See 160	-	C	A	-	Bldg. 991
162	See 160	-	C	A	-	Bldg. 991
163	See 160	-	C	A	-	Bldg. 991
164	S-1062	None	A	A	A	Bldg. 888
165	Exact storm drain location unknown	None	A	A	B	Bldg. 991
165	----	----	-	-	-	----
166	S-1062	None	A	A	A	Bldg. 888
167	C-113?	-	B	A	B	900 Area
168	Exact storm drain location unknown	-	-	-	-	Bldg. 778?
169	C-115	-	C	B	A	207 Ponds
170	Exact storm drain location unknown	None	A	A	A	Bldg. 888
171	C-12	None	A	B	A	Bldg. 850
172	PP2-PP1	None	A	B	A	Bldg. 850

TABLE B-2

Summary of VSR Corporation "Inspection and Work Reports"
Storm Sewer Cleaning and Inspection 1987
Rocky Flats Environmental Technology Site

VSR Report Number	Locations from Storm Drain Map on Plate B1	OU8 IHSS Number	Evaluation			Storm Drain General Location
			#1	#2	#3	
173	002-001	None	A	B	A	Bldg. 850
174	C-88	None	A	A	A	Plot 86
175	VV3-VV2-VV1	None	A	A	A	Bldg. 440
176	NN1-NN2	None	B	A	B	Bldg. 850
179	C-147 or C-146?	None	A	A	A	Bldg. 883
180	C-33	None	A	A	A	Bldg. 111
181	C-34; Exact storm drain location unknown	None	A	A	A	Bldg. 111
182	BBB2-BBB1	-	B	C	A	Bldg. 334
183	C-59	-	B/C	C	A	Bldg. 334
184	C-58	172	C	C	A	6th & Sage
185	C-57; Exact storm drain location unknown	172	C	C	A	6th & Sage
186	MM-2 to NW	None	C	B	B/C	Bldg. 881 FD Line
187	MM-2 to W	-	C	B	B	Bldg. 881
188	MM2-MM1	None	C	C	B/C	Bldg. 881 FD outfall
189	C-92	None	A	B	A	Bldg. 865
190	No longer exists	----	-	A	-	Bldg. 883
191	C-7	None	A	A	A	Bldg. 664
192	003-002	None	A	B	A	Bldg. 850
193	C-142	-	C	C	C	Bldg. 886
194	AAA1-AAA2	None	A	A	A	Bldg. 112
195	WW1-WWE4	-	C	C	B/C	Bldg. 440
195	WA1-WW2	-	C	B	B/C	Bldg. 448

TABLE B-2

Summary of VSR Corporation "Inspection and Work Reports"
Storm Sewer Cleaning and Inspection 1987
Rocky Flats Environmental Technology Site

- = not an OU8 IHSS
Bldg. = building
BZ = Buffer Zone
FD = foundation drain
IHSS = Individual Hazardous Substance Site
OU = operable unit
P-lot = parking lot
SD = storm drain
? = VSR information unclear
None = no Operable Unit IHSS adjacent to or downgradient

* adjacent to = within 100 feet in any direction
** downgradient = within 100 feet in the generalized direction of suspected groundwater flow based on spring 1992 data.

ATTACHMENT 1

Transcribed VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

Tommy-Todd-Pat-Jim 7-20-87

- Got here at 8:00 AM - got clearance & signed in
- Start 10:15 AM cleaning bottom of invert - Rocks & gravel 6 buckets full. (Drawing in margin)
- Started cleaning line 11:00 AM till 11:30. Rocks & sand in invert 8 1/2 buckets full.
- Start TV (video screening) at 11:45 - run TV in 56'. Stopped at top, couldn't make it through. We will change direction and try going from storm drain 2 to 1 going south to north.
- We tried to TV from storm drain #2; went 9'8" and stopped.
- #2 - tried to push to storm drain #3. Couldn't get past 39' 9" we will jet up and pull with jet truck.
- From 12:30 pm to 1:30 pm tried to push camera up line #2 to 3.
- From 1:30 pm cleaned invert in storm drain #3 rock & sand & gravel - till 2:10 pm, 13 buckets of rocks & grit.
- Start TV at #2 to #3 tape at 0504 - 0808 cracked on top. Time 2:15 pm finished at 2:45 pm. (Drawing in margin)
- Storm drain #3 to #4 18" pipe - cracked on top all the way down pipe.
- Storm drain #4 to #5 18" pipe going east to west. Cracks up pipe. Bad crack at 116 ft. Chunk of concrete is missing from top of joint. Tape 1147 - 1396 time 4:00 pm. (Drawing in margin)

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

Tommy-Todd-Pat-Jim 7-21-87

- Started at east side of Building 460 going south.
- Cleaned line from 8:20 to 9:45 am.
- Started TVing 9:20 am 231' 9" Tape 1397 - 1686 Time 9:20 am storm drain 1 - storm drain 2 east Side of 460. East side of Building 460 going south.
- Cleaned out #2 storm drain. Got 8 buckets of sand and rock.
- TV #2 to #3 storm drain start at 10:00 am tape 1686 storm drain #2 northwest of S.D. #3 we will be TVing south east from #2 to #3 - we will be pushing TV up as far as we can by hand. Size of line 21".
- Unable to push TV up storm drain 2 because of sand and rock. Got up to 21' 9". We will try to push up from S.D. #3 to S.D. 2 as far as we can. We can see 8" lines going through 21," will record it on camera video - Time 10:15 - Tape 1194.
- Tape 1958 could not push past 10' from S.D. #3 8" pipe going through 21" pipe 2' & 10' in with maybe an old storm drain in about 10' to 12' in Time 11:00 AM. Tape 1958 cleaning till 12:30 to 2:00 pm. (Drawing in margin)
- S.D. #3 to #4 cracks all along top of pipe 2 'in' broken pipe on to doesn't look good - 155'. 21" tape 2218 end #5 12 buckets. S.D. #4 to #5 Time 3:00 pm - 30 ' 21" cracks on top of pipe all the way to the end of pipe. Tape 2299 end - Time 4:00 pm. Stopped TVing. (Drawings in margin.)

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

7-22-87

- Got here at 8:00 filled up with water went to Bldg. 460 had to wait for monitoring storm drain. We checked in at Guard gate at 8:15 waited for monitor, monitor said that we had to wait for Fire Department before entering #S.D. 6 & S.D. &# - must move to different location for TVing. Time 8:45 AM. (Drawings in margin.)

- S.D. #5 to S.D. #6 time - Starting on south east corner of Bldg. 460 S.D. #5 going east to west to S.D. #6 pulling with jet truck 21" line.

- At 9:00 Am start TVing in from of Bldg. 440 going west in 18" c.m.p. will be pushing by hand up pipe - was unable to push up past 22' going to change to 12" skids and try to push up line. Time is 9:20 will attempt to push up line with 12" skids up 18" line.

- Pushed up 18" with 12" skids unable to push past 52', camera was going off during push - pulling back seam cracked or bent pipe at 36' pipe was clean. Time 9:30 AM. Tape end 265 could not go past 41'.5 going east in 18" line to #3 will get access to #3 sometime. Time 10:15 tape end.

- Next will be in southwest corner of Bldg 477 going west to east going through S.D. #2 be pulling with jet truck. 18" c.m.p. started at 10:45 am. Tape start 2801 to 3008 time end 10:45 AM.

- Moving to different location (time 11:00 tape start 3008 - 3272 time end 12:00) going from S.D. #3 through S.D. #4 to S.D. #5 18" c.m.p. will be pulling with wash truck. Had little trouble with camera - pipe looked good there was a S.D. pipe 53' in from S.D. #3 going north 12". (Drawing in margin)

- Go north to south to intersecting line between S.D. #3 & 4 going south 12". southeast of Bldg. 477 Door 14 Time 12:40 Tape 3269. TVed 10' stretch between S.D. #3 & 4 12" storm drain catch basin.

- 30" line was jet cleaned one time before TVing. This is a continuing line from S.D. #5. There is a ditch between #5 & 6 which should be trenched out at sometime. We will be going from the end of #5 and starting in at the beginning of #6. Tape start at 3310. Time 1:00 pm. Line is going east with the flow S.E. Dock of 444 Bld. Spider web cracks on top of pipe up underneath the paved road. Footage is 9'8". Tape end at 3433. Skids were riding hinge in S.D. #6 & 7 when pipe got to smaller pipe. (Drawing in margin) Start time 1:45 pm end time 1:55 pm.

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

7-22-87 continued

- Be TVing on north side of Bldg. 444 on Central Ave. TVing roof drain is from Bldg. 444 north side pushing by hand going south 8" line C.M.P. Tape start at 3434, end at 3492. (Drawing in margin)

- Moving to other section of pipe will be a roof drain going south to Building 444. 8" C.M.P. Tape start 3493 to 3600 time 2:15 to 2:30.

- Time 2:30 Starting TVing 12" in from of Bld. 444 going east to west right in front of guard house. Tape 3600 to 3784 time 3:10 in end - unable to push past 19'8 camera keeps turning over on us and going under water - found roof drain at 18'.4 going south. Had bad time with camera was stuck in pipe. Time 3:30 TV line on north side of Bldg. 444 - Roof Drain 8" going south storm drain on west side of guard shack. Roof drain going south dents and wide joints in line 11' turns into PVC for eight ft. of PVC in corrugated pipe and then turns into CMP at 17' then more dents to 90 degree looks like it might turn to the west? Finished up at 4:00 pm. Tape stopped at 3942.

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

7-23-87

- Got at job site at 8:00. Got TV van ready to TV Rocky Flats was not ready to monitor. (Down time 1 hour). TV in front of Building 460 - south side.

- Retape storm drain #2 to S.D. #3 going to manhole between #2- #3. Went 81' there was an 8" line going through manhole. Tape 4048-4135. Time 9:45 AM.

- Inspecting storm drain #1 to #2 going south - are in front of 444 south side going south.

- Start at Bldg. 460 from S.D. 5 to S.D. 6 going east in 21" storm drain. Tape start 4135 - 4243. Time 10:40 to 11:00. (Drawing in margin)

- Tape 4243 - 4471 time 11:30. Going south from bldg. 460 in 30" sq. S.D. 1 to S.D. 2 will be going through each basin south of S.D. #1 - pulling with jet truck (color TV) 0 a lot of cracks in pipe at 35' where 18" line is taped in - and cracks all down pipe 170 came up to a lot of rocks and sand sediment on bottom. (Drawing in margin)

- Storm drain #1 to 2 going under guard shack going east to west drain concrete pipe. Time 12:40 to 1:10 pm Tape 442 to 4543 could not push past 33' - camera keep going on and off. (Drawing in margin)

- Time 1:15 pm will get jet truck and pull camera through S.D. 1 to 2 going west at 35' chunk of concrete was missing out top of pipe total footage was 56' line was clean. (Drawing in margin)

- Outside Red Area - south of Bldg. 460 outside of guard's gate. Tape 4614 time 1:40. this is a continuing run from the 30" line going south from Bldg. 460 outside going through parking lot. 21" C.C.P. will be going west to S.D. 4. Quit taping at 4:00 pm.

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

Friday 7-24-87
Rocky Flats

- Start from shop at 7:35 got to Rocky Flats at 8:00. Filled up with water & got TV ready for inspecting lines. west side of 3rd Street started TVing on parking lot southwest of Bldg 460 outside of fence going from storm drain #6 to MH will be pulling west with jet truck.

- Time 8:45 to 9:10 tape 4948 to 5070 18" CCP. Jim had bod count at 9:00 am had hard time getting up line with jet truck still going west pipe looked good no cracks or separations of joints.

- Time 9:25 to 10:25 tape 5070 to 5170 18" CCP will be pulling from M.H. 7 to S.D. 8 going west will be pulling with jet truck. Still in parking lot pipe looked good. Had a few hairline cracks but nothing major in line ft 160'.8 end of run.

- Going north from #7 time 9:55 to 10:25 am tape 5170 to 5284 18" CCP will be pulling TV going north to S.D. 9 from M.H. 7 pipe is running into 18" pipe going west into M.H. 7 pipe looked in good condition no major cracks.

- Time 10:50 to 12:10. Tape 5284 to 5349. Start TVing going southwest to S.D. 2 to 1 against flow S.D. 1 is in parking lot most of Bldg. 25 just behind the trailer on east side. In side fence area had to clean line before TVing it is a 151" C.M.P. going southwest - started cleaning at 11:00 to 11;50 jetted line - pipe was cracked at 12' & 61' possible wide joint or bad cracks in pipe. Cleaning time 12:30 to 1:30 on mas line running north is suppose to be 12" CMP but is only 8" CMP.

- Time 1:30 till 4:00, 8" CMP. Still cleaning lines 8" CMP going from S.D. 2 to 3 washtruck is not running very good back engine needs tune-up or looked at. Buckets of sand and rock 35 buckets in S.D. 3 (three loads of water).

- Time 3:15 to 3:30. Tape 5341 to 5389. 15" S.D. going under small road Asphalt we will be using black and white TV be on southwest side of Bldg. 125. Right in front of water treatment plant going south 12" CMP (looked good). Stopped at 4:00 going home.

ATTACHMENT 1
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Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

Monday 7-27-87

- Got here at 8:00 filled up with water started cleaning 8" cm line going north - start cleaning at 8:30 till 11:15. Got 25 buckets of sand and rock out of storm drain 3 and 4 we will be starting from S.D. 2 going through S.D. 3 to S.D. 4 to 5 - (clean can & get camera ready, started TVing at 11:20 will 11:55am - line looked good all the way from 2 to 5. Footage: S.D. 2 to 3 84'.7 - to 3 to 4 82'.8 - from 4 to 5 94'.0 - total footage is 260'. S.D. 5 to S.D. 6 will be going northwest in 12" CMP. Still west of Bldg. 125 - S.D. is inside fence area S.D. 6 is outside of fence area other side of parking lot.

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

2-29-87

- Worksheet no 39. S.D. 1 to 2 is located north of Cottonwood Ave on the southeast Bldg. 444 just west of 6th Ave.

- Time 1:10 till 1:35. Went up line to 45'.7 and couldn't go any more. Total footage of line is 60'.3. S.D. 1 to 2 pulling with jet truck. 18" by 28" CMP located on Cottonwood Ave. just east of R.R. tracks. southeast of Bldg. 444 will be pushing northwest underneath Cottonwood Ave just past 6th St. northeast of acid tanks. Had a dent in pipe at 43' at top of pipe - at 47' was (a 12" steel pipe sticking in line at 3 on clock).

- Time 1:40 to 2:00, tape 1353- 1581 S.D. 1 & 2 12" CMP will be just east of last line up - just northeast of acid tanks going underneath Cottonwood Ave going south pulling with jet truck - real bad holes in line at 20', 22', 24', 24'.8 - we were unable to go past 24'8" a lot of sand and rock in pipe over half full (pipe should be cleaned).

- Time 2:35 to 2:55, tape 1581 to 1711. S.D. 1 to 2 12" CMP. Will be on south side of Bldg. 442 in front of door 2 going north into invert with 18" line going east and west will be going from S.D. 2 to 1 will be going with flow will be pulling east to S.D.1. Pipe looked good all the way down from S.D. 2 to 1. Diagram of S.D. 1 and 2 going to the east from S.D. 2 to 1 it shows you how S.D. 1 goes into invert 2. (Drawing in margin)

- Time 12:55 to 1:25, tape 5649 to 5749. S.D. 5 to 6 line was good till we got to 128' looks like they replaced section of pipe with another style of CMP pipe - line was clean end of line (tape end at 5795).

- Tape 0-0269. S.D 1 to 2 between Bldg. 127 & 128 going north in 12" CMP line will be pulling with jet truck 15' pipe in pip (chanced to deferment style of pipe) rest of pipe looked good.

- Tape 0269 - 0895 S.D. 1 to 2 on Central Ave. start at 3rd St going east down Central Ave - 14" line CMP pulling with jet truck with 12" skids.

ATTACHMENT 1
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Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

Wednesday 7-29-87

- Time 8:30. Used loads of water. Got at job site at 8:30 am got water started cleaning at 8:50 am - finished at 12:00. Will be going east on Central Ave from Fourth Street on the south side of street - will be pulling with jet truck with 12" skids. S.D. 3 to 4 (could not do). Decided not to TV - could not get jet head to go through other side (keep getting stopped by object in pipe). Tape 0895.

- Time 11:35 till 12:00 tape 0895. S.D. 1 to 2 located on north side of Bldg. 444 will be pushing north under Cottonwood Ave. pipe looked good (lots of rock and sand in pipe).

- Worksheet #39 time 12:30 looked up line from both ends with flashlights - pipe looked good about half full of dirt and sand.

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

Thursday 7-30-87

- Going under 5th street - east. Got at job site at 8:00, got water - will be starting on the east side of Bldg. 443 at S.D. 3. Will be pulling with jet head to S.D. 2 in back of Bldg. 442 by door 2. Had to get key to get in gate at Bldg. 443 - had hard time going through pipe maybe caused by 45 degree bend in pipe. Almost got stuck look up line with flashlight - about 25 ft in we can see a 45 degree pipe which goes down and we have no idea where it is going. Can be a problem in a bad rain if rock and sand can build up in this area. Camera is down have to go back and get another light head to continue TVing. Todd and Tommy will stay and clean in back of Bldg. 125 two lines cleaned at Bldg. 122 for one hour then tried to locate S.D. 2 - couldn't locate it so we moved to Bldg. 461 south side looked up line saw that line was clean and made a 45 degree angle going east stopped at 12:00 than took lunch till 12:30. (Drawing in margin)

- Start 12:30 to 2:00. Then went to S.D. in back of Bldg. 461 - south side of Cactus Ave. Could not clean with jet head, so we cleaned it out by hand just the invert #2 got about 35 buckets full out of #2. Also, could not jet lines was full of sand and rock in S.D. 3. Water was unable to go down with flow. The bank was to 0 high going from #3. Quit work at 2:00 pm.

ATTACHMENT 1
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Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

Friday 7-31-87

- Time started 9:00, time arrived 8:00. Had to sign in at Portal 1 it took about 20 mins. Started in Portal 1 in front of guard shack at front gate going northwest from S.D. 1 to 2 we were unable to pull camera through S.D. 1 to 2 we will look up line from both ends with flashlight and give report on visual look in line - give you condition of pipe. Condition of pipe - was good - there were no bad joints or dents in line - I had a good look at line with flashlight. Total footage was 39'.4

- Sheet #47. Time 10:20 till 11:30, tape 1956. Tried to locate manhole in street in front of Portal located on 10th street in Portal 1 just south of Spruce Street. be a 15" CMP pipe going south on 10th street will be pulling with 12" skid there will be two S.D. between us will not on tape. Second try will be pulling with 15" skids the 12" skids were to low it kept fogging up on the camera. Started at 10:50 till 11:25 pipe was cleaned all the way from S.D. 2 to S.D. 4 - S.D. 1 to 2 was 1/4 full of rock and dirt the rest looked real good. (Drawing in margin)

- Sheet #48. Still on 10th Street going north from S.D. 1 to 3 going through 2 manhole #3 is a catch basin which is going east out of area - 15" smp start at 6 feet in. 15" line looked real good shape from S.D. 1 to M.H. 3 went to lunch at 12:00 got back at 12:30. Time 11:30 am till 11:50. Tape 2215- 2366.

- Time 12:50 to 1:30 tape 2366 - 2896 (from man hole 1-3 and reverse pull). Start TVing at Bldg. 750 in front of door 3 on the west-side just as you enter the gates. 24" smp be going south with camera with 24" skids pulling with jet truck will be going through M.H. 2 to 3 from M.H. 1 - going in hallway M.H. 2 will be inside hallway - we were only able to pull camera in 95.2' will pull TV cable all the way to M.H. e and Reverse will pull north pull #3 to M.H 1 going through M.H. 2 we will try to pull all the way to the copper tubing in line at 95'.2 away from M.H. 1. (on reverse pull from #3) Sheet #49 is first pull going north to south - pulling with TV can winch. Tape 2600 to 2899. Line good from M-H 3 to M-H 2 from M-H 2 to M-H 1 there is a lot of rust spots in line all the way down to copper tubing.

- Time 3:00 pm tape 2846. From middle of walkway inside M-H 1 to M-H 2. will pull from M-H 1 to S.D. 2 going west with jet truck. M-H 1 was also used as M-H 2 on sheets 49 & 50 will be going west from there. Unable to pull past 123.8' cause of tap sticking in at 10 o'clock - pipe was rusted all the way down the line - will pull from other side start Monday. 123.8 tap in line low.

ATTACHMENT 1
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Rocky Flats Environmental Technology Site Industrial Area

8-3-87

- Got at job site at 8:05 went through Portal 1 and signed in jet truck went & got water we got set up. We were unable to get the monitor to come to our area till 12:30.

- 9:00 we moved to different location still in fenced area.

- Todd's truck back engine would not start had to wait for pair of jumper cables. We will be setting up by Bldg. 78 on the south side just behind Bldg. 778 will be going east in 15" CMP.

- Start at south side of Bldg. 778 will be going east. Will be going under 778/707 walk corridor. Were unable to go on, had to go back to shop. Int. wash truck would not start in back engine went home at 10:30 went back to ship worked on truck got it going finished work at 11:30. Tape 3093 time 9:30.

ATTACHMENT 1
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Rocky Flats Environmental Technology Site Industrial Area

Tuesday 8-4-87

- Start time 8:00 down till 9:45 cause of monitors and check in at gate - wash truck got water (Had to string outline) will be working in back of Bldg. 707 from M.H. 2 to 1 east. Start TVing at M.H. 2 going east to M.H 1 where we got stuck at tap 123' in from M.H. 1 going west. Going from M.H. 2 going east we got up to second tap (at 45 ft) and were unable to go past tap. It was sticking in line about six inches it kept hitting camera had to pull back and more to next run M.H. 3 going west.

- Time 10:50 to 11:03 tape 3229 to 3307. M.H. 2 going to M.H. 3 going west (continue from last pull) is located on southwest corner of Bldg. 707 on the other side of fence just west of Bldg. 707. 15" CMP from M.H.2 is a drop going to M.H. 3 against the floor. Line looked good - a little hit of sand and rock at end of line - should be cleaned regularly.

- Sheet #54. Time 11:20 to 11:50 tape 3307 - 3465. Starting at Portal 1 just past gate going southeast to S.D. 2 which has four lines going into M.H. 2 - 24" CMP line looked good - was heavily coated with tar all the way down line. Had 2 taps in line one at 32' and one at 47' the line at 47' was just a little rough underneath tap we had a melt at 32'.

- (Drawing in margin) Tape 3465-3558. Time 12:30. Sheet 55. Located in Portal 1 going south from SD #1 to MH2. MH2 is on west side of intersection in front of gates - west side of Building 764 - using 12" skids on camera. Start camera. Pipe had a bend at 17' went up to 20' and couldn't get past different style of pipe in line. We kept getting skids stuck between joints of the two different styles of pipe.

- Tape 3558-3907. Time 1.08. Total footage 552.6. Sheet 56. Going from MH2 to MH3 is a 36" concrete CCP. Will be going east to MH3-MH2 is in the intersection of Portal 1 just east of intersection going east. On south side of Building 764 in front - MH3 is just south of sage on Tenth St. Had to get water so we could float line down to MH3 for a reverse pull with TV truck winch. Line looked good, just a few crack in joints but nothing that looked bad.

- End of day - 4:00 have to get monitored.

ATTACHMENT 1
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Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

Wednesday 8/5/87

(Drawing in margin) Sheet 57. Time arrived 8:00. Got checked in and had monitors check manhole. It took till 9:30 to finish monitoring. Downtime 1-1/2 hrs. Started timing at 9:42. located at the south Side of Bldg. 778 will be going east in 15" CMP. Will be going under walk. Corridor No. 778-707. Going from MH1 through MH2 than under corridor then to MH3. Unable to go post 20 ft. because of sunken pipe or crunched. The water was full in pipe so we didn't try to go any further. Did not want to take chance of getting stuck in line. Could not reach MH2. Total footage is 119' from MH1.

Sheet 57. time 10:25-11:20. Tape 3972-4336. Will start from MH2 going east to MH3. Total footage is 306.7 ft from MH2 to MH3. 18" line looked good. It had a few dents and rough joints but nothing real bad. Line should be cleaned on east side of MH2. Had a lot of sand and rock in line about the first fifty feet. (11:30 a.m. went to get water for wash truck).

(Drawing in margin) Sheet 58. Time 11:30 - went to get waster then took lunch. Tape 4332-4637. Going from MH3 to MH4. Located in front of 78 locker room on the south side of Bldg. 778. Will start at MH3 going to MH4 going south 18" CMP. (international(?) wash truck has been leaking diesel fuel in front engine.) We had 6 tap in line than all had a little rust all around line where taps are. One hole at 44 ft. in a small hole on top of pipe. Total footage 249.8 ft. Time finished 1:28. (Will be moving to 10th St. to finish up the day.)

Tape 4633-4641. Time 1:30. (Int. wash truck was leaking diesel fuel). Had to call fire department to clean up the diesel fuel on asphalt. Have to see if we will clean it up and how or if the fire department will.

(Drawing in margin) Time 2:00 p.m. -2:51 p.m. End of. Start 4630 Tape 4641. Start TVing on Tenth St. at MH just north of sage. Will be pulling northeast to open area going east. 36" CCP (line looked good all the way through line). Started cleaning at the north end of Tenth St. on 12" line for on hour. Then we strung out our TV line and jet hose for monitoring. Waited till 4;30 p.m. to leave area (down for 1/2 hr).

ATTACHMENT 1
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Rocky Flats Environmental Technology Site Industrial Area

Thursday 8/6/87

Sheet 60. Tape 4641. Time arrived 8:00 a.m. Checked in at Portal 1. GMC went to get water. Called monitor and went to section north of Bldg. 727. To locate MH3 had to dig up by hand (2 MHs). One was about a foot and a half under rock and dirt, the other was about ten inches under rock. Till 10:00 then we started cleaning lines that have a lot of sand and rock in lines. Got 30 buckets out of MH2. We got 20 buckets out of MH3. Cleaned MH2 until 12:00. Started cleaning MH3 at 12:30.

(Drawing in margin) Start TVing from MH1 to MH2 going northeast in 15" CMP pipe located north of Bldg. 727. MH1 is next to roadside from MH1 to MH2 at the end of pipe about the last two feet is squished down to 10". Will not be able to pull through to MH2. End of tape 5786.

Time 2:30. Start TVing at 2:30 from MH2 to MH3. The line looks in good shape. At 24 ft. there was a 1" pipe going down on side of 15" CMP at 9 o'clock. Rest of line looks in good shape.

(Drawing in margin) From MH3 to MH4 we were unable to pull past 8 ft. because of water and could use cleaning. So we had to pull back. Got finished pulling back at 3:00 p.m. Went to Tenth St. and started cleaning. Cleaned for 1 hour and then waited for monitor to check us for radiation until 4:15. Left job site at 4:30 went back to stop. Got 20 buckets of rock and sand in SD2.

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

Friday, 8/7/87

(Drawing in margin) Sheet 62. Tape 4844. Got here at 8:00. Went to location on the west side of Bldg. 773, Door 1. Opened MH3 inside gate area and monitored it then we had to wait for maintenance men to open MH2 for us till 9:00 a.m. Then I went to take fireman monitor to Bldg. 559 to check and see if we need any other monitoring any where else. Came back to Bldg. 773, Door 1 and maintenance men went on break after opening SD1. Had to wait till 10:00 before they started working again. They finished at 10:30. Todd started jetting up toward me.

Start TVing at 10:40. will pull with jet truck going northeast to MH2 from SD1. Line was clean. The pipe is in good shape all the way down to MH2. Was in good shape. Finished at 11:20. Went to MH3. Couldn't make it from #2 to #3 because of valve about 20 ft. away from MH3. Could not go from #2 to #3 with jet truck.

Tape 5029. Time 2:20. Located on northwest corner of Bldg. 559 going southeast to SD2 starting at open pit at bottom of hill will be going against the flow. Pulling with jet truck. Line looked in good condition. No dents or real bad spots in line. Same line going south from SD2 to SD3 on NW side of Bldg. 559. Last run on this line. Looked in good shape (needs cleaning). Stopped TVing and called monitor at 3:30.

ATTACHMENT 1
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Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

Monday 8/10/87

(Tommy, Pat, Todd) Tape 0. Time started 8:00. Got here and checked in at Portal 1. Went filled up with water. Went to Bldg. 788 just northwest to SD. Went to find MH. We think it is under the concrete floor in Bldg. 788.

Sheet 65. Went to Bldg. 559 southwest side 15" CMP going south. Push in with small TV black and white camera. Going from SD1 as far as we can push. Went picked up Jim at 750 at 11:00.

Sheet 66. Started TVing at south side of Bldg. 559 going west. Push as far as we can. Pushed up 14ft. Couldn't get up any further, too much sand. The camera kept going under with 12" skids.

Sheet 67. Time 1:00 p.m. Tape 0356. Moved to different location. Moved to Bldg. 773 to do line. Must be done by 1:30 p.m. north of Bldg. 773 in 8" PVC pipe going southwest. Pipe looked good to valve box 30 ft in.

Sheet 68. Went to SD2. Will be pushing from the other side of valve box going southeast. Went up 79 ft to valve box. Just about four feet past was a prop. Line looked good.

Sheet 69. Start on south side of Bldg. 559 in 6" CMP. 6" brushes on camera, push by hand.

Tape 0496-0579. Start TV at 2:10 p.m. 6" CMP looked good all the way through.

Cleaned for one hour on 12" line. Moved to the south side of Building 778 in 12" CMP going north to SD #2 from SD#1. Lines in good shape but need to be cleaned a few more times. Quit working and went and got monitored at 3:45.

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8/11/87

(Drawing in margin) (Todd, Tommy, Pat, Fernie?) Sheet 71. Tape 0649-0755. Arrived at 8:00 Tuesday. Start 8:25. TVing on south side of Building 778 going west in 10" SD - is an inlet going into 18" line going south in SD#1, small SD 10". We were unable to go past 20' because of pipe going down. Didn't want to take chance and get camera stuck.

Sheet 72. Tape 0755-0821. Time 8:45. #2. Start at SD#2 in 8" line going west into 18" CMP line still on south side of Building 778. Line is clean up to 21'. We were unable to go past the bend in pipe. Didn't want to take chance on getting stuck.

SD #_____. Another small storm drain going west into 18" or bigger right at the inside of gate just west of Guard Shed 750 inside gate (line looks good).

(Drawing in margin) Tape 0872-0952. Start at SD#4. Located on the west side of corridor just west of Guard Post 750 pushing in CMP 8" line going east to bigger line going south.

(Drawing in margin) Sheet 76. Tape 1031-1087. Going to SD#5 just south of SD#4 will be pushing east to bigger line in corridor. Camera is turning off and on. SD#6 just south of SD#5 going east to 18" line to the corridor. Pipe collapsed at 6" - also turns into PVC pipe. Looks like when they put it in they squeezed it down. We were unable to push camera any more - <u>should be fixed</u>.

Sheet 77. Tape 1087. Time 10:30 (Pat got off at 11:00). SD#7 going north in 8" CMP (went and got generator) located on the south side of Building 707 in front of Door #7. Camera is still giving us trouble (line looks good).

Sheet 78. Tape 1112. Time 1:20. SD#8 last small run going south going to MH - went up to 28' couldn't push camera any more. Total footage 34'.

(Drawing in margin) Sheet 79. Tape 1253. Time 2:00. southwest side of Building 564 will be pushing south in 18" CMP with 15" skids. Total footage 47 feet. Pushed in from both ends -line is bad on top. A rock is sticking through the top of pipe. Line should be replaced soon.

Sheet 80. Tape 1394. Time 2:30. south of Building 559 outside of fenced area will be pushing north as far as we can. Pushed up 6' and looked like pipe was cut off and they back field it with rock and sand.

Sheet 81. Will be going under road 71 going west 12" by 18" CMP - line looked good - 50'.

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8/11/87 continued

Sheet 82. Tape 1592. Time 3:00. On dirt road just south of 773 12" CMP going south to north (line looked good).

Sheet 83. Time 3:30. southwest side of Building 773 going east in 18" CMP under road 71 - #1 to #2. Couldn't push past 24' in line - but line looks good up to this point. End of day 3:50 going home.

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8/12/87

(Drawing in margin) Sheet 84. (Tommy, Todd, Pat, Fernie?). south side of Building 774 going through black PVC pipe running SW to NE just east of chimney. Started the day 8:00 (with the flow) (cleaned line once before). Line is in good shape - (?? at joint in at 14' ??) is bent or came separated and turned to the north - some root's sticking in at joint - cleaned line for 3 hours.

Sheet 85. Tape 1918. south side of Building 774 - pushing in 10" castiron going with flow. At 9:30 a.m. camera wouldn't turn on because of computer.

Sheet 85. Tape 1918-1920. At 11:00 went back to shop and called and asked about total footage 55 computer - couldn't fix it so went to Don and got a loaner for a couple of days. Todd and Pat stayed and cleaned on 10th St. until we got back at 1:10 p.m. (cleaned 2 hours) - got 30 buckets out of line on 10th St. Time 1:25. Started TVing at the south side of Building 774 going northeast in 10" castiron pipe. Had to clean line before TVing. (Line looked good.)

Sheet 86. Tape 1920-2020. Time 2:30. Located on the west side of Building 776 - line is going southeast (total footage 190") 4" CMP could only go 20' in - was muddy, camera was covered with mud. End of day 3:15. Went home.

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8/13/87

Sheet 87. (Tommy, Todd, Pat, Fernie?). Will be no footage count on screen. Arrived at 8:00. Checked in. Started cleaning on north side of Portal #1. Will be pushing north from storm drain into open pipe running poor into another storm drain going east - open MH (cleaned line one time) (wait for monitors) - monitor got here at 8:50 - started TVing at 8:50 - 6" CMP going north just north of Portal #1 (line is in good shape).

(Drawing in margin) Sheet 88. Tape 2041. Time 9:15. Start on north side of Portal #1 just past guard post - front gate going east to MH #2 from SD#1 pulling with jet truck 18" CMP.

(Drawing in margin) Sheet 89. Time 9:55. From SD#1 going north to other line going east 15" CMP located at the north side of Portal #1 going north - just north of guard post at front gate - can't push any more (big rock in pipe at 11:00 sticking in about 10").

Sheet 90. Tape 2224-2253. Time 10:20. south of Building 778 just west of 5-D in the bottom of dock we were unable to push in because of rocks and weeds in line (at 1 foot in is a 45° pipe). Clean line. (Todd and Pat cleaned line for 2½ hours; got 10 buckets of sand and rock.)

(Drawing in margin) Sheet 91. Tape 2253-2397. Time 12:40. Catch Basin #1 to open end going north to #2 east of 10th Street and north of PSZ fenced area - (push with flow) 6" PVC. Started at catch basin in 8" PVC went 2' in turned into 6' PVC. 6" looked good all the way to open area. Line was cleaned one time before TVing (Todd went to fill up with water.)

(Drawing in margin) Sheet 92. Tape 2397. Time 1:30. Pipe has about ¼ full of sand in line - located on the east side of Building 750 - east of cafeteria - will be pulling east with flow - 12" by 18" CMP oval pipe (going with flow). Line should be cleaned and dug out at each end of ditch so water can flow down ditch. Time 2:15. (Todd, Pat, and Fernie?) went back to clean lines on 10th St. while I went to look at priority #3 for Friday morning.

(Drawing in margin) Sheet 93. Tape 2445-2635. Time 3:00. Cleaned for 1 hour and 45 minutes. Started TVing on the west side of 10th St. going south from SD#1 through SD#2 to SD#3. 18" CMP - pull with jet truck - pulling with 15" skids because of pile of dirt 5' in at SD#1. From SD#1 23' in was a bad crack or more like a hole in pipe - can see rocks and sand through hole in pipe from SD#2 at 62' was patch in pipe at 8 o'clock - hole was cut with saw.

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8/14/87

(Drawing in margin) Sheet 94. (Todd, Tommy, Fernie, Pat). Tape 2635. Portal #3. Time 10:30. Got here at 8:05, checked in, had to wait for Julie to check out. Portal #3 went to 60" line and found out it was a 48" RCP. Setup for Monday to open or cut open so we can TV line. Looked at some more line. Sent Todd and Pat to fill up with water then went to tell them to start cleaning on the north side of Building 381 going east to SD#3. Then I went to look for more SDs to see if we need to clean or make sure we can TV them (also waited for industrial hygiene to come).

Start TV at 11:00 going east from SD#1 located on north side of Building 381 Door 2. Had one low area at 100' from SD#1 open area. All the rest of line looked good.

Sheet 95. Tape 2843-2886. Time 11:30. Located the north side of Building 374 going south from SD#4 to SD#5 (line looked good).

Tape 2886-2909. Time 12:10 until 12:20. SD#4 to SD#5 holding ponds. Started at north side of Building 374 going east to holding ponds - from SD#4 to SD#5 holding pond - at 20' in was a crack at joint. Line looked good after crack in pipe at joint.

Sheet 97. SD#7 to SD#2. On west side of Building 371 a supposed 60' run running north to south. A 15" corrugated metal pipe. 2909. Went 44' into pipe and stopped because of sand. Going to south end next to inspect the last bit of pipe we couldn't see because of the sand. The first 44' was good but a little dirt and sand on bottom.

Sheet 98. Will be going from other end of pipe 25' in to finish up line. 15" CMP. Line looked good (needs cleaning).

(Drawing in margin) Sheet 99. Tape 3025-3062. Time 2:45. Start on the northeast end of holding pond - will be going in through valve. Will start going north then turn northeast and going down to open end. Went 16' in then came to drop in. Pipe looks like the pipe went straight down - didn't want to get camera stuck.

(Drawing in margin) Tape 3062. Start at SD#1 going east 16" CMP located at the east side of Portal #2 just north of PSZ area - pull with jet truck. A few dents at the joints but line looks good (line was clean). Stopped and went home at 3:30.

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8/17/87

Sheet 101. (Tommy, Todd, Pat, Fernie). Tape 3146-3213. Time 8:55. Got here at 8:00. Checked in at Portal #1. Got water. Cleaned for 45 minutes. Cleaned line 4 times. Start TVing at 8:50. 18" CMP will be pulling jet with 15" skids. In front of Portal #2 on north side going east - jet truck will pull. At 9:20 the computer keeps jumping. Had to go to Don Williams and get generator and TV cable.

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8/18/87

(Jim, Fernie, Pat, Todd) 12" CMP running from east to west in front of guard tower 550. 9:00 through with first line. Line was in good condition 71.6'.

(Jim, Fernie, Pat, Todd). Time 9:25. Looking at line that runs from holding pond to an open ditch just northwest of substation 517-518. The line looks good as far as you can see, which is about 50'. Then it's leveled off and you can't see much more. Pipe is clean and in good shape.

(Jim, Fernie, Pat, Todd). Time 9:50. We are going to walk through and visually inspect the 48" RCP just east of guard tower 375 in the ditch next to the road. The pipe is covered with a huge steel grate that was lifted back with a crane.

(Jim, Fernie, Pat, Todd). Time 10:45. Presently waiting for fire department and everyone else to test the line we are about to walk through. The line runs from south to north. It's a 48" CMP that is approximately 210' long. Its location is in the ditch between 6th St. and substations 517-518. We left our present location to return later today. We couldn't get the monitors until the afternoon.

(Jim, Fernie, Pat, Todd). Time 11:28. Presently we are in front of 371. We will be TVing a 16" CMP. Distances will be approx. 80 feet to a 45° bend and then another 30'. Most likely we will TV the first 80' and inspect with a flashlight the last 30' ;until the bend. We will be going with the flow which is west to east.

Going to inspect 48" line under PSZ. At present we are waiting for monitor since 11:30. Started at 1:15 we went into line at 115 foot stage deed air monitoring we are going to next line downstream on Sixth Street.

(Todd, Pat, Fernie, Jim). Time 1:45. We are shut down waiting for rope to continue inspection. Inspected one 87' 38" CMP line before 1:45. From 1:45 to 3:00, we were down. We were then instructed to go to 881 and clean a line for plant services. This was cleared with Al. We started cleaning at 3:00, cleaned until _____.

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8/19/87

Sheet (blank). (Todd, Tommy, Pat, Fernie). Time (me) 8:15 until 9:30. Got here at 8:00. Got water then went to Building 881 east dock to clean (6" cast iron?) cleaned for 1½ hours ground services.

Time 9:30. Moved to the southeast side of Building 371 to clean 12" CMP going west to east - cleaned line for 1 hour and 15 minutes.

southeast of Building 371 going south. Meeting canceled. Will walk through 48" RCP with lights and note pad and record all bad spots in line (cleaned until 11:00).

Sheet 108. Time 11:30 until 11:45. Start TVing at the southeast corner of Building 375 guard tower pulling south with jet truck going under dirt road (line looks good) - took lunch at 12:00. Down time from 12:00 until 1:45.

(Drawing in margin) Tape 3618-(blank). On the southwest corner of Building 111. 12" CMP running. Cleaning started at 1:45 until 3:45. south to north going from SD#1 north to SD#2 (located on the southwest side of Building 111 just west of door #1). Start TVing at (blank - didn't TV line) (cleaned 2 hours). Line was full of sand and concrete about ½ pipe full. Cleaned until 3:45. Left from Rocky Flats at 4:00.

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8/20/87

Sheet 110. (Todd, Tommy, Pat, Fernie, Jim). Left shop at 7:40. Forgot the harness and rope, went back. Got here at 8:00. Checked in at Portal #1. Waited for monitors at Portal #1. Missed monitor at Building 371. Had to wait until 10:00 to start walking down 48" line. Had to reschedule monitor until 10:00. Went and got the air blower ready and gas for generators.

(Drawing in margin) Time 10:00. Monitors are here. Start on the southeast side outside of fenced area of Building 371 going south. Todd and Jim will walk down pipe and inspect. Time ended: 11:00.

(Drawing in margin) Sheet 111. Time start 11:30. Going north in 48" CMP - walk through just west of Road 71 going down through open field going with flow in 48" CMP. Pulling footage tape to get correct footage count. Line has tar coating around pipe - except at bottom where water had been running. Went up 147 feet - unable to continue up line any further. Will get the total footage of pipe from up above. Rocks and sand. If there was proper drainage on the end of pipe water would run better going down hill.

Time 12:30 until 3:50. (Tommy, Todd, Fernie, Pat, and Jim). south side of Building 111. Pat and Todd went to Building 111 to clean line 12" CMP got 10 bags of sand and rock out of SD#2 by Door #1. Jim, Fernie, and Tommy waited to get equipment monitor until 1:00 p.m.

End of day, time 3:50. Cleaned on line going west to east in front of Building 111 on the southeast side. Line should be clean. (Got 1 bag of sand). Went home.

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8/21/87

(Drawing in margin) Sheet 112. Tape 3591-3849. (Todd, Tommy, Fernie, and Jim). Total footage 249.6. Got here at 8:00. Checked in at guard post at Building 111. At the southwest of Building 111 by Door #1 going east from SD#1 through #2 going to SD#3 - pulling with jet truck - time 8:30 to 9:15. Line had a piece of PVC pipe in at 164' from SD#2 going to SD#3. Had a few low areas in line also - rest of line looked good.

(Drawing in margin) Sheet 113. Moved to SD#3 to SD#4 on the southeast side of Building 112. Went to get water. Cleaned from 9:30, cleaned line for 1 hour. Sand and rock in between SD#3 going east to SD#4. Got (blank) bags of sand out of SD#4. From SD#3 went in 69', couldn't pass this point - from SD#4 going west went in 147' and couldn't go past this point. Jet hose wouldn't go past any way we went in - couldn't jet through to TV line (going east on Central north side of road) (time stopped 10:30).

Sheet 114. On the corner of 4th and Sage Ave. just south of Sage line running east along Sage Ave. Total footage 79'. Line had 2 bad dents in line on top. Looked with flashlight. One dent at 25' and 45' in from the west side of pipe - 24" CMP.

Sheet 115. Time 11:15. In 15" CMP still on Sage Ave. going on south side of road going east at 6' in was a small rock sticking in on top of pipe - rest of line looked good.

Sheet 116. Time 11:25. In 15" CMP going east on south side of Sage Ave. - line should be cleaned inside pipe and on each end so water will flow properly.

(Drawing in margin) Sheet 117. Time 11:35. Looked up with flashlight. On the corner of Sage Ave. and 6th St. line running north and south. Too full of sand and water, need access to the north end. Cleaned from 12:30 to 2:30. Truck broke down.

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8/24/87

Cleaned line continued from Friday from 8:00 until 12:30. Now we are going to attempt to TV this line between Central and Building 333 running from west to east. It's a 15" corrugated steel pipe and we will be using 12" skids to ride over the sand that was still left in the line. Finish time 1:45.

We are setting up to pull the camera with the washtruck going from the west in an inlet to a steel grate just before the railroad tracks. The inlet is in the ditch between Central and the south side of Building 334. We will be pulling with the flow which is west to east. The pipe runs from the inlet under the asphalt to the steel grate just before the railroad tracks. Line changes from 15" to an 18". Tried to TV line but got stuck 20' in line because of sand and rock. Cleaned line until 3:45.

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8/25/87

(Tommy, Pat, Fernie, Jim, Todd). Waited at parking lot 750 until 12:30. Down time from 8:00 until 12:00. Cleaned the line on the south side of 334 going to railroad tracks until 4:00. Got 20 bags of sand and rock out of SD on Central and 6th Ave.

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8/26/87

(Drawing in margin) Sheet 119. (Tommy, Pat, Todd, Jim, Fernie). Tape 3960-4020. Got here at 8:00. Waited at the east end of 750 parking lot until 10:15. (Norm couldn't get everything going.) Moved to west of Building 901 will be TVing 22"x18" CMP - will pull with jet truck pulling northeast with 18" skids. Pipe had 2 big dents in at 45' and 47' stick down about 6" to 8". Rest of line looked good.

Sheet 120. Tape 4020. Time 11:20. 15" CMP. Visual report - looked up line with flashlight (15" CMP line is located on Patrol Road). Line looked good from both ends. Line runs north to south (north of Building 901 on Patrol Road).

(Drawing in margin) Sheet 121. Tape 4016-4046. Time 11:30. Guard Tower. 12" CMP. south side of Building 761 - line running east to west (between guard tower 701 and road). Had small dent in line at 15' in didn't look bad - rest of line looked good (time 12:00, take lunch).

(Drawing in margin) Sheet 122. Tape 4046-(blank). Time 12:35. 24" CMP. Going underneath Central Ave. going from southwest going northeast into open area (looked up with flashlight). Line is clean and has a crack at 75' in from south side of Central Ave. at the turn in pipe.

(Drawing in margin) Sheet 123. Time 12:50. Looked up with flashlight in 21" CMP pipe going into 70" pipe going down ditch just south of PSZ just east of parking lot 750. Footage about 40"? 21" line looked good all the way down to open ditch above 70" pipe.

Sheet 124. Tape 4096-4234. Time 1:30 - 1:55. 24" CMP. Going southwest to northeast, will be pulling with jet truck located on the south side of guard tower 901 on the south side of PSZ. Line had a few roots between joints but nothing bad - overall conclusion of pipe is good.

(Drawing in margin) Sheet 125. Tape 4234-(blank). Total footage 56'. Looked with flashlight north of gate #9 going across inside Perimeter Road. Had some wide joints with a 3" gap 7' in, rest of pipe in pretty good shape.

(Drawing in margin) Sheet 126. Total footage 42'. 18" CMP. Looked up with flashlight - 20' in was wide joint to make a 22° angle in line - but rest of line was in good shape. Located on north side of Gate #9 running north parallel with Perimeter Road.

Sheet 127. Looked with flashlight. north of Gate #9 going under Perimeter Road going east on the outside of fence area - two lines going northeast - end of pipe is bent (north side 25' offset joint, last 25' of line is oval shape; south side looked good all the way to end then at end of pipe it was bent down about 15" - should be fixed soon).

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8/26/87 continued

Sheet 128. Tape 4230-(blank). Time 2:55. On the south side of Building 334 going east in 15" CMP pulling with jet truck - with 12" skids (have been cleaning line for past 2 days). Went in line 68', were unable to TV any more because of sand and rock in line - line should be cleaned more before TVing again. Pipe over half full. Almost got camera stuck and had to work it out. Took until 3:45. Finally got it out. End of day 4:00.

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8/27/87

(Tommy, Todd, Pat, Fernie, Jim). Got here at 8:00. Waited for Norm. Norm couldn't get everything here so we could walk down line until 10:00 - moved to Building 334. Started cleaning, cleaned until 3:00, ran out of gas in back engine. Cleaned for 4½ hours. Went to inspect some lines on 7th Ave.

(Drawing in margin) Sheet 129. Running down on 7th Ave. just east of Building 556. 12" CMP. Total footage 33 feet. Line running south to north on east side of road. Line looked good, but end of pipe should be cleaned out so water can flow properly down ditch (looked with flashlight).

Sheet 130. Total footage 46'. Looked with flashlight. On 7th Ave. 12" CMP line running north under drive going to parking lot (east side of 7th Ave. road). Line looks good. On each end should be cleaned out so the water can flow out in ditch.

Sheet 131. Total footage 43. Looked with flashlight. On 7th Ave. on west side. 10" by 17" CMP line running on northeast on the northeast corner of Building 559 outside of fence. Line is half full of rock and sand. Should be cleaned / at the northeast end of pipe is bent down about 6". Line should be cleaned - both ends of pipe should be graded out so water can flow properly. End of day 3:45.

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8/28/87

(Drawing in margin) Sheet 132. Tape 4311-(blank). (Tommy, Todd, Fernie, Pat, and Jim). Arrived at Rocky Flats at 8:00. Went to get water. Set up at the south side of Building 334. Will be TVing for the third time in this line. Will be pulling with jet truck going east in 15" CMP line with 12" skids. Unable to pull past 43' because of sand covering our camera lens. Moved to other end of pipe; will try to TV rest of pipe going west. Starting on the southwest corner of Building 551 going west in 15" CMP pipe. At 83' in from east end going west about 2' pieces of pipe are missing out of _____ - could be where a lot of sand and rock may be coming from.

(Drawing in margin) Sheet 133. Tape 4602-4688. Time 10:20. On the southwest side of Building 551 going east in 15" CMP line with 12" skids - pulling with jet truck. Total footage 139.7. Line looked good just had one bad crack at 57' in. Rest of line looked good.

(Drawing in margin) Sheet 134. Tape 4684-4791. Time 10:50. Total footage 203.1. On the southeast corner of Building 551 going east in 15" CMP. Line looked good all the way down.

(Drawing in margin) Sheet 135. Tape 4791-(blank). Time 11:30. (Got stuck in line with camera.) On the southeast side of Building 551 outside of fenced area going east then pipe goes off and goes northeast. Got stuck in line (we were unable to TV line).

(Drawing in margin) Sheet 136. Tape 4849-4915. Time 2:00. 12" CMP. Going west underneath parking lot west of Building 750 pulling with jet truck west. Total footage 153.5. Pipe looked good.

(Drawing in margin) Sheet 137. Tape 4915-5049. Time 2:50. Going west in 11" by 17" CMP going west against the flow pulling with jet truck under parking lot 750 east of 7th Ave. (add 3' onto footage). Line had a few dents at 8' to 26' and a crack at 17'-not bad.

Sheet 138. Tape 5045-(blank). 12" CMP. On the northwest side of credit union (334) going northeast (Drawing in margin) in line - pull with jet truck - total footage 115' 4" - line looked good.

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8/31/87

(Drawing in margin) Sheet 139. Time started 12:30. Took all morning to get everything ready. Got here at 8:00. Waited for Norm to get them ready to walk down 70" line going west to east, will be walking west in line goes to 70" to 48" line. At 43' have a 4x4 brace holding up pipe in middle.

(Drawing in margin) Sheet 140. 30" CMP. Total footage 49'. On the west side of Building 111 on Patrol Road. Two 30" CMP going under Patrol Road west of Building 111. Going west to east. Looked up with flashlight. Both lines look good - the line on south side has 6" of sand on bottom. The one on north side looks good all the way through.

Sheet 141. Time 3:10. 36" CMP. Total footage 115'. Going northwest under northwest Perimeter Road north of Building 130. Line had a big dent in from southeast end. Sticks in about 8" to 10" at 10 o'clock on clock meter - rest of line looked good. Water flow running southeast.

(Drawing in margin) Sheet 142. 72" CMP. Total footage 33'. Running north in the fields north of Building 130 about ½ mile in buffer area - walked up line. Line looked good.

(Drawing in margin) Sheet 143. north of Building 130 ¼ mile. north of Building 130 in field in buffer area. The pipe on west is 36" CMP; the one on the east is 24" CMP. Lines look good. Looked with flashlight. Total footage 49' (west side); 46' (east side).

(Drawing in margin) Sheet 144. 54" CMP. Running northeast through fence and under Perimeter Road. Looked at with flashlight. Line looks good all the way through. Total footage 305'.

(Drawing in margin) Sheet 145. 20" by 14" CMP. Total footage 100'. Line running northeast going under Patrol Road. Pipe was bent down on the southwest end of pipe. Line has a few dents in about 50' on top grade change but line looks good. End of day 4:00.

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

9/1/87

Sheet (blank). Start time 8:00, end 11:00. (Tommy, Jim, Fernie, Todd, Pat). Arrived at 8:00. Started generators to get blowers inside manhole cover so our air can flow inside pipe. Started TV at 9:00. Jim and Fernie walked down pipe going 72" CMP northeast then to a 70" RCP going north. Total footage (blank).

(Drawing in margin) Sheet 146. Time 11:10. Looked up with flashlight. Two lines on the south side of Portal #1 outside of fence. 26" by 21" CMP. Total footage 61'. Both lines going east. Lines running west to east - look good in both lines.

(Drawing in margin) Sheet 147. Time 11:30. Total footage 102' 24" by 34" CMP. On the south side of Central Ave. northeast corner of parking lot 86, total footage 102'. Line running west to east from the west end 30' in. The pipe has been crushed down all the way down to the bottom of pipe. Should be fixed as soon as possible. Also pipe is squeezed down more as you go in pipe.

Sheet 148. Total footage 41' 6". Size 24" CMP. Line located on the north side of parking lot 86. Line running east, south of Central Ave. Small dent at 15' in from west side and 20' in.

Sheet 149. Time 11:47. Total footage 44'. 21" CMP. Looked up with flashlight. Running east along on the south side of Central Ave. 20' in has smashed pipe and pipe is bent a little in middle of pipe. Located on the north side of parking lot 888.

Sheet 150. Time 12:40. Total footage 84'. On the south side of Central Ave. Size 21" CMP. Water running east - just north of Building 690. Line is in good shape - no bad spills in line - line is clean. Does not need cleaning.

Sheet 151. Total footage 41'. Size 21" CMP. On the south side of Central Ave. running east. Right underneath power lines - just east of 7th Ave. Line looks good all the way down (looked with flashlight).

Sheet 152. Time 1:04. Total footage 45'. Size 18" CMP. Looked with flashlight from both ends. On the corner of 7th Ave. and Central Ave. Going underneath 7th Ave. running east. Line looks good all the way through.

Sheet 153. Total footage 70'. Size 12" CMP. Start on the north side of Building 334. Will be pushing south up 12" CMP pushing with little black and white TV camera. Line looks good all the way to 70' in as far as we can push up by hand (against flow).

ATTACHMENT 1
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Rocky Flats Environmental Technology Site Industrial Area

9/1/87 continued

(Drawing in margin) Sheet 154. Tape 0170-0369. Total footage 89' 6" - 12" CMP. End time 2:30. (At 2:00 Jim went to meet Norm.) Located on the north side of Building 334 going northeast. Will pull with jet truck with flow. Line looks good all the way down pipe - no bad dents or cracks in line.

(Drawing in margin) Sheet 155. Tape 0369-0526. From 2:30 to 2:50. Total footage 76'. 12" CMP. Will start cleaning down same line going east. Cleaned for 20 minutes. Located on the north side of Building 334 going east pulling with jet truck with 12" skids. Line should be dug out on the east end of pipe so water can flow properly in and out of pipe (in ditch). Line looked good all the way down.

Sheet 157. Time 3:40. Total footage 71'. Time 3:40. On the south side of Portal #2 and the corner of Sage and Portal #2 exit road - 34" CMP. Looked up with flashlight. Line looked good all the way through - on east end of the pipe ditch should be dug out so water can flow out of line. End of day 4:00.

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Rocky Flats Environmental Technology Site Industrial Area

9/2/87

(Drawing in margin) (Tommy, Pat, Jim, Todd, Fernie). Time 8:00. Got here at 8:00. Went and got generator and blowers and stacked them in a pile then started cleaning on 7th Ave. just south of Central Ave. then moved to Building 888 guard post just south of post running north to south in 12" CMP. Cleaned lines for 4 hours. Stopped for lunch. Started cleaning in priority #6 in 800 area - cleaned until 1:45.

Setting up to walk through a 72" CMP in the ditch in the northwest corner of Portal #3. The pipe runs from west to east. We will be using the handheld camera. Got out of pipe at 3:25. Picked up everything and went back to shop. End of day 4:00.

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Rocky Flats Environmental Technology Site Industrial Area

9/3/87

(Tommy, Todd, Jim, Fernie, Pat). Arrived at RF at 8:00. Went to Portal #1. Checked in. Waited half hour and moved to priority #8. Started cleaning lines in the southeast side of Building 883. 12" CMP going east. From 9:30 until 11:00.

Sheet 159. Tape 0527-0778. Time 11:10 - 11:55. Started to TV in 6" RCP - running east of Building 881 pushing by hand up 6" pipe with 6" brushes. Pipe is halfway up hillside coming out. Line looked good up to 39.6' then we ran into the concrete piece. Took lunch.

Sheet 160. Time 12:30 until 1:50 (after lunch). Went down to Building 761 guard tower (on plans line should be 60"). Going down 48" RCP going north with handheld camera and lights. Time 2:00 going back to priority #8 to clean lines until 3:30.

ATTACHMENT 1
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Rocky Flats Environmental Technology Site Industrial Area

9/4/87

(Todd, Fernie, Jim). Arrived at 8:00. Cleaned line southeast of fire hydrant. Left to go to set up air movers in 48" line under parking lot of 991, outside gate. Set up second air mover in manhole south of fence of Building 991. Had grating removed for entry in 48" in parking lot of 991 outside fence. Set up Briggs air mover in parking lot of 991 outside fence. Approximately 10:00 fire department came to check line for air. Didn't test it and left. Rescheduled for 12:30. Picked up radiation monitors at Portal #1. Came back to 48" line. Waited for fire department and HS&E representative. Fire department showed up and checked line for air, signed entry permit. The rain started so we went to guard shack at gate of 991. HS&E representative showed up and left. Didn't sign entry permit. Was shut down because of rain. 1:30 - went and cleaned lines south of 885. Cleaned until 4:00.

ATTACHMENT 1
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Rocky Flats Environmental Technology Site Industrial Area

9/8/87

(Drawing in margin) (Tommy, Todd, Fernie, Pat, and Jim). Tape 2612-3080. Arrived at 8:00 went to west of Building 991. Will be going down 48" CMP walk down with handheld camera.

Time 8:45. Set up fans and got everything ready to go in line. Jim and Fernie will be walking in 48" line going southeast to a 70" line still going east at manhole. At 9:30 monitors went in line.

Sheet 160. Time 9:45. Went inside 48" CMP going east running southeast. 48" CMP. 61' a bend in pipe turns and goes straight east - 6" CMP at 158' have a tap at 7 o'clock is a 15" CMP pipe running underneath guard tower. Line is clean. Can see up 40' in then turns right. At 177' have a catch basin has a 24" CMP line coming in from the south running north. The manhole should be brought up to grade. At 178' rocks and sand about 7" to 8" deep at 180 to 223'. Section of pipe was poured in place. Size 44" by 54" concrete. Length of poured section is 43' then 60" RCP starts at 223' in.

Sheet 161. Tape 3080-110. Total footage from 48" to 60 to go 518'. Still same line, MH#2 to MH#3. Going up 60" RCP going southeast. At MH#2 is a 15" CMP line coming in from the south - has some white solidified substance on bottom of pipe about ½" deep. Had some water running out - we had also another 8" transite pipe coming in from the south. Couldn't see up line.

Sheet 162. Tape 3110-3383. 60" RCP. At 730' tap at 9 o'clock 6" coming in from the north side of pipe - at 872' a bend going straight east 60" CMP starts at bend about under PSZ zone - at 1000' at 12 o'clock big rip in pipe about a foot wide. At 1035' have a head going northeast - pipe has rust on bottom of pipe. Water goes in one rust spot then goes out another rust spot further up line in another rust spot - at 1098' a tap at 9 o'clock with water running out - also at 1098' have rocks on bottom about 20" of rock - as we looked up line can see that the pipe has about 3/4 full of rock.

Sheet 163. Tape 3383-3530. Walking in from the southwest side. 60" CMP. Walking in from other end of pipe went in at 104' had a bend going west. At 116' had tap at 3 o'clock 4" perforated pipe has running water also at 116' have about ½ pipe full of rock and sand as we looked up line the line has more rock further up line about 3/4 full - about 40" of rock. We guess that line has about 200' of rock about 3/4 full.

Sheet 164. Cleaned rocks and dirt in front of 48" RCP. Clean front of line for 2 hours from 2 o'clock until 3 o'clock on the east side of 991 line running northeast. Then went to Building 888 to TV 12" CMP line running north - line starts on the south side of Building 888 goes underneath walkway to open pit. Line looked good up to 41' in, had 2 bad dents on top of pipe underneath concrete walkway.

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Rocky Flats Environmental Technology Site Industrial Area

9/9/87

(Tommy, Todd, Fernie, Pat). Arrived at 8:00. Went to Portal #1. Checked in. Went down to Building 991 on east side. Set up air blowers and got ready to walk down 48" line going northeast.

Time 8:30. Monitors went downhole. Took about 15 minutes. Got camera ready and lights - had to wait for fireman to get here. Waited for 20 minutes.

(Drawing in margin) Sheet 165. Tape 3530-3724. Total footage 302'. Time went down line 9:40 - Todd and Fernie went downline. Line located on the northeast corner of Building 991 will be going northeast in 48" RCP underneath Patrol Road and PSZ zone to open area. At 65' is an old catch basin that has been covered up by asphalt. Tap at 139' is a 16" CMP pipe coming in at 2 o'clock from the south - looked up about 10' in, seen a grate (catch basin) coming in (no water running out of 16"). Pipe was clean. Rest of line was in good shape. Time end 10:30.

Sheet 167. Time 10:45. Went to next line. Helped maintenance get grate off of front of 48" RCP. Took about 20 minutes to get everything ready. Moved all equipment down to bottom of pipe. Waited for Norm to get back and set up for monitor.

Time 11:55. Took lunch.

Time 12:30. Monitors went up line and checked it out. Took 30 minutes. Got ready. Went up line at 12:55. Fernie and Todd walked up line with handheld camera. Had to wait for fireman to come until 1:20.

Time 1:20. Started in line. Time out of line at 2:00. Helped maintenance put steel grate back on front of line. Then headed to Building 888 to finish up the line we went in yesterday. 12" CMP will be pushing up line.

Sheet 166. Time 2:30. Started at 888. 12" CMP will be pushing south with 12" skids located on the north side of Building 888. Will TV the other half of pipe that we TVed 9/8/87. (Tried 2 times, had hard time going up line.) Line is in bad shape at 24' in to 57' to bad joint at 42' - section of pipe is missing about a foot wide - also has rock and sand falling out of pipe. Pipe in bad shape. Should be fixed as soon as possible. Had hard time pulling out. Time 3:45.

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9/10/87

Sheet 168. Tape 3833-3995. Time 10:30 to 12:00. Located on the northwest of Building 778. Line running northeast to 70" CMP. Line running west to east. At 23' rocks start building up gradually about 6" to 8" high. At 36' have tap at 12 o'clock, have a storm drain on top, at 65' rocks 12" high. 135' rocks 15" high, went up to 160' in, were unable to pull light and tap any further, rocks about 24" high.

Sheet 169. Time 1:20 to 2:00. Total footage 132'. Walked down 48" RCP running northeast to open area just north of PSZ zone going under Perimeter Road northeast of 900 Area outside of fence - looked with flashlight - Todd and Tommy walked up line. At 112' is a wide joint at bottom of pipe - not bad. Line in good shape.

Time 2:10. Moved to 800 area to TV line. Picked up a load of water.

Time 3:00. Washed into the line. Ready to TV 12" line running parallel with gate in front of guard shack 888 on the inside. Time at end of day 3:50.

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Rocky Flats Environmental Technology Site Industrial Area

9/11/87

Sheet 171. 18" RCP. Time 8:00 got here and warmed up. Washed truck. Went to 800 Area. Located on the east corner of 7th and Cactus Ave. Line running south.

Time 9:00. Pushed up line with camera. Looked up line. Had an offset joint from north side pushing south. Offset at 6' in on bottom of pipe. Sticks up about _____. Visual report. Total footage 514. Camera keeps cutting out on us - camera giving us trouble. Put arc light head on and pushed up line. Condition of pipe had an offset joint 4' 1" in from the north side. Rest of line is in good condition. Had trouble with light bulb from Don Williams.

(Drawing in margin) Sheet 172. Tape 1494-1608. Total footage 64.2 Time 9:50 - 10:50. Push up with camera, couldn't push. Located on corner of 7th and Cactus Ave. just west of 7th Ave. running south from catch basin to open area south of Cactus Ave. Will pull with jet truck. Conclusion of pipe - had one small crack at 54' all around pipe not bad. Rest of line looked good.

(Drawing in margin) Sheet 173. Tape 1608-(blank). Time 11:15-11:50. Located on the southwest corner of Building 850. Going under Cactus Ave. Manhole is inside fenced area - line runs south. Will be pushing us as far as we can north against flow. 12" CMP. Line looked good all the way to manhole. Camera keeps going off and on with arc light head. Took lunch.

Sheet 174. Time 12:35-12:50. Total footage 40'. 18" CMP. Looked up line with flashlight. Located on the southeast corner of parking #88. Line running northeast to open area. Line looked good all the way through.

Sheet 175. Time 1:25-1:50. Visual report. We looked up the line that was a 15" line running under the road from a grate on the south side of Cactus just south of Building 440. The line runs southwest for 25' then turns directly west and runs into the pipe running south along the fence just east of the guard shack #(blank). Pipe looks good for the first 25' but it turns so we can't see past that point. The other end of the pipe ends up running into another pipe so we weren't able to send our hose down the line, so we couldn't hook our camera to pull it through that line.

Sheet 176. Time 2:30-3:15. We will now be pushing our camera up a 12" CMP that runs under the Cactus road and goes into the fence that enclosed Building 850. This line is the east line. The west line we did earlier today. The south end of the pipe was smashed so we bent it out. We cleaned the pipe the other day. So we put back the dirt we pulled out the other day. We pushed up the line against the flow going north. Moved to 800 area and dug up manhole. Needed to get entry permit but nobody shoed up. End of day 3:45.

ATTACHMENT 1
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Rocky Flats Environmental Technology Site Industrial Area

9/14/87

Sheet 179. Tape 1725-1945. (Tommy, Fernie, Todd). Total footage 143.8. Got here at 8:00. Went to get water. Checked in at 800 Area. Started TVing. 18" CMP. Line running.

(Drawing in margin) Time 9:00. Started TVing. 18" CMP. Located on the north side of Building 883. Will be going east in line with flow - pulling with jet truck east - there was last week an open pipe - they put a section of in between 2 pipes that was going underneath dirt road and paved road going east. Condition of pipe - had a crack at 39' in at 11 o'clock about 5" long. At 43' have a small hole in pipe at 3 o'clock. At 72' they had put in a new section of pipe going to 102', new pipe length 30' long. Rest of pipe in good shape. Time out of line 9:50. Moved to (blank)" CMP line, started cleaning line located on the east side of Building 883, line running east underneath asphalt just put in - line is full of rock and sand - cleaned for 2 hours.

(Drawing in margin) Sheet (blank). Tape 1945-(blank). Time 11:00. 18" clay. Located on the southeast corner of 881. In manhole has 3 pipes going into MH, 1 going south, the one we will be TVing first. Will be pulling with jet truck with flow going to open area outside of fence. Camera still giving us trouble. Keeps going on and off. We messed with camera trying to get it to stay on. Camera seems to have acquired a short because we blew some fuses. We ate lunch 12:15 to 12:45. We looked on the map to find out what else we could do while our camera is down. Moved to 12" CMP line running east and west south of Building 865. Cleaned mud and rocks out of line until 1:45.

Time 1:55. Moved inside 900 Area to look for lines. Still needed to be cleaned and/or TVed. Will be getting a load of water before entering 900 Area. We're on the northeast Perimeter Road 2:25. We found outlet for the 18" line that runs under the northeast Perimeter Road but we cannot find the inlet. The outlet comes straight out then takes a 45° turn that runs downward so we can't shoot our hose up the line to find the other end unless the 45° bend is cut off with a torch or something. We moved to the next line north of the 18" pipe which should be a 10" CMP pipe that runs on the north side of the garage-like structures east next to Building 995. We have looked for the 10" line. We have an idea that it ends in a cement box with a cement cover which we couldn't remove. We will be moving to the other side of the perimeter fence to see if we can find the other end of the 10" CMP pipe which is supposed to end on the east side of the new outside Perimeter Road. Time now is 3:00. Now we're on the outside of the perimeter fence. We looked for the other end of the 10" CMP but could not find the east end of the pipe. Time now 3:40. End of day.

ATTACHMENT 1
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Rocky Flats Environmental Technology Site Industrial Area

9/15/87

Arrived at 8:00. Went to 800 Area. Looked for line in back of Building 881 on south side. Looked for 1½ hours. Couldn't find entry to 6" line going east - we think it's at roof drain and we can't get to it. Time 10:00. Moved to the west side of building making sure lines were clear. At 11:15 went back to shop to get camera truck Q seal TV. Got back at 12:00, took lunch. (Todd, Fernie, and Pat cleaned for one hour on the northeast corner of Building 334 from 11:15 to 12:10, took lunch.) Started up TV van. TV went out on us (fuse burned) in back. So Tommy went back to shop at 1:15. Left Todd, Pat, and Fernie to clean lines on the southwest of Building 773. Cleaned for 2 hours on 18" CMP line running northwest. Got lot of sand and rock out of line. I got back at 3:10 and talked to Norm and Julie and set up some more cleaning at Building 771 on the north side. Will start cleaning tomorrow. End of day 3:50.

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9/16/87

(Tommy, Todd, Pat, and Fernie). Got at parking lot 88 at 8:00. Talked to Norm. Went to Portal #1 to Building 771. Todd had some trouble with GMC wash truck (it kept stalling). Truck started running good. Went to get water.

Time 9:00. Went to Building 771. Started cleaning at catch basin on the north side. Got some trash out of top of C.B. - the C.B. was too small to get in - so Norm had to get monitors to check manhole.

Time 9:30. Went to get monitors.

Time 10:00. Waited for Norm to get hiphighs to go down MH. Cleaned until 12:00. Took lunch.

At 12:30 started cleaning on same line until 1:15 (cleaned 45 minutes). Moved to 776 to clean line. Couldn't find catch basin. We dug all around area and still couldn't find anything.

(Drawing in margin) Time 2:00. Cleaned for 2½ hours at 900 Area. 12" line. Was the wrong line. Then dug around for awhile. Couldn't find any other line. So we packed up and went home. Time at end of day 3:45.

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9/17/87

(Drawing in margin) (Tommy, Todd, Pat, and Fernie). Tape 1948-2032. Got here at 8:00. Went and got water. Then went to parking lot 88. Started cleaning on 12" CMP pipe line running southeast. Cleaned for 1½ hours. They called and said that the TV van was at the east gate - went and got the van and headed up to 111.

(Drawing in margin) Sheet 180. Tape 1948-2032. Time 10:30-11:10. 30" RCP. (TV this one on north side, see drawing). Located on the northwest corner of Building 111. Have 2 lines running side by side. Will TV one on north side. Condition of pipe - pipe looked good all the way down line to open pit.

(Drawing in margin) Sheet 181. Tape 2032-2165. Time 11:30. Will be going with flow pulling with jet truck going southeast. Still located on the northwest corner of Building 111. Flow is running southeast. 30" RCP. To open pit - 2 lines running northeast side by side. Condition of pipe - looked good all the way through. Line on south side is in good condition also. Time 12:15 took lunch.

(Drawing in margin) Sheet 182. Tape 2165-2271. Time 12:50. 17" by 12" CMP. Located on the north side of Building 334. Total footage 40'. Line running east. Will clean 2 times before TVing line. Cleaned until 2:00. Line running towards 6th Ave. Condition of pipe - line looked good - 2:00 until 2:40.

(Drawing in margin) Sheet 183. Tape 2271-2350. Time 2:50-3:45. Located on the north side of Building 334 running along 6th Ave. - line going south under road going west off of 6th - had to dig out end so water can flow out of line. Condition of pipe - had rust all the way through pipe. Pipe was in pretty good shape. Total footage 37' 8".

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9/18/87

(Tommy, Todd, Pat, Fernie). Cleaned for 5 hours. (Had to shovel sand out of pit and clean pit out by hand.) Got here at 8:00. Went to get water then went to 6th and Sage and started cleaning lines going under Sage. Lines are above 3/4 full of sand and rock, had to dig by hand.

Sheet 184. Tape 2366-2496. Time 2:00-2:50. Will start TVing one line going underneath Sage St. line running south to north - will be pulling with jet truck, will be TVing line on the east side of 6th Ave. Condition of pipe - at 43' in is a wide joint on top, going down is about 2" wide, can see rocks and sand between pipes. Also at 50' is a smashed pipe - should be fixed so water can flow properly. Will start cleaning on the west side of 6th going under Sage - north - we will have to dig by hand so water can flow out of line while we clean with jet truck at end of pipe on north side of Sage the pipe coming out is lower than that is north of Sage going north still - should lower pipe so water will not build up back in pipe under Sage. Time 3:00. Cleaned lines for 1 hour.

ATTACHMENT 1
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9/21/87

(Tommy, Todd, Pat, and Fernie). Arrived at 8:00. Went to get water. Then went to 6th and Sage. Have one more line to TV going under Sage St. - running north hard to dig out rocks and sand out of pit. Cleaned until 10:30. Cleaned for 2½ hours.

Sheet 185. Tape 2496-2608. Time 10:45-11:40. 18" CMP. Running north under Safe just west side of 6th Ave. will be pulling with jet truck. Condition of pipe - have some small holes and dents in line at one foot in and 36' at two o'clock some big dents in pipe and at end of pipe was dented at the edges couldn't get camera to go all the way through about 7' of pipe was under water moved to 800 area to manhole on the southeast corner of Building 881 - there are 3 lines coming into manhole. Time 12:00 took lunch.

(Drawing in margin) Sheet 186. Tape 2608-2735. Time 12:45. Total footage 50'. 15" steel pipe. Will wait for monitors to check manhole - at 1 o'clock monitors got to area pushing by hand with 15" skids. Time 1:15-150. Start TV inside manhole will be pushing up 15" steel pipe, will be going against flow, can't find other entry into 15" line, we think this is a roof drain, will go as far as we can. Condition of pipe - had a small crack at 15' in at 3 o'clock, rest of line looked good as far as I could see up line.

Sheet 187. Tape 2735-2871. Time 2:00-2:35. Will be pushing up 10" steel pipe going west (will be pushing by hand) located southeast of Building 881. 10" steel pipe. Condition of pipe - looked good all the way to 80' in where water was standing in pipe - looks like pipe leveled off and started going down - couldn't go any further because of water.

Sheet 188. Tape 2873-3008. Time 2:50-3:30. Total footage 151'. 18" clay. Still located on the southeast corner of Building 881 in manhole, will be pulling with jet truck south with flow to open area. Condition of pipe - had 2 cracks in line at 9' in and 100'. Rest of line looked good until the end had a crack on top at end. Time 3:45 will get everything picked up and go home.

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Rocky Flats Environmental Technology Site Industrial Area

9/22/87

Sheet 189. (Tommy, Todd, Fernie, Pat). Tape 3008-3071. Time 8:45-9:20. 12" CMP. Got here at 8:00 to 800 area. Went to get water. Started to TV in 12" CMP line running east under new asphalt located on the south side of Building 865 (pull with jet truck). Condition of pipe - have a dent at 48' which has a small hole in about ½" wide - dent hangs down about 3" to 4". Rest of pipe looks good.

Sheet 190. Tape 3071-3233. SD#1 to SD#2. Located on the south side of Building 883. Cleaned for 1½ hours.

Time 10:00. Had to dig out the ends and cut a pipe that was coming into 12" concrete. Took us until 11:45. Took lunch.

Time 12:30. Started to TV in 12" concrete pipe running east. Will be pulling with jet truck - having camera trouble again - camera keeps going off. Condition of pipe - from SD#1 to SD#2 line looked good all the way down - had a 22° bend at 24' in looked good - will not be able to TV the rest to the end at open pit.

Time 1:50. Couldn't TV from SD#2 to SD#3. Will start cleaning 12" RCP south of Building 883 the line we just got through TVing. Time 2:15.

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9/23/87

Sheet 191. Tape 3233. (Tommy, Todd, Fernie, and Pat). Got here at 8:00. Went to get guards at 800 Area then went to get water - went to the south side of Building (blank) outside of fenced area. Started cleaning on 10" CMP pipe. Time started cleaning 10:45 (had to wait for monitors). Will stay and clean line. Line has a lot of sand and rock in pipe.

(Drawing in margin) We go in about 450' in and clean as much as we can - every time we jet up line lots of rock and sand comes out of 10" line that runs north to south. Will try to set up TVing line for Thursday or Friday. The back hydraulic hose broke in the back at 3:00 will head back to shops). Clean at same line all day. Time spent cleaning line: 10:00-3:00. Will be going home at 3:10.

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9/24/87

(Tommy, Todd, and Fernie). Got here at 8:00. Went to 888 to pick up guards and talked to Norm about what's going on - went to get water.. We will start to TV 12" CMP located on Cactus Ave. Line will be running southeast going under Cactus Ave. to open pit. Will start just south of Building 664 just outside of fence.

Sheet 191. Tape 3233-3302. Time 8:40-9:25. Condition of pipe - line looked good all the way to end - at end pipe was dented down about 3" to 4". Couldn't take camera out of end. Will move to different area. Total footage 60'.

(Drawing in margin) Sheet 192. Tape 3302-3352. Time 9:45-10:10. Total footage 33.6. Moved to parking lot 850. Will TV a 12" clay pipe running east to manhole inside fence in back of Building 850. Will push up by hand as far as possible pushing east to MH with flow. Condition of pipe - looked good all the way to manhole.

(Drawing in margin) Sheet 193. Tape 3352-3503. Time 10:40-11:15. 12" CMP running northeast to open area just south of Central Ave. and on the northeast corner of Building 880 going northeast under parking lot. Condition of pipe - at the beginning of pipe going in from southwest side is smashed down 2" to 3". Will have to take off skids with flow. At 12' in have a 22° turn to the north with rough joints at 30' wide joint - 45' have a crack that goes all around pipe and a long one that goes for 3' then ends. At 57' wide joint - 70' wide joint all around joint. Total footage 93'.

Sheet 194. Tape 3503-3635. Time 11:25-12:00. 12" CMP. Located on the northeast corner of Building 112 on 4th Ave. just west side of 4th Ave. - will be pushing in as far as possible with 12" skids - will be pushing south against flow - there is no entry from south end (just north of Central).

Condition of pipe - at 10' in have a wide crack all round the pipe, can see sand and rock in crack. At 23' couldn't push because of sand and rock in bottom of pipe. Looks like 5' in more there is a tap coming in from the west about 1 o'clock.

Time 12:30. Started cleaning line located on the southeast side of Building 112 on 4th Ave. to open area. Time spent cleaning from 12:30 to 3:30, went to 400 area to see if we can float a line down from Building 448 south to outside of fence.

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

9/25/87

Got here at 8:00. Went to get water. Then went to Building 418. Started to set up - had to wait for monitors until 9:30, then we went down the manhole to see what we needed to start TVing. Time 9:30.

There was water setting in manhole over top of pipe, about 10" of water on bottom of manhole - 8" CMP going out is full of water so we send up jet up line about 400' - had to string out 100' of hose just to get to manhole - shot it up line twice, nothing came back and water didn't go down any. Time 9:30-11:30.

Time 12:15. Started cutting out top of pipe so we can fit camera in line - there was about 4" of CMP pipe we had to cut out. Took until 1:45, waited for Norm to get pump so we can pump out water sitting in line to TV line.

Time 1:50-3:00. Tried to float a line to other manhole (would not go). Wait for monitors. End of day 3:25.

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

9/28/87

(Tommy, Todd, and Fernie). Got here at 8:00. Got water. Then went to Building 448. Had to wait for monitors to get in manhole until 9:45, then went outside manhole. Located on the south side of Building 440 outside of fenced area. Went to outside manhole to jet up and string through so we can get jet hand all the way to manhole outside of fenced area. Time 12:00, went to lunch.

Time 12:35. Shot up jet hose to outside manhole. Took about 1 hour. Got stuck a few times.

(Drawing in margin) Sheet 195. Tape 3625-4391. 10" CMP. Located south of Building 440 outside of fenced area. Will be pulling north against the flow with jet truck. Total footage 450', total footage of line 650'. Condition of pipe - has a lot of low areas all up the pipe in sections - had some wide joints. Could only get up line 450'. Jet truck wouldn't pull any more (got 450' in line).

From 2:00 until 3:30 got stuck pulling back for about 1 hour to get out - the front clip broke in front cable - have to get PM monitors. End of day, have to get monitored out. Time 3:50 until 4:45.

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

9/29/87

(Tommy, Todd, and Fernie). Got here at 8:00. Went to get water. Talked to Norm, went to 900 Area to do 30" RCP.

Time 9:00 started stringing line through pipe about 400'. Then went back to get rope from truck - seen Norm, he wanted us to go back to Building 448 to finish up rest of line from yesterday (9/28/87) (was going to finish up rest of lines we needed to - they decided not to).

Time 10:00. Went to Building 448. Had to wait for monitors to check manhole. Took lunch at 11:30.

Monitors came at 12:00. Got everything ready for us.

Time 12:40. Continue sheet 195 from 9/28/87, total footage from 9/28/87 450'. Tape 4391. String line from manhole #2 to manhole #1. Get winch cable pull back to manhole #2. Hook up to TV cable and then pull to manhole #1. Hook up to TV and then start reverse pulling.

Time 1:45. Shoot jet hose in to manhole #2 to #1 - the winch wouldn't start so had to work on that until 2:45. Started to pull cable but hose kept on getting stuck. So we unhooked it and sent rope throughout that all the way through.

Time 4:00. Wait for monitors. End of day 4:50.

ATTACHMENT 1
Transcribed from VSR Field Notes of
Storm Sewer Cleaning and Video Survey
Rocky Flats Environmental Technology Site Industrial Area

9/30/87

Got here at 8:00 went to Building 448. Talked to Norm - he went to get monitors to check out manhole monitors - came at 8:45 to the manhole in Building 448 - went to check manhole outside of fence. Time 9:50.

Sheet 195. Tape 4391. Time 10:30. Located pulling from Building 448 reverse pull - pulled up once and only went 68' - got stuck - pulled it back to manhole - taped up ends - will try again.

Time 11:15 - (12:15 Todd and Pat went to Body Count) Went up to 516', couldn't go any more because of dent on top of pipe at 516' - our camera was too big to go through - will pull back and put 6" skids and try again.

Time 12:30. Will try again after lunch. Will take lunch 12:50 until 1:30. Went to hook up 6" skid on camera. Took until 2:20. Will start pulling with TV van. Having trouble with light head - won't turn on - can't get light head to work (going home). Total footage 516'.

ATTACHMENT 2

VSR Inspection and Work Reports
Rocky Flats Environmental Technology Industrial Area

The ORIGINAL VSR CORPORATION INSPECTION AND WORK REPORT SHEETS DID NOT CONTAIN SHEET NUMBERS 177 AND 178.

V.S.R. CORPORATION

Tape - 0-[illegible] Tape [illegible]-351

Video Sewer Renovation Contractors
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CLOCK

INSPECTION AND WORK REPORT

OR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	7-20-87

MANHOLE	TO	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
Storm Drain NO. 1		Storm Drain NO. 2		15" CCP	1

MH NO. 1

DIRECTION OF FLOW

MH NO. 2

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
6	C	12			Start Cleaning Storm Drain at
	C	12			10:15 A.M. - Rocks & mud on
	C	12			invert in Storm Drain one
	C	12			start T.V. 11:00 am
	C	12		→	pipe is cracked from storm drain one [illegible]
56'	T	11			Tape sticking in pipe [illegible]
					can't get though going north to south
					going north to Storm Drain 1 [illegible]
					97"
					looked up Storm Drain 2 [illegible]
					Flashlight [illegible] Could See Tap [illegible]
					pipe. will not Beeble to T.V. past
					Tape, But will send up T.V. To tap

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP–Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

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Tape-035.1-504
Tape 0504-0808

CLOCK

INSPECTION AND WORK REPORT

FOR	INSPECTOR	OPERATOR	DATE
Rocky Slate		[illegible]	7-20-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2	3	174.6	15" CLP	2

MH NO. 2

DIRECTION OF FLOW

MH NO. 3

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
30.5'	T	12			[illegible] 035
39.9					Could not push anymore ring bund
					will get jet truck and jet up
					To #2 and pull To #3 - [illegible]
					From 1:30 To 2:10pm Cleaned [illegible]
					Rocky 3 and T[illegible]
69'	T	12			
89'	C	12			
115	T	12			
130	C	12			Crackes on sides and on to of pipe
140	C	12			on enfultrain.
167	T	12			165 Cracked on top Before [illegible]
170	LA				
165'	C	12			

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Tape 0808-1147

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CLOCK

INSPECTION AND WORK REPORT

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats			7-20-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
3	4	173.9	18" CCP	3

MH NO. 3 → DIRECTION OF FLOW → MH NO. 4

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
6	C	12			we will be Sending the TV with [illegible]
38	+	12			
77	+	12			
78	C				Cracks on top and on Sides of pipe
80	C				Cracks go all the way around the pipe
90	C				173 Ft of pipe has been [illegible]
117	T	12			
129	CG				
162	WJ				

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

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Tape 1147-1396

CLOCK

INSPECTION AND WORK REPORT

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-20-87

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
4		5	156.7	18" CLP	4

MH NO. 4

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
10	C	12			going East to west
35	C	12			hole in pipe
51	C	12			
67	C	12			Cracks seem to Be all the way up and
87	C	12			Down pipe
100	C	12			
116	C	12			
116	R	6			Roots sticking out of bottom of pipe
139	C	67			Top of three strands of Roots
156.7					

MH NO. 5

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP–Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

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Tape 1397-1686

INSPECTION AND WORK REPORT

Start Time 8:55

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats			7-21-87

MANHOLE NO. 1	TO	MANHOLE NO. 2	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
East Side of Bldg 460			231.9	15" CCP	5

North

MH NO. 1

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
1'	C				
6'	C				
13'	C				
16					Some Rocks & Sand on bottom of pipe
30	C	12			
53	C	12			
70	C	12			
78	C	12			
94	C	12			
103	C	12			
110	C	12			
119	C	12			
136	OJ				offset joint - not Bad
150	C	12			
151	OJ				
176	C	12			
199	C	3			
207	C	12			chunk of Concrete missing from top of pipe at joint
					Stop time 9:30

MH NO. 2

South

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Tape 1686-1194
Time - 10:00 am

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CLOCK

INSPECTION AND WORK REPORT

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-21-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2	3		21" CCP	# 6

North
MH NO. 2

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					Storm Drain 2 to 3 is going south-East
					East Side of bld 460 -
					will be pushing tv camera up line 2"-3" as
					far as we can by hand
13 Ft	C	[illegible]			Cracks
					[illegible]
					[illegible]
					will try to tv from SD 3" going N
					To SD 2" will be pushing by hand
					Tape 1194 Time 1015
					Time 10:30 Am
going from SD 3" to SD 2"					Northwest Tape 1794 To
2" pipe	pipe	[illegible]			8" pipe going through 21" long N & South
10"	pipe	[illegible]			going north & South [illegible] long
					could not go past 10' 19.58

2" pipe

MH NO. 3

South-East

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

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Tape 1958-2218

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CLOCK

INSPECTION AND WORK REPORT

Time ~~[illegible]~~ 2:40 pm

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-21-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
SD NO. 3 #	TO SD NO. 4 #	155'	21" CCP	7 #

MH NO. 3

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
Broken pipe 2	C	12			going from S.D 3 To S.D. 4 pulling
6	C	12			with jet truck
10	C	4			
18	C	12			Cracks all along To Top of pipe it's
26	C	12			cracked all the way from 3# to #4
33	C	1			
44	C	12			Time 3:00pm
51	C	12			
60	C	12			at 2' we have Broken pipe all
71	C	12			along the top of pipe doesn't look good
80	C	12			
93	C	12			
104	WJ				
109	C	12			
135	T	12			
154					

DIRECTION OF FLOW

MH NO. 4

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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Tape 2218-2299

INSPECTION AND WORK REPORT

Time 3:00pm

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-21-87

MANHOLE		MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 4 #	TO	NO. 5 #	40.1	21' CCP	8 #

MH NO. 4

DIRECTION OF FLOW

MH NO. 5

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
5	C	12			still we have Cracks all up the
10	T	12			pipe on top. line looks level
13	C	12			
25	C	12			
30	C	12			
35	C	12			
40	C	12			

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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Tape 2299-2412

INSPECTION AND WORK REPORT

Time 3:25 pm

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Stal's			7-21-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 5th	TO NO. 6th	79.5	21" cp	9th

MH NO. 5

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
5	C	12			Starting from Southend of B.M. 400
17	C	12			on S.D. 5th going west to 6th pulling
31	C	12			with jet truck
32	C	12			
43	C	12			Still we have cracks all along top of pipe
44	C	12			most of the way to S.D. 6th
56	C	12			
64	C	12			
69	C	3			
79.5					End of pipe

MH NO. 6

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
END. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

Time 9:05

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CLOCK

INSPECTION AND WORK REPORT

In front of Bld 440

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flat		[illegible]	7-22-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2		18" Cmp.	10#

MH NO. 1

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
5'	A	9			bent in pipe
					went up pipe abor 22' was unable
					To push up any Further
				–	Second try to push up line with 12"
					sleds up 18" line - Tape 2496 - 52'
36'	C				crack or Bent pipe

DIRECTION OF FLOW

MH NO. 2

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

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Tape 2054-2801

INSPECTION AND WORK REPORT

Time 9:35 - [illegible]

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-22-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2	3	41.5'	18" cmp	11

West

MH NO. 2

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					will Be pushing East to 3rd
					pushing with 12" skids pushing backward
					no access to #3 to pull with jet truck
41.5'					line can use cleaning
					Sand & Gravel all the way down pipe
					as far as 41.5. will get access
					to S.D 3rd to flush [illegible] line

MH NO. 3 East

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape - 2401

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INSPECTION AND WORK REPORT

Time 10:25

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-22-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	3	HO2 34' 80.7	18" CMP	12 II

Corrugated metal pipe

MH NO. 1

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
30'	Bend				will be going through S D 2 going To #3 - will Be pulling with jet truck going west to East
39'	S.D				to SD 2
					[illegible] looks good except for joints loaded little rough [illegible] the [illegible]
					S.D. 2 to #3 is 80.7

DIRECTION OF FLOW

2

MH NO. 3

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3008-3272

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CLOCK

INSPECTION AND WORK REPORT

Time 11:00 am Till 12:00

...TOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-22-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
3	4	#-4 / 171.6-4	18" CMP	13#

MH NO. 3

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					going from S.D. 3# To 5# will Be going through S.D. 4# on South side of Bld 477 going East - will Be pulling with jet # truck
53'	+	9			another storm Drain pipe going in To [illegible] going North
171.6					To SD 4#
4 171.6					
					pipe looked good on this strech just [illegible] was bilt up about 1/4 of pipe
25					To End of pipe is 25'

MH NO. 5

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3273-3312
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CLOCK

INSPECTION AND WORK REPORT

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T-7	7-22-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
A	B	10'	12" Cmp	14#

MH NO.	FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
Catch Basin A						Pipe looked good from point A to B
DIRECTION OF FLOW						
	18" Cmp					Between S.D. 3#, 4#
C.B. MH NO. B						

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3310-3433

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INSPECTION AND WORK REPORT

Time 1:10 pm

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	7-22-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
6	7	92.8	30" RCP	15 #

MH NO. 6

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
10					going into smaller pipe, pipe is
27	WJ				cracked upon top of pipe spiderweb
44	C	12			type cracks
48	OJ				
51	C				
70	C	12			
80	C				
92.8					End of pipe

MH NO. 7

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3433-3442

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INSPECTION AND WORK REPORT

time [illegible]

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-22-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	48' 4	8" CMP	16#

North MH NO. 1

DIRECTION OF FLOW

2 MH NO. South

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
15'	Dent in pipe				we will Be tving the roof Drain from Bld
					444 going south - (TV camera is jumping)
					15' was Dent in pipe probably caused
					when Back Field with Rock and O grave!
					Wier OR String was hanging from
					pipe going Down

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats			7-22-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
3	4	51.6	8" CMP	17

MH NO. 3

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					will Be trying 8" Roof Drain just west
					of Roof Drain #2 on the North side of
					Bld 444 pushing in my hand going
					South
9.7	C				Seperation of pipe all around pipe
30	C				all around pipe maybe real Bad joint
51.6					To 90 Degree angle pipe -
					water was hanging from pipe coming
					Down to the 90

MH NO. 4

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP–Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3600-

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INSPECTION AND WORK REPORT

time 2:30 pm to 3:10

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-22-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	19.8	12" CMP	18 II

MH NO. 1

DIRECTION OF FLOW

MH NO. 2

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					push in East to west in 12" CMP
8'	Bend in pipe				light in front of caved house under asphalt
18.4					roof Drain coming in a 9"
19.8					unable to go past 19.8 camera keeps turning over and going under water - we try four times to go up line.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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Tape 3784 - 3942

CLOCK

INSPECTION AND WORK REPORT

Time 3:30 - 3:50

...TOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-22-87

MANHOLE NO. 5	TO MANHOLE NO. 6	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
Roof Drain			8" CMP	19#

MH NO. 5

DIRECTION OF FLOW

MH NO. 6

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
2.6	WJ				will be pushing South in 8" line
8.8	Dent in pipe				Roof Drain
11	WJ				
11					CMP - go's into a 8" PVC pipe
16	C				
18					
18.7	WJ	all			wide joints looks like Ram nick [illegible]
22.2					22.2 to the 90 degree angle [illegible]
					turn towards the west ?

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3941-

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
[illegible]	—	[illegible]	7-23-87

MANHOLE NO. 2 TO MANHOLE NO. 3	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
		21" [illegible]	20 TF

MH NO. 2

DIRECTION OF FLOW

MH NO. 3

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
[illegible]	C				[illegible]
10	Good	Good			will be [illegible] pulling with [illegible] head
33	C				going [illegible] west to South-East
52	[illegible]	[illegible]			[illegible] line
60	T	[illegible]			
605	C				
815	F			8"	Sewerline going through
					center of MH
					line was cracked all along the Top [illegible]
					Bottom tube is [illegible]
					Cracked like [illegible] Sealant [illegible]
MH	81'				

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors home 4048-4141
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INSPECTION AND WORK REPORT

time 9:10-11:00

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-23-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	68.9	12" CMP	21 #

Storm Drain

MH NO. 1

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					South of Bld 444 running to Bld 447 going south
					out flow should be cleaned out for proper flow in line
4.9	C				[illegible] PIPE
4	T				[illegible]
4	C				
30					[illegible]
					went under water at 32' stayed under
68.9					for 35' could not see anything -

MH NO. 2

Storm Drain

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	line must be cleaned for proper flow – and monitoring
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP – Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 4141 -
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CLOCK

INSPECTION AND WORK REPORT

Time [illegible]

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-23-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
5	6	78'0	21" CCP	22#

MH NO. 5

DIRECTION OF FLOW

MH NO. 6

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
10	C	12			going west To S.D. 6 at South Side
40	C	1			of Bld 460 going East in SD 5# To 6#
57	C	12			with the flow
					Few cracks out top of pipe [illegible]
					pipe looks good
78'0					

NOTES

CLEANLINESS -

COND. OF LINE -

GRADE -

COND. OF M.H. -

CODE

L - Leak
C - Cracked Pipe
CLP - Collapsed Pipe
OJ - Offset Joint
WJ - Wide Joint
T - Taps
R - Roots
Y - Y's
LA - Low Area

COMMENTS

[illegible]

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 4239-4476

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CLOCK

INSPECTION AND WORK REPORT time 1135 - 1155

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-23-87

MANHOLE NO. 1#	TO MANHOLE NO. 2#	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
Storm Drain		204.9	30"	23#

MH NO. 1

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
10	C	12			in front of Bld 460 will be going south
23	C	12			in 30" pipe CCP
					TV van is setting in front of South Side
					of Bld 460
					we will be going through one catch basin
35.5					south of SD 1# going to SD 3# - start 6' in
					30" line with camera - will be going with flow
59'	C	12			
78	L	12			possible Leak a
102	L	12			possible Leak at joint
113	LA				
170					
182	T	9			18" pipe coming in from East
					209 ft to SD #3

2 Catch Basin

DIRECTION OF FLOW

MH NO. 3

NOTES

CLEANLINESS -

COND. OF LINE -

GRADE -

COND. OF M.H. -

CODE

L - Leak
C - Cracked Pipe
CLP - Collapsed Pipe
OJ - Offset Joint
WJ - Wide Joint
T - Taps
R - Roots
Y - Y's
LA - Low Area

COMMENTS

line should be cleaned as soon as possible 2 cracks and sand are bottom of pipe

V.S.R. CORPORATION

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4466-4543 Tape [illegible]

Second Tape [illegible]

CLOCK

INSPECTION AND WORK REPORT

time 12:40 to 1:10 pm

FOR	INSPECTOR	OPERATOR	DATE
Rock Flats		[illegible]	7-23-87

MANHOLE NO.	MANHOLE TO NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
# 1	# 2	going 33' 56'	15" CCP	# 24

MH NO. 1

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
4	C	8			Storm Drain going under Garde Shack
					going East to west 15" CCP concrete
					Be pushing by hand with (Blue & white
					Camera)
					will Be working in front of Bld 460
from East end 33'					South side
					Camera is going off & on are
					camera only went in 33' could not
					push in by hand any further
					pipe looded good up to 33'
4542 - 4614					Second attained to pull though 15" line
11	WJ	12			
35	C				chunk of Concrete missing at top
50	WJ				of pipe
56					End of pipe

MH NO. 2

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	[illegible] was clean one [illegible] Bad
COND. OF LINE –	C – Cracked Pipe	chunk of concrete was missing
GRADE –	CLP – Collapsed Pipe	from top of pipe at 35
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

V.S.R. CORPORATION

Tape 4014 - 4684

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CLOCK

INSPECTION AND WORK REPORT

time 1:45-

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-23-87

MANHOLE # NO. 3	TO	MANHOLE # NO. 4	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
			91.6	21" CCP	25 #

MH NO. 3

DIRECTION OF FLOW

MH NO. 4

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
4	C				this line is a continue line from the 30"
			In crit Area		line going south from Bild 460 outside
56.2	MH				of gate will be pulling South from
					SD 3# to SD 4# - on castus ed going west
86.4	C				this will be with (color +x)
91.6	MH				

NOTES

CLEANLINESS -

COND. OF LINE -

GRADE -

COND. OF M.H. -

CODE

L - Leak
C - Cracked Pipe
CLP-Collapsed Pipe
OJ - Offset Joint
WJ - Wide Joint
T - Taps
R - Roots
Y - Y's
LA - Low Area

COMMENTS

V.S.R. CORPORATION

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INSPECTION AND WORK REPORT

4694 – 4800

Time 309

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Sims	7-23-57

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
4	5	109	18" Concrete	26

MH NO. 5

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
45	C				Storm drain in parking
					lot just West of south in front
					of 400 area. Runs North to South
109					

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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INSPECTION AND WORK REPORT

10,PC 4801 - 4943

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats			2-23-87

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
# 4		# 6	245	24" CCP	# 27

MH NO. 4

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
7	C	12:00			[illegible] from the MH
13	C	12:00			in the Parking Lot West
23	C	2:00			of the South entrance of
52	C	both sides			Area 400. Going to the
59	C	2:00			catch basin on the West side
66	C				of 3rd Street
76	C	9:00			
98	C	11:00 to Bottom			
107	C	12:00			
[illegible]		[illegible] missing			at [illegible]
138	C	9:00			[illegible]
181	C	9:00 & 300			running to the Bottom
189	C	4:00			
245					

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 4948-5070

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INSPECTION AND WORK REPORT

Time 8:45 to 9:10

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		[illegible]	7-24-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
6#	7#	349.3	18" CCP	28#

MH NO. 6

DIRECTION OF FLOW

MH NO. 7

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
132	C	12			will Be Starting at parking lot # 1st Southwest of Bild 460 will Be pushing west form S.D. 6# To M.H. 7# going against the Frow

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe looked good
pipe was clean and in
good shape

V.S.R. CORPORATION

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Topic 5070-5170

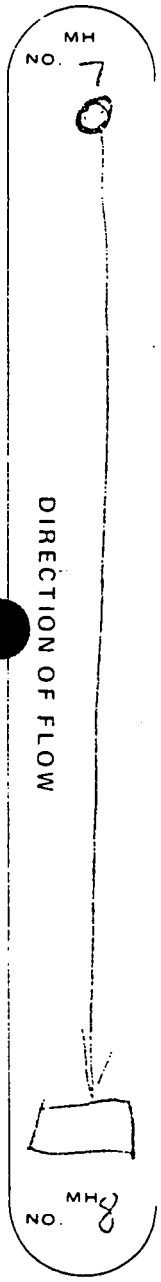
CLOCK

INSPECTION AND WORK REPORT

Time 9:35 to 9:55 am

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-24-87

MANHOLE # NO. 7	TO MANHOLE S.O. # NO. 8	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
		160.8	18" CCP	29 #



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
7	C	12			In parking lot southwest of Bld 460
54	C	3:9			west of 3rd st going west
79	C	12			MH7 To SO8 18" CCP
128	C	12			
132	C	12			Some cracks in line not bad -
153	C	9			line looked in good condition
					(End of run)

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe had a few cracks
but nothing major

V.S.R. CORPORATION

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Tape 5170-5284

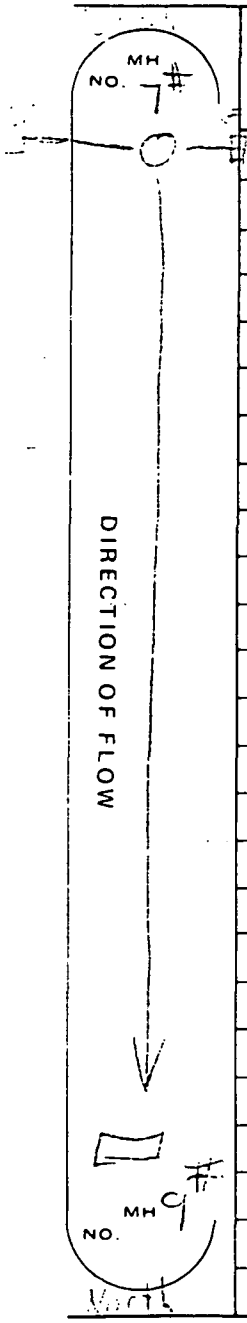
CLOCK

INSPECTION AND WORK REPORT

Time 9:55 am to 10:20 am

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-24-87

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
			237.4	18" CCP	30#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
100	C	12			pipe is running north from MH 7# 18" CCP
180	C	3			will pull with jet truck - still in packing
191	C	12			lot southwest of Bld 460 west of 3rd ST
					in packing lot

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe looked good
was clean

V.S.R. CORPORATION

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Tape 5284 to 5341

CLOCK

INSPECTION AND WORK REPORT

Cleaned
Time 10:55 to 11:45 [illegible] at 11:55

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-24-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2 #	1 #	86.7	15" CMP	31 #

North

MH NO. 2

DIRECTION OF FLOW

MH NO. 1 #

South

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
12'	WJ	12			will start at west of Bld 25 just Behind
37	C	12			the trailer in side Fenced area - going
61	C	12			from S.D 2# to S.D 1# going South west
86.7			end of pipe to 1#		will be pulling against the flow with jet truck
					Started cleaning lines at 1100 AM till 11:50
					with 10" Skids we will Be pulling Down 15" line
					12' in pipe had what looked like [illegible]
					37' more wide cracks in pipe
					61' more wide cracks all around pipe and
					going down sides
					pipe pose not look good at these [illegible]
					(could Be possible joints collapsed)

NOTES

CLEANLINESS –

COND. OF LINE – Bad cracks in pipe

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

15" line going Southwest
was cleaned Times with
jet truck Before [illegible]

Cleaned 15" line for 45 min
cracked pipe

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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Tape 53-1-2389

CLOCK

INSPECTION AND WORK REPORT

time 3:15

FOR	INSPECTOR	OPERATOR	DATE
[illegible] flats		[illegible]	[illegible]

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1 #		2 #	37'3	15 CMP	

MH NO. 1

DIRECTION OF FLOW

MH NO. 2

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					[illegible] Southwest side of Bld [illegible]
					pushing Northwest to SD 2#
					Black & white tv van

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe looks good
[illegible]

V.S.R. CORPORATION

Tape 5387-5410

Video Sewer Renovation Contractors

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CLOCK

INSPECTION AND WORK REPORT

Time 3:30 to 3:40

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats			7-24-87

MANHOLE NO. #	TO MANHOLE NO. #	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	27.0	12" CMP	33 #

MH NO. 1

DIRECTION OF FLOW

MH NO. 2

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					12" long running north to South
					Right in front of water treatment
					plant will be pushing south
					To SD 2# from #1

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

Pipe looked good

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 5405-5649

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT

time 11:15 am to 11:55

FOR	INSPECTOR	OPERATOR	DATE
Rock Flats		[illegible]	7-27-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2	5	260'	8" CMP	34#

DIRECTION OF FLOW

MH NO. 2 #

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
43'	LA				cleaned line for 2hr 45 min
					will be going from S.D 2# to SD 5#
					going north 8" cmp - will be west
					of Bld 125 - will be pulling through SD
					3# 4# to 5# will stop at each one get
77	Sand at end of pipe				footage
84.7	end of pipe				

5483

-3#

5560

-4#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
82.8					
30'	Dnt	3			
94.0					

MH NO. 5 #

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

S.D. 2# to S.D. 3# all the way to S.D. 5# should be cleaned as often as posable

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 5649-5795

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT

Time 12:40 pm – 1:25 pm

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	7-27-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
5 #	6 #	223.8	12" CMP	35 #

MH NO. 5 #

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					12" CMP going northwest -
					tv. van setting at west of Bld 125
					will be getting with jet truck with 10" skids
128.8					change style of comp
140	LA				
140					
165					

MH NO. 6 #

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looked good. Except between 126' & 140' the pipe style had been changed at one time (it seems to be a low area)

V.S.R. CORPORATION

Video Sewer Renovation Contractors 1600 0-0269
11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT

Time 1:35 pm 200 pm

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	7-27-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1 #	2 #	63'	12" cmp	36 #

MH NO. 1

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
15'	OJ	9 1/3			12" line Between Bld 1273 128 going north
					under sidewalk [illegible] with jet truck
					have to put 10" skids to pull with
					15' Bent pipe around joint [illegible]
					(changed to Different Style of pipe at 15')
63'					

MH NO. 2

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 0269-895

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT

Time 2:30 p.m.

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-27-87

MANHOLE # NO. 1	TO	MANHOLE # NO. 2	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
			253.3	14" cmp	37#

MH # NO. 1

DIRECTION OF FLOW

1 in tap

MH # NO. 2

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
14	Dent				
15'6	WJ	3			
18	LA				Fell in hole Camera lenses got Dirty
23	out of LA				
47					change pipe might be just [illegible]
127	OJ				piece of model sticking in pipe
180	LA				
210	T	2			Starting at 3rd st & going down Central Ave
253.3	end of line				going East - 14" SD [illegible] with
					just truck - with 12" skids

NOTES

CLEANLINESS -

COND. OF LINE -

GRADE -

COND. OF M.H. -

CODE

L - Leak
C - Cracked Pipe
CLP - Collapsed Pipe
OJ - Offset Joint
WJ - Wide Joint
T - Taps
R - Roots
Y - Y's
LA - Low Area

COMMENTS

at 47' change of pipe [illegible] style of pipe & [illegible] Bigger 15" by 15"

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 0895-
11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

INSPECTION AND WORK REPORT time

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	7-29-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	3#		15" CMP 12	[illegible]

MH NO. 2

DIRECTION OF FLOW

MH NO. 3

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					cleaned lines from [illegible] To [illegible]
					will start tiring at [illegible] 2# to [illegible] 3# on
					central ave going East From Forth st -
					15" turns into 12" will pull 12" sled
					all the way though

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

[illegible]

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 0895 - 1123

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT

Time 11:35 am to 12:00

FOR	INSPECTOR	OPERATOR	DATE
Rock Flats		Tom	7-29-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
# 1	# 2	27' 7	18" CMP	# 38

MH NO. 1

DIRECTION OF FLOW

MH NO. 2

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					will Be pushing up 18" line with 12" Skids
					S.D 1# & 2# are located on north side of Bldg
					444 will be pushing North under paved road

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe was Dirty had rocks and sand at north end of pipe

V.S.R. CORPORATION

Video Sewer Renovation Contractors
11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

Lamp inspected

CLOCK

INSPECTION AND WORK REPORT

FOR	INSPECTOR	OPERATOR	DATE
Rock Flats		[illegible]	7-29-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2			39#

MH NO. 1

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked up pipe with flash light -
					pipe looked good
					pipe should be Cleaned, is about half
					full of Rocks and sand
					pipe located at the SouthEast corner
					of Bld 444 pipe is running west - East

MH NO. 2

NOTES

CLEANLINESS -

COND. OF LINE -

GRADE -

COND. OF M.H. -

CODE

L - Leak
C - Cracked Pipe
CLP - Collapsed Pipe
OJ - Offset Joint
WJ - Wide Joint
T - Taps
R - Roots
Y - Y's
LA - Low Area

COMMENTS

Should Be Cleaned

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 1123-1353
11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT

time 1:15

...OR	INSPECTOR	OPERATOR	DATE
Rocky Flat		[illegible]	7-29-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	45.7	18" by 28" [illegible]	40 #

MH NO. 1

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
39					Stick was sticking in joint at 39
43	Dent in pipe	12 o clock			
45	T	3			looked like a 12"? line was sticking in line - (was a steel pipe coming in a 3 o clock
					located on the Northeast side of [illegible]
				west	just past QR tracks - will be pushing +V up line
60.3					total length of pipe is 60.3

60.3

2

MH NO.

NOTES	CODE	COMMENTS
CLEANLINESS -	L - Leak	T - Taps
COND. OF LINE -	C - Cracked Pipe	R - Roots
GRADE -	CLP - Collapsed Pipe	Y - Y's
COND. OF M.H. -	OJ - Offset Joint	LA - Low Area
	WJ - Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 1353 - 1581

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT time 1:40 pm 2:00

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats			7-29-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1 #	TO 2 #		12" CMP	41 #

MH NO. 1

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
19'	C	all around pipe			
22	hole	2			hole in pipe
2[illegible]	hole	2			hole in pipe
2[illegible]	hole	2			holes in pipe
24.8		12			Big hole in pipe
24.8	→				as far as we can pull tv camera
					were unable to pull any further with jet tower past 24' 8 - Sand and Rock
					will be pulling southeast with jet tower
					loaded on northeast of Road tracks just East
					of R.R. tracks on Cottonwood Ave going
					underneath road

MH NO. 2

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

hole at 30' 22' 24' 28'
Bad Holes in pipe
pipe should Be Cleaned

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tony	7-29-87

MANHOLE NO. 1 TO MANHOLE NO. 2	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
	24" 18"	24" into 18"	42 #

MH NO. 1

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
15'					
					looked up line with flashlight
					location-in front of Bld T4526 in driveway
					going East on Central Ave is a 24" line
					in 15' then changes to 18" line C.M.P
					just west of 6th st

MH NO. 2

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 1581 - 1711

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

INSPECTION AND WORK REPORT Time - 2:35 - 2:50

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	7-29-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
S.D. 1-A	TO S.D. 2	17.2	12" CMP	43

MH NO. 1-A

DIRECTION OF FLOW

MH NO. 2

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					pipe is heavily coated with tar or Black soil around pipe
					looked up pipe with flashlight pipe looked good to the end of SD 2
					located on South Side of Bld 442 in front of Door 2 will be pushing by hand going North line will be going into a Culvert that has a 18" line going East & west

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP – Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 1717-1907

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT time 3:05

OR	INSPECTOR	OPERATOR	DATE
Rocky Flats			7-29-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2	1	104'	18" CMP	44#

MH NO. 2

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					line looked good all the way down
					Southside 80F Bld 442
					18" line going from East to west
					will be pulling with jet truck
					against the flow

DIRECTION OF FLOW

MH NO. 1#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe looked in good cond.
Heavily coated with tar
pipe was clean.

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape-1907-

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

INSPECTION AND WORK REPORT time-9:15 am

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tony	7-30-87
MANHOLE NO. 1 TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
		18" CMP	45 #

MH NO. 3#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					on the east side of Bld 443 will
					be pulling East to S.D. 2# from S.D. 3#
					will be pulling with jet truck
					will be pulling under 5th st going east
					line has a 45 Degree Bend in it
					looked with flash light
					looked up line from S.D. 3# about 25 ft
					we have a 45 Degree pipe which goes down
					we have no idea where it goes - could be
					a problem when it comes real bad

MH NO. 2#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP–Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 1907 - 1956

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

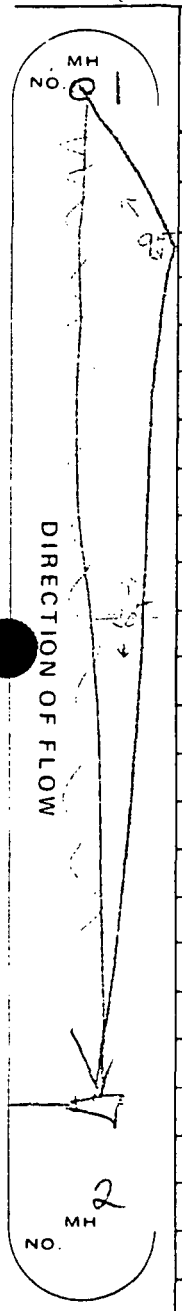
INSPECTION AND WORK REPORT

time 9:00 am 9:10 am

CLOCK

OR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	7-31-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	39.4'	12" cmp	46#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					we were unable to pull a from S.O. 1# around
					45 Degree Bend did not want to take a chance
					of getting stuck
					will be going Northwest from S.O. 1# in
					front of Gate at portal 1 going to
					S.O. 2#.
					got little part in the VCR unit 1907-1956

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

looked up line with flash light got a good look - pipe is in good condition was clean and didn't have any bad joint's or Dent's

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 1956-2215

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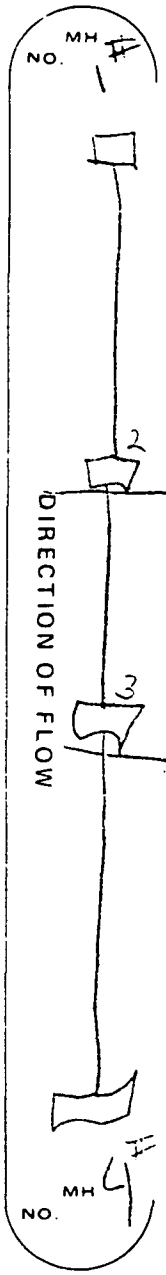
CLOCK

INSPECTION AND WORK REPORT

time 10:20

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tony	7-31-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	4#	180.5	15" CMP	47#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
8'					Dirt all the way down to SD 2# about ¼ pipe full
60'					60'
					From 2# to 3# pipe was clean
119'					119'
					located at 10th St in portal 1 S of [illegible] will be pulling south with camera 15" CMP with 12" skids will be going thru two Storm Drains -
					Second atmt - will be pulling with 15" skids the twelve in skids were to how it keeped making to much steam fog

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe looked good all the [illegible] from SD 1 to SD 4# 1# to 2# was about ¼ full of Dirt & Rock

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 2215 -
11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

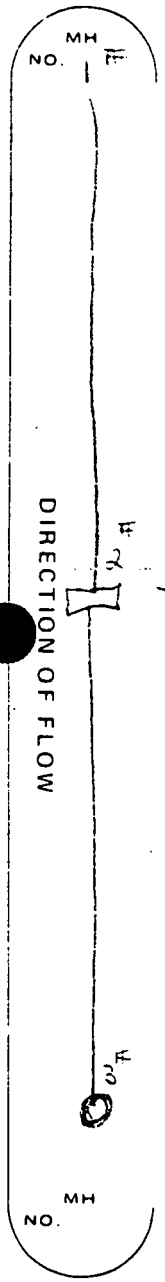
CLOCK

INSPECTION AND WORK REPORT

time 11:25 -

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tay	7-31-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	3	106.1	15" CMP	48#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked good
62'					looked good
					will be on 10th st going North from Dead end SD 1# will be going thru SD 2# going north to m H 3# with jet hot
					m H 3# is catch Basin which is going East
					Shoe at 6# in pipe with camera
106.1					go's to 35" pipe going East

NOTES

CLEANLINESS -

COND. OF LINE -

GRADE -

COND. OF M.H. -

CODE

L - Leak
C - Cracked Pipe
CLP - Collapsed Pipe
OJ - Offset Joint
WJ - Wide Joint
T - Taps
R - Roots
Y - Y's
LA - Low Area

COMMENTS

pipe looked good
was clean no bad cracks
or wide joints

V.S.R. CORPORATION

Video Sewer Renovation Contractors

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tape 2360-2600

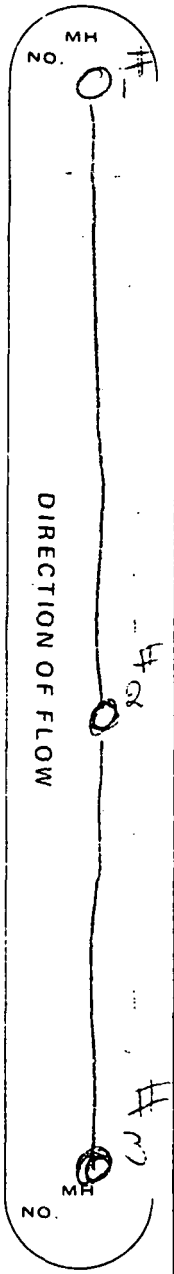
INSPECTION AND WORK REPORT

time 1250

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats			7-31-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1 #	TO 3 #	95.2	24" CMP	49 #



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
20	WJ	8-4			
45	T	10			
82.6	T	2			
93	LA				
95.2					copper tube was in line: couldn't get past copper we only went 95.2 ft in from MH 1 #
					will be west of Bld 750 just west of Door #3 will be pulling South from MH 1 # to #3 will be going though 2 # in a long hall way going South

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP – Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

V.S.R. CORPORATION

Video Sewer Renovation Contractors page 2600-2899

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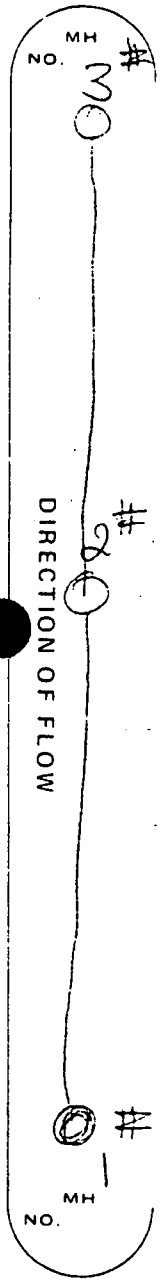
INSPECTION AND WORK REPORT time 1:55-2:40 pm

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats			7-31-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
3#	TO 1#	268.0	24" C.M.P	50#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
210.6	T	10			
216	WJ	3			from m.H 2# to m.H 1# is alot of
					L.H... rust spots in line
112'					
138	T	10			
203	T	10			will be pulling from Portal 2 going North
					Had to Dig up m.H. cover 4" of Asphalt on top
					will be pulling from m.H 3# a reverse
					pull we will stringall of the T.V. cable
					from 1# to 3# and then pull back with
					T.V van winch - Reverse Pull
					Sheet #49 is the first pull from North to South

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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Tape 2896-3093

CLOCK

INSPECTION AND WORK REPORT

time 3:00-3:45

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[signature]	7-31-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	123.8 FT	15" CMP	51#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
20					Rust
25					Rust
71					"
80					"
87	+	9			
93					"
97					"
104					"
108					"
123	+	10			
123					Rust

will be going west from mH 1# going west to SD 2# - North of Portal 1 Front Gate
S.D. 1# was also used as mH 2# on last run one sheet 49# 50# mH 1# [illegible] way about 112 ft away from gate at Portal 1# going north from front gate

we were unable to go past 123' house of Bent pipe a Tap from the mH 1# going west

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3095—3229

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CLOCK

INSPECTION AND WORK REPORT

Time 9:45 —

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-4-87

MANHOLE NO. 2#	TO	MANHOLE NO. 1#	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
			45.4	15" CMP	52#

East

MH NO. 2#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
19	T	9			(pipe looked like it might have been cracked on top)
45	T	3			we were unable to pass tap in line it was
					sticking in line about six inches got up to
					45.5# as far as we can go going east
					will be going east on south side of Bld
					707 will be pulling with jet truck
					going east from mh 2# to mh 1# in
					covered walk way -
					we tried up to 193# on Friday, this will be
					the other half of 15" CMP going east were
					we can into tap we couldn't get by

MH NO. 1#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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Tape 3465-3558

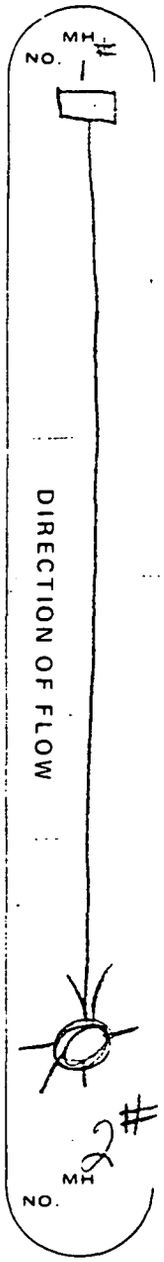
CLOCK

INSPECTION AND WORK REPORT

Time 12:30 -

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[signature]	8-4-87

MANHOLE	TO	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
S.D. NO. 1		NO. 2#	39'	18-12" Comp	55-#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
20					Different style of pipe - couldnot pull past 20'# the skids were getting stuck under neath the edge of pipe going south the rest of pipe looked good from 20' in
					At 17' almost got stuck pulling camera back out of S.D. 1# - total footage of line is 39' (messur with tape)
					use 12" skids for pulling camera - with jet truck will be going south to m.h. 2# this is another line going in to m.h. 2# - is located in front of Gate's in Portal 1# - west side of Bld 764 -

NOTES

CLEANLINESS -
COND. OF LINE -
GRADE -
COND. OF M.H. -

CODE

L - Leak
C - Cracked Pipe
CLP - Collapsed Pipe
OJ - Offset Joint
WJ - Wide Joint
T - Taps
R - Roots
Y - Y's
LA - Low Area

COMMENTS

V.S.R. CORPORATION

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Tape 3558-3907

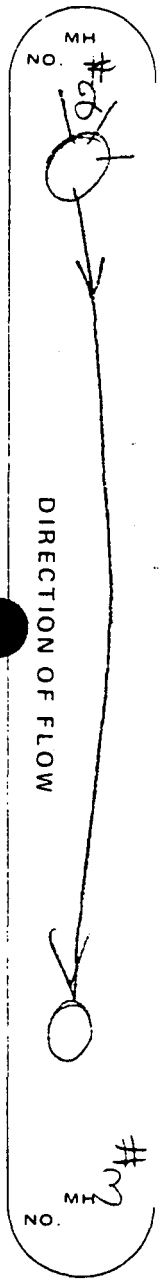
CLOCK

INSPECTION AND WORK REPORT

time 1:19 - 3:35

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-4-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	3#	552.6	36" CCP	56#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
1	C	12:00			
183	C	11:			Started
300	C	10:00			Stoped
354	C	10:00			started
360	C	10:00			Stoped
438	C	10:00			just before joint
445	C	7:00			just before joint
500	C	300			small hair line crack
525	C	3:00			small hair line crack
531	C				just before joint & just after
					(revers pull) will be pulling with tv [illegible]
					will start at MH 2# going East to MH 3#
					located on South Side of Bld 764 By front
					gate. Portal 1# going east MH 2# on west
					Side of intersection MH #3 is on [illegible]
					just south of Sage

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

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INSPECTION AND WORK REPORT

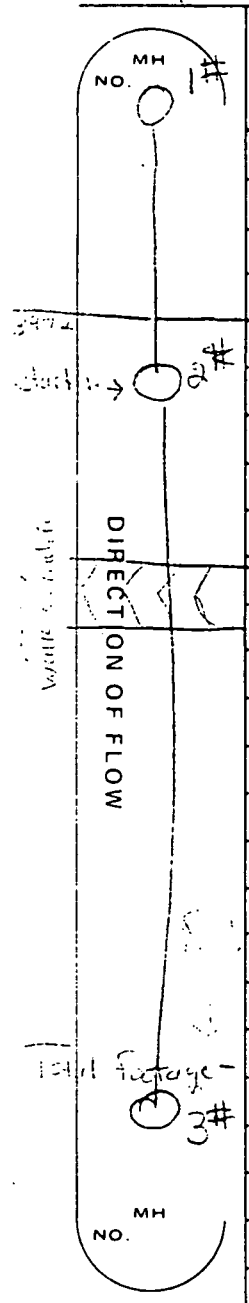
Tape 3907-3972

Time 9:45 – 10:10

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-5-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	3	m.H 2# to m.H 3# 306.7	15" CMP	57 #



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					From m.H 1# to m.H 2# Total Footage is 119
20					we were unable to go past 20# cause of the pipe was down into water which filled up the pipe all the way – didnot want to take chance and get camera stuck
					m.H 2# to m.H 3# Tape 3972 –
				→	Start at m.H. 2# and go to m.H 3# 18" CMP
					Time – 10:25
					will Be useing 18" slide to pull
52.5	T	11:00			
53	T	12:00			
144	Dent		small		
156.4	Dent		small crack		
206	11:00				
					located at the South Side of Bld 778 will be going East though m.H 2# going to m.H. 3# 15" CMP – we will be going (under 778-707 walk cocadore)

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

had to move to m.H 2# [illegible] go to m.H 3#

Between m.H 1# & m.H 2# [illegible] at 20# in unable to [illegible]

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 4332-4633
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INSPECTION AND WORK REPORT

Time - 12:30

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-5-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
3#	4#	249.8	18" C.M.P.	58#

MH NO. #3

DIRECTION OF FLOW

MH NO. #4

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
44.1		12:00			[illegible]
45	T	11:00			
86	T	1:00			rust around tap
108	T	11:00			rust " "
169.6	T	11:00			rust " "
197	T	2:00			rust " "
214	T	11:00			rust " "
					Some rust around taps and spots [illegible]
					[illegible] didn't look bad
					located at the South side of Bldg 778 in front
					of locker room 78 [illegible] from MH 3# to
					MH 4# - 18" CMP [illegible]
					MH 4# located in front of [illegible]
249.8					Total Footage

NOTES	CODE	COMMENTS
CLEANLINESS -	L - Leak	T - Taps
COND. OF LINE -	C - Cracked Pipe	R - Roots
GRADE -	CLP - Collapsed Pipe	Y - Y's
COND. OF M.H. -	OJ - Offset Joint	LA - Low Area
	WJ - Wide Joint	

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Tape - 4633 - 4641

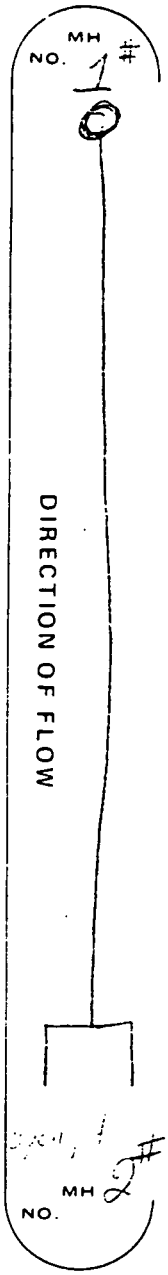
CLOCK

INSPECTION AND WORK REPORT

time - 200

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-5-87

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
			116.7	36" CCP	59 #



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
18	C	1			small hair line [illegible] nothing major
24	C	1			" "
55	C	3			" "
					" " "
					located on 10th st just North of Sage
					will be pulling North east to open area [illegible]
					36" concrete pipe

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

Pipe looks in good shape it was clean all the way through line

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape #641-

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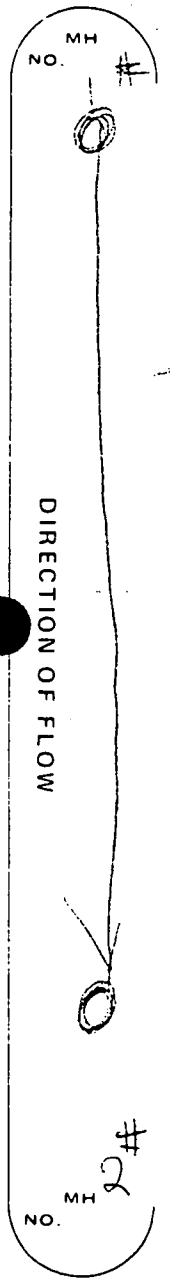
INSPECTION AND WORK REPORT

Time 1:50-

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-6-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	25.8	15" CMP	60#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located on the North Side of Bld 727 next
					to roadside going North East from MH 1# to MH 2#
					from MH 1# to MH 2# at the end of pipe is
25.8					squeezed down to 15" [illegible] Be able to pull
					through to MH 2# [illegible] have to pull back with
					TV [illegible]

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line ~~[illegible]~~ looked good except for last 2 Ft

V.S.R. CORPORATION

Video Sewer Renovation Contractors 4680-4838
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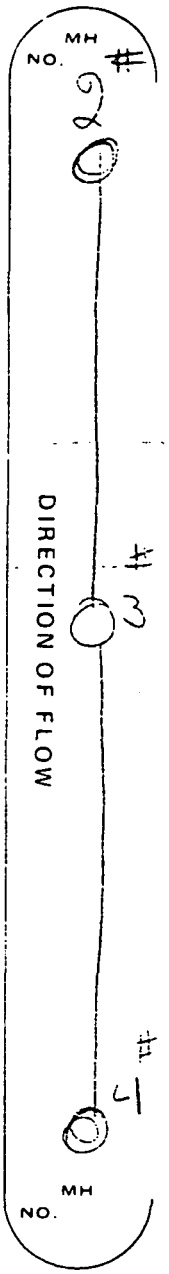
INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-6-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	4#		15" CMP	61#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
24.4		9			one inch pipe going down on side of 15"
					cmp at [illegible]
88.2					To M.H. 2# from 3#
93.6					
					[illegible] side of Bld 727 - going north
					from M.H. 2# to M.H. 3# [illegible]
					Spots in line
					From M.H. 3# to M.H. 4# we were unable
					to pull past 8# past M.H. 3# [illegible]
					two much water and could use some cleaning

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

From M.H. 3# to 4# need's cleaning to finish [illegible] line

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 4844-5029

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CLOCK

INSPECTION AND WORK REPORT

Time 10:40

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8·7·87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	289.4	48" CMP	62#

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
77	Dent	1		Small	Dent in pipe
188	C	12		Small	crack on top of pipe at joint
					light head keeped going on & off
					located at the west of Bld 773 Door 1# going northeast from S.D. 1# to S.D. 2# will pull with jet truck

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 5023-5191

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CLOCK

INSPECTION AND WORK REPORT Time 2:15

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	8-7-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1 #	TO 2 #	219.9	15" CMP	63 #

MH NO. 1 #

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located on Northwest corner of Bldg 559
					will TV from open pit at the bottom of
					hill going to the east to SD 2# against the
					flow going up
219.9					

2 #

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 5191-5252

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CLOCK

INSPECTION AND WORK REPORT Time 2:58

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-7-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	3#	66.3	15" CMP	64 #

MH NO. 2#

DIRECTION OF FLOW

3#

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
15	LA				
					at SD 3# we have cover for SD on top
					could be replaced
					located on North west corner of Bldg
					559 going South from SD 2# to SD 3
					last run in this line
					line looked good all the way to SD 3#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

need jet cleaning

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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Tape 0-0121

CLOCK

INSPECTION AND WORK REPORT

time 10:30

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tony	8-10-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	51.5	15" CMP	65#

MH NO. 1# 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					[illegible] on side of pipe
					located on S.W. side of Bldg 559, [illegible] South
					pipe is about half full of sand [illegible] unable to push up line past 51.5
51.5					

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line needs cleaning

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 0240223

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INSPECTION AND WORK REPORT Time 11:30

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Brady Flats		Tom	8-10-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	14.4	15" CMP	66

MH NO. → DIRECTION OF FLOW → MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					unable to push past 14' Too much sand
					camera keeps going under with the
					12" skids - wouldn't go with 15" skids
					located on South Side of Bld 559
					15" CMP going west - pushing with
					Black & white camera with 8" skids
					Tape 240 with 12" skids

NOTES	CODE	COMMENTS
CLEANLINESS -	L - Leak	T - Taps
COND. OF LINE -	C - Cracked Pipe	R - Roots
GRADE -	CLP-Collapsed Pipe	Y - Y's
COND. OF M.H. -	OJ - Offset Joint	LA - Low Area
	WJ - Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape - 0223 - 0356

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INSPECTION AND WORK REPORT Time 1:00

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats			8-10-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1 #	2 #	30.9	6" P.V.C.	67 #

MH NO. 1 #

DIRECTION OF FLOW

MH NO. 2 #

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located on North Side of Bld 773 inside
					of fenced area just past guard shed
					pipe looks in good shape gen.

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak C – Cracked Pipe CLP – Collapsed Pipe OJ – Offset Joint WJ – Wide Joint T – Taps R – Roots Y – Y's LA – Low Area	
COND. OF LINE –		
GRADE –		
COND. OF M.H. –		

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape - 0356 - 0496
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CLOCK

INSPECTION AND WORK REPORT

Time 130 am

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-10-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	1#	79'	6" PVC	68#

MH NO. 2#

DIRECTION OF FLOW

MH NO. 1#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located Northwest of Guard Shed 773
					outside of Fence North of [illegible] 773
					will start a SD 2# going Southeast
					To SD 1#

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe looked good

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 0496-0579

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CLOCK

INSPECTION AND WORK REPORT

time 2:00

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-10-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	31.6	6" CMP	69#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					line looks good
					located on South Side of Bld 559
					will be going North in 6" CMP pushing
					buy hand with Brushes
31.6					

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

~~[illegible]~~

cleaned lines two times

V.S.R. CORPORATION

Video Sewer Renovation Contractors
11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

Tape 0579-0-49

CLOCK

INSPECTION AND WORK REPORT

Time 3:00 pm

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tommy	8-10-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	21.5	12" cmp	70#

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
2	C	12			Small crack on top
					located in the South Side of Bldg 778
					line is in good shape, But needs cleaning

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line needs cleaning
a few more lines

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 649-0755

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT

Time 8:25

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-11-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#		20'	10" CMP	71#

MH NO.

DIRECTION OF FLOW

18'

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
20'					
					located on South Side of Build 778 Starts on small Drain going west into 18" SD going South
					we were unable to go past 20 ft cause of pipe go's down - didn't want to take chanse on getting stuck

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe looked good up To 20 ft

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 0755-0821

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INSPECTION AND WORK REPORT

Time 8:45

CLOCK

OR	INSPECTOR	OPERATOR	DATE
Rocky Flats			8-11-87

MANHOLE NO.	MANHOLE TO NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#		21.5"	8" CMP	72#

MH NO. 2#

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					on South Side of Bld 778 in small
					S.D. 8" going west into 15" line
					will be pushing by hand
					unable to go past 21' connection Bending pipe
					going down don't want to take chance on
					getting stuck

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe was clean

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 0820 - 0872

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

INSPECTION AND WORK REPORT time 9:00

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats			8-11-87

MANHOLE NO.	MANHOLE TO NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
3#		7'	8" CMP	73#

MH NO. 3#

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					just west of David post 750 inside of
					Gate in 8" CMP going west

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak C – Cracked Pipe CLP–Collapsed Pipe OJ – Offset Joint WJ – Wide Joint T – Taps R – Roots Y – Y's LA – Low Area	line looked good
COND. OF LINE –		
GRADE –		
COND. OF M.H. –		

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 0872 - 0952
11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT

Time 9:15

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		[illegible]	8-11-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
4#		30.1	8" CMP	74#

MH NO. 4#

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
30.1					
					on west side of [illegible] 750
					will be on the west side of [illegible] will
					be pushing East to Bigger line that's going
					North and South

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looks good to the Deep in pipe

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 0952-1031
11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT

time 9:30

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		[illegible]	5-11-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
5#		30.7	8" CMP	75#

MH NO. 5#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
30.7					
					Still on west side of [illegible] 5# going east in 8" cmp - [illegible] hand

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line look good to [illegible]

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 1031-1087

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INSPECTION AND WORK REPORT

line 1000

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats	S'9	[illegible]	8-11-87

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
6#					76#

MH NO. 6#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					line looks something like this → [illegible]
					located just South of SD 5# [illegible]
					to [illegible] 18" [illegible] line -
					pushing by hand
					line Should be fixed as soon as possible

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line is [illegible] 8" in – also turns into PVC pipe

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 1087-1112

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

INSPECTION AND WORK REPORT

Time ~~[illegible]~~ 1:00

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
		[illegible]	8 11 87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
7#		15 7	8" CMP	77#

MH NO. 7#

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					on the South Side of Bld 707 [illegible]
					of door 7# [illegible]

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looks good!

V.S.R. CORPORATION

Video Sewer Renovation Contractors
11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

Type 1112-1254

INSPECTION AND WORK REPORT

Time 1:15

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-11-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
8#		34 ft	12" CMP	78#

MH NO. 8#

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
28.1					on the South Side of Bldg 707
					west of Door 2# will be pushing
					South to MH - toyed with [illegible]
					and [illegible] work [illegible] 12" [illegible]
					Cement push past 28# Tabard

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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Tape 1253 - 1287 - 1394

CLOCK

INSPECTION AND WORK REPORT

Time 2:00

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-11-87

MANHOLE NO. 1 #	TO MANHOLE NO. 2 #	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
		47'	18" CMP	79 #

MH NO. 1 #

Tape 253

DIRECTION OF FLOW

Cracked

Tape 1288 - 1394

2 #

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
15	C	12			Bad tar in line pipe Should Be Replaced Soon -
					pushed from north end could not go past 15 ft
					will go to other side and push from
15'					South end going north
22.5					Rock sticking in at top
20					Rough on top
					on [illegible]
					pushing [illegible]
4	05				

NOTES

CLEANLINESS -

COND. OF LINE -

GRADE -

COND. OF M.H. -

CODE

L - Leak
C - Cracked Pipe
CLP - Collapsed Pipe
OJ - Offset Joint
WJ - Wide Joint
T - Taps
R - Roots
Y - Y's
LA - Low Area

COMMENTS

Bad pipe in at 15 = [illegible] [illegible] on top

Bad tar on top

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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Tape 1394-1441

CLOCK

INSPECTION AND WORK REPORT

time 2130

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-11-77

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1 #	2 #		12" CMP	80 #

MH NO. 1 #

DIRECTION OF FLOW

MH NO. 2 #

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
5'					looks like the pipe was cut off and they back fild it
					located on the South side of Bld 559 out side of fence next to road will be pushing North to South

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 1441 - 1592

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CLOCK

INSPECTION AND WORK REPORT

Time 2:45

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-11-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1 #	2 #	50'	12" Bay 18" CLP	81 #

MH NO. 1 #

DIRECTION OF FLOW

2 #

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
37	OJ	[illegible]			
18	OJ				line looked good a couple of off set joints
					+Ved on the way [illegible]
					will be going under coat [illegible]
					west

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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INSPECTION AND WORK REPORT

1592-1645

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1 #	2 #		12" CMP	82

MH NO. 1 #

DIRECTION OF FLOW

MH NO. 2 #

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					line looked good all the way down
					located under dirt road - [illegible]
					Gravel post 773

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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Tape 1645-1796

CLOCK

INSPECTION AND WORK REPORT

3:30

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-11-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#		18" CMP	83#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					heavily coated with tar
24'					was unable to push any further up [illegible]
					southeast of [illegible] post 773 [illegible] road 71 east

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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CLOCK

INSPECTION AND WORK REPORT

TIME 8:45

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-12-80

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	30'	6" BLACK PVC	84#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
13.8	OJ	3			joint Bend's to the north
14	R				some roots sticking in at joint
					located on the South Side of Bld 774
					going northeast in 6" line [illegible]
30'					

MH NO. 2#

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

14' in at joint looks like it may have come apart and turned to the north

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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Tape 1918-1970

INSPECTION AND WORK REPORT

Time ~ 1:30 pm

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-12-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	55'	10" cast iron	85#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					South side of Bld 774 - going [illegible]
					just east of chimney [illegible]
					going with flow
					got Different Computer will not have [illegible]
					on screen

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looks good

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 1970-2021

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INSPECTION AND WORK REPORT

Time 2:45 -

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tony	8-12-87
MANHOLE NO. 1 TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE 4" CMP	SHEET NO. 86

MH NO. 1

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					Line was good to this point
20'					was muddy in at 20' could go any
					more
					West Side of Bld 776 going
					Southeast in 4" CMP

MH NO.

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 2020 - 2041

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-13-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	11.6	6" cmp	87#

MH NO.

DIRECTION OF FLOW

2#

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					Vault of portal 1# will be going north in SD 2# in street

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looked good
was cleaned one time

V.S.R. CORPORATION

Video Sewer Renovation Contractors

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Tape 2041 - 2138

INSPECTION AND WORK REPORT

Time 9.15 - 9.40

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-13-87

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	TO	2#	71'	18" CMP	8 [illegible] #

MH NO. 1#

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
18					Rough joint rough pipe
34					Rough joint
60					" "
					[illegible] 1# - [illegible] 2# [illegible]
					[illegible] 2# [illegible]
					[illegible]

NOTES	CODE	
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP–Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

COMMENTS

Line has a [illegible]

[illegible]

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tax 2138-2224
11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8.13.87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#			15" CMP	89#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
13		11			Big rock sticking in at 12# - will not be able to go any more - Rock sticks in about 8 to 10" @ 11 [illegible]
					Mouth of partial 1# [illegible] will be [illegible] by hand

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

[illegible]

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 2224 - 2253

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

INSPECTION AND WORK REPORT

Time 10:20

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-13-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
7#		2'	[illegible]	90#

MH NO. 7#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
2'					
					[illegible]
					[illegible]
					South [illegible] of Bld 778 [illegible]
					[illegible]
					[illegible]
					[illegible]

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

[illegible]

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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Tape 2253 -

CLOCK

INSPECTION AND WORK REPORT

Time 12:50

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T—7	5-13-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	232.6	6" PVC	91#

MH 1# NO.

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
2	WJ				From 8" to 6" PVC - Rocks between
145	LA				8" and 6" line - about 2" gap between lines
					(white PVC)
					on the east side of 10th st just North
					of PSZ [illegible]
					to [illegible] 2# pushing by hand -
232.6					

MH 9# NO.

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	line is in good shape
COND. OF LINE –	C – Cracked Pipe	in 6"
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

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Video Sewer Renovation Contractors

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
[illegible] Sluts			8-13-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
7	2	56'	12" to 18" CMP	92

MH NO. 7

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
20					[illegible]
					on the [illegible]
					[illegible]
					[illegible]
56'					

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

[illegible] Be Cleaned

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Tape - 3445 -

INSPECTION AND WORK REPORT

time 300 ...

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-13-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	3#	103	18" CMP	93#

North

MH NO. 1#

DIRECTION OF FLOW

2#

MH NO. 3#

South

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
23	C	8			Bad crack in side of pipe - Dirt is Seeping in pipe at 23 Ft
42'					To SD 2# From SD 1#
62'					Looks like a patch was put over [illegible] that was cut out on the North Side of 10th st - [illegible] Side of road - will be pulling with [illegible] pull with jet truck 18" CMP
					From SD 2# to SD 3# line is in good condition - just at 62 Ft From SD 2# [illegible] patch on side of pipe at 8 [illegible]
103					

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

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Tape 2835-2843

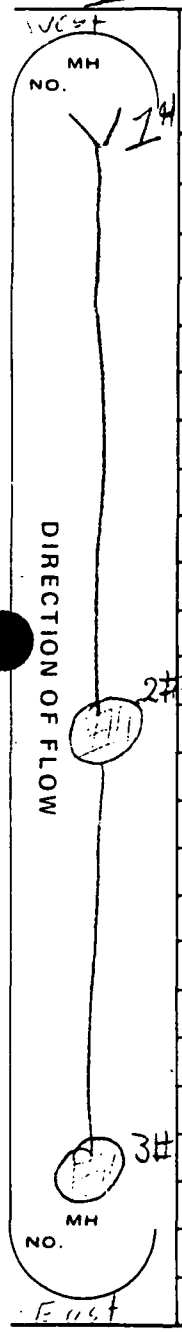
INSPECTION AND WORK REPORT

time 11:30

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		[signature]	8-14-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	3#	181'	15" by 21" CMP	94#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
97'					to SD 2# from SD 1#
160	LA				on North Side of Bld 381 by Wave 2 going east from SD 1# through 2# to 3# will be pulling with jet truck with 15" skids
181					

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line is in good shape - [illegible] SD 2#

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 2843-2886

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CLOCK

INSPECTION AND WORK REPORT

Time 11:50

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tony	8-14-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
3#	4#	28.8	15" by 21" CMP	95-#

North

MH NO. 3# S.D. #

DIRECTION OF FLOW

MH NO. 4# #

South

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					on the North side of Bld 374 going south to S.D. 4# will be pushing by hand

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP–Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

line looked good

V.S.R. CORPORATION

Video Sewer Renovation Contractors tape 2886-2909

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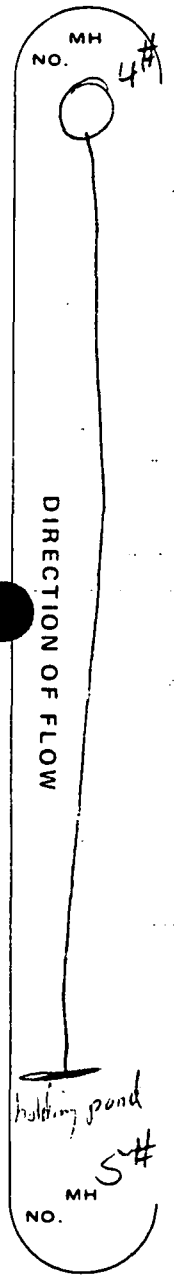
INSPECTION AND WORK REPORT

time 1200 - 12:20

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-14-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 4#	TO NO. 5#	27'	15" by 21" CMP	96#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
20	C	12			Cracked pipe all around pipe at joint alittle rock and sand sticking through crack
					will be pushing east from SD 4# to Holding pond - will push by hand SD.5#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

TAPE 2404 — 2445

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INSPECTION AND WORK REPORT

CLOCK 2:00

FOR	INSPECTOR	OPERATOR	DATE
Kelly Flats		Todd	8-14-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
#1	#2	69'	15 CMP	97 #

MH NO. #1

DIRECTION OF FLOW

#2

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					RUNNING ON WEST SIDE OF 301
					RUNNING FROM THE NORTH TO
					THE SOUTH. CORRIGATED METAL
					PIPE.
					WENT 44' INTO PIPE AND
44'					STOPPED BECAUSE OF SAND.
					GOING TO SOUTH END NEXT
					TO PUSH UP THE OTHER WAY
					AND INSPECT LAST PORTION
					OF PIPE FIRST 44' WAS A
					LITTLE DIRTY BUT THE PIPE
					WAS IN GOOD CONDITION FROM
					WHAT YOU CAN SEE.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape -2995-3025

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INSPECTION AND WORK REPORT

time 2:20

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	8-14-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	7#		15" CMP	98#

MH NO. 2#

DIRECTION OF FLOW

MH NO. 7#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
25'					
					On west side of Bld 371 going north to SD 7# the other half of sheet 97#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looked good

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape # 3025-3062

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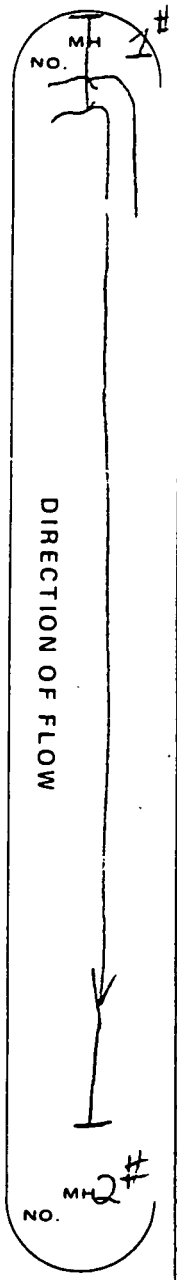
CLOCK

INSPECTION AND WORK REPORT

time 2:45

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-14-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	16'	16" PVC	99#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					went in 16# couldn't push in any more because of Drop in pipe would almost have to get stuck in line
					on north east corner of Holding pond in 16" PVC will be going N.E. to connection at bottom of Hill

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3062 - 3146

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INSPECTION AND WORK REPORT

time 3:15

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-14-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 1#	TO NO. 2#	95'	16" CMP	100#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
30	WJ	9			Pipe is Bent in a joint
45					Dent in pipe
64	WJ	9			pipe was Bent in at joint
					on the east side of parcel 2# going east
					just North of PS2 next to Sidewalk
					will pull with jet truck
95'					(end of pipe)

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

the rest of pipe looked good

V.S.R. CORPORATION

Tape 3146-3306

Video Sewer Renovation Contractors

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INSPECTION AND WORK REPORT

time 8:45 –

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-17-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	177	18" CMP	101#

MH NO. 2#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
6	WJ				
26					Dent in pipe
28					"
45					"
67#	WJ				
74		12		Bad	hole in pipe - rough around a small hole on top
79		1			Bad Dent
105	WJ				Dent at joint
118	WJ				Dent around joint
126	C	8			
137	WJ				
161	LA				
					(will not be able to talk on tape)
					on the north side of portal 2#
					will be going east under Asphalt on the north
					side
					(try again at 1:45 pm)
2# 177					

MH NO.

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak C – Cracked Pipe CLP–Collapsed Pipe OJ – Offset Joint WJ – Wide Joint	T – Taps R – Roots Y – Y's LA – Low Area
COND. OF LINE –		
GRADE –		
COND. OF M.H. –		

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3306- 3493

CLOCK

INSPECTION AND WORK REPORT

FOR	INSPECTOR	OPERATOR	DATE
ROCKY FLATS		TODD	5-18-91

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
#1	TO #2	71.6	12" CMP	#102

MH NO. #1

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
18'					Joint in pipe
55'		9:00			Dent in pipe not bad
68'		9:00			Dent in pipe not bad
					LINE IN FRONT OF GUARD
					TOWER #550 RUNNING FROM
					EAST TO WEST. A 12" LINE WITH
					JS CMP

#2

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

3493

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Todd	8-13-87

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
Pond		Opening	Aprox. 130'	15 CMP	#103

925

MH NO.

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					We visually looked in the 15 CMP pipe running from just north west of SM-5B substation. The pipe runs west to east from the holding pond to just northwest of the substation into a ditch when looking up the pipe you can see about 50' which was very clean. After the 50' the pipe levels off and you can't see much more pipe in good condition

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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INSPECTION AND WORK REPORT

CLOCK 9:40

FOR	INSPECTOR	OPERATOR	DATE
Pocket Plans		Todd	5-9-91

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
				15" RCP	#104

MH NO. — DIRECTION OF FLOW — N — MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
14	WJ		2"		INSERT NEW CONDITIONS TO WORK
21.9	WJ		1"		THROUGH A 45° REINFORCED CONCRETE
29	1:00	12:00	runs full length		PIPE THIS LINE RUNS UNDER THE
37	11:00	C	"	"	~~FENCE~~ RR FENCE THE LINE IS IN
44	11:00	C	"	"	THE DITCH JUST EAST OF GUARD
52	12:00	C	"	"	TOWER #305 THE LINE RUNS
59	C	12:00	runs about 3/4		SOUTH TO NORTH THE SOUTH END
67	12:00		runs full length		OF THE PIPE IS COVERED WITH
74	C	12:00	3/4		A SOLID STEEL GRATE
82	C	12:00	runs full length		
90	C	12:00	"	"	
97	C	12:00	"	"	
105	C	12:00	"	"	
113	C	12:00	"	"	
120	C	12:00	"	"	
128	C	12:00	"	"	
135	C	12:00	12:00	3 FT	
143	C	12:00	1 FT		water stops
150	C	12:00	full length		
158	C	12:00	1 FT		mud stops
166	WJ	3 FT			
173	Good				
177		Grate			8" of dirt on pipe
180	End				
					SE BLD 371

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

3496 - 3588

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INSPECTION AND WORK REPORT

CLOCK 11:28

FOR	INSPECTOR	OPERATOR	DATE
ROCKY FLATS		TODD	8-18-87

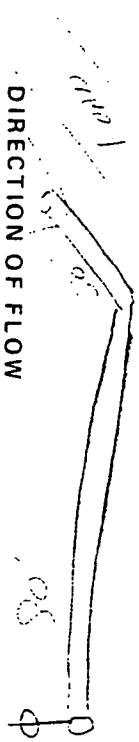
MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	155'	16" CMP	#105

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
14.8	LA				water Starlike
34	LA				[illegible]
47					coulp of Rocks
49	11:00	Dent			
60	11:00	Dent		not bad	
64	3:00	Dent			
81	7:00				around the [illegible]
99'	Bend				unable to go ~~around~~
					line is good shape over all there are rocks on the bottom but not enough to resist flow

looking in the pipe from the east end we can see a dent in the pipe at about 15' and a rather one at 20 feet both are in the bottom of pipe the line then [illegible] down and unable to see past at this point

DIRECTION OF FLOW



MH NO. 3

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak; T – Taps	
COND. OF LINE –	C – Cracked Pipe; R – Roots	
GRADE –	CLP – Collapsed Pipe; Y – Y's	
COND. OF M.H. –	OJ – Offset Joint; LA – Low Area	
	WJ – Wide Joint	

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Todd	8/18/87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2		48" RCP	106

MH NO.

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
15	C	12:00	Full Limit		Stand [illegible]
22	C	12:00	"	"	
30	C	12:00	"	"	
36	C	12:00	"	"	
52	C	12:00	"	"	
59	C	12:00	"	"	
74	C	12:00 & 2:00 - 3.5			
83	C	slipped at 12:00			
90	C	11:00 start.			
98	C	11:00			
105					alarm went off on the oxygen monitor.

MH NO.

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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INSPECTION AND WORK REPORT

Time - 10:15

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flat		Tony	8-19-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	TO —		24" cmp	107#

MH NO. 2#

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located on the Southeast side of Bld 371# outside of fence
					~~walk~~ look in 24" cmp with flash light
					as far we can
				→	looked up line with flash light pipe looked
					good up to about 40' in couldn't see
					end of pipe

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looks clean

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3542-3618

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INSPECTION AND WORK REPORT

time 11:39 - 11:45

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Slate			8-19-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	48.6	12" cmp	108#

MH NO. 2#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located on the Southeast corner of Bldg 22
					Gated tower
					will be going north to south pull with jet back
48.6					

MH NO. 2#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP–Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	line looked good

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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INSPECTION AND WORK REPORT

time - 10:30

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-19-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	40'	12" cmp	109#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located on the North side of Bld 371
					going under Dirt road running west to east
					looked up with flashlight
				→	line looked good - no Bad Joints or cracks
					in line - line should be cleaned on
					Both Sides of pipe going down ditch line

2#

MH NO.

NOTES

CLEANLINESS -

COND. OF LINE -

GRADE -

COND. OF M.H. -

CODE

L - Leak
C - Cracked Pipe
CLP - Collapsed Pipe
OJ - Offset Joint
WJ - Wide Joint
T - Taps
R - Roots
Y - Y's
LA - Low Area

COMMENTS

(line should be cleaned)

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Video Sewer Renovation Contractors
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INSPECTION AND WORK REPORT

time 10:10

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-20-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE RCP	SHEET NO.
1#	2#	345'	48" RCP	110#

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
105'					Start in at 105' in from [illegible]
[illegible]	[illegible]	[illegible]			
	[illegible]	[illegible]			
	[illegible]	[illegible]			
	[illegible]	[illegible]			
					[illegible] inside 48" RCP with flashlight
					and [illegible] monitor on body
					[illegible] blowers will be running while [illegible]
					pipe with [illegible]
					Cont'd from Sheet no. 106# - [illegible]

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP – Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

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INSPECTION AND WORK REPORT

Time 11:30

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Sluls		T	8-20-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2 #	2 #		48" CMP	111 #

MH NO. — DIRECTION OF FLOW — MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
136					Rock - Sand & mud on bottom of pipe
147					too much mud & Rock can't go any further
					on the north side of pipe going out could
					be cleaned out so water can flow properly

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

no north end of pipe

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Video Sewer Renovation Contractors Tape 3591 - 3849

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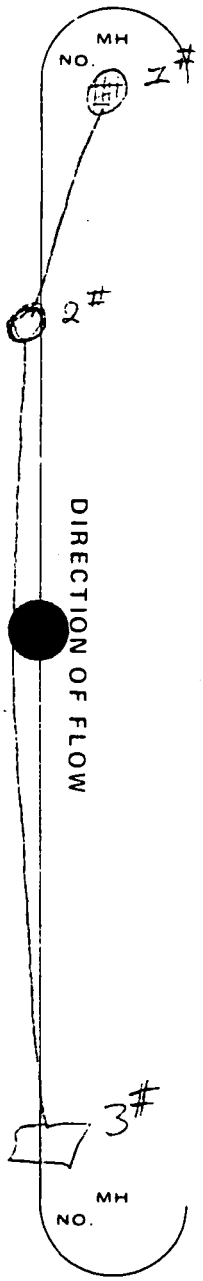
INSPECTION AND WORK REPORT

time 8:30 - 917

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[signature]	8-21-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	3#	249.6	12" CMP	112#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
69.7			end of line		line looked good
113	C	12			
50	LA				
73	LA				ended at 90'
100	WJ				
130	C	11			Dent & crack
164					turned into PVC
164	C				piece of metal was sticking in at joint
169					PVC ends
					12" cmp pulling with jet truck
					on the southwest side of Build 111# west of Dwc
					1# going from SD 1# through SD 2# to SD 3#
179.9					end of line

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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Video Sewer Renovation Contractors Tape - 3846 -

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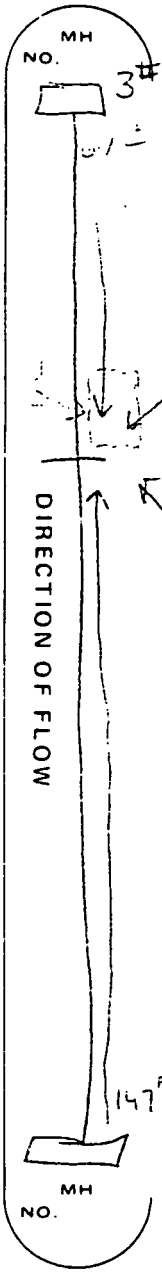
INSPECTION AND WORK REPORT

time

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tim	8-21-87

MANHOLE NO.	MANHOLE TO NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
3#	4#	216'	12" CMP	113#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					Something is stopping us from going the right
					couldn't TV line because the jet hose wouldn't go from one end to the other on the southeast side of Building 112# going east to S.D. 4# from S.D. 3#
					cleaned line 9 times before TV-ing

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape

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INSPECTION AND WORK REPORT

time 11:00 -

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	8-21-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 1#	TO NO. 2#	79'	24" CMP	114#

East

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

West

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked with flash light
25'		12			Big Dent in pipe on top sticks down about 8" to 10" Down
45'	W3	12			Dent in joint - sticks down about 5 or 6 inches
					on the ~~south~~ intersection on 4th & Sage Ave just south of intersection line is running east to west looked up line with flash light had two bad spots in line

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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INSPECTION AND WORK REPORT

time 11:15

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-21-87

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
			40'	15" CMP	115 #F

MH NO. 1 #

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked with flashlight
6'	C	12			Small rock sticking in on top
					on the south side of Sage Ave running with or along the road going east

MH NO. 2 #

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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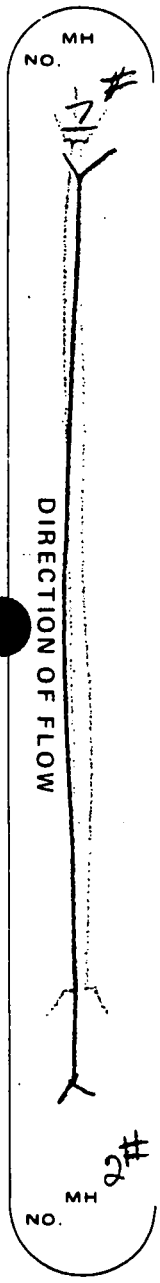
INSPECTION AND WORK REPORT

time 11:25

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	8-21-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 7#	TO NO. 2#	41'	15" cmp	116#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked up line with flashlight
					on south side of Sage Ave right along the road going east
					line should be Cleaned

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line should be cleaned out & cleaned on both side of pipe going in and going out to let water flow properly

SOH - 3913

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		tommy	8-24-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	TO 2	121.8	15" CMP	#117

MH NO. W → E → Z MH NO.

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
8.5	C				ALL AROUND PIPE
28	C				" " "
35	WJ				9 O CLOCK PIPE ~~SMASH~~ DENTED
43	WJ				
87					ROCKS
101	WJ				ALL AROUND PIPE
112	T				12 O CLOCK
					ON South SIDE of BLD 333 PULLING
					with the flow with A WASH TRUCK
					IN the Ditch BEFORE CENTROL. WE RE
					PULLING From the WEST to the
					EAST. STILL the PIPE COULD NEED to
					BE CLEANED to ELIMINATE ALL SAND
					AND ROCKS that WILL STOP-UP MORE
					ROCKS & SAND. FINISH 1:45

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

PIPE IN DECENT CONDITION EXCEPT FOR A FEW WIDE JOINTS. LINE NEEDS CLEANED MORE OFTEN AND NEED ENDS OF PIPE CLEARED BACK AWAY FROM PIPE.

Tape 3712 -

V.S.R. CORPORATION

Video Sewer Renovation Contractors

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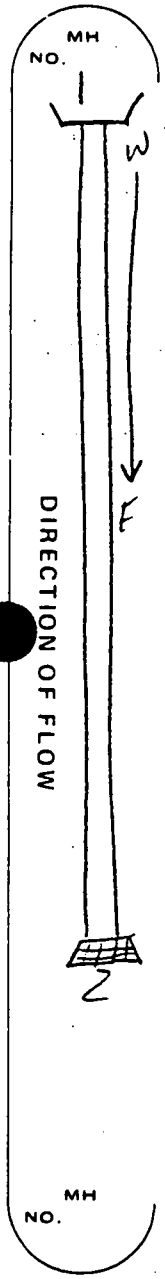
INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tommy	8-24-87
MANHOLE NO. 1 TO MANHOLE NO. 2	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO. #118



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
18'	WJ				SEPERATED JOINT
19'.4					
					went in 19' couldn't get any more - will clean line
					WE WILL BE PULLING the CAMERA WITH the Jet TRUCK FROM the DITCH BETWEEN CENTRAL AND BLD 334. WE WILL BE PULLING WITH the flow to the EAST GOING UNDER the ASPHALT to A GRATE JUST BEFORE the RAILROAD TRACKS. LINE CHANGES FROM 15" to 18"

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP–Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

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Tape 3960-4020

INSPECTION AND WORK REPORT

time 10:30

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-26-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	TO 2#	89.5	22" x 18" CMP	119#

MH NO. 2#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
15.6	WJ				
45		1			Big dent in line sticks down about 6" to 8"
47		12			Big dent in line sticks down about 6" to 7"
48		12			Small Dents
50		12			Small Dents
					Gouged tower 901#
					will be just west of Build 901# going northwest
					pulling with jet tracks with 18" skids

MH NO. 2#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

V.S.R. CORPORATION

Video Sewer Renovation Contractors tape - 4020

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INSPECTION AND WORK REPORT

Time

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-26-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	62'	15" cmp	120#

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked up with flashlight -
				→	line ~~tested~~ looked good all the way through
					on petrol road north of Build 901 - line running north to south

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 4016-4041

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CLOCK

INSPECTION AND WORK REPORT

time 11:30 - 11:50

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-26-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 2# TO	NO. 2#	84.9	12" cmp	121#

MH NO. 2#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
15		12			Small Dent in line
					Gauged tower 761# right in front next to curb
					on the South side of Build 761#
					line running east to west parking will get to
84.9					

MH NO. 2#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

V.S.R. CORPORATION

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INSPECTION AND WORK REPORT

Time 12:35-

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats			8-26-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	101'	24" cmp	122#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					line going underneath center are going northerly
					at 25' in from the north side crack at 12 o'clock
					to 2 o'clock Bad crack 3" wide
					located on the east side of parking
25'					lot 750' line going from south side of Entry
					looked up line with flash light -
					line is in good shape
101'					

MH NO. 2#

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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INSPECTION AND WORK REPORT

Time 12:50.

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-26-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#		40' P	21" cmp	123#

MH NO. 2#

DIRECTION OF FLOW

70" line

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					Line look good Full length
					on the east side of parking lot 750 just south of PS2 and north of central ave going northeast into ~~[illegible]~~ open ditch above 70" pipe

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 4096 - 4234

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INSPECTION AND WORK REPORT

time 1:30 - 1:55

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-26-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	208.5	24" CMP	124#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
46'	R	12			
66	J				Looks good
86	J				" "
106	J				with Roots
127	J				a few Root
147	J				a few Roots
166	J				Looks Good
208.5					
					on the south side of culvert tunnel 901# just
					south of P.S.Z. Fence
					will be going northeast pulling with jet header

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors tape - 4230 -

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INSPECTION AND WORK REPORT

Time

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		Tom	8-26-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	TO	56	30" Concrete	125 #

MH NO. 1

DIRECTION OF FLOW

2

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
7	WJ		3" Gap		Root Hanging down
14	WJ				Grass Hanging down
21	OJ		not bad		
28					
56	WJ		and little OJ		
					Clear
					North of Gate 9 ~~on~~ gain
					access inside perimeter
					road looked up the line
					with flash light

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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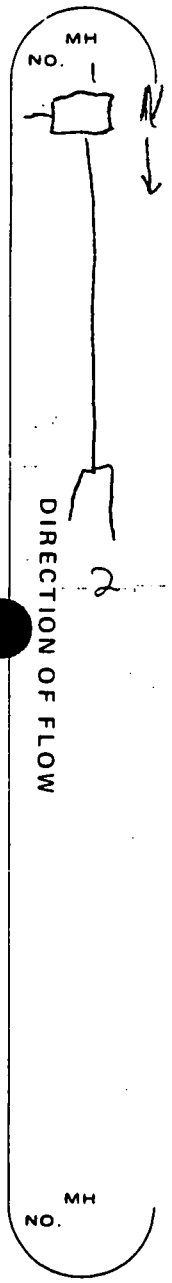
INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flat		Tommy	8-26-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	42'	18" CMP	126#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
20'	WJ				caused by bending the pipe to make a 22° angle
42'					Clean +
					North of Gate 9 running North parrell to inside permeter road

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flat		Tommy	8-26-87
MANHOLE NO. TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
	75'	2-30" CMP	127 #

MH NO. — DIRECTION OF FLOW — MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
Looks good (South Side)					North side the end is bent down should be fixed
			North Side		
25'	OJ				not bad
last 25 feet			pipe		is oval shaped, Northeast end is Bent down about half way there are alot of rocks on this end
					the ends of both pipe are smashed and should be fixed
					North of Gate 9 going across perimeter road (outside)

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 4230-4326

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INSPECTION AND WORK REPORT

time 2:50 - 3:25

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-26-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#		15" cmp	128#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
18	WJ				Sand & rock sticking through joint
68'					tried several times were unable to go any more to much sand & Rock in line to go any more up line - will have to clean more
					on the South side of Build 334# going east - pulling with jet truck pulling with 12" skids

MH NO. 2#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	line should be cleaned more before trying line again
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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INSPECTION AND WORK REPORT

Time 3:00

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-27-87

MANHOLE		MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 1#	TO	NO. 2#	33'	12" cmp	129#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					(looked with flashlight)
					line looked good -
					on each end of pipe ditch should be
					cleaned out so water flow can properly flow
					on 7th Ave east of Build 556#

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tony	8-27-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
7#	2#	46'	12" cmp	130#

MH NO. 7#

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					(looked up line with Flashlight)
					line looked good -
					but on both ends should be cleaned
					out so water can flow properly down
					ditch
					on 7th running north under driveway
					going to parking lot on east side of
					7th Ave

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8·27·87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 1#	TO NO. 2#	43'	10" by 17" cmp	131#

MH NO.

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					(looked up with flash light)
					line looked good -
					but should be cleaned out on each end
					so water can flow properly
					located on the west side of 7th Ave
					just east of Build 559# going Northea

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape - 4311-4368-4602

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CLOCK

INSPECTION AND WORK REPORT

Time - 8:30

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[signature]	8-28-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
7#	2#	200'	15" CMP	132#

MH NO. 7#

DIRECTION OF FLOW

east FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					Same as sheet #128
19	LA				
					unable to pull past 43 ft cause of sand was covering up our camera lens
					will go to other end of pipe and try to TV as much as we can
					Bad section of pipe about 2 ft peace of pipe is missing out - Had alot of sand & rock in line will try to TV 15" line on the South side of Build 334# going east pulling with jet line
83	(peace of pipe missing)				will pull with 12" skids
60	+	12			this will be are 3rd try
57	Dent				
					(went in 69 ft and hit joint on 8-27-87)
					sheet

missing 2 ft

2#

MH NO. West

west

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak; T – Taps	
COND. OF LINE –	C – Cracked Pipe; R – Roots	
GRADE –	CLP – Collapsed Pipe; Y – Y's	
COND. OF M.H. –	OJ – Offset Joint; LA – Low Area	
	WJ – Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 4602 - 4688

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INSPECTION AND WORK REPORT

Time 9:55

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8·28·87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	139.7	15" cmp	133#

West

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

East

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
23					small dent
27					~~[illegible]~~ pipe ~~[illegible]~~ [illegible]
57	C				all around pipe different [illegible]
90					rough joint
					on the South side of Build 551 going east
					pulling with jet truck
					(pulling with 12" skids)
139.7					

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looked in good shape

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Tape 4684 - 4791

CLOCK

INSPECTION AND WORK REPORT

time 10:55

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		[illegible]	8·28·87

MANHOLE NO. 1#	TO MANHOLE NO. 2#	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
		203.1	15" cmp	134#

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
32	WJ				not bad
					on the southeast side of Bldg 551 going east to SD 2# pulling with jet truck
203.1					

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looked good all the way down

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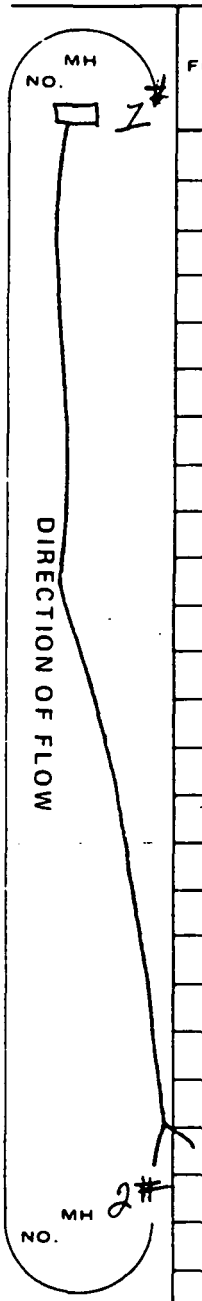
Tape 4741-

INSPECTION AND WORK REPORT

time 11:30-

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	8-28-87
MANHOLE NO. TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
		15" CMP	135-#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					(weren't able to pull in line)
					line had sweed bend in it
					we got the camera stuck
					(pulling with 12" skids)
					going east than will turn and go Northeast
					just Southeast of Build 557#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors tape 4849-4915

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INSPECTION AND WORK REPORT

time 2:00

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		Tom	8-28-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 1#	TO NO. 2#	153.5	12" cmp	136#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
51					joint was rough around edges
					will be going against flow in 12" cmp going west under north parking lot 750 western pulling with jet truck going west

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe looked good

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 4911 -

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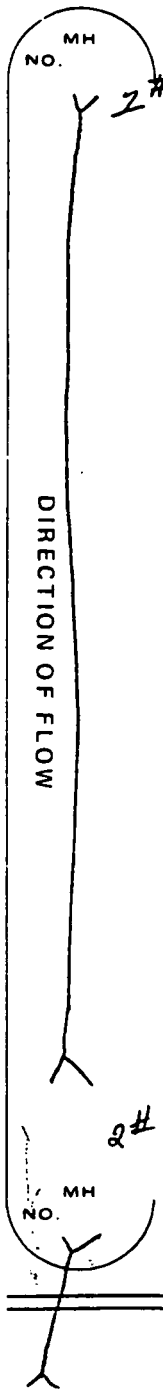
INSPECTION AND WORK REPORT

Time 2:50

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tony	8-28-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 2#	TO NO. 2#	139.6	17" by 11" CMP	137#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
8		12			Small dent
10		12			Small dent
17	C	12			crack on top of pipe
20		12			Small dent
26		12			Small dent
					(add 3Et on to the footage counter)
					11" by 17" CMP
					on the west side of Build 750 parking lot
					west of DS2 - going west against the flow

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape - 5045-5167

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CLOCK

INSPECTION AND WORK REPORT

Time 2:20

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tony	8-28-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 7#	TO NO. 2#	115.4	12" CMP	138#

MH NO. 7#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
108	105				not bad
					on the northeast side of Bld 334 (credit union)
					going northeast in 12" cmp
115'					end of pipe

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R. – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe looked good

V.S.R. CORPORATION

New tape
Tape - 0-0777

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CLOCK

INSPECTION AND WORK REPORT

Time 12:30

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		jim	8·31·87

MANHOLE NO. 1# TO MANHOLE NO. 2#	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
	823'	70" CMP	139#

MH NO. 1#

DIRECTION OF FLOW

2#

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
43'					have a brace holding up pipe in middle of pipe
209					Rocks on Bottom
280					change from 72" to 60" Rocks
310					change of grade
722				only	25" of Space
768	T	900	8" PVC		
					jim & fernie walking down line
					line runs west to east
					going west in 70" line against the Flow
					walking with hand held camera

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

Rocks and Sand in the west end of pipe line should be cleared

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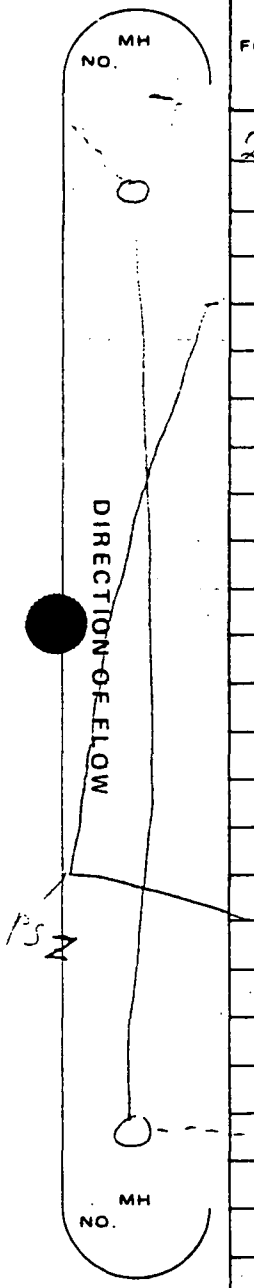
INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		Jim	9-1-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	296	70" Rcp	139A



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
215'	T	10	11500		12" CMP going into the PSZ
					alot of trash at the end of pipe
					should be taken out
296'					
					located on the south east side of
					the PSZ

NOTES

CLEANLINESS – Trash at the end
COND. OF LINE – good
GRADE – —
COND. OF M.H. – good

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

Line looked good

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Jim	9-1-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2 TO	4	641	72" cmp	139B

DIRECTION OF FLOW

MH NO.	FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
2	44					Round joint
	121					Bought pipe and change of grade
	162'					grade change
						line is squashed (oval shape)
	240					Rough joint
	372'					Bend
	470					grade changed (Flat out)
						located on the east side of the P.S.Z.
3	578					
4 MH NO.	641					

NOTES

CLEANLINESS – good
COND. OF LINE – squashed oval shape
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats	—	Tommy	8-31-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	49	2-30" CMP	140

MH NO.

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					Going across Patrol Rd at the west end of parking lot of Building 11 [illegible] west to East
					Two lines the one on the South side should be cleaned
					the line on the North side look good

MH NO.

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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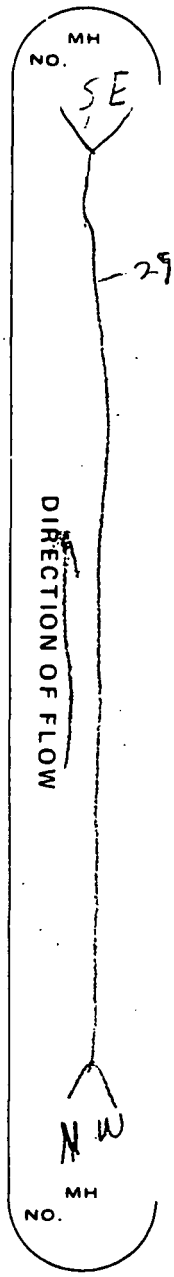
INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats	—	Tommy	8-3

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	7	115	36" CMP	141



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
29'		From south side and			
		a big dent. Stick is about 10"+12"			
					line should be fixed
					North of Building 130
					on the NE corner of storage
					yard

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	9-1-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	33'	72" CMP	142#

MH NO.

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					line looked good all the way down
					located way north of Build 130# about ½ mile in buffer area line going north
					the line is approximently 90 ft long the last 77' the top half of pipe had been removed

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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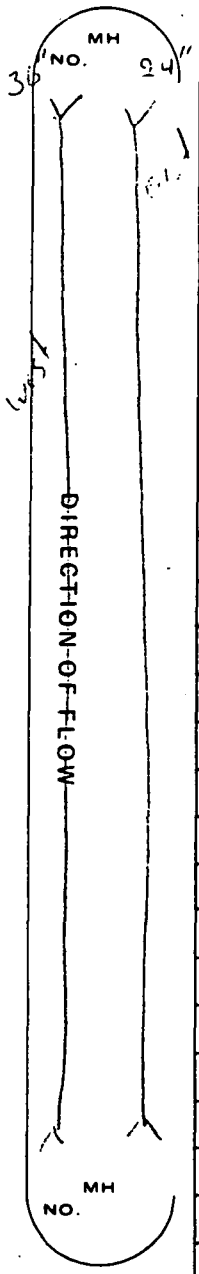
INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		[illegible]	8-31-87

MANHOLE NO.	TO MANHOLE NO.	36" TOTAL FOOTAGE	24" TOTAL FOOTAGE	PIPE SIZE & TYPE		SHEET NO.
2 #	0 #	49'	46'	36" cmp	24" cmp	143 #



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked with flashlight
					Two lines going northwest one 24" on the east side
					and a 36" c.m.p. also going northwest
					located north of Build 130# in buffer about 1/4 mile away from Build 130#
					lines look good all the way down

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tony	8-31-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	305'	54" cmp	144#

MH NO. 1#

DIRECTION OF FLOW

2#

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					(looked up line with flashlight)
					line looked good all the way through pipe
					line running northeast going under fence - ~~[illegible]~~ road perimeter

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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INSPECTION AND WORK REPORT

Time 3:30

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	8-31-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	100'	20" by 14"	145-#

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked up with flash light
					line running northeast going under Parkwold road
					about 50' in small dents on top and also has a grade chang in pipe overall condision of pipi is good

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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INSPECTION AND WORK REPORT

Time 11:10

CLOCK

TOR	INSPECTOR	OPERATOR	DATE
Berry Flats			9-1-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
7#	2	61'	26" by 21"	146#

MH NO.

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					has two line running east
					in front of partial 7# on South side out
					side of fence
					both lines are 61' long
					looked up with flash light from both ends

NOTES

CLEANLINESS –

END. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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INSPECTION AND WORK REPORT

Time 11:30

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flat		[illegible]	9-1-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	102'	CMP 24" by 34"	147#

MH NO. ↓ DIRECTION OF FLOW ↓ MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					line on the South side of central Ave
					on the northeast corner of parking lot
					#888
					line running east
					line is crushed all the way down
					to bottom of pipe
					Should be fixed as soon as possible

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		[signature]	9-1-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	41.6"	24" CMP	148#

MH NO.

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
15'		12			Small Dent from west end
20'		5			Small Dent at 5 o'clock sticks in 6"
					located on north side of parking lot 588#
					southside of central ave
					from west side of pipe is small Dent
					at 15'
					rest of line is good

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flat		[illegible]	9-1-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	44'	21" cmp	149#

MH NO. 2#

DIRECTION OF FLOW

2#

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
20		6			smached pipe
21					has litted bent in middle of pip - rest of pipe looks good
					located on the north side of parking lot 88# running east

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe cleaned

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	9-1-87

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#		2#	84'	21" CMP	150#

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					[illegible] flashlight
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
				→	[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]
					[illegible]

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flat		Tom	9-1-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	41'	21" CMP	151#

MH NO. 2# → MH NO. 2#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked with flashlight
					on the South side of Central Ave
					running east underneath power line
					just east of 7th Ave
				→	line looked good

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	9-1-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	45'	18" cmp	152#

MH NO. 1# → MH NO. 2#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked up with flashlight
					~~on the north side of Butte~~
					on the corner of 7th Ave and central Ave - line running rust underneath 7th Ave
				→	line looks good all the way down

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

New tape
Tape 0-0171

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INSPECTION AND WORK REPORT

time ~ 1:20

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	9-1-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	70'	12" cmp	153#

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					could only push up line 70' by hand line is in good condition - no bad spots in line
70'					will be pushing south in 12" cmp by hand up as far as possable going to the front of door 3# located on the north side of Build 334# in the rock Bedded area

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line good - Clean

2:00 PM

V.S.R. CORPORATION

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Tape 0170-0369

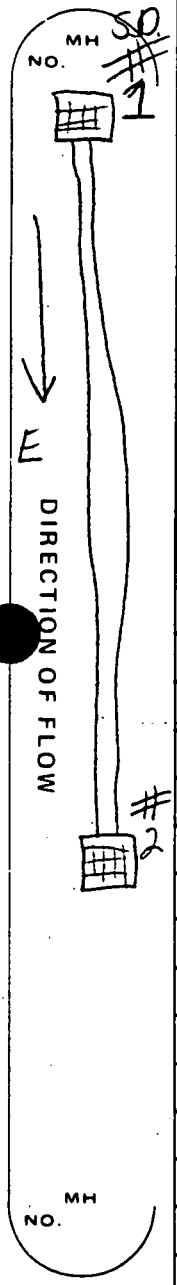
CLOCK

INSPECTION AND WORK REPORT

time 2:15

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tommy T.	9/1/87

MANHOLE NO.	MANHOLE TO NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
# 1	# 2	89.6	12" CMP	#154



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					will pull with jet truck
					We are going to T.V. from the
					grate in the rocks just North
					of Door 3 of Bld 334. We will
					be going with the flow which
					is West to East. We will be
					pulling the camera with the
89.6"					wash truck.
					→ line looked good all the way down
					to SD 2#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak C – Cracked Pipe CLP–Collapsed Pipe OJ – Offset Joint WJ – Wide Joint	T – Taps R – Roots Y – Y's LA – Low Area	line is clean
END. OF LINE –			
GRADE –			
COND. OF M.H. –			

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Tape - 0364-0526

CLOCK

INSPECTION AND WORK REPORT

time 3:00

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	9-1-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 2#	TO NO. 3#	76'	12" cmp	155#

MH NO. 2#

DIRECTION OF FLOW

MH NO. 3#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					from S.D. 2# to S.D 3#
					on the corner of 6th and road N of Build 334# located on the north side of Build 334# continue from sheet 154# going east in 12" cmp pulling with jet truck
				→	lin. is in good shape all the way down at the east side of pipe in ditch should be cluge out for proper flow

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
# Rocky Sluts		Tom	9-1-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 2#	TO NO. 2#	51'	18" by 15" cmp	156#

MH NO. 2#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked up with flashlight
					on the south side of portal II line running west to east
				→	line looked good all the way down

MH NO.

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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INSPECTION AND WORK REPORT

Time 3:45

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		T	9-1-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 2 #	TO NO. 2 #		34" cmp	157 #

MH NO. 1 #

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked up with flash light
					on the South side of pocket 2 # on the corner of Sage and Exit of pocket 2 # line running west to east water flows east - on the east end of pipe the ditch should be dug out so water can flow out of pipe

MH NO. 2 #

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

Tape 4#

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape –

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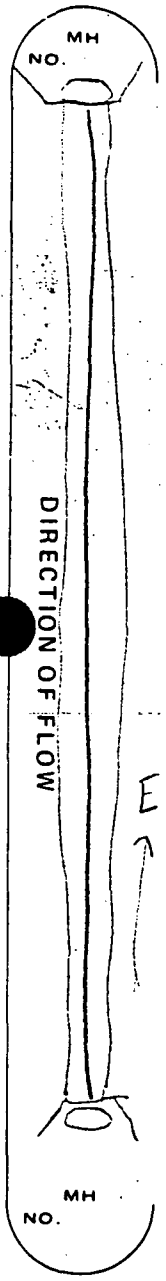
CLOCK

INSPECTION AND WORK REPORT

time 7:00

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	9-2-87

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
			1500	72" CMP	158#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
10'	T	3			48"
171	Brace				
177	Brace				chain link Fence# should be removed
196	Brace				
208	Brace				
355	Brace				WE ARE IN THE PITCH IN
738	start of curve bright				THE NORTHWEST CORNER OF THE PARKING
925	start of curve tall				LOT OF PORTAL #3 THE PIPE WE'RE
1078					GOING to BE GOING INTO IS A 72"
					CMP. that RUNS FROM WEST to EAST
1180	T	3	48" low		WE WILL BE SETTING UP FOR A FEW
					MINATES THE TIME IS 2:00 WE'LL
					BE USING THE HAND HELD CAMERA

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Jim	9-3-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	TO Bulkhead	322	48" RCP	158A

MH NO. 1

DIRECTION OF FLOW

72"

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
49					Catchbasin
276					patch
304					grade change on diameter correction
316					Bulkhead
322					

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

Tape 4

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 0527-0778

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CLOCK

INSPECTION AND WORK REPORT

time: 11:10

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		Tom	9-3-87

MANHOLE NO.	MANHOLE TO NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2 #		39.6	6" RCP	159#

MH NO.

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
11	WJ				wide joint ?
39.6	→				run into a chunk of concret
					will be pushing west up line with 6" Brache
					push up as far as possible
					located on the east side of Build 881
					line running east out to open area on
					hill side

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looked good up to 39 Ft

V.S.R. CORPORATION

Video Sewer Renovation Contractors 1apc-2612-3080

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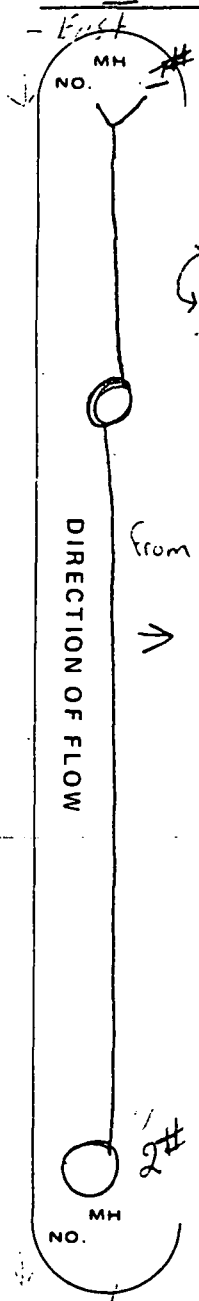
INSPECTION AND WORK REPORT

Time - 9:45

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Jim	9-8-87

MANHOLE NO.	MANHOLE TO NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#		223'	48" CMP	160#



	FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
	61'					a bend in pipe - is going straight east
	124'	T	7			6" line running up hill into 48" line
	178'					rock 7" to 8" deep
	158'	T	7			15" cmp runs underneath Gravel lower
						line is clean - goes 40' in then turns right
	177'					catch Basin - 24" cmp coming in from south
						running north - man hole could be brought
						up to grade
from	180'	to	223'	M.H.	43'	Section of pipe was poured in place - 44"-54"
						concrete - (total length of pipe is 223' poured in three
						Ends at 223' then starts 60' RCP
						next sheet 161#
						walking with hand held camera - (Two men)
						will be walking in 48" cmp - going East
						located on the west side of Build 991#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3080-3110

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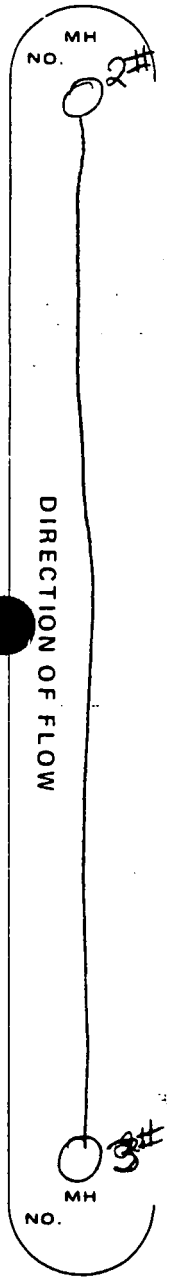
CLOCK

INSPECTION AND WORK REPORT

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Jim	9-8-87

MANHOLE NO.	TO	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
			518'	60" RCP	161#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
223'					60" RCP start - going ~~east~~ southeast
230					from the south is 15" cmp. had some white
					Solidifide substance on bottom of pipe
					about ½ inch deep - some water
230					hat 8" transite pipe on the south side
					of man hole
518'					

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors

Tape 310-3383

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CLOCK

INSPECTION AND WORK REPORT

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Jim	9-8-87
MANHOLE NO.	**MANHOLE NO.**	**TOTAL FOOTAGE**	**PIPE SIZE & TYPE**	**SHEET NO.**
3#	TO 4#		60" RCP	162#

MH NO. 3

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
730'					
[redacted]	T	9			have a 6" camp pipe coming in from the north side of pipe
872'					Bend going start east again going from 60" RCP to 60" camp running east underneath PSZ zone
1000'		12			have a rip in pipe at 12 oclock is about a foot wide - dosent look like anything will fall through
Tape 3261 1035'					have a bend going northeast
					Section of pipe has a few rust spots in - water comes in at one point and out further up the line cost another rust spot
1098'	T	9			has water running water
					also at 1098' have rock setting on bottom of pipe about 20" of rock
					as you looked up pipe past the 1098' mark has about 3/4 full of rock further up line

MH NO. 4#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP–Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

V.S.R. CORPORATION

Video Sewer Renovation Contractors 1apc 3383-3530

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CLOCK

INSPECTION AND WORK REPORT

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Jim	9-8-87

MANHOLE NO.	MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
end of pipe			60" cmp	163#

DIRECTION OF FLOW

MH NO. ✓

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
104'					bend in line is going west
116'	T	3			4" perpherated pipe - running water
116'					pipe had about ½ pipe full of rock
				→	looked up line with light - line has about
					¾ full of rock up further up line -
					about 40" of rock
					we guess that line has ¾ rock about
					200 ±1 of line
					Comeing in from the other end of pipe walking
					in Southwest

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

Tape 4#

V.S.R. CORPORATION

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Tape 0778-0899

CLOCK

INSPECTION AND WORK REPORT

Time 3:20 - 3:50

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	9-8-87

MANHOLE NO. 2#	TO MANHOLE NO. 2#	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
		41.6	12" CMP	164# [redacted]

MH NO. ✓

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
19.6					Bent joint
41.6					Have a Dent on top of pipe about 6" to 8" underneath concrete walkway on the east side of Build 88. Could't +ve past Dents
					running south to north in 12" cmp pulling with jet truck with 12" skids south side of Build 888

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak; T – Taps	
COND. OF LINE –	C – Cracked Pipe; R – Roots	
GRADE –	CLP–Collapsed Pipe; Y – Y's	
COND. OF M.H. –	OJ – Offset Joint; LA – Low Area	
	WJ – Wide Joint	

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tape #

Video Sewer Renovation Contractors

Tape 3530-3724

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CLOCK

INSPECTION AND WORK REPORT

Time 9:40

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Todd	9-9-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	302'	48" RCP	105-#

MH NO. 1#

DIRECTION OF FLOW

2#

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
65'					have a grate that has been covered over
					with Asphalt
139'	T	2			16" cmp pipe coming in from southeast side
					looked up - was 10' long was a catch Basin
					rest of line looks good
					northeast of Build 991 going northeast

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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Tape 4#
Tape -0899 - 1138

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CLOCK

INSPECTION AND WORK REPORT

Time 2:30

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	9-9-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	1#	57'	12" CMP	166#

MH NO. 2#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
~~13~~ 139		3			Dent in line
24		12			Dent in line
28	INS	9			
34					Squish pipe at 3 oclock
47		3			Section of pipe missing at 3 oclock (Bad)
57					joint is collapsed has alot of rock and
					Sand Falling in
				→	line is in bad shape from 24' in to 57'
					should be replaced or fixed as soon as possible
					Couldent push camera - will pull with jet lock
					going south in 12" line pushing by
57.					hand - this is second half of pipe we
					tried 9-8-87
					located on the north side of Build 888#

MH NO. 1#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak C – Cracked Pipe CLP–Collapsed Pipe OJ – Offset Joint WJ – Wide Joint T – Taps R – Roots Y – Y's LA – Low Area	
COND. OF LINE –		
GRADE –		
COND. OF M.H. –		

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Hand Held tape 3#

tape 3724 - 3823

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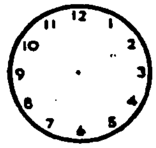
INSPECTION AND WORK REPORT

time 1:20



CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Todd	9-9-87
MANHOLE NO. 1# TO MANHOLE NO. 2#	TOTAL FOOTAGE 226'	PIPE SIZE & TYPE 48" RCP	SHEET NO. 167#

DIRECTION OF FLOW: MH NO. 1# → MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
220'	OJ				on the bottom of pipe has a 3" to 4" [illegible] at the last joint gap at 3 oclock to 9 oclock
					northeast side of 900 area going under neat pulated road and 552 area line running northeast

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	rest of line looked good
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

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Tape 3#
Tape 3833 - 3995

CLOCK

INSPECTION AND WORK REPORT

Time 10:30 - 12:00

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Todd	9-10-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	250' ?	48" RCP	168#

MH NO. 0

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
23'					rocks start building up gradually
					slate about 6" to 8" of rock
36'	T	12			Storm Drain coming in a 12 o'clock 12" CMP
65'					Rocks about 12" high
135'					Rocks keep getting higher / 15" of rock
166'					about 20" of rock
166					couldent pull tape of light up any further
60'					from other end have about 24" of rock
					At end of pipe bulk head has barrel size
					8" hole blocking flow of water
					north west of build 778 in manhole running
					northeast going under paved road and PSZ zone
					to 70" CMP running east to east

2#

70"

MH NO.

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak C – Cracked Pipe CLP–Collapsed Pipe OJ – Offset Joint WJ – Wide Joint T – Taps R – Roots Y – Y's LA – Low Area	
COND. OF LINE –		
GRADE –		
COND. OF M.H. –		

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Walk in

INSPECTION AND WORK REPORT

Time 1:50 - 2:20

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tony	9-10-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 2# TO	NO 2#	132'	48" CMP	169#

MH NO. 2#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
112'	WJ				wide joint on bottom of pipe about one inch wide
					line running northeast to open area located on the north side of P.S.Z zone (north of paved road at turn - (900 area) walked in line with flash light and looked at line condision of pipe - is good

MH NO. 2#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak C – Cracked Pipe CLP–Collapsed Pipe OJ – Offset Joint WJ – Wide Joint T – Taps R – Roots Y – Y's LA – Low Area	
COND. OF LINE –		
GRADE –		
COND. OF M.H. –		

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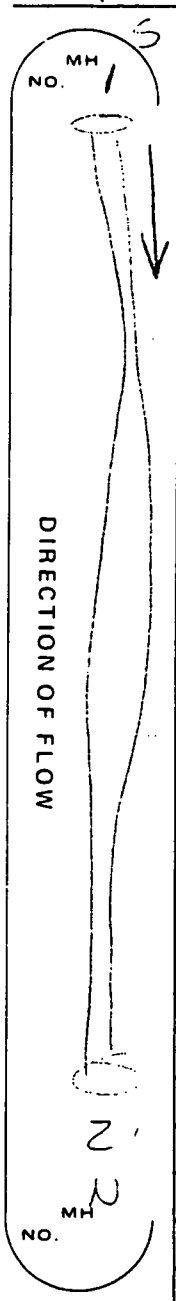
INSPECTION AND WORK REPORT

1138 - 1303

CLOCK 300'

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Todd	9-10-80

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
#1	#2		12" CMP	#100



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					LINE IN GOOD SHAPE
					12" LINE RUNNING PARRELLEL WITH
					THE GATE ~~[illegible]~~ IN TROUGH OF
					GUARD SCHOOL 388 1ST LINE RUNNING
					FROM SOUTH TO NORTH JUST INSIDE
					SWINGGING GATE

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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Tape 1306-1444

INSPECTION AND WORK REPORT

time 9:00

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	9-11-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 1# TO	NO. 2#	51.4	18" RCP	171#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
4.1	OJ	6			
2# 51.4					located on the corner of 7th & [illegible] just east of 7th running south

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

[illegible]

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Tape 1494-1608

CLOCK

INSPECTION AND WORK REPORT

time 9:50

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	9-11-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	64.2	18" RCP	172#

MH NO. — DIRECTION OF FLOW — MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
54	C				Small crack all around pipe
					located on the north side of cactus Ave
					and on the west side of 7th Ave
					line running south
					pull with jet truck

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line is in good shape.

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Video Sewer Renovation Contractors Tape 1608-1674

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INSPECTION AND WORK REPORT

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		TO	9-11-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 1#	TO NO. 2#	36.3	12" CMP	173#

MH NO. South 1#

DIRECTION OF FLOW

MH NO. North 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located on the South west corner of Build 850#
					will be going underneath cactus due
					pushing by hand north against flow to
					man hole

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

Pipe looked good

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INSPECTION AND WORK REPORT

Time 12:30 - 12:50

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	9-11-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 2#	TO NO. 2#	40'	18" CMP	174#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked up line with flashlight
					located on the Southeast corner of [illegible] lot 88
					line running northeast

MH NO. 2#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP–Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

line looked good all the way through

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CLOCK

INSPECTION AND WORK REPORT

Time 1:25 - 1:50

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	9-11-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#		25'	15" CMP	17-#

MH NO.

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					looked up with flashlight
					THIS LINE RUNS SOUTH WEST FOR 25'
					THEN TURNS DIRECTLY WEST AND
					RUNS INTO A 30" LINE that RUNS South.
				→	line runs southwest for 25' then turn and
					go's southwest along fence inside 400 area
					can't find other end
					line is clean first 25' feet
					located on the south side of Build 440#
					line running Southwest

MH NO.

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

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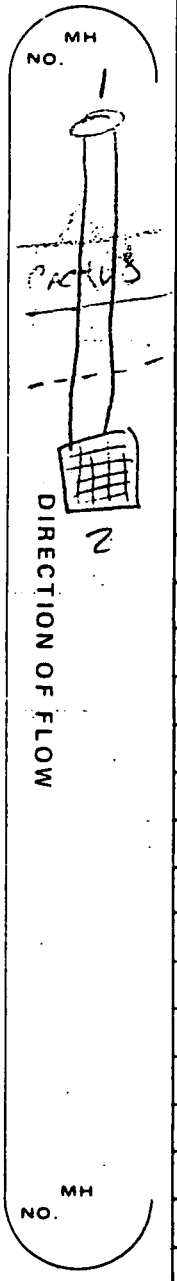
INSPECTION AND WORK REPORT

1644-1725

CLOCK 2:30 - 3:15

FOR	INSPECTOR	OPERATOR	DATE
ROCKY FLATS		TODD	9-11-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1	2	31'	12" CMP	#176



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					THE LINE WAS CLEAN AND IN GOOD SHAPE THE LINE IS 308 FT
					THE LINE WE ARE LOOKING AT IS A 12" CMP THAT RUNS UNDER THE ROAD TO A GRATE INSIDE THE FENCE OF BLD. #850. THE FAST LINE WE CLEANED THE LINE THE OTHER DAY SO WE HAD TO DIG BACK THE DIRT WE PULLED OUT OF THE LINE. THE END OF THE PIPE WAS SMASHED SO WE BENT IT BACK SO OUR CAMERA WOULD FIT INTO THE LINE. WE PUSHED AGINST THE FLOW ~~GOING~~ PUSHING NORTH.

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak C – Cracked Pipe CLP–Collapsed Pipe OJ – Offset Joint WJ – Wide Joint T – Taps R – Roots Y – Y's LA – Low Area	
COND. OF LINE –		
GRADE –		
COND. OF M.H. –		

Tape 4#

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Tape 1732-

INSPECTION AND WORK REPORT

time 9:10

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		Tom	9-14-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	143.8	18" cmp	179#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
39	C	11			have a crack about 5" long going down from top
42	hole	3			small hole in pipe at 3 o'clock
45					small dent
72					new pipe had been added
96					end of one section of pipe
102					new line end's
					located on the north side of Build 883#
					will be pulling east in 18" cmp
143.8					
					was a new section of pipe put in between
					pipe running east

MH NO. 2#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak C – Cracked Pipe CLP–Collapsed Pipe OJ – Offset Joint WJ – Wide Joint T – Taps R – Roots Y – Y's LA – Low Area	
COND. OF LINE –		
GRADE –		
COND. OF M.H. –		

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tape 1948-2032

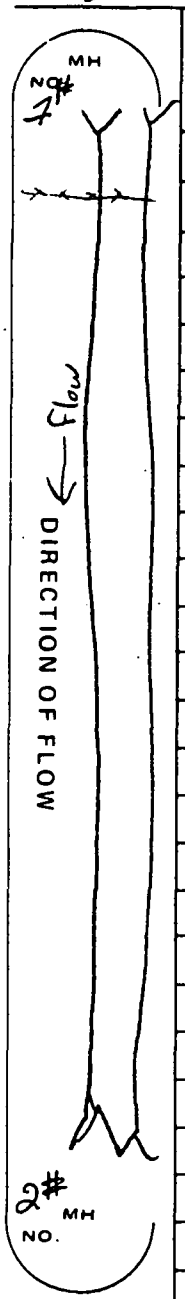
CLOCK

INSPECTION AND WORK REPORT

time 10:30

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	9-17-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
3#	2#	56.9	30" RCP	180#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located on the northwest corner of Build 111#
					out of fenced area then goes ~~into~~ inside fence
					line's are running southeast - will be pulling aga.
					flow -
					there are two line together - will be taking line
					on north side

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line was in good condision

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 2032-2166

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CLOCK

INSPECTION AND WORK REPORT time 11:25 - 12:10

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	9-17-87

MANHOLE		MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 7#	TO	NO. 2#	91.1	30 RCP	181 #

MH NO. 7#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					two lines running northeast side by side
					located on the northwest corner of
					Build 111# line running northeast
					the line on the south side is in good
					condision also

MH NO. 2#

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak C – Cracked Pipe CLP–Collapsed Pipe OJ – Offset Joint WJ – Wide Joint T – Taps R – Roots Y – Y's LA – Low Area	line looked good all the way through
COND. OF LINE –		
GRADE –		
COND. OF M.H. –		

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape - 2165 -

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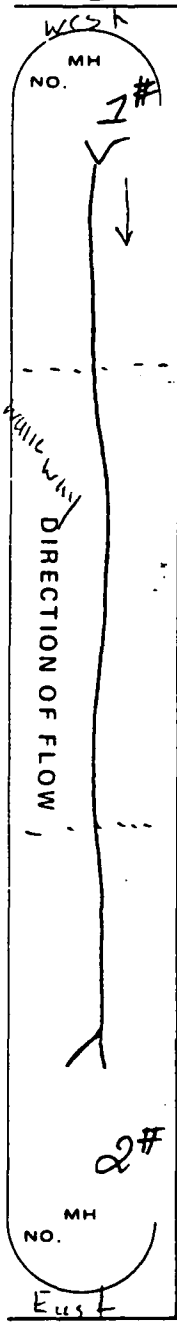
INSPECTION AND WORK REPORT

time 2:00

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	9-17-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	40.2	17" by 12" CMP	182#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located on the north side of Build 334#
					line running east going towards 6th Ave
					will pull with jet truck

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looked good

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 2271-2356

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CLOCK

INSPECTION AND WORK REPORT time 3:00 - 3:45

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		TM	9-17-87

MANHOLE	MANHOLE	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
NO. 1#	TO NO. 2#	37.8	12" cmp	183#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					rust all down pipe
					located on the north side of Build 334# line run's along 6th Ave running South under north road going west

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line had rust all the way though – is from water standing in line for long

→ overall condision – is good

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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tape 2356-2496

CLOCK

INSPECTION AND WORK REPORT

time 2:00 - 2:45

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		T	9-18-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	68.3	12" cmp	184#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
43	WJ	12			Bad wide joint about 2 inch's wide
50'		12			pipe is squished down also pipe is up higher than flow level
					located on 6th Ave & Sage line running north going under Sage road to open ~~pip~~ pit - this line is on the east side of Sixth ave

2# MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

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Tape - 2496-2608

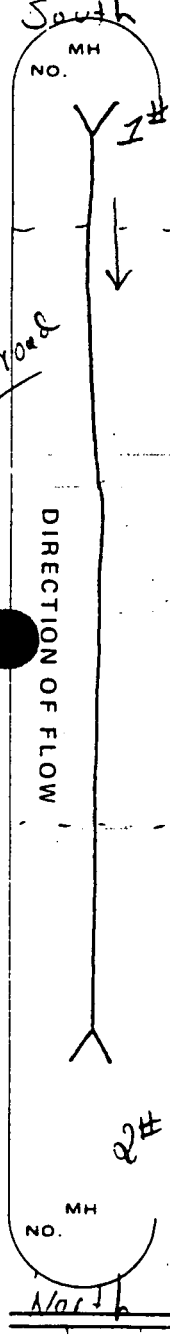
CLOCK

INSPECTION AND WORK REPORT

time 10:50 - 11:20 monday

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	9-21-87
MANHOLE NO.	**MANHOLE TO NO.**	**TOTAL FOOTAGE**	**PIPE SIZE & TYPE**	**SHEET NO.**
1#	2#	59'	18" cmp	185-#

South



North

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
1 1/2 FT		3			hole in pipe
36'		2			Big dents in line - has some small cracks at edge of dent
52'					went under water will get total Footage from top of road
					rest of pipe looked good what i can see of it
					their was 7' of pipe that was under water
					located on the Corner of 6th & Sage running north under Sage road just west of 6th Ave
					pulling with jet truck

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

at the north end of pipe it was dent down to small to get camera out

V.S.R. CORPORATION

Video Sewer Renovation Contractors

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

Tape 2608-

INSPECTION AND WORK REPORT

Time 1:15

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	9-21-87

MANHOLE NO.	MANHOLE TO NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#		50'	15" Steel pipe	186#

MH NO. 1#

DIRECTION OF FLOW

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
15	C	3			small crack going along the wall
50'					was as far as we could push camera in 15" pipe
					located on the Southeast corner of Build 881# inside man hole just off the road - will be pushing northwest against the flow

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 2735-2871

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CLOCK

INSPECTION AND WORK REPORT

Time 2:00 - 2:45

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	9-21-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#		80'	10" Steel pipe	187#

MH NO.

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
17'	C	12			small crack on top
50'					started going upward in pipe
80'					went in 80' the pipe leveled off and had water standing in line camera went under water
					located on the Southeast side of Build 881# will be pushing west from man hole against Fl. buy hand

MH NO.

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe looked good to this point

V.S.R. CORPORATION

Video Sewer Renovation Contractors

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Tape 2873-3008

CLOCK

INSPECTION AND WORK REPORT

time 2:45 - 3:25

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats			9-21-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	151'	18" clay	188#

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
9	C				all around pipe
100	C				all around pipe
151'	C	12			small crack on top of pipe
					on the South east corner of Build 881#
					go's from man hole to open area out side
					of fence going South - pulling with jet truck

MH NO. 2#

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

over all condision of pipe is good

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3008-3071

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

INSPECTION AND WORK REPORT

tim 8:45

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	9-22-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	58'	12" Cmp	189#

West

MH NO. 1#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
48	C	12			have a dent, on top which has a small hole about 1/2 inch - does not look Bad
					located on the South Side of Build 865-# underneath new asphalt at the ramp going to Box's
58'					

MH NO. 2#

East

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	tim looked good
COND. OF LINE –	C – Cracked Pipe	
GRADE –	CLP–Collapsed Pipe	
COND. OF M.H. –	OJ – Offset Joint	
	WJ – Wide Joint	
	T – Taps	
	R – Roots	
	Y – Y's	
	LA – Low Area	

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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Tape 3071-3233

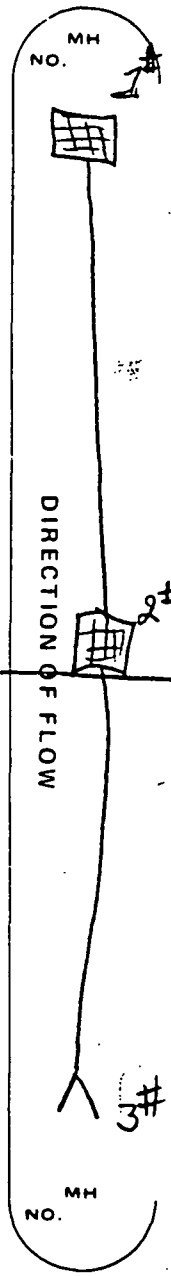
CLOCK

INSPECTION AND WORK REPORT

time 12:40

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	9-22-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	3#	94'	12" RCP	190#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
22.8					PVC pipe starts
24					22 Degree Bend
70					10' of concrete pipe - then turns back into
80					PVC pipe starts
94					To Storm Drain 2# is 94' - looks good to point
					will not be able to tv from SD 2# to SD 3# cause of camera problems
					at S.D. 1# have a 6" PVC pipe coming in from the west - line is new
					located on the South Side of Build 883 line running east will be pulling east with jet truck

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps
COND. OF LINE –	C – Cracked Pipe	R – Roots
GRADE –	CLP–Collapsed Pipe	Y – Y's
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area
	WJ – Wide Joint	

line looked good

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3238-3302

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

INSPECTION AND WORK REPORT

Time 8:40 - 9:20

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		Tom	9-24-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
2#	2#	60'	12" cmp	191#

Northwest MH NO. 2#

DIRECTION OF FLOW

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located on the South side of Build 664 outside of fence going under cactus are southeast - will be pushing by hand

MH NO.

Southeast

NOTES

CLEANLINESS –

END. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

line looked good

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3302-3352

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

INSPECTION AND WORK REPORT

time 9:45 - 10:15

CLOCK

FOR	INSPECTOR	OPERATOR	DATE
Rocky flats		Tom	9-24-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	33.6	12" clay	192#

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
					located on the Southwest corner of Build 850# and on the Southeast Corner of parking lot 85# just north of Cactus ave

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP–Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

pipe looked good all the way to man hole

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape -3352-3503

11780 Wadsworth • P.O. Box 267 • Broomfield, Co. 80020 • (303) 466-3411

CLOCK

INSPECTION AND WORK REPORT

time 10:40

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	9-24-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	93'	12" CMP	193#

Southwest MH NO. 1#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
1					at the begaining of pipe - the pipe is
					smashed down about 2" to 3" will have to
					take off top side
12'					90 Degree Bend to the north
30	WJ	12			
45	C				all around pipe
47					end of crack
52	WJ	12			
70	WJ	12			
					located on the northeast corner of
					Build 886# running northeast to open
					area just South of Center ave going under
					parking lot

DIRECTION OF FLOW

MH NO. 2#

north east

NOTES	CODE	COMMENTS
CLEANLINESS –	L – Leak	T – Taps	should be looked at
END. OF LINE –	C – Cracked Pipe	R – Roots	
GRADE –	CLP–Collapsed Pipe	Y – Y's	
COND. OF M.H. –	OJ – Offset Joint	LA – Low Area	
	WJ – Wide Joint		

V.S.R. CORPORATION

Video Sewer Renovation Contractors Tape 3504-3635

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CLOCK

INSPECTION AND WORK REPORT

time 11:25 - 12:00

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		T	9-24-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#		23'	12" cmp	194#

MH NO. 1#

DIRECTION OF FLOW

2#

MH NO.

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
10'	C	3			go's all around pipe - could be a problem
23'					couldn't push up any more
28'				→	~~KS~~ can see up pipe about 5' to 8' there is a tap coming in from the west about 7 [illegible] (8" cmp coming in)
					just west of 4th Ave & north of center [illegible] located on the northeast corner of Build 112# will be pushing south as far as we can

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

V.S.R. CORPORATION

Video Sewer Renovation Contractors

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Tape 3625-4341

INSPECTION AND WORK REPORT

Time 2:00 - 3:30

CLOCK

OR	INSPECTOR	OPERATOR	DATE
Rocky Flats		Tom	9-28-87
MANHOLE NO. 1# TO MANHOLE NO. 2#	TOTAL FOOTAGE 0-445'	PIPE SIZE & TYPE 10" cmp	SHEET NO. 195-#

MH NO. 1#

DIRECTION OF FLOW

MH NO. 2#

FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
50	WJ	7			
120					started going under water
207	LA				(still has alot of water standing in pipe)
270					rust at joint - sloped at 303 ft
280	LA				
371	C?				possible crack around pipe
400					water level started rising
430	LA				
441					Couldent pull any further with jet truck
					also at 441' pipe looks like it has good
					water flow
					located on the South side of Build 440
					outside of Fenced area pulling against
					the flow with jet truck going north

NOTES

CLEANLINESS –

COND. OF LINE –

GRADE –

COND. OF M.H. –

CODE

L – Leak	T – Taps
C – Cracked Pipe	R – Roots
CLP–Collapsed Pipe	Y – Y's
OJ – Offset Joint	LA – Low Area
WJ – Wide Joint	

COMMENTS

4556

V.S.R. CORPORATION

Video Sewer Renovation Contractors
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tape 4391 - 4556

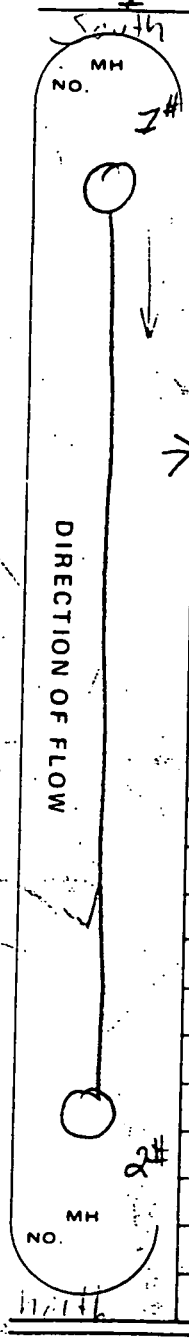
CLOCK

INSPECTION AND WORK REPORT

time 10:45 - 3:30

FOR	INSPECTOR	OPERATOR	DATE
Rocky Flats		[illegible]	9-30-87

MANHOLE NO.	TO MANHOLE NO.	TOTAL FOOTAGE	PIPE SIZE & TYPE	SHEET NO.
1#	2#	450' to 516'	10" cmp	continue 195#



FOOTAGE	CODE	CLOCK LOC.	FILM NO. / PIC. NO.	INFLT G.P.M.	REMARKS
450'					(End of footage on 9-28-87)
↓					
453	LA				To 488'
496	WJ	5			with rocks sticking in on side
516	Dent	12			Dent on top of pipe Sticking Down 3" to 4"
516	WJ	9 12			about 2" to 3" wide
→ 516'					
					located on the north side of Build 448#
					will be reverse pulling with tk van winch
					from manhole 2# From m.H 1#

NOTES

CLEANLINESS –
COND. OF LINE –
GRADE –
COND. OF M.H. –

CODE

L – Leak
C – Cracked Pipe
CLP – Collapsed Pipe
OJ – Offset Joint
WJ – Wide Joint
T – Taps
R – Roots
Y – Y's
LA – Low Area

COMMENTS

CONTINUATION OF

OU08-000126

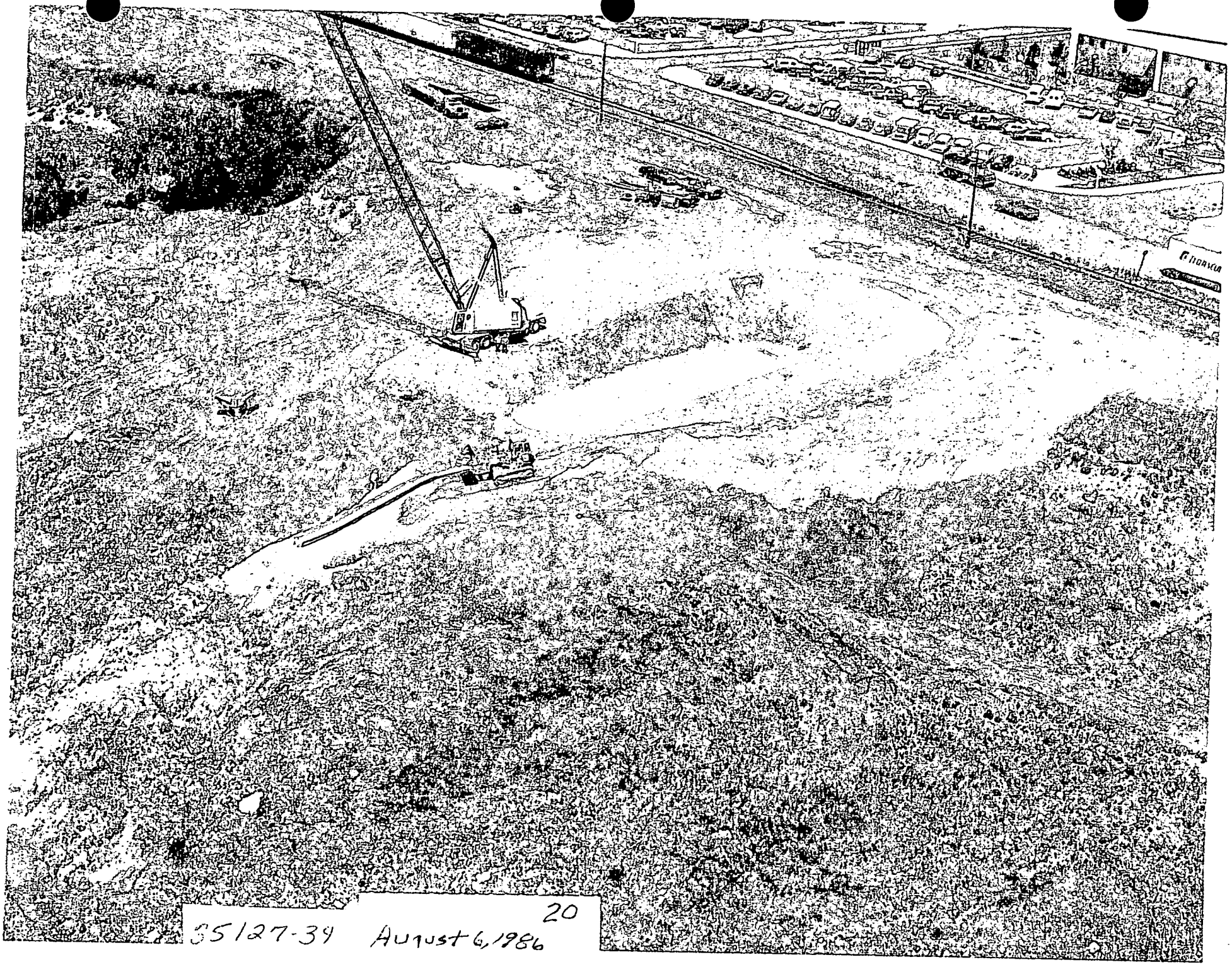
ON REEL # 1163

FROM

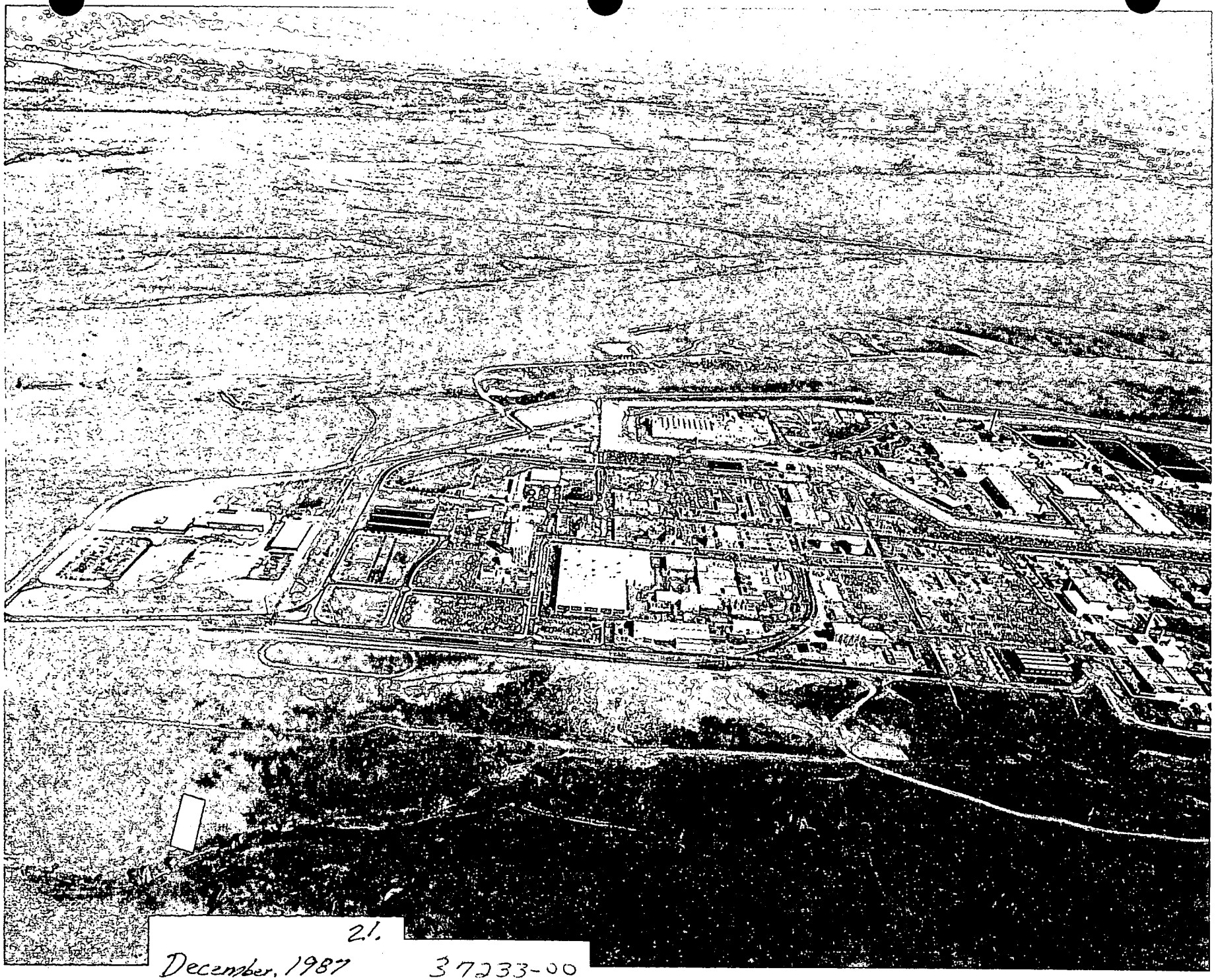
PREVIOUS REEL # 1161

APPENDIX C

Selected Aerial Photographs



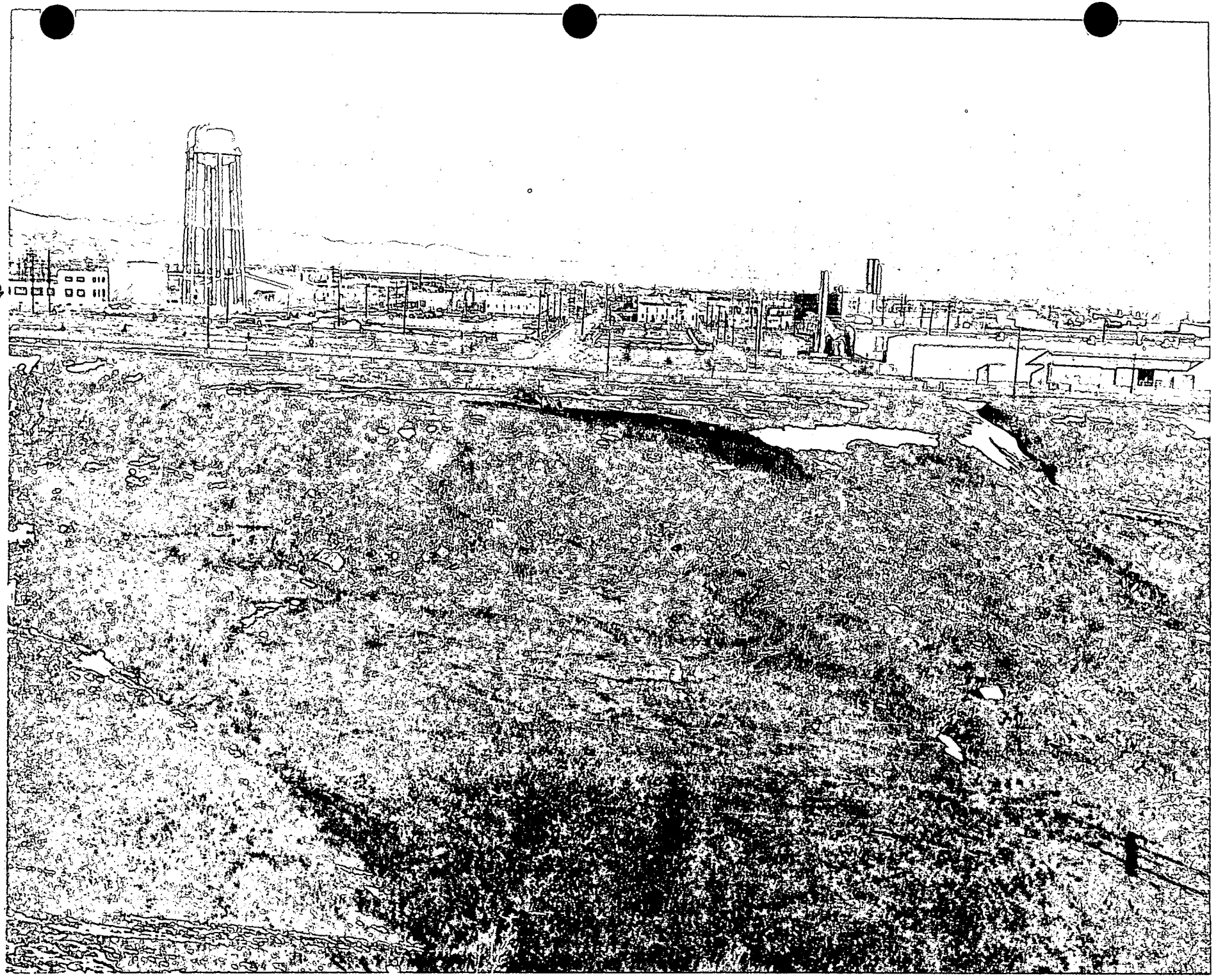
35127-34 August 6, 1986



21.

December, 1987 37233-00

Building 124



Feb 11, 1974 RF# 18333-00 Bates # 23347

APPENDIX D

Letters, Memoranda, and Meeting Notes

This is a retyped copy of a 1952 memo, the original is very difficult to read.

June 13, 1952

To: Mr. F.H. Langell

From: Mr. B. P. Shepherd

cc: Dr. Chapmen
Mr. Harrison
Dr. Matheson
Mr. Venable
Mr. Epp

Subject: Liquid Waste Disposal at Rocky Flats Plant.

Purpose: To outline the various methods of liquid waste collection and disposal at the Rocky Flats Plant, in order that the adequacy of treatment or the degree of radioactive contamination or chemical contamination can be shown.

Summary: Liquid waste from the Rocky Flats Plant consists in general of three types: sanitary, storm and process wastes.

Sanitary wastes from all building are collected through a sewage distribution system and flow to an activated sludge sewage treatment plant, Building 95. After treatment, which should remove form 90 to 95% of the B.O.D., the effluent is discharged in to the south tributary of Walnut Creek. The dried sludge can be spread over certain areas within the plant site, where it will act as a soil enriching substance, or it may be disposed of through any one of a number of means off the site, since it is a relatively inoffensive substance and has considerable value as a fertilizer. Samples will be taken regularly of the sewage in the sewage treatment tanks and will be analyzed for possible radioactive contamination. The design is such that it is practically impossible for any contamination to enter the sewage collection system except by actual sabotage or gross negligence or carelessness of some employee.

Storm wastes and rain and snow water run-off will be handled either by surface drainage or by storm sewers to the nearest water course. The ten air-sampling stations spotted at strategic points on the site should give sufficient indication as to whether or not contamination is sufficient as to be a hazard when picked up by normal run-off. Building air exhaust filtering systems have been designed in such a way as to reduce to a minimum any possibility of such contamination.

This is retyped copy of a 1952 memo, the original is very difficult to read.

Process wastes, as used in this report, include actual wastes from processing material as well as cooling water, laundry wastes and other liquids which might potentially carry contamination, but which normally should be entirely free from radioactive contamination. These process wastes also include in some cases purely chemical wastes which carry no contamination whatsoever, in no case are any liquids released, either on or into the ground, until they have been adequately processed and the degree of contamination positively determined as being within acceptable tolerance for such liquids. Provisions have been made in plant design and process equipment to treat any wastes which will develop, so that they can be rendered harmless and released without danger to animal or plant life on or off the site.

Discussions:

Building 71

The fundamental design philosophy which has guided the engineering of sewer and drain systems in this building may be stated as follows:

(a) Under no circumstances is a vessel carrying radioactive materials to be equipped for draining, nor will overflows or open type tanks be installed.

(b) No floor drains will be installed in the processing areas of the building, including production, development and analytical areas.

(c) No service tunnels of any variety, including ventilation ducts, will be constructed beneath processing areas.

(d) No dry boxes or hoods in which radioactive materials are processed will be equipped with drains.

(e) All process wastes, whether from production, analytical or development areas, will be vacuum transferred to Building 74 for treatment.

The following liquid waste systems will be provided for this building:

(a) Sanitary wastes. these wastes will be collected at a sewage lift station adjacent to the building, from which point the wastes will be pumped to the sanitary sewage treatment plant, Building 95 for treatment. These wastes should not contain any radioactivity.

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(b) Storm and footing drains. Waters collected in these drain systems should be free of radioactivity and will be discharged into Walnut Creek.

(c) Analytical Wastes. These wastes are collected in a separate drain system which will discharge into a 500-gallon sump north of and adjacent to the building. It is estimated that analytical waste will amount to approximately 300 gallons per day. The wastes in the sump will be held and sampled on a batch basis. If the wastes fall below acceptable limits, they will be pumped and discharged into Walnut Creek. If these wastes exceed the accepted limits, they will be pumped to Building 74 for further processing.

(d) Laundry wastes. These wastes will be collected in a separate drain system and will discharge, together with the cooling water, into one of two 25,000-gallon underground storage tanks located north of and adjacent to the building. At such time as one tank is filled, it will be sampled and the sample analyzed for radioactive isotope contamination. Should the level of activity fall below the accepted limits, the tankful of waste will be pumped to Walnut Creek. Should the level of activity exceed the accepted limits, the waste will be pumped to Building 74 for further processing. Laundry wastes should amount to approximately 3000 gallons per day.

(e) Cooling water. The cooling water referred to here is used entirely in heat exchange type of equipment, with adequate safeguards in design and operation to preclude any reasonable probability of radioactive contamination. This water will be collected in a separate drain system and will discharge, together with the laundry wastes, into one of two 25,000-gallon underground storage tanks located north of and adjacent to the building. Sampling and disposal will be as described in paragraph (d) above.

(f) All other liquid wastes. Other liquid wastes will be transferred by vacuum to Building 74 for further processing. These wastes will amount to approximately 1700 gallons per day.

Building 81

(a) Storm and footing drains. Water from these drains will be discharged into Woman Creek.

(b) Sanitary Wastes. These wastes will be collected in a separate drain system and brought into a sewage lift station adjacent to the building, from which point they will be pumped into the main sewerage distribution system, from whence they will flow to the sanitary sewage treatment plant, Building 95, for necessary treatment.

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(c) Laundry Wastes. These wastes will be pumped through a suitable filter system into one of two 3000 gallon retention tanks. Each tankful of waste will be sampled and if the level of activity is within acceptable limits the wastes will be discharged into the sanitary drain system. Should the level of activity exceed the accepted limits, the wastes will be pumped to Building 74 for further treatment. Should the wastes by any chance exceed the level of activity which Building 74 can handle or be uneconomically high in accountable material, it will be necessary to process the wastes in Building 81, to reduce to an allowable level which Building 74 can handle or to a level below which accountability must be considered for economic reasons.

(d) Laboratory Wastes. These wastes will be collected in a single drain system from such laboratories as the analytical lab, spectroscopy lab, and radiography, and discharged into one of two 3000 gallon retention tanks. The waste in each tank will be sampled and if the level of activity is below the limit which Building 74 can handle, it will be pumped to that building for further processing. Should the level of activity exceed the limit which Building 74 can handle, it will be necessary to process these wastes further in Building 81.

(e) All other wastes. These other wastes will consist of various process wastes of a low level of activity which can be handled by Building 74, and will also include wastes coming from janitors' slop sinks, boiler blow-down water, cooling tower wash-down water, cooling water waste, which will be bled off occasionally to prevent excessive salt buildup, and miscellaneous other wastes. These wastes will be collected in suitable tanks and will be monitored before being transferred to Building 74.

It is estimated that the amount of waste which will be transferred from Building 81 to Building 74 will amount to approximately 6000 gallons per day. This figure may vary some what but will probably average this magnitude over a reasonable period of time.

Building 23 and 41

Wastes from these building will consist entirely of chemical laboratory wastes normally encountered in laboratory operation of the type which these buildings will be expected to carry on, with the exception of relatively small quantities of urinalysis samples which Building 23 will analyze. These urinalysis samples may contain very minute quantities of radioactive materials but the level of activity is so extremely low that no hazard from this standpoint should be expected. It is estimated that these buildings will discharge approximately 2000 gallons per day, of which 300 gallons per day will be discharged from Building 23 and 1700 gallons per day from Building 41. These wastes will be discharged into a lime pit to provide neutralization, thence to a holding tank of some 600 to 800 gallons capacity, from which tank it will be pumped

This is retyped copy of a 1952 memo, the original is very difficult to read.

to Building 74, where it will be processed even though the level of activity will be within acceptable limits.

Building 74

Total liquid waste flowing to this building will probably average about 9000 gallons per day. Treatment in this building will generally consist of removing the chemical and radioactive content to a point where it can be released and remain within the accepted limits of radioactivity, as well as chemical content. A detailed report covering the analysis of the liquid wastes entering the building for processing, the method of treatment employed within the building, and the analysis of the effluent leaving the building is contained in the Secret Document No. 00732. The treated effluent from the building will be pumped to the downstream side of the sanitary sewage treatment plant, Building 95, and discharged into the effluent from Building 95. This dilution will provide an additional factor of safety in reducing further any residual radioactivity or harmful chemicals.

In view of the relatively unproven process to be employed in Building 74 for the treatment of waste, a 200,000-gallon retention tank will be provided on the flat to the south of the building. This will provide approximately one month's normal operating hold-up of material. Wastes can be pumped from Building 74 to the retention tank and can be returned from the retention tank to Building 74.

Building 44

(a) Storm Drains. Water from the roof drains will be discharged onto the ground along the outer walls of the building, and will then depend upon surface runoff.

(b) Footing Drains. Water from these drains should be very small in quantity and will be discharged into the 1200-gallon waste sump located in the basement of the building (see paragraph "d" below). Normally, water from the footing drains would be discharged to the nearest water course or to the sanitary sewer system, but the hydraulics of these systems with relation to each other is such as to make it impractical to discharge footing drain water in accordance with normal practices.

(c) Sanitary Wastes. These wastes will be collected in a separate drain system and discharged in to the plant sewage system, through which the wastes will flow to the sanitary waste treatment plant, Building 95 for necessary treatment. Floor drains in the carbon shop will discharge into the sanitary sewer system, since no radioactivity should be present in this portion of the building.

This is retyped copy of a 1952 memo, the original is very difficult to read.

(d) All other wastes. The other wastes not mentioned above consist of a few floor drains in the basement of the foundry, drains from slop sinks, metallurgical laboratory sinks, a few drinking fountains and a few other miscellaneous sources. These wastes will be collected in a separate drain system and discharged into a 1200-gallon sump located in the basement. It is expected that approximately 800 gallons per day of these wastes will be collected in this sump. A float-operated pump will empty the sump by pumping the wastes through a suitable filter system. It is expected that one passage through the filters will reduce any radioactivity below the accepted limits. The wastes will pass from the filter into a second retention basin, at which point the wastes will be sampled. Should the level of activity be below accepted limits, the wastes will be discharged by gravity into the sanitary sewerage system. Should the wastes exceed the accepted limits, it will be necessary to pass them through the filter system again.

Building 95

This plant will treat sanitary sewage through the activated sludge process in equipment of conventional design and operation. It is anticipated that the effluent to be discharged from this plant will vary between 40,000 to 80,000 gallons per day. Samples will be taken regularly of the sewage treatment plants and will be analyzed for possible contamination. Further description of this process was outlined previously in the summary.

Conclusions No liquid wastes from the Rocky Flats Project will be released until the level of radioactivity, as well as the chemical content, has been reduced by positive processing methods to within acceptable limits. No dependance has been placed upon leaching fields or settling basins, inasmuch as these do not provide positive assurance against the release of liquids within safe limits. All liquids released from the project will fall within the requirements established by the AEC for level of activity, and within the generally accepted health requirements for biological and chemical wastes.

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6-5-92

June 5, 1992
1801-17

Mr. Jim Shaffer
Project Manager
Advanced Sciences, Inc.
405 Urban Street Suite 401
Lakewood, Colorado 80225

Subject: Foundation Drains which may impact OU8 IHSSs

Dear Mr. Shaffer,

Foundation drains (or footing drains) around some buildings in the PA were studied by us to determine potential impacts on OU8 IHSSs. Information was sought mainly to identify the location of current and historical foundation drains which has been doubted and contradicted in the past by various resources at the RFP. An effort was made to determine which drains are still operational. This letter summarizes information identified and sources reviewed for this information. An attempt was made to quantify the impact some of the drains may have on the water table in the vicinity of OU8 IHSSs. Assumptions made for this effort are stated.

The subject of foundation drains will be an evolving one since new sources of information on these drains are likely to be found in the future. Any additional information we obtain will be evaluated and incorporated with the information in this letter. This has not been an exhaustive study and in the interest of providing you this information as timely as possible, the summaries stated are to be considered in draft form, although they are true and complete to the best of our knowledge.

Location

Several sources of information were used to determine the locations of foundation drains. These are stated below. We have prepared a map (attached) showing the approximate locations of the drains relative to the OU8 IHSSs. The following paragraphs describe the sources used.

1. A set of Foundation Drain Plans identify the approximate locations of the foundation drains around many buildings at the RFP. The twelve drawings are dated June 13, 1975 and are more schematic than design-oriented. We have the complete set obtained from

the RFP Engineering Drawing Room. These are numbered 25581-1 through 25581-12. The set includes drawings of foundation drains specific to Buildings 771, 774, and 779 which indicate the location of the pipes and the direction of flow. No other buildings in the OU8 Area are identified in these drawings. Therefore, it is assumed that the other production buildings that would be of concern to OU8 (e.g. 776/777, 707, 559) do not have foundation drains. Most individual drawings do not show termination points but reference the Area Plot Plan (25581-1) for the termination points. The Area Plot Plan is at a small scale and exact locations of termination points cannot be discerned.

2. An Internal Letter written in May 1977 by N.E. Moody of the RFP General Laboratory describes the locations of building sumps and foundation drains. The letter states the identification number and a brief description of its location with a notation indicating whether it would be expected to be wet or dry. In comparing the information in this letter to the 1975 maps, an additional foundation drain location is described. This foundation drain is FD707-1 and is described as being the storm drain outlet east of the Building 750 Parking Lot. The description of this sampling point includes a statement that it "should pick up water from Buildings 559, 750, 776, 777, 778, and 707." This is of significance because it is the only mention found that describe drainage from these buildings. Because the identification number is prefaced with FD, it was believed to be a foundation drain, but the description is of a storm drain and no other documentation was found which describes foundation drains associated with the mentioned buildings.

3. A sampling program was initiated sometime in the mid 1970s (based on the memory of Ralph Hawes, retired RFP Environmental Group employee) to monitor the quality of water discharging from drains. The results of this sampling program were summarized in a December 1981 report written by Nancy Hoffman (now Nancy Kirk with Procurement Control at the RFP). This report, entitled "Water Quality Data for Foundation Drains and Building Sumps from 1977 through 1981 (Draft)," reiterates and supplements N.E. Moody's Internal Letter in the descriptions of the foundation drain and building sump locations. In preparing the report, Ms. Hoffman traced down the sampling locations in the field using the 1975 maps. She went to the locations indicated to be termination points for the foundation drains and if a discharge pipe was found, it was concluded to be the discharge pipe indicated on the map. No additional analysis was performed, such as dye testing, to determine if the pipes found were truly foundation drain outlets.

4. Original construction drawings were found for portions of Buildings 771 and 774 or additions to them. Foundation drains along the north side of Building 771 were verified from a 1962 (RF-V71-10008) drawing and the drain from the northwest corner of Building 771 to the outlet in a manhole were verified from a drawing from 1952 (RF-70-111-C). For these locations, exact (at the time of the drawing) invert elevations were

stated. Other than these, foundation drains were not identified in other construction drawings and were not able to be verified. A 1989 drawing (38544-102) for the replacement of Tanks 66, 67, and 68 at the southeast corner of Building 774 indicates a designed "perimeter foundation drain" which is a gravel pack over geosynthetic fabric directly adjacent to the foundation and is not representative of the type of foundation drain (pipe) that are the focus of this letter. Where not specifically found, foundation drain invert elevations were estimated based on the design elevations of the building foundations taken from construction drawings.

5. Current RFP Utility Drawings were studied for the existence and location of footing drains in the OU8 area. Several were found in the vicinity of Building 774 and a few near Building 771. In the case of Building 771, these were very close to the ones indicated on the 1975 map. The drains near Building 774 varied significantly. Building 774 has been modified many times since its construction in 1952. Small and large additions were built on to it in all directions from its original configuration.

   It is supposed that the original building was constructed with the foundation drains around it and that subsequent construction activities probably left the drains in place but not serving their original intent. The drains may have been blocked off internally by these construction activities. It is believed that these original foundation drains are indicated on the 1975 map, superimposed over the new shape of the building. In comparing the building outline from the 1975 map with the current building outline on the 1990 Utility Drawings, it is clear that all of the drains indicated in the 1975 map are currently beneath some structure or pavement. The foundation drains indicated on the current utility drawings are noted only where they emerge from beneath the building and its path under the building is unknown. It is not believed that any foundation drains were added subsequent to the construction of the building (or additions) and that one or both of the maps are in error or are incomplete. The veracity of the 1975 map is doubted more than the utility drawing because is schematic in nature and the purpose of the 1975 maps is not currently known.

Working Condition

Foundation drains that are currently in existence are the ones of most concern to the OU8 workplan. For estimating the potential impact of the foundation drain on each IHSS in the OU, all of the foundation drains found from the sources above were included. This was considered to be a conservative approach and also as a direction for continuing investigations. There is one exception to this. The 1975 map indicates a foundation drain along the north side of Building 779. The map indicates a termination point between Solar Ponds 207C and 207A. It is believed that the pipeline between the solar ponds is a storm drain (based on the utility map and discussions with RFP employees) and that the foundation

drain portion was only north of the building. No other documentation or verification was found in support of the current existence of this foundation drain. The configuration of the building has changed since its original construction and construction activities occurred in the late 1980s which affected the foundation of Building 779 in retrofitting for seismic stability. The estimated elevation of this foundation drain is higher than the elevation of the closest OU8 IHSS and it was not considered for further analysis at this time.

The foundation drains are a subsurface network of pipes of various materials. There are no sampling ports, lamplights, or other access points other than the outlet. Therefore, the water quality identified from the outlet water samples are a composite of all waters entering the network and there is no direct and non-intrusive manner to isolate the source of potential contamination (assuming the water sample indicates contamination) and attribute it to one particular IHSS or PAC.

Some buildings in the OU8 Area do not have foundation drains. Buildings 771 and 774 are original production buildings at the RFP. Buildings 559, 707, 750, 776/777, 778, and other main buildings in the area were constructed in different phases after the initial construction. These buildings are equipped with interior building sumps. It is speculated that the buildings were designed without foundation drains, which would direct water away from the foundation, with the intent of allowing groundwater to seep into the building. Infiltrated groundwater would be contained within the building as a means of controlled monitoring and discharge of collected water.

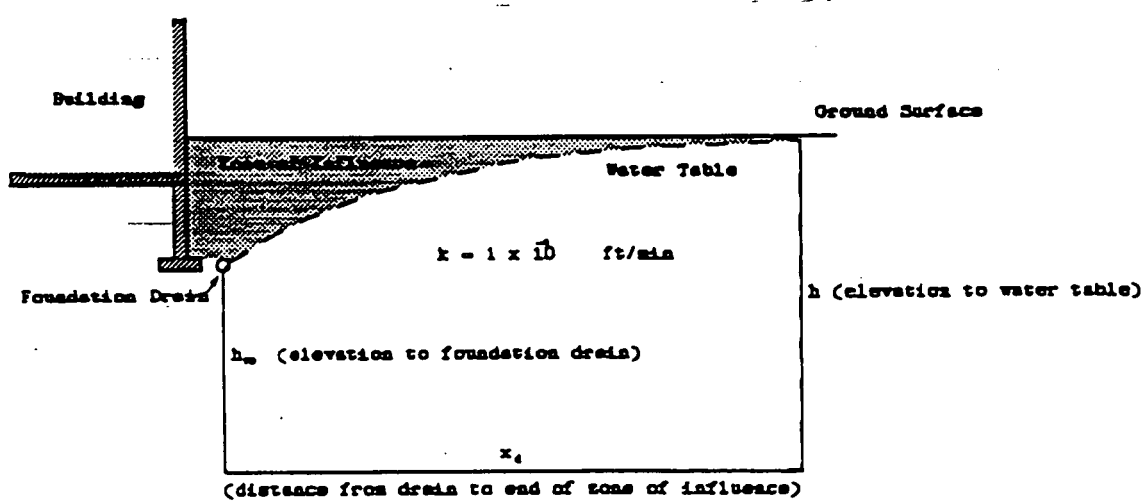
Impact on Groundwater

An evaluation was made in areas where the foundation drains were in close proximity to an OU8 IHSS to estimate if the foundation drain would impact the groundwater beneath the IHSS insofar as drawing down the water table toward the drain and allowing for potential contaminant migration. Many assumptions were made for this evaluation. It was assumed that a foundation drain would collect the same amount of water along its length, that is, flow, Q, is constant and could be measured directly from the termination point of the pipe. All subsurface structures (pipelines, tunnels, tanks) were ignored in respect to effects on groundwater drawdown.

The location of the OU8 IHSSs and the buildings and drains are considered constants. The water table elevation and the flowrate, Q, are variables. A table was prepared which summarized the flowrates and water table elevations necessary to have an impact on the OU8 IHSS. The flowrates can presumably be measured from the termination points and the water table elevations can be estimated from monitoring well control. If these variables are known, then it can be determined if the foundation drains actually impact the groundwater below the OU8 IHSSs. The flowrate is zero if the water table elevation is below the level of the drain.

In this cases, the drains may not have any impact even if the IHSS is directly above the drain. However, there still could potentially be an impact if infiltration of surface water travels through the IHSS toward the drain, even if the water table elevation is below the drain elevation. If the drain loses water through its length, the drain could be impacting the groundwater beneath the IHSS, but this condition cannot be quantified accurately.

To estimate the relationship among flowrate, foundation drain elevation, water table elevation, and location of the IHSSs, an equation was derived to determine the zone of influence from the drain to the point where the water table is no longer impacted by the presence of the drain. This equation was derived from Darcy's Law:



$$Q = kh\frac{dh}{dx}$$

(From Fetter, 1980, p. 133 and McWhorter & Sunada, 1977, p. 97)

Integrating both sides, with flow from right to left gives:

$$Qdx = khdh$$

$$Qx_d = \frac{k}{2}(h^2 - h_{FD}^2)$$

or,

$$x_d = \frac{k(h^2 - h_{FD}^2)}{2Q}$$

This equation is generally used to predict the water table profile. The actual water table is generally greater than the predicted profile because vertical components of flow are neglected (McWhorter & Sunada, 1977, p. 147).

Other basic assumptions for this equation are as follows:

- flow is steady state;
- aquifer is homogeneous and isotropic; and
- the Dupuit-Forcheimer assumptions apply (Freeze and Cherry, 1979, p. 188):
    - flowlines are assumed to be horizontal and equipotential lines are assumed to be vertical;
    - the hydraulic gradient is assumed to be equal to the slope of the free surface and invariant with depth.

Calculations were made, using the elevation of the foundation drain and the elevation of the ground surface of the IHSS, to find flowrates of the drains if the extent of the zone of influence was to the boundary of the IHSS. The attached table summarizes these discharge calculations. The IHSS in question would potentially be affected if the actual discharge from the foundation drain was determined to be less than the flowrate calculated. For a given static water table elevation, a very low flowrate will have a relatively wide zone of influence; conversely, a high flowrate will have a relatively narrow zone of influence.

Flowrates were calculated for fully saturated and half saturated conditions. The fully saturated condition would apply if the water table elevation was just beneath the ground surface (a worst case scenario). The half saturated condition applies if the water table is half way between the ground surface and the foundation drain elevation. Although flowrates were calculated only for fully saturated and half-saturated conditions, it should be noted that the discharges calculated for fully-saturated conditions are twice the discharge rates calculated for half-saturated conditions, indicating a proportional relationship between the flowrate and the amount of saturation when the elevation differences are relatively small.

In cases in which IHSS boundaries and foundation drain boundaries overlap, it is assumed that the IHSS could be affected by the foundation drain regardless of the saturation and flowrate. Also, if the IHSS elevation is less than that of the drain, it is assumed that the foundation drain will not affect groundwater beneath the IHSS.

Conclusion

The information presented in the table should be used as guidance and measured values can be used in the derived equation to determine if there is a potential impact on the IHSS by the foundation drain. ASI has data for these variables that can be used in the equation.

I hope this information and effort are useful for your evaluation. If you need additional information or explanation, do not hesitate to call.

Sincerely,
DOTY & ASSOCIATES

Ann K. Sieben

Attachments: 2

cc: Frank J. Blaha
File 1801-17

ATTACHMENT 2

IHSS #	LOCATION	FOOTING DRAIN ELEVATION (FT.)	GROUND SURFACE ELEVATION (FT.)	FULLY-SATURATED HEAD (FT.)	HALF-SATURATED HEAD (FT.)	FULLY-SATURATED DISCHARGE (GPM)	HALF-SATURATED DISCHARGE (GPM)
Footing drain - south side of Building 771 (runs E-W)							
139.1(S), 139.2	SE corner, Bldg. 771	5943	5987	44	22	4.35	2.17
118.1	E side of Bldg. 701	5943	5986	43	21.5	1.53	0.76
132, 144	E of Bldg. 701	5943	5986	43	21.5	1.91	0.96
137	SE of Bldg. 771	5943	5982	39	19.5	1.29	0.64
150.2	W of Bldgs. 771 & 777	Overlaps footing drain - will be affected regardless of flow and saturation					
Footing Drain - East side of Building 771 (runs N-S)							
150.3	Between Bldgs. 771 & 774	Overlaps footing drain - will be affected regardless of flow and saturation					
137	SE of Bldg. 771	5943	5982	39	19.5	1.29	0.64
Footing Drain - West of Building 771 (runs N-S)							
150.2	W of Bldgs 771 & 777	Overlaps footing drain - will be affected regardless of flow and saturation					
172	NW and N of Bldg. 771	5943	5946	3	1.5	1.33	0.67

IHSS #	LOCATION	FOOTING DRAIN ELEVATION (FT.)	GROUND SURFACE ELEVATION (FT.)	FULLY-SATURATED HEAD (FT.)	HALF-SATURATED HEAD (FT.)	FULLY-SATURATED DISCHARGE (GPM)	HALF-SATURATED DISCHARGE (GPM)
Footing drain - northernmost running E-W out of West side of Building 771							
150.2	W of Bldgs. 771 & 777	5943	5961	18	9	1.33	0.67
172	NW and N of Bldg. 771	Considered unaffected by footing drain due to pavement and opposite slopes					
Footing drain - southernmost running E-W out of West side of Building 771							
150.2	W of Bldgs. 771 & 777	5943	5961	18	9	4.0	2.0
172	NW and N of Bldg. 771	Considered unaffected by footing drain due to pavement and opposite slopes					
Footing Drain - North of Building 771 (runs E-W)							
172	NW and N of Bldg. 771	5941	5944	3	1.5	1.33	0.67
150.1	N of Bldg. 771	Overlaps footing drain (on west end) - will be affected regardless of flow and saturation					
163.2	N of Bldg. 771	5941	5944	3	1.5	0.11	0.05
Footing Drain - South/Central Building 774 (runs E-W and N-S)							
137	S of Bldg. 774	5949	5982	33	16.5	0.47	0.24
150.3	Between Bldgs. 771 & 774	Overlaps footing drain - will be affected regardless of flow and saturation					

IHSS #	LOCATION	FOOTING DRAIN ELEVATION (FT.)	GROUND SURFACE ELEVATION (FT.)	FULLY-SATURATED HEAD (FT.)	HALF-SATURATED HEAD (FT.)	FULLY-SATURATED DISCHARGE (GPM)	HALF-SATURATED DISCHARGE (GPM)
Footing Drain - South/East side of Building 774 (runs E-W)							
137	S of Bldg. 774	5948	5982	34	17	0.37	0.19
Footing Drain - northernmost North of Building 774 (runs E-W)							
150.1	N of Bldg. 771	5946	5944	Footing drain won't affect IHSS - drain elevation greater than IHSS elevation			
northern portion - 139.1(N)	N of Bldg. 774	5946	5936	Footing drain won't affect IHSS - drain elevation greater than IHSS elevation			
163.1	N of Bldg. 774	5946	5940	Footing drain won't affect IHSS - drain elevation greater than IHSS elevation			
172	N of Bldg. 771	Overlaps footing drain - will affect regardless of flow and saturation					
southern portion of 139.1(N)	N of Bldg. 774	5946	5956	10	5	8.9	4.4
Footing Drain - southernmost North of Building 774 (runs E-W)							
southern portion of 139.1(N)	N of Bldg. 774	Overlaps footing drain - will affect regardless of flow and saturation					
172	N of Bldg. 771	5946	5947	1	0.5	0.89	0.44
163.1	N of Bldg. 774	Footing drain won't affect IHSS - drain elevation greater than IHSS elevation					
northern portion of 139.1(N)	N of Bldg. 774	Footing drain won't affect IHSS - drain elevation greater than IHSS elevation					

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May 28, 1992
1801-17

Mr. Jim Shaffer
Advanced Sciences, Inc.
405 Urban Street
Suite 401
Lakewood, CO 80228

5-28-92

Subject: OU8 Information

Dear Mr. Shaffer:

This letter transmits information to you regarding various Operable Unit 8 (OU8) issues. The main issues addressed in this letter are listed below.

- Our comments on figures based on a review of the drawings for OU8 Individual Hazardous Substance Site (IHSS) locations.
- The status of photographs for the various OU8 IHSSs.
- A transmittal of currently available information on footing drains in OU8.

Review of Figures for IHSS Locations

With regard to our review of the OU8 IHSS drawings, we have identified a number of changes that are necessary in order to make the IHSSs locations better agree with currently available data. These changes are identified on the attached figures, and are briefly explained below. These changes, if made, will make the OU8 IHSS locations better agree with those locations presented in the Historical Release Report which has just been completed by my firm. The exception to this rule is your location for IHSS 150.3 which is more accurately presented in your drawings than in the final HRR.

The following comments are based on the colored figures that we obtained from you on May 14, 1992. The IHSSs are discussed in numerical order, references to figures are based on the ASI numbering system presented in the lower left-hand corners of the figures.

IHSS 118.1	Information obtained during HRR activities indicate that the boundaries of this IHSS should be modified to represent a rectangular area just south of the "notch" on the east side of Building 701 to better represent the former location of the tank. These comments are pertinent to Figures IHSS4 and IHSS9.
IHSS 118.2	Appropriate as presented.
IHSS 132	The boundaries for IHSS 132 are not presented on Figures IHSS9 or IHSS4. HRR information indicates that the boundaries for this site should be located east of Building 701 and IHSS 118.1, which is northeast of the IAG location.
IHSS 135	Appropriate as presented.
IHSS 137	Appropriate as presented.
IHSS 138	Information obtained during HRR activities indicate that the boundaries of this IHSS should be located a small distance east of the location presented in Figure IHSS6.
IHSS 139.1	Appropriate as presented.
IHSS 139.2	Appropriate as presented.
IHSS 144	Based on engineering drawings obtained during HRR activities, IHSS 144(N) should be located east of Building 701 and IHSS 132. Since the exact location of the sewer line break between Buildings 777 and 779 is unknown, the boundaries of 144(S) should include more of the alleyway. This comment pertains to Figures IHSS4, IHSS6, and IHSS9.
IHSS 150.1	Appropriate as presented.
IHSS 150.2	Appropriate as presented.
IHSS 150.3	Appropriate as presented.
IHSS 150.4	It was proposed in the HRR that this IHSS be moved to the west side of Building 750, since the IAG location is inaccurate. This comment pertains to Figure IHSS8.

IHSS 150.5 Information obtained during HRR activities indicates that this IHSS is really a duplicate of IHSS 123.2. Therefore, the boundaries have been deleted in the HRR. This comment pertains to Figure IHSS7.

IHSS 150.6 The boundaries of IHSS 150.6 have been modifies to agree with the IAG. However, it is possible that the IAG location is inaccurate. Since we found no hard information in the course of the HRR study contradicting the IAG boundaries, no changes were made to the boundaries of this IHSS. We have indicated to change the boundaries of this IHSS to the south of the boundaries shown on Figure IHSS6, including portions of Buildings 705 and 706. This comment pertains to Figures IHSS6 and IHSS8.

IHSS 150.7 The location of this IHSS is appropriate, however the west end should be modified to a rectangular shape. This comment pertains to Figures IHSS5 and IHSS9.

IHSS 150.8 The boundaries are appropriate as presented.

IHSS 151 The boundaries are appropriate as presented.

IHSS 163.1 Appropriate as presented.

IHSS 163.2 Appropriate as presented.

IHSS 172 Information obtained during HRR activities indicate that the boundaries of this IHSS be extended, since the roadway was contaminated to the west dock of Building 774. This comment pertains to Figure IHSS2.

IHSS 173 It was proposed in the HRR that this IHSS be reduced in size to include only the southwest corner of Building 991. Interviews and documentation indicate that activities which may have affected the site took place only at the south dock of Building 991. This comment pertains to Figure IHSS10.

IHSS 184 The boundaries of IHSS 184 appear to be too far north. The site location was not changed as a result of HRR activities, and should presumably

be the same as that presented in the IAG. This comment pertains to Figure IHSS10.

IHSS 188 Appropriate as presented.

The original colored figures are attached and are marked-up in pencil.

OU8 IHSS Photographs

Photographs were taken of OU8 IHSSs yesterday, May 27, 1992. These photographs were taken by the RFP Photography Department with my help, and will be ready for review approximately June 15, 1992. Two copies of each photograph will be made. A number of IHSS sites will be addressed through the use of low-level aerial photographs from recent years. Low-level aerial photographs at the RFP are done on an annual basis. Should any of the current aerial photographic coverage of OU8 prove inadequate, arrangements can be made for additional low-level aerial photographs to be taken in the month of June. Clearly these low-level aerial photographs will not be ready for a June 22, 1992 deliverable, but they can be ready for the fall deliverable. A number of OU8 IHSSs cannot be adequately covered by aerial photography, and for those we have taken ground-level shots.

Footing Drains

Footing drains in the OU8 area for which relatively complete information exists are located as described below. Also presented with these location descriptions is an evaluation of IHSSs potentially impacted by the footing drains, as well as a description of the locations at which these footing drains could be sampled.

- A footing drain is located along the tunnel that connects Buildings 771 and 776. This footing drain is not identified on any known engineering or utility drawings, but is expected to run along the north-south tunnel the full distance between Buildings 771 and 776. This footing drain is currently inoperative (the water collected by it must be pumped to the ground surface and the pump that does this is currently "locked out"). This footing drain, if operative, has the potential to impact groundwater flow near IHSSs 118.1, 132, 139.1(s), 139.2, 144, and 150.2 in OU8. This footing drain, if operative, would pump collected groundwater to the surface near the northwest corner of Building 701.

- A footing drain is located on the south side (and partially on the west and east sides) of Building 771. This footing drain discharged to South Walnut Creek to the northwest of Building 771 until sometime in the 1970's or 1980's. Drawings and records are available regarding these old discharge points. However, the current discharge from this footing drain is believed to be in the same general location of the Building 774 footing drain discharge to the north of Building 774. I have not yet identified any documentation of this change in discharge point for the Building 771 footing drains, but I have spoken to more than one person who has alluded to this change. The change in discharge point was made during the modification of drainage, roads and parking lots in the general Building 771 and 774 area. These changes have greatly modified this general area. This footing drain has the potential to impact groundwater flow near IHSSs 118.1, 132, 139.1(S), 139.2, 144, and 150.2.

- A footing drain is located on the south side (and partially on the west and east sides) of Building 774. This footing drain daylights on the hillside north of Building 774 near a small pond. This footing drain has the potential to impact groundwater flow near IHSSs 137 and 150.3.

- A footing drain is also located near the southeast corner of Building 559 along a tunnel that connects Building 559 and Building 528. This footing drain daylights a considerable distance northwest from Building 559 (and southwest from Building 771) on the hillside along a drainage that runs to the northeast. This footing drain has the potential to impact groundwater flow near IHSSs 150.5.

As a further step in evaluating the overall impact of these footing drains on the various IHSSs. I suggest that we run a quick paper calculation of the potential "zone of influence" of each of these footing drains. This evaluation will require some of the groundwater parameter information that should currently be available at ASI. The completion of these calculations will help increase the certainty of which IHSSs are potentially impacted by the footing drains, and will help in the identification of missing groundwater parameter information. This type of evaluation is a part of our current scope of work under Initial Evaluation.

I trust that the above is complete enough for your review and evaluation. If you have any questions or need additional clarification on any points, please call.

Sincerely,
DOTY & ASSOCIATES

Frank J. Blaha

Frank J. Blaha

DRAFT

MEMORANDUM

TO: Meeting Attendees

FROM: Frank J. Blaha

DATE: January 19, 1994

RE: Notes of meeting with EG&G personnel on footing drains and related information

In Attendance:

Steve Barros, EG&G
Leslie Dunstan, EG&G
Dan Wistrand, EG&G
Dean Yashan, EG&G (arrived about 11 AM)
Ferrel Hobbs, Jacobs
Dave Landes, Jacobs
Mike Visocky, Jacobs
Frank Blaha, Wright Water Engineers (WWE)

The above people attended a meeting on December 22, 1993 to discuss the information and findings of the Jacobs team regarding footing drains and to determine whether EG&G personnel had additional information of which the Jacobs team was unaware. The meeting focused upon those footing drains for which there seemed to be incomplete or conflicting information or for which there seemed that a better sampling point exists.

The EG&G personnel were interested in the footing drain invert elevations that Jacobs had developed from engineering drawings. This constitutes new information for the EG&G personnel and helps to determine the direction of flow within the footing drains. The direction of flow is useful in establishing a good monitoring point.

This memorandum consists of meeting minutes as well as a summary of all information this author knows of regarding Rocky Flats Plant (RFP) footing drains,

WRIGHT WATER ENGINEERS, INC.

except for data. Data will be addressed in a separate memorandum to follow this one. Specific buildings and issues discussed are presented below.

Building 111: The Jacobs team was concerned about the fact that EG&G personnel have recently been sampling a building sump in the basement of Building 111. During a site walk, EG&G had indicated that the footing drains possibly flowed to this building sump. However, the Jacobs team did not believe that the building sump was connected to the footing drain system. Footing drain elevations generated by Jacobs indicated the low point in the footing drain system was on the opposite side of the building from the sump, making it unlikely that the footing drains flowed into the sump.

EG&G personnel concurred that there is uncertainty related to the footing drains at Building 111. EG&G personnel had been told by Building 111 Utilities personnel that the footing drains had been re-routed to the sanitary sewer system as a part of the construction of Building 115. However, a review of the drawings for construction of Building 115 found no evidence for the re-routing of the drains (all of the pipes were shown as truncated at the Building 115 wall). Further, a number of EG&G personnel have inspected the general area in which the Building 111 footing drain once daylighted and found no pipes or moist areas that could be indicative of the end of the footing drain. It was explained that one of the reasons the building sump in 111 has been sampled is to determine whether there is any connection between silver hits that have been identified in sanitary wastewater treatment plant sludge and a possible silver hit in a Building 111 sump sample. These two hits could indicate a tie-in of the building sump to

HOW? FLOOR DRAINS YES!

footing drains and then to the sanitary wastewater treatment plant. However, EG&G personnel concurred that the building sump was probably not related in any way to the footing drains. After these discussions, it seemed that most reasonable routes of investigation had been pursued and that some questions still remained. However, the Rocky Flats Plant engineer responsible for construction of Building 115 had not yet been contacted, and it is possible that additional information could be available from that person. EG&G personnel indicated that dye testing of the building sump and footing drains at Building 111 will be conducted as a part of the Drain Identification Study (DIS) activities.

SAW A PHOTO OF IT!

POSSIBLE NO CONFIRMATION

Building 124: Based upon engineering drawings obtained by Jacobs, Building 124 (the potable water treatment building) has a footing drain system that flows away from the building to the south. It was generally agreed that this footing drain once daylighted on the hillside south of Building 124 uphill from Woman Creek. However, Jacobs found drawings indicating that the footing drain had been connected to an 18"/24" southeast-running storm drain just southwest of Building 460. This storm drain connects with the other 444/460 storm drains that terminate above the South Interceptor Ditch (SID) just south of Building 664. Thus, flow from this footing drain would be sampled when samples are taken for the 444/447 footing drain.

The POSSIBLE routing of Building 124 footing drain flows into this storm drain appeared to be new information to the EG&G personnel. EG&G personnel had spent VERY LITTLE some time trying to identify the point at which the Building 124 footing drain daylighted on the hillside south of Building

124 but had been unsuccessful in locating the pipe and had found no wet areas on the hillside in the general area in which the pipe had once daylighted. WWE personnel have information on Pond 6 that could be useful in locating the point at which the Building 124 drain once daylighted. This information includes drawing 27006-4, sheet 4 of 12 (Rockwell International Corporation, 1975, Backwash Storage Tanks Layout, RFP Drawing No. 27006-4 sheet 4 of 12, As Built June 18). This drawing indicates that a drain leaving the general Building 124 area and draining to the south was plugged as a portion of the project for which these drawings were completed. This project was a backwash water recycle/management project intended to eliminate any discharge to Woman Creek from the water treatment plant due to NPDES permitting issues. It is WWE's opinion from interviews of personnel involved in this project that the drain from 124 to Woman Creek was plugged or removed, and Drawing 27006-4 supports the statements made by RFP personnel in those interviews. This drawing also indicates that this plug should be effective in preventing discharges from the footing drain to this outfall pipe.

ED MAST HAS A PHOTO OF IT (1969)

It was also conjectured at the meeting that the tie-in of the footing drain to the storm drain should be visible in a stormwater catch basin. No one at the meeting was familiar with that particular catch basin. Further, it was also conjectured that Tom Trujillo, the RFP engineer that had recently been involved in many of the stormwater drainage problems and issues in the 444/460 area, might have additional information on the routing of this footing drain and stormwater drain. Jacobs' attempts to reach Mr. Trujillo had been unsuccessful. It was

also stated that dye testing of the Building 124 footing drain should be helpful in determining the true routing of the flow.

Building 444: Based on drawings recently accessed by Jacobs, the low point on the Building 444 footing drain occurs on the south side of Building 444 just east of Building 449. However, although this is the low point of the footing drain system (at an elevation of 6007.0'), there appears to be no pipe or other conveyance structure to remove the footing drain water from this area. Information obtained from building personnel has indicated that the footing drain flows are collected into a building sump and that the flow from that building sump goes into a second building sump and then the combined flow from that sump is pumped to the process waste treatment system. However, the elevations of the sumps are 6008.4', and thus these sumps are not capable of gravity draining flow from the footing drains on the south side of the building. According to elevations obtained by Jacobs, flow should actually be from the building sumps into the footing drain on the south side of the building, but again there is no conveyance structure related to footing drains shown from that point.

There was general agreement at the meeting that additional information needs to be obtained about the footing drains and building sumps at Building 444. Avenues of investigation that were discussed at the meeting included:

- talking to the Building 374 Process Waste Treatment operators (these people should know

what building sumps and other connections are made to the process waste collection system),

- talking to Tom Trujillo, an RFP engineer who has been involved in many drainage modifications in the 400-area of RFP,

- determining through utility drawing review and site inspections whether any current or original process waste treatment collection system valve vaults occur near the south side of Building 444, and

- inspecting the storm drain catch basins and drainage structures in the area to determine whether or not any pipes can be found daylighting to any of these structures.

A 1952 document sheds some light on the issue of footing drain flows from Building 444. This document (Shepherd, B.P., "Liquid Waste Disposal at Rocky Flats Plant," Dow Chemical Company, Internal Memorandum to F.H. Langell, June 13, 1952) gives some indication as to the original operation of both the footing drain system as well as the waste management system:

> (b) Footing Drains. Water from these drains should be very small in quantity and will be discharged into the 120-gallon waste sump located in the basement of the building (see paragraph "d" below). Normally, water from the footing drains would be discharged to the

> nearest water course or to the sanitary sewer system, but the hydraulics of these systems with relation to each other is such as to make it impractical to discharge footing drain water in accordance with normal practices.

and

> (d) All Other Wastes. The other wastes not memioned above consist of a few floor drains in the basement of the foundry, drains from slop sinks, metallurgical laboratory sinks, a few drinking fountains and a few other miscellaneous sources. These wastes will be collected in a separate drain system and discharged into a 1,200-gallon sump located in the basement. It is expected that approximately 800 gallons per day of these wastes will be collected in this sump. A float-operated pump will empty the sump by pumping the wastes through a suitable filter system. It is expected that one passage through the filters will reduce any radioactivity below the accepted limits. The wastes will pass from the filter into a second retention basin, at which point the wastes will be sampled. Should the level of activity be below accepted limits, the wastes will be discharged by gravity into the sanitary sewerage system. Should the wastes exceed the accepted limits, it will be necessary to pass them through the filter system again.

The existence of the two sumps in the basement of 444 and the fact that the footing drains flowed to these sumps due to unfavorable hydraulics, appear to make more sense based on the above passages from the Shepherd document.

Building 707: Jacobs personnel have obtained engineering drawings indicating the existence and routing of footing drains associated with Building 707. EG&G Surface Water personnel have not previously accessed these engineering drawings.

The routing of the footing drains and the current sampling point employed by the EG&G Surface Water group to monitor the Building 707 footing drains were both discussed. There was general agreement that some modifications in sampling points may need to be made in order to monitor Building 707 footing drain flows. EG&G Surface Water personnel had been sampling water in a catch basin south of Building 707 and north of a cooling tower as potentially representative of footing drain flows. This sampling point was established based upon an interpretation of historical documentation related to the footing drains from the 1970s and 1980s. Engineering drawings accessed by Jacobs indicated that the footing drain flows pass north of the catch basin sampled by EG&G personnel and that the flows from the catch basin also enter this same pipe. It is conjectured that there may be some access points to the pipes identified by Jacobs as carrying footing drain flows, but additional research on this issue will be needed.

Building 771: The locations and sampling of Building 771 footing drains were discussed at the meeting. The footing drains from Building 771 historically flowed to the northwest from the Building. However, significant changes in drainage and drainage structures occurred to the northwest of Building 771 as a part of the Protected Area (PA) construction of the early 1980s. Footing drain drawings that address Building 771 footing drains prior to construction of the PA indicate three separate discharges of footing drain flows to North Walnut Creek.

The EG&G Surface Water Group is currently sampling a manhole just west of the Carpenter Shop of Building 771 as being indicative of some

of the Building 771 footing drain flows. Drawings indicate that some of the footing drains on the west and south sides of Building 771 flow to this manhole.

However, other footing drain flows from Building 771 existed prior to PA construction due north of this manhole. These flows entered a manhole (designated as manhole #3 on some drawings) just west of Building 778. An 18"-diameter vitrified clay pipe is indicated as flowing northwest from this manhole, and this constituted the original discharge of footing drains on the east, north, and portions of the west side of Building 771. However, drawings obtained by Jacobs related to PA construction indicate that the discharge pipe from this manhole has been plugged. These drawings do not indicate the current location of the footing drain discharge related to manhole #3.

Long-time employees of Building 771 or of RFP have told both EG&G Surface Water personnel and employees of WWE that at least some of the Building 771 footing drain flows have been routed to the east of their original discharge locations. In general, these personnel have indicated that the footing drains now flow into the small pond just north of Building 774. In the general vicinity of this pond, a number of pipes have been identified as daylighting, but the source of all of these pipes has never been successfully tracked down. This small pond is partly being addressed by Operable Unit 4 site characterization and remediation activities because the flows from this pond had been, until late 1992, collected by the french drain system located north of the solar ponds. Although attempts have been made by both EG&G Surface Water personnel and WWE employees, no drawings have yet

been located that corroborate the re-routing of footing drain flows to the small pond north of Building 774.

There was general agreement in the meeting that additional work is needed to obtain better information on the Building 771 footing drains.

Building 774: The footing drains associated with Building 774 were discussed. The author of this memo was not directly involved in this conversation, but there appeared to be general agreement at the meeting that most of the Building 774 footing drains flow to the small pond north of Building 774. At least some of the flows into this small pond are being monitored as footing drain flows, but there was some uncertainty as to the exact pipes currently carrying footing drain flows. There have been a number of additions to Building 774 and a number of construction projects in the general Building 774 area. Many of these projects could have encountered footing drains and required the rerouting of those drains. Drawings do indicate an additional footing drain outfall to the east of the small pond.

The following information on Building 774 is based entirely on this author's memory of events in 1987/1988. A construction project in approximately 1987/1988 involved the expansion/addition of a loading dock on the north side of Building 774. The construction activities for the foundation for this structure encountered a subsurface pipe which was cut and blocked by the foundation. Shortly thereafter the basement of Building 774 began to experience seepage of water through the floor/walls of the building. A small sump was constructed through the floor of the building to allow for sampling of the seepage

water and to allow for a more centralized management of the water. Sampling of the water collected in the sump indicated that the water was elevated in gross alpha activity. I believe that the water collected in the sump was being pumped into process waste tanks for appropriate treatment at that time, but the situation may have changed since my involvement with this project.

A 1989 drawing has been obtained by WWE (Rockwell International, 1989, Replace Tanks 66, 67, and 68, Phase I, Site Utility Plan, RFP Drawing No. 38544-101, Sheet 6, Original Issue June 12) that indicates that a buried footing drain manhole exists to the east of Building 774, apparently buried at a depth of approximately 10 feet, as well as the existence of a footing drain clean-out just east of Tank 68. The placement of the manhole is noted to be based on verbal information. Although most of the information on this drawing is related to the installation of new footing drains around the new construction described in the drawing, the references to existing footing drain structures could be of use in future investigations. The project described in this drawing was never built.

Building 779: It was verified in the meeting that the EG&G personnel had been sampling the corrugated metal pipe (CMP) that daylights on the solar pond hillside in the general vicinity of the Building 779 footing drain. However, no known footing drain flows are conveyed in the CMP, only stormwater from the Building 779 area. EG&G personnel were unaware of the smaller pipe that daylights east of the CMP, and it was agreed that this smaller pipe is in the correct location for the footing drain outfall based on extant footing drain drawings

believed to have been created by Nancy Hoffman (now Nancy Kirk) of RFP. A seep typically present immediately down the hill from the small pipe outfall has been established as a surface water monitoring point. Data from this surface water monitoring station should be present in the 1989 and 1990 "Surface Water and Sediment Geochemical Characterization" reports. (EG&G sampling personnel were shown the smaller pipe as part of a field trip the next morning. The pipe that day was dry, although a seep with a small quantity of flow was present just downhill from the pipe. Flow from the pipe had been noted during a storm event in the spring of 1993.)

Building 865: The footing drains associated with this building were discussed in some detail as well as their possible connection to the pumped discharge that daylights near the guard post (Building 888). The footing drains associated with Building 865 are shown to flow to a manhole near the main entrance to Building 865 on engineering drawings obtained by Jacobs personnel. This manhole is the same as the manhole that long-term building personnel had indicated as collecting footing drain flows. Water that reaches this manhole flows to the sanitary sewage treatment plant (Building 995). Based on the information presented at the meeting it seemed that many questions about the Building 865 footing drains will be adequately addressed by this project.

The pumped discharge that daylights near the guard post appears to be associated with a roof drain sump in the general area of the main door to Building 865. However, additional definition of the source of

the pumped discharge is necessary. It is possible that some footing drain or other flows could be associated with this pumped discharge.

Building 881: A number of issues were discussed related to Building 881 footing drains. It was first discussed that the main footing drain that flows directly to the south of the building was being separately collected and treated as a part of Operable Unit 1 IM/IRA activities. However, the possible connection of Building 883 footing drains to the Building 881 footing drains was brought up by Jacobs personnel. Some engineering drawings accessed by Jacobs allude to such a connection. EG&G Surface Water personnel were unaware of any possible connection between the Building 883 and Building 881 footing drains.

More recent information generated by Jacobs after the meeting with the Surface Water Division raises concerns about a possible second footing drain associated with Building 881. This information indicates a large drain that leaves the general 881 Building area and flows to the southeast. noted as a storm drain on RFP Utility Drawings, could possibly also serve as a footing drain. This pipe appears to have drained to old Pond 8 which previously existed southeast of Building 881. This large diameter pipe (18-inches) is also present beneath Building 881 - and is also labeled as a storm drain in those areas. This type of configuration (storm drains beneath a building) is unique in our experience. It is conjectured that this pipe may be serving as a footing or other drain where it is present under the building. Further research is needed on this issue.

Building 883: There was general agreement that the exact location and configuration of footing drains for this building requires additional investigation. Jacobs obtained engineering drawings not previously available to EG&G Surface Water personnel which indicated that the Building 883 footing drains once flowed to a sump off the southeast corner of the building. However, an addition was constructed on the southeast corner of Building 883 and this construction might have modified the footing drain configuration. Additional research needs to be done on Building 883 drains.

Building 991: At Building 991 EG&G has recently been sampling a sump located in southeast corner of the building. It had been indicated to EG&G personnel that the footing drain flowing to the east along the north side of Building 991 had been re-routed into this sump. However, this re-routing seems unlikely since new piping would have needed to have been laid under Building 991 or within Building 991.

It is ~~believed~~ known that prior to construction of the PA the footing drain north of Building 991 flowed directly to the east and daylighted in a drainage. Re-routing of this pipe, if it occurred, probably took place as a part of PA construction. The area east of Building 991 is currently poorly drained, and a considerable amount of standing water is typically present. Recent inspections by EG&G and WWE personnel have been unable to locate any pipes daylighting in the general area where these footing drains should be found, but standing water and general marshiness of the area could easily have prevented identification of the pipe. A likely scenario is, that during PA

construction, the footing drains were routed to the sanitary wastewater treatment plant. A sanitary wastewater pipeline passes northeast from Building 991, and connection of the footing drain to this system would have been easy. Another likely scenario is that the Building 991 footing drains were re-routed during PA construction into the pipes/culverts that carry South Walnut Creek flow past 991. Some of these piped flows do not daylight until immediately south of Building 995.

A roof drain near the northeast corner of Building 991, along with footing drain flows, has been conjectured to be tied into the sanitary wastewater collection system in that area. The roof drain is piped below ground approximately 20 feet from a sanitary wastewater system pipeline and very near a sanitary wastewater system manhole. Dean Yashan related the results of a dye test on this roof drain conducted to try to confirm that it was flowing to the sanitary wastewater treatment plant. A considerable amount of dye was dumped down the roof drain using a hose. Inspections of the STP influent and of the drainage east of Building 991 never detected dye in either of these locations. Thus, the routing of this roof drain, and any footing drains that might also be connected to it, is unknown at this time.

The people at the meeting agreed that additional work needs to be done to determine the fate of the Building 991 footing drain flows. but this is hampered by the fact that most Building 991 personnel, including the Building Manager, are relatively new to RFP. F.D. Hobbs suggested that Don Goetmen was a Building 991 Building Manager with a long-term history in the building and that Mr.

Goetman may have additional information on the fate of the footing drains.

A contract between WWE and EG&G is being negotiated for WWE to design changes in the drainage system east of Building 991. These activities have been prompted by the fact that Building 991 is in danger of being flooded during certain storm events. I believe that the intent is for these drainage changes to be constructed by the end of calendar year 1994. During the course of these activities additional information may be found on the Building 991 footing drain.

Solar Ponds: For completeness' sake I am including the following information on footing drain structures (drain tiles) near the solar ponds. This information was not discussed at the meeting of December 22, 1993, but I am including it so that personnel with footing drain responsibilities will be aware of it. The existence of these drain tiles (some personnel might consider these drain tiles to be footing drains, of a sort) is known to, and is being addressed by, the personnel working on Operable Unit 4 activities. The solar ponds constitute Operable Unit 4.

Three drain tiles related to the solar ponds exist in the immediate vicinity of the solar ponds. These drain tiles are located immediately east of the 207B Solar Ponds, between Solar Ponds 207A and 207B, and immediately beneath the center, in an east-west direction, of Solar Pond 207C. All of these drain tiles flow to the north where they discharge/daylight on the Solar Pond hillside. The drain tile beneath Solar Pond 207C was built as a leak detection pipe.

The drain tile east of the 207B Solar Ponds is indicated on some engineering drawings from the early 1960s related to re-design of the 207B Solar Ponds. Some discrepancies between the engineering drawings and actual field conditions do exist. This drain tile is shown as extending to the southern end of the 207B Solar Ponds.

The drain tile between Solar Ponds 207A and 207B was not indicated on any engineering drawings and was installed due to seepage problems encountered during original construction of the 207B Solar Ponds. This pipe is conjectured to extend to the southern end of Solar Ponds 207A and 207B, but this has never been verified.

In addition to the above drain tiles, there also exists a large and elaborate french drain system north of the Solar Ponds.. This french drain system was installed to collect groundwater flows as well as some surface water seep flows. This system is indicated on engineering utility drawings.

This represents events of the meeting and related information to the best extent my memory allows. Please let me know if any changes are needed.

FJB/lal
B:\FOOTD.MTG

MEMORANDUM:

DATE: March 9,1994
TO: Andy Carpenter, Jacobs Engineering Group
FROM: Steve Barros, EG&G, Surface Water Division
SUBJECT: UPDATE ON FUTURE SAMPLING

Saturday March 12,1994 is the anticipated start date for the discharge of A-4 Pond and the transfer of B-5 Pond. Please instruct the samplers to collect a total chrome sample along with the normal sample parameters at each pond.

Monday March 14, 1994 Stan May from CDH will be on plantsite for the monthly sample collection at the STP. Also samples will be collected at the A-4 discharge for CDH's monthly list. The STP samples will be collected first at about 9:30 am and then A-4 about 10:00 am.

Sunday March 13, 1994 is the scheduled start date for the collection of the quarterly footing drain and building sump samples. The dates and locations to be sampled are as follows:

SUNDAY MARCH 13,1994
FD 371-3

FD 371 MC

BS 707-2

FD 771-1

FD 774-1

FD 779-1

FD 790

FD 910

FD & BS SAMPLE LOCATIONS FOR WEEK OF MARCH 14, TO MARCH 18,1994

FD 991-2 Ron Holmes - Steve will set

FD 111-2

SAMPLE LOCATIONS FOR SUNDAY MARCH 20, 1994

FD 444-460 BS 865-1

FD 883-1 FD 865-2

PARAMETERS TO BE SAMPLED FOR AT FD & BS SITES

ALPHA/BETA	VOA's (METHOD 524.2)
METALS (AA/ICP)	SEMI VOL's
NITRATES	TDS
CONDUCTIVITY (IN FIELD)	

If there any questions please contact me at X5288 or D4679.

cc.

A. K. Brown

L. A. Dunstan

FOOTING DRAIN & BUILDING SUMP SAMPLING FOR DECEMBER 1993

SUNDAY DECEMBER 5, 1993

FD 371-3

FD 371 MC

BS 707-2

FD 771-1

FD 774-1

FD 779-1

FD 790

FD 910

WEEK OF DECEMBER 6 TO DECEMBER 10, 1993

FD 991-2

FD 111-2

SUNDAY DECEMBER 12, 1993

FD 444-460

FD 883-1

FD 886-1

FD 886-2

BS 865-1

FD 865-2

PARAMETERS TO BE SAMPLED FOR

ALPHA/BETA	VOA's (METHOD 524.2)
METALS (AA/ICP)	SEMI VOL's
NITRATES	Pu,U,Am (8 LITERS FD 886-1 & 886-2 ONLY)
TDS	

SAMPLING LOG SHEET # 3	Dist: S. Barros/L. Dunstan	SAMPLERS:	S Barros	R.C. Holmes
DATE: 09/11/93	WEATHER: Clear, Warm	SIGNATURES:	[signature]	[signature]

Site: FOOTING DRAIN 444-460, QUA.	Site: Footing Drain 883-1, QUA.	Site: Footing Drain 886-1, QUA.	Site: Footing Drain 886-2, QUA.
VW02069JE REAL TIME: 8:40	VW02070JE REAL TIME: 1145	VW02071JE REAL TIME: 9:20	VW02072JE REAL TIME: 9:30
☑ Semi V CLP 3x1L AG, 4C, 881 ///	☑ Semi V CLP 3x1L AG, 4C, 881 ///	☑ Semi V CLP 3x1L AG, 4C, 881 ///	☑ Semi V CLP 3x1L AG, 4C, 881 ///
☑ HSL Metals 1L P, HNO3, 881 ///	☑ HSL Metals 1L P, HNO3, 881 ///	☑ HSL Metals 1L P, HNO3, 881 ///	☑ HSL Metals 1L P, HNO3, 881 ///
☑ Gross α/β 1L P, HNO3, 881 ///	☑ Gross α/β 1L P, HNO3, 881 ///	☑ Gross α/β 1L P, HNO3, 881 ///	☑ Gross α/β 1L P, HNO3, 881 ///
☑ VOA 524.2 reg. 2x40ML AG, 4C, 881 ///	☑ VOA 524.2 reg. 2x40ML AG, 4C, 881 ///	☑ Pu;Am;U 2x4L C, HNO3, 123 ///	☑ Pu;Am;U 2x4L C, HNO3, 123 ///
☑ TDS 500ML P, 4C, 881 ///	☑ TDS 500ML P, 4C, 881 ///	☑ ~~VOA CLP~~ 524.2 reg 2x40ML AG, 4C, 881 ///	☑ VOA 524.2 reg. 2x40ML AG, 4C, 881 ///
☑ NO3 500ML P, H2SO4/4C, 881 ///	☑ NO3 500ML P, H2SO4/4C, 881 ///	☑ TDS 500ML P, 4C, 881 ///	☑ TDS 500ML P, 4C, 881 ///
If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	☑ NO3 500ML P, H2SO4/4C, 881 ///	☑ NO3 500ML P, H2SO4/4C, 881 ///
		If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP
Field Parameters:	Field Parameters:	Field Parameters:	Field Parameters:
PH= 7.93 (6.0-9.0 S.U.)	PH= 8.23 (6.0-9.0 S.U.)	PH= 7.74 (6.0-9.0 S.U.)	PH= 8.02 (6.0-9.0 S.U.)
SC= .585 MS/CM	SC= .204 MS/CM	SC= .705 MS/CM	SC= .708 MS/CM
TEMP(AIR)= 24.4 °C	TEMP(AIR)= 29.8 °C	TEMP(AIR)= 26.0 °C	TEMP(AIR)= 27.0 °C
TEMP(H2O)= 16.7 °C	TEMP(H2O)= 19.4 °C	TEMP(H2O)= 22.6 °C	TEMP(H2O)= 21.8 °C
Comments:	Comments:	Comments:	Comments:

SAMPLING LOG SHEET # 4	Dist: S. Barros/L. Dunstan	SAMPLERS:	S Barros	R.C. Holmes
DATE: 09/11/93	WEATHER: Clear, warm	SIGNATURES:	S Barros	Ron C Holmes

Site: BUILDING 865 SUMP 1, QUA.	Site: Footing Drain 865-2, QUA.
VW02073JE REAL TIME: ~~10:55~~ 11:05	VW02074JE REAL TIME: 10:35
☑ Semi V CLP 3x1L AG, 4C, 881	☑ Semi V CLP 3x1L AG, 4C, 881
☑ HSL Metals 1L P, HNO3, 881	☑ HSL Metals 1L P, HNO3, 881
☑ Gross α/β 1L P, HNO3, 881	☑ Gross α/β 1L P, HNO3, 881
☑ VOA 524.2 reg. 2x40ML AG, 4C, 881	☑ VOA 524.2 reg. 2x40ML AG, 4C, 881
☑ TDS 500ML P, 4C, 881	☑ TDS 500ML P, 4C, 881
☑ NO3 500ML P, H2SO4/4C, 881	☑ NO3 500ML P, H2SO4/4C, 881
If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP
Field Parameters:	Field Parameters:
PH= 8.40 (6.0-9.0 S.U.)	PH= 8.29 (6.0-9.0 S.U.)
SC= 1.109 MS/CM	SC= .784 MS/CM
TEMP(AIR)= 29.0 °C	TEMP(AIR)= 28.5 °C
TEMP(H2O)= 20.6 °C	TEMP(H2O)= 20.9 °C
Comments:	Comments:

SAMPLING LOG SHEET # 3	Dist: S. Barros/L. Dunstan	SAMPLERS:	LJC	DB
DATE: 09/16/93	WEATHER: COOL CALM CLEAR	SIGNATURES:		

Site: 995 EFFLUENT, ROUT

VW02067JE REAL TIME:

☐ Pu;Am;U
4L C, HNO3, 123 ✓

If any were not taken, circle a reason:
DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR
BRKBOT VEHIC EQUIP NOTSHP

Comments:

Site: C-1 POND, ROUT

VW02068JE REAL TIME:

☐ Pu;Am;U
4L C, HNO3, 123

If any were not taken, circle a reason:
DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR
BRKBOT VEHIC EQUIP NOTSHP

Comments:

Site: WALNUT & INDIANA, ROUT

VW02115JE TIME:

Field Parameters:

GAGEHT1(N)=	FT
GAGEHT2(S)=	FT
TOTALIZER1(N)=	DIAL
TOTALIZER2(S)=	DIAL

Comments:

Site: FOOTING DRAIN 111-1, QUA.

VW02116JE REAL TIME: 1030

☒ Semi V CLP
3x1L AG, 4C, 881 ✓ ✓

☒ HSL Metals
1L P, HNO3, 881 ✓ ✓

☒ Gross α/β
1L P, HNO3, 881 ✓ ✓

☒ VOA 524.2 reg.
3x40ML AG, 4C, 881 ✓ ✓

☒ TDS
500ML P, 4C, 881 ✓ ✓

☒ NO3
500ML P, H2SO4/4C, 881 ✓ ✓

If any were not taken, circle a reason:
DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR
BRKBOT VEHIC EQUIP NOTSHP

Field Parameters:

PH=	8.31	(6.0-9.0 S.U.)
SC=	.084	MS/CM
TEMP(AIR)=	—	°C
TEMP(H2O)=	26.3	°C

Comments:

SAMPLING LOG SHEET # 4	Dist: S. Barros/L. Dunstan	SAMPLERS: LHC	DSR
DATE: 09/16/93	WEATHER: cool, clear, calm	SIGNATURES:	

Site: Footing Drain 991-1, QUA.

VW02117JE REAL TIME 0915

- [ ] Semi V CLP 3x1L AG, 4C, BBI
- [ ] HSL Metals 1L P, HNO3, BBI
- [ ] Gross α/β 1L P, HNO3, BBI
- [ ] VOA 524.2 reg. 3x40ML AG, 4C, BBI
- [ ] TDS 500ML P, 4C, BBI
- [ ] NO3 500ML P, H2SO4/4C, BBI

If any were not taken, circle a reason:
DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP

Field Parameters:

PH=	7.9	(6.0-9.0 S.U.)
SC=	0.433	MS/CM
TEMP(AIR)=	Inside	°C
TEMP(H2O)=	20.2	°C

Comments:

Site: 750 CULVERT (OP), QUA.

VW02125JE REAL TIME: 0950

- [x] HSL Metals 1L P, HNO3, BBI

If any were not taken, circle a reason:
DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP

Comments:

SAMPLING LOG SHEET # 3	Dist: S. Barros/L. Dunstan	SAMPLERS:	L. ANDY CARPENTER	STEVE BARROS
DATE: 09/18/93	WEATHER: Cloudy, cool, rain	SIGNATURES:	[signature]	

Site: FOOTING DRAIN 371-3, QUA.	Site: 371 Metal Culvert, QUA.	Site: BUILDING 707 SUMP 2, QUA.	Site: Footing Drain 771-1, QUA.
VW02134JE REAL TIME: 1010	VW02135JE REAL TIME: 1020	VW02136JE REAL TIME: 1050	VW02137JE REAL TIME: 0955
☒ Semi V CLP 3x1L AG, 4C, 881	☒ Semi V CLP 3x1L AG, 4C, 881	☒ Semi V CLP 3x1L AG, 4C, 881	☐ Semi V CLP 3x1L AG, 4C, 881
☒ HSL Metals 1L P, HNO3, 881	☒ HSL Metals 1L P, HNO3, 881	☒ HSL Metals 1L P, HNO3, 881	☐ HSL Metals 1L P, HNO3, 881
☒ Gross α/β 1L P, HNO3, 881	☒ Gross α/β 1L P, HNO3, 881	☒ Gross α/β 1L P, HNO3, 881	☐ Gross α/β 1L P, HNO3, 881
☒ VOA 524.2 reg. 2x40ML AG, 4C, 881	☒ VOA 524.2 reg. 2x40ML AG, 4C, 881	☒ VOA 524.2 reg. 2x40ML AG, 4C, 881	☐ VOA 524.2 reg. 2x40ML AG, 4C, 881
☒ TDS 500ML P, 4C, 881	☒ TDS 500ML P, 4C, 881	☒ TDS 500ML P, 4C, 881	☐ TDS 500ML P, 4C, 881
☒ NO3 500ML P, H2SO4/4C, 881	☒ NO3 500ML P, H2SO4/4C, 881	☒ NO3 500ML P, H2SO4/4C, 881	☐ NO3 500ML P, H2SO4/4C, 881
If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP
Field Parameters: ✓	Field Parameters: ✓	Field Parameters: ✓	Field Parameters: ✓
PH= 6.9 (6.0-9.0 S.U.)	PH= 7.1 (6.0-9.0 S.U.)	PH= 8.8 (6.0-9.0 S.U.)	PH= (6.0-9.0 S.U.)
SC= 0.591 MS/CM	SC= 0.233 MS/CM	SC= 0.584 MS/CM	SC= MS/CM
TEMP(AIR)= 9.2 °C	TEMP(AIR)= 10.0 °C	TEMP(AIR)= 10.0 °C	TEMP(AIR)= °C
TEMP(H2O)= 16.0 °C	TEMP(H2O)= 19.4 °C	TEMP(H2O)= 13.7 °C	TEMP(H2O)= °C
Comments:	Comments:	Comments:	Comments: Grate clogged with mud.

SAMPLING LOG SHEET # 4	Dist: S. Barros/L. Dunston	SAMPLERS:	L. ANDY CARPENTER	STEVE BARROS
DATE: 09/18/93	WEATHER: Cloudy, cool, rain	SIGNATURES:	[signature]	

Site: FOOTING DRAIN 774-1, QUA.	Site: FOOTING DRAIN 779-1, QUA.	Site: Footing Drain 790, QUA.	Site: Footing Drain 910, QUA.
VW02138JE REAL TIME: 0924	VW02139JE REAL TIME: 0920	VW02140JE REAL TIME: 0950	VW02141JE REAL TIME: 0900
☒ Semi V CLP 3x1L AG, 4C, 881 ✓ ✓ ✓	☐ Semi V CLP 3x1L AG, 4C, 881 ✓ ✓ ✓	☐ Semi V CLP 3x1L AG, 4C, 881 ✓ ✓ ✓	☒ Semi V CLP 3x1L AG, 4C, 881 ✓ ✓ ✓
☒ HSL Metals 1L P, HNO3, 881 ✓ ✓ ✓	☐ HSL Metals 1L P, HNO3, 881 ✓ ✓ ✓	☐ HSL Metals 1L P, HNO3, 881 ✓ ✓ ✓	☒ HSL Metals 1L P, HNO3, 881 ✓ ✓ ✓
☒ Gross α/β 1L P, HNO3, 881 ✓ ✓ ✓	☐ Gross α/β 1L P, HNO3, 881 ✓ ✓ ✓	☐ Gross α/β 1L P, HNO3, 881 ✓ ✓ ✓	☒ Gross α/β 1L P, HNO3, 881 ✓ ✓ ✓
☒ VOA ~~CLP~~ 524.2 2x40ML AG, 4C, 881 ✓ ✓ ✓	☐ VOA 524.2 reg. 2x40ML AG, 4C, 881 ✓ ✓ ✓	☐ VOA 524.2 reg. 2x40ML AG, 4C, 881 ✓ ✓ ✓	☒ VOA 524.2 reg. 2x40ML AG, 4C, 881 ✓ ✓ ✓
☒ TDS 500ML P, 4C, 881 ✓ ✓ ✓	☐ TDS 500ML P, 4C, 881 ✓ ✓ ✓	☐ TDS 500ML P, 4C, 881 ✓ ✓ ✓	☒ TDS 500ML P, 4C, 881 ✓ ✓ ✓
☒ NO3 500ML P, H2SO4/4C, 881 ✓ ✓ ✓	☐ NO3 500ML P, H2SO4/4C, 881 ✓ ✓ ✓	☐ NO3 500ML P, H2SO4/4C, 881 ✓ ✓ ✓	☒ NO3 500ML P, H2SO4/4C, 881 ✓ ✓ ✓
If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP
Field Parameters: ✓	Field Parameters: ✓	Field Parameters: ✓	Field Parameters: ✓
PH= 7.0 (6.0-9.0 S.U.)	PH= (6.0-9.0 S.U.)	PH= (6.0-9.0 S.U.)	PH= 6.7 (6.0-9.0 S.U.)
SC= 0.316 MS/CM	SC= MS/CM	SC= MS/CM	SC= 0.533 MS/CM
TEMP(AIR)= 7.0 °C	TEMP(AIR)= °C	TEMP(AIR)= °C	TEMP(AIR)= 7.2 °C
TEMP(H2O)= 12.5 °C	TEMP(H2O)= °C	TEMP(H2O)= °C	TEMP(H2O)= 16.2 °C
Comments:	Comments:	Comments:	Comments:

SAMPLING LOG SHEET # 3	Dist: S. Barros/L. Dunstan	SAMPLERS:	S Barros	LA Cuph
DATE: 12/05/93	WEATHER: Cool / windy	SIGNATURES:	S Barros	[illegible]

Site: 995 EFFLUENT, ROUT
Log #3 has more 995EFF
VW02835JE DUP | TIME:

- ☐ Gross α/β — 1L P, HNO3, 881
- ☐ Tritium(H3) — 4OZ P, NO PRSV, 123
- ☐ NO3/NO2 — 500ML P, H2SO4/4C, 881 (BB)
- ☐ TOC — 125ML AG, H2SO4/4C, 881

If any were not taken, circle a reason:
DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP

Comments:

Site: EB995 EFFLUENT, ROUT
Log #3 has more 995EFF
VW02836JE RNS | TIME:

- ☐ Gross α/β — 1L P, HNO3, 881
- ☐ Tritium(H3) — 4OZ P, NO PRSV, 123
- ☐ NO3/NO2 — 500ML P, H2SO4/4C, 881 (BB)
- ☐ TOC — 125ML AG, H2SO4/4C, 881

If any were not taken, circle a reason:
DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP

Comments:

Site: 995 EFFLUENT, ROUT
VW02837JE SPLT | TIME:

- ☐ Gross α/β — 1L P, HNO3, TMAN
- ☐ Tritium(H3) — 4OZ P, NO PRSV, TMAN
- ☐ Rad Screen — 125ML P, 4C, TMAN (BB)
- ☐ NO3/NO2 — 500ML P, H2SO4/4C, RFWG
- ☐ TOC — 125ML AG, H2SO4/4C, RFWG

If any were not taken, circle a reason:
DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP

Comments:

Site: FOOTING DRAIN 371-3, QUA.
VW02838JE REAL | TIME: 9:30

- ☑ Semi V CLP — 1L AG, 4C, 881
- ☑ HSL Metals — 1L P, HNO3, 881
- ☑ Gross α/β — 1L P, HNO3, 881
- ☑ VOA 524.2 com. — 3x40ML AG, 4C, 881
- ☑ TDS — 500ML P, 4C, 881
- ☑ NO3 — 500ML P, H2SO4/4C, 881

If any were not taken, circle a reason:
DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP

Field Parameters:

PH=	7.54	(6.0-9.0 S.U.)
SC=	.794	MS/CM
TEMP(AIR)=	4.1	°C
TEMP(H2O)=	14.7	°C

Comments:
STD 7.04
CND .981

SAMPLING LOG SHEET # 4	Dist: S. Barros/L. Dunstan	SAMPLERS:	S Barros	LA Cimpat
DATE: 12/05/93	WEATHER: Cool / windy	SIGNATURES:	S Barros	[illegible]

Site: 371 Metal Culvert, QUA.	Site: BUILDING 707 SUMP 2, QUA.	Site: Footing Drain 771-1, QUA.	Site: FOOTING DRAIN 774-1, QUA.
VW02839JE REAL TIME: 9:10	VW02840JE REAL TIME: 850	VW02841JE REAL TIME: 9:45	VW02842JE REAL TIME: 9:55
☑ Semi V CLP 1L AG, 4C, 881	☑ Semi V CLP 3x1L AG, 4C, 881	☐ Semi V CLP 1L AG, 4C, 881	☑ Semi V CLP 1L AG, 4C, 881
☑ HSL Metals 1L P, HNO3, 881	☑ HSL Metals 1L P, HNO3, 881	☐ HSL Metals 1L P, HNO3, 881	☑ HSL Metals 1L P, HNO3, 881
☑ Gross α/β 1L P, HNO3, 881	☑ Gross α/β 1L P, HNO3, 881	☐ Gross α/β 1L P, HNO3, 881 (82)	☑ Gross α/β 1L P, HNO3, 881
☑ VOA 524.2 com. 3x40ML AG, 4C, 881	☑ VOA 524.2 com. 3x40ML AG, 4C, 881	☐ VOA 524.2 com. 3x40ML AG, 4C, 881	☑ VOA 524.2 com. 3x40ML AG, 4C, 881
☑ TDS 500ML P, 4C, 881	☑ TDS 500ML P, 4C, 881	☐ TDS 500ML P, 4C, 881	☑ TDS 500ML P, 4C, 881
☑ NO3 500ML P, H2SO4/4C, 881	☑ NO3 500ML P, H2SO4/4C, 881	☐ NO3 500ML P, H2SO4/4C, 881	☑ NO3 500ML P, H2SO4/4C, 881
If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP
Field Parameters: STD 7.10	Field Parameters: STD 7.08	Field Parameters:	Field Parameters:
PH= 8.09 (6.0-9.0 S.U.)	PH= 8.54 (6.0-9.0 S.U.)	PH= (6.0-9.0 S.U.)	PH= 8.30 (6.0-9.0 S.U.)
SC= .255 MS/CM	SC= 0.65 MS/CM	SC= MS/CM	SC= .470 MS/CM
TEMP(AIR)= 1.9 °C	TEMP(AIR)= ~~+~~ 0.1° °C	TEMP(AIR)= °C	TEMP(AIR)= 1.5 °C
TEMP(H2O)= 11.8 °C	TEMP(H2O)= ~~6.5~~ 8.5 °C	TEMP(H2O)= °C	TEMP(H2O)= ~~4.0~~ 2.2 °C
Comments:	Comments:	Comments:	Comments: STD 7.10 CND .983

SAMPLING LOG SHEET # 5	Dist: S. Barros/L. Dunstan	SAMPLERS:	S Barros / LA Crosby
DATE: 12/05/93	WEATHER: Cool / windy	SIGNATURES:	S Barros / [illegible]

Site: FOOTING DRAIN 779-1, QUA.	Site: Footing Drain 790, QUA.	Site: Footing Drain 910, QUA.
VW02B43JE REAL TIME: 9:50	VW02B44JE REAL TIME: 9:50	VW02B45JE REAL TIME: 10:10
☐ Semi V CLP 1L AG, 4C, 8B1	☐ Semi V CLP 1L AG, 4C, 8B1	☑ Semi V CLP 1L AG, 4C, 8B1
☐ HSL Metals 1L P, HNO3, 8B1	☐ HSL Metals 1L P, HNO3, 8B1	☑ HSL Metals 1L P, HNO3, 8B1
☐ Gross α/β 1L P, HNO3, 8B1	☐ Gross α/β 1L P, HNO3, 8B1	☑ Gross α/β 1L P, HNO3, 8B1
☐ VOA 524.2 com. 3x40ML AG, 4C, 8B1 (Sb)	☐ VOA 524.2 com. 3x40ML AG, 4C, 8B1 (Sb)	☑ VOA 524.2 com. 3x40ML AG, 4C, 8B1
☐ TDS 500ML P, 4C, 8B1	☐ TDS 500ML P, 4C, 8B1	☑ TDS 500ML P, 4C, 8B1
☐ NO3 500ML P, H2SO4/4C, 8B1	☐ NO3 500ML P, H2SO4/4C, 8B1	☑ NO3 500ML P, H2SO4/4C, 8B1
If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC (NOFLW) ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW (ACCESS) WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NODSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP
Field Parameters:	Field Parameters:	Field Parameters:
PH= (6.0-9.0 S.U.)	PH= (6.0-9.0 S.U.)	PH= 7.44 (6.0-9.0 S.U.)
SC= MS/CM	SC= MS/CM	SC= .828 MS/CM
TEMP(AIR)= °C	TEMP(AIR)= °C	TEMP(AIR)= 1.9 °C
TEMP(H2O)= °C	TEMP(H2O)= °C	TEMP(H2O)= 9.8 °C
Comments:	Comments:	Comments: STD 7.05 GWD .950

SAMPLING LOG SHEET # 3	Dist: S. Barros/L. Dunstan	SAMPLERS:	LA. Carpenter / RC Holmes / ~~S.R. Hardy~~
DATE: 12/07/93	WEATHER: clear, cool, lt breeze	SIGNATURES:	[signature] / Ron Holmes

Site: C-1 POND, ROUT

VW02828JE REAL TIME:

☐ Pu;Am;U 4L C, HNO3, 123

If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP

Comments:

Site: 124 RAW (OP), ROUT

VW02861JE REAL TIME:

☐ Pu;Am;U 4L C, HNO3, 123

If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP

Field Parameters:

DO=	MG/L
PH=	(6.0-9.0 S.U.)
SC=	MS/CM
TEMP(H2O)=	°C

Comments:

Site: FOOTING DRAIN 111-1, QUA.

VW02862JE REAL TIME: 1030

☒ Semi V CLP 1L AG, 4C, 881	
☒ HSL Metals 1L P, HNO3/4C, 881	
☒ Gross α/β 1L P, HNO3, 881	
☒ VOA 524.2 com. 3x40ML AG, 4C, 881	
☒ TDS 500ML P, 4C, 881	
☒ NO3 500ML P, H2SO4/4C, 881	

If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP

Field Parameters:

PH=	7.86	(6.0-9.0 S.U.)
SC=	.337	MS/CM
TEMP(AIR)=	9.9	°C
TEMP(H2O)=	20.8	°C

Comments:

Site: Footing Drain 991-1, QUA.

VW02863JE REAL TIME: 0850

☒ Semi V CLP 3x1L AG, 4C, 881	
☒ HSL Metals 1L P, HNO3/4C, 881	
☒ Gross α/β 1L P, HNO3, 881	
☒ VOA 524.2 com. 3x40ML AG, 4C, 881	
☒ TDS 500ML P, H2SO4/4C, 881	
☒ NO3 500ML P, H2SO4/4C, 881	

If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP

Field Parameters:

PH=	7.84	(6.0-9.0 S.U.)
SC=	7.36	MS/CM
TEMP(AIR)=	9.2	°C
TEMP(H2O)=	12.6	°C

Comments:

SAMPLING LOG SHEET # 3	Dist: S. Barros/L. Dunstan	SAMPLERS:	Steve T. Barros	Carl R. Harig
DATE: 12/12/93	WEATHER: PTLY CLOUDY, WARM, LT BREEZE	SIGNATURES:		[illegible]

Site: FOOTING DRAIN 444-460, QUA.	Site: Footing Drain 883-1, QUA.	Site: BUILDING 865 SUMP 1, QUA.	Site: Footing Drain 865-2, QUA.
VW02903JE REAL TIME: 1035	VW02904JE REAL TIME: 1005	VW02922JE REAL TIME: 0945	VW02923JE REAL TIME: 0925
☒ Semi V CLP 3x1L AG, 4C, 881	☒ Semi V CLP 1L AG, 4C, 881	☒ Semi V CLP 1L AG, 4C, 881	☒ Semi V CLP 1L AG, 4C, 881
☒ HSL Metals 1L P, HNO3/4C, 881	☒ HSL Metals 1L P, HNO3/4C, 881	☒ HSL Metals 1L P, HNO3, 881	☒ HSL Metals 1L P, HNO3, 881
☒ Gross α/β 1L P, HNO3, 881	☒ Gross α/β 1L P, HNO3, 881	☒ Gross α/β 1L P, HNO3, 881	☒ Gross α/β 1L P, HNO3, 881
☒ VOA 524.2 com. 3x40ML AG, 4C, 881	☒ VOA 524.2 com. 3x40ML AG, 4C, 881	☒ VOA 524.2 com. 3x40ML AG, 4C, 881	☒ VOA 524.2 com. 3x40ML AG, 4C, 881
☒ TDS 500ML P, 4C, 881	☒ TDS 500ML P, 4C, 881	☒ TDS 500ML P, 4C, 881	☒ TDS 500ML P, 4C, 881
☒ NO3 500ML P, H2SO4/4C, 881	☒ NO3 500ML P, H2SO4/4C, 881	☒ NO3 500ML P, H2SO4/4C, 881	☒ NO3 500ML P, H2SO4/4C, 881
If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP	If any were not taken, circle a reason: DRY LACKH2O FRZ NOOSC NOFLW ACCESS WTHR BRKBOT VEHIC EQUIP NOTSHP
Field Parameters:	Field Parameters:	Field Parameters:	Field Parameters:
PH= 8.55 (6.0-9.0 S.U.)	PH= 8.08 (6.0-9.0 S.U.)	PH= 8.22 (6.0-9.0 S.U.)	PH= 7.19 (6.0-9.0 S.U.)
SC= .354 MS/CM	SC= .827 MS/CM	SC= .685 MS/CM	SC= .780 MS/CM
TEMP(AIR)= 13.5 °C	TEMP(AIR)= 9.2 °C	TEMP(AIR)= 9.6 °C	TEMP(AIR)= 10.0 °C
TEMP(H2O)= 11.9 °C	TEMP(H2O)= 10.8 °C	TEMP(H2O)= 6.0 °C	TEMP(H2O)= 11.5 °C
Comments:	Comments:	Comments:	Comments:

MEDICINE HEALTH & SAFETY
3-6 FY. 19[illegible] S. [illegible]

THE DOW CHEMICAL COMPANY

ROCKY FLATS DIVISION
P. O. BOX 888
GOLDEN, COLORADO 80401

MAY 13 1 21 PM '74

May 9, 1974

J000680

Mr. E. W. Bean
RFAO, USAEC

WATER FROM FOOTING DRAINS, BUILDINGS 771 AND 774

This memo is to confirm our May 8, 1974, verbal understanding regarding disposition of the subject water.

1. The present holding pond for this water will be enlarged to contain the normal flow for a minimum of 3 days.

2. Sampling of the water will continue on a daily basis.

   a. Water which contains less than 50,000 pCi of tritium per liter will be sprinkled on the area north and west of the landfill.

   b. Water which contains greater than 50,000 pCi of tritium per liter will be transferred to pond 207-B south. Every reasonable effort will be made, such as holding as long as possible for additional dilution, to avoid transferring any more water than is absolutely necessary to the 207 pond.

J. B. Owen
J. B. Owen
Waste Management

JBO:sls
Orig. and 1 cc - Mr. Bean

cc:
L. P. Ferris II - Dow, Rocky Flats
M. E. Maas - Dow, Rocky Flats
J. Seastone - Dow, Rocky Flats
M. A. Thompson - Dow, Rocky Flats

REFER TO
COLSTON
LAMB
WATT
[illegible]
[illegible]
EWB

Hullman [illegible]

C50681

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HEALTH & SAFETY
3-6

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ROCKY FLATS ENVIRONMENTAL MASTER FILE

THE DOW CHEMICAL COMPANY

ROCKY FLATS DIVISION
P. O. BOX 888
GOLDEN, COLORADO 80401

January 9, 1974

R. V. Carroll
S. E. Cerise
C. H. Dompierre
J. H. Hanes
C. M. Love
J. B. Owen
J. L. Sullivan
M. A. Thompson
E. J. Walko
J. F. Willging

ROCKY FLATS DIVISION ECOLOGY COUNCIL
MINUTES OF MEETING HELD JANUARY 2, 1974
AND JANUARY 8, 1974

G. J. Werkema presented environmental monitoring data for November 1973. Air monitoring data from Station S-8 located adjacent to the East perimeter patrol road south of Central Avenue indicated some resuspension could be occurring due to vehicular traffic. E. J. Walko agreed to oil the two patrol roads as soon as possible, as follows: inside the perimeter fence from Central Avenue south and west to a point due south of the west edge of the 903 area asphalt pad; outside the perimeter fence from Central Avenue south to Pond C-1.

J. F. Willging discussed a proposed USEPA sampling program to be conducted at Rocky Flats Plant. E. W. Bean reported that a new, revised proposal was recently received at RFAO.

R. V. Carroll sent copies of the Broomfield City Council tritium report to Congresspersons, State legislators, and the Governor, among others. Those who responded indicated they were pleased to see the issue presented in its proper perspective. Newsline is now doing a significant job of publicizing plant progress in energy conservation.
J. B. Owen's waste management graphs also have been submitted for Newsline publication and should be appearing soon.

J. B. Owen reported that the survey project on infiltrated soil has defined areas for consideration, including inventories and estimates of extrinsic material.

1500927

E. J. Walko reported that the survey of the sanitary landfill is nearly complete. In a related discussion, G. J. Werkema was asked to assemble the available analytical data on the landfill holding pond and the Building 774 footing drain to determine proper disposition of these waters.

These results are primarily for Building 771 - So I won't use the 95,000 pCi/l

C. M. Love described sampling results on footing drain water collected in the vicinity of Buildings 771-774. The concentration of tritium in drains near Building 771 on December 11 was 95,000 pCi/l. On the same date, the comparable result for the drain water near Building 774 was 3,000 pCi/l.

J. F. Willging requested that all parties receiving communications and requests for information from outside agencies (CDH, EPA, etc.) should prepare a call report, copy to the Environmental Master File, Building 123.

774 H3 Results - Condensate or Footing Drains? Don't know how to handle.

J. F. Willging expressed increasing dissatisfaction with the quality of work being done under the Colorado State University research contract "Study of Plutonium in Aquatic Systems in the Rocky Flats Environs." The Ecology Council recommended that the principal investigator should be advised of this dissatisfaction and, lacking improvement, the research contract should be transferred to another scientist at Colorado State University or another institution.

On January 8, 1973, a special meeting of the Ecology Council was called to review a proposal by Shade Business Forms and B. J. Faris, Dow Purchasing, for collecting and recycling white waste paper. Copies of the Shade program brochure were distributed to all attendees.

The next meeting of the Ecology Council will be on Wednesday, January 16, 1974, at 10:00 a.m. in the Labor Relations Room. The agenda will include Energy Conservation and Raw Materials Utilization data presentations.

G. J. Werkema
Secretary

cc:
E. W. Bean - RFAO, USAEC
C. R. Rose - Dow, Rocky Flats
B. J. Faris - Dow, Rocky Flats

THE DOW CHEMICAL COMPANY

ROCKY FLATS DIVISION
P. O. BOX 888
GOLDEN, COLORADO 80401

May 10, 1971

E. A. Putzier

HEALTH PHYSICS MONTHLY STATUS REPORT - OPERATIONS GROUP TECHNICAL AND CONSTRUCTION - APRIL, 1971.

HEALTH PHYSICS - ADMINISTRATIVE

Personnel

No change.

Safety and Security

All personnel received a safety and security contact on April 28.

Achievements and Problems

Preliminary design criteria for Remotely Operated Engineering Pilot Plant Facility for Manufacturing Operations is now complete. This project is a FY1972 line item and calls for construction of a 18,000 sq. ft. building in the 800 complex. The building will have three high bay areas for developing and engineering studies directed towards remoting and automating existing manufacturing operations, mainly in the plutonium field. No radioactive materials will be processed in the facility.

A prototype air exhaust monitoring system has been purchased from Brock, Easley, Inc., Denver, Colorado. This system will be installed in the main exhaust duct of Building 771 for a 60 day trial period prior to final acceptance. Installation is scheduled to be completed by July 1.

Drainage modification work around the 903 asphalt pad area is now completed. All runoff from this area now flows into pond number 9 on Women's Creek.

150057

A PJO has been initiated to construct a ditch and install gate valves to divert drainage water from Central Avenue ditch to South Walnut Creek above Pond Number 2. This provides for collection of potentially contaminated water during abnormal operations.

During Title II review of Phase II, Building 774, it was noted there are three drains that flow from this facility into North Walnut Creek:

1. Cooling tower and roof drain.
2. Evaporation drain, releasing approximately 20,000 gal. per day, averaging 100 dpm/liter and 5 ppm nitrate.
3. Footing drain, small volume, samples indicate 400 dpm/liter plutonium and 800 ppm nitrate.

Leaking underground concrete storage tanks are believed to be the source of contamination in the footing drain effluent. These tanks are scheduled to be replaced under Phase II renovation work which should correct the problem.

A request for a Davis-Bacon exception has been submitted covering the installation of a new Health Physics vacuum pump and 86 CAM's in Buildings 776-777 and 707 under Authorization 399050. This provides for purchasing the equipment in July and installation in August instead of next year. Installation of a new 90 cfm Health Physics vacuum pump in Building 774 is now complete. Directives and justification have been submitted to Facilities Engineering to connect all the main Health Physics vacuum pumps to emergency power.

Testing for leakage of all underground process waste lines and tanks under Authorization 410204 is to start in July. This is to be accomplished by purging the systems with a tracer gas, such as Helium and monitoring the rate of leakage.

Due to additional space requirements for computer equipment in Building 559, Health Physics has agreed with Mr. H. C. Anderson and Facilities Engineering to move our office from Room 105 to Room 113.

A meeting was held with Mr. J. D. Carpenter in reference to the Health Physics letter which recommended small batch type processing for plutonium recovery operations. Mr. Carpenter agreed to designing the New Plutonium Recovery Facility for automated batch type processing except for calcine and fluorination type operations. Experiments by J. D. Moseley indicate that direct conversion of oxide to fluoride is practical using a batch type process, however, additional time is required to work out a system of this type. Present plans indicate batch quantities of 1 to 3kg in the new facility.

The portable multi-channel analyzer has been returned to the Operations Group. Experiments related to isotopic determinations by direct sample counting techniques and gamma spec surveys of the general work areas are planned.

New Plutonium Recovery Facility - The Architect Engineering contract to study the four proposed alternatives has been awarded to C. F. Braun. The four alternatives are as follows:

A. Modifications to existing plutonium recovery facility with provisions for a new incinerator facility, waste drum and plutonium storage.
B. New building for R&D and modifications of Building 771 for plutonium recovery as stated in A.
C. New Plutonium Recovery Facility (3 buildings).
   (1) Plutonium Recovery including utilities and filter plenums.
   (2) Plutonium storage.
   (3) Incinerator and waste drum storage.
D. New Plutonium Recovery Facility (5 buildings).
   (1) Plutonium recovery process.
   (2) Utilities and filter plenums.
   (3) Incinerator and waste drum storage.
   (4) Plutonium storage.
   (5) Support facilities.

Studies are to be completed by September 1, 1971. Criteria outlined in a document titled "Minimum levels of criteria for new Plutonium Facilities" is now being used as basic guidelines in the studies and design phases of the new Plutonium Recovery Facility. The criteria has been accepted by AEC Headquarters and Albuquerque as interim guidance until the formally accepted criteria is issued. In this new criteria under Radiation Protection it states, "Levels less than one fifth of the permissible dose limits given in AECM 0524 are desirable".

Liquid Waste Control Project - Rocky Flats Area Office (AEC) approved our proposed phasing of the subject project and deferral of the silt removal, Phase II, until FY1976. Samples are now being collected from the effluent holding ponds by M. R. Boss and CSU students to determine amounts of plutonium in the sediment. This project is in Title I Engineering with construction scheduled to start in September, 1971.

C. G. Haynes continued to provide the necessary Health Physics support for Colorado State University biological experiments.

There were 30 ^{239}Pu air samples, 2 ^{241}Am determinations, 61 dog samples and 22 special samples ran for isotopic determinations during the month.

Education, Trips and Visits

K. J. Freiberg attended the Rocky Flats Symposium on Safety in Plutonium Handling Facilities on April 13 through 16, 1971.

Construction

Significant Health Physics considerations for contamination and radiation controls during construction, modification and operation were discussed as follows:

SUBJECT	GROUPS INVOLVED OTHER THAN HEALTH PHYSICS
Additional Contamination Control Measures Pu Buildings Authorization 329018	Utilities and Facilities Engineering
Construction fire rated doors and walls in Manufacturing Buildings Plant Wide Authorization 315010	Facilities Engineering
Development Coating Facility Building 777 Authorization 410109	Manufacturing and Facilities Engineering
Building 707 Addition and Modifications Buildings 707-707A	Facilities Engineering and Manufacturing
Fire Damage Recovery Building 776 Authorization 399010	Facilities Engineering and Manufacturing
Phase II Building 774 Authorization 319008	Manufacturing and Facilities Engineering
Breathing Air Systems Plant Wide Authorizations 315530 and 315542	Facilities Engineering and Utilities

SUBJECT	GROUPS INVOLVED OTHER THAN HEALTH PHYSICS
Safety Restoration Improvements Buildings 776 and 777 Authorization 399050	Manufacturing and Facilities Engineering
Plutonium Recovery Facility New Building 771 Authorization 319005	Manufacturing and Facilities Engineering
Inert Hazardous Gloveboxes Buildings 776 and 777 Authorization 319009	Manufacturing and Facilities Engineering
Filter Plenum Improvements Plant Wide Authorization 319007	Facilities Engineering and Utilities
Liquid Waste Control Plant Wide Authorization 315011	Utilities and Facilities Engineering

Part V Expansion

Additional discussions concerning ventilation, radiation, shielding, and contamination control in Buildings 707A, 707, 774, 776 and 777 were held with representatives of Manufacturing, Facilities Engineering, C. F. Braun, Swinerton & Walberg and the AEC.

K. J. Freiberg
Health Physics

KJF:jd

cc:
R. E. Hayne
C. R. Johnson
W. D. Kittinger
J. D. Leigh
R. M. Vogel

THE DOW CHEMICAL COMPANY

ROCKY FLATS DIVISION
P. O. BOX 888
GOLDEN, COLORADO 80401

May 17, 1971

C. W. Piltingsrud

ITEMS FOR FURTHER DEFINITION

This is in response to a memo concerning potential problem areas, CWP/WDK, dated March 9, 1971.

1. Leakage from process waste tanks.....

   No Action

2. Outfall from Building 778 Laundry

   a. Old discharge -- west of Building 995

      Samples range from 600 to 1400 d/m/g

   b. Present discharge

      13.05 d/m/g at discharge
      91.36 d/m/g in creek bed bottom

3. Outfall from Building 881 sewage lift station

   Samples analyzed from outfall: 1.05 d/m/g and 0.30 d/m/g

4. Outfall from Building 774 footing drains

   a. Evaporator condensate discharge: 2.56 d/m/g
   b. Footing drains: 3.62 d/m/g, 3.46 d/m/g, and 1900 d/m/g

1500883

5. Buildings 444 and 881 process drain lines

   No Action

6. Diversion ditch

   Analysis of samples collected in April, 1970 show 16.6 and 20.6 d/m/g

   Recent samples were collected during a period of high runoff (water flowing in ditch) and analyzed at 0.27 d/m/g

7. Silt in holding ponds

   Recent analysis of sediment from holding ponds show:

P-1	26.6 d/m/g	P-4	27.2 d/m/g
P-2	216.0 d/m/g	P-5	31.6 d/m/g
P-3	124.0 d/m/g	P-9	2.9 d/m/g

The following are items for further definition which were not included in the aforementioned memo.

1. Building 778 storm drain

   Initial screening made by direct gamma ray spectrometry shows no contamination >10 d/m/g (i.e., detection limit of method).

2. Rocky Flats water treatment plant

   This outfall is located outside security fence SE of water treatment plant. Samples analyzed from this outfall: 0.09 d/m/g

3. Woman Creek sediment samples

Recent monthly analysis of these samples: 1.02 d/m/g, 1.98 d/m/g, and 0.54 d/m/g

4. Walnut Creek sediment samples

Recent analysis of these samples show:

5.11 d/m/g	19.8 d/m/g
35.93 d/m/g	5.93 d/m/g
35.99 d/m/g	3.99 d/m/g
3.89 d/m/g	

M. R. Boss

MRB:ab

cc:
W. H. Lee

3-9-71

ITEMS FOR FURTHER DEFINITION:

1. Question of leakage from process waste tanks and process drain lines which lead to the liquid waste treatment plant.
   (references: Harold Moss and Bill Beck of Facil. Eng.)

Scope

Liquid process waste is generally held in local tanks for pumping through process drain lines to Building 774 for treatment. Lines come from all process and laboratory buildings and are of varied construction; cast iron, saran-lined, and stainless steel.

Facilities Engineering is preparing at this date to ask for bids from outside firms (such as Dow Industrial Services) to check all process drain lines and tanks for leakage. The check of lines is to be given first priority. It is expected the checks on lines and tanks will be completed by December 31, 1971. In addition an attempt will be made to identify and locate abondoned lines, particularly those under buildings.

A study has been performed to establish testing techniques. Pressurization techniques and use of nitrous oxide or Freon with "sniffer" identification of leaks have shown to be promising.

Plans For Contamination Evaluation

Plans have not been finalized for excavation, sampling, or disposal of leak sites that are found.

2. Question of outfall from 778 Laundry (Prior to 1966)

Scope See Report

The liquid effluent from Building 778 laundry up to September 1966 could bypass the sanitary sewage plant if the concentration was below 3500 dpm/l. The discharge was piped to join with similar effluents from Buildings 771 and 774 to be released into Walnut creek at a point slightly west of Building 995. These releases were never above 1/3 of the guide value concentration for drinking water. The effluent releases from 771 and 774 continue to be released to this outfall. OLD

Short-term control will continue to be based on adherence to 1/3rd of the guide value or 3500 dpm/l. (As stated in 0524 for soluble plutonium released to an uncontrolled area.)
In the long term, completion of a new waste treatment facility planned for FY '75 (Authorization 319010) should eliminate any release of contaminated water from laundries or waste treatment.

Plans For Contamination Evaluation

Sampled

Surface soil sampling will be conducted at the points of two outfalls; one at an old disused line and at the other presently used. Initial sampling will consist of 8 to 10 samples at points of highest expected concentrations. If significant results are obtained, further stream bed sampling will follow. NEW

An initial screening of soil samples will be made by direct gamma spectrometry for estimation of plutonium by americium determination. From this screening, selected samples will be subjected to routine laboratory procedures.

Health Physics personnel will collect and analyze samples.

Goal Date

Initial sampling to be completed by May 1, 1971. May 15

3. Question Of Outfall From 881 Sewage Lift Station

Scope

A sanitary liquid waste overflow exists at the sewage lift station at Building 881. Its outflow is to the surface immediately south of the sewage lift station. There has seldom been any overflow at this point.

Plans For Contamination Evaluation

sampled

Surface soil samples (5) will be collected by Health Physics to characterize contamination levels at the outflow point. (We expect negative information).

Samples will be screened by direct counting and selected samples submitted to laboratory procedures. All analyses will be done by Health Physics.

Goal Date

Samples will be collected by Health Physics by May 1, 1971.

4. Question Of Outfall From 774 Footing Drains

Scope

sampled

Footing drains exist around Building 774 which are thought to collect some slight seepage from concrete process waste tanks immediately south of 774. The drain outflows to the surface north of 774 to drain toward North Walnut Creek. Renovations underway for 774 will eliminate the sources of undesireable seepage. Past measurements of activity concentrations by Haas indicate levels in the region of 500 dpm/l. The outfall area was recently and inadvertantly convered with about 3 feet of dirt in leveling an adjacent fill dirt pile. May 15

749 - 752

753 - 755

Plans For Contamination Evaluation

Surface soil samples (5) will be collected initially by Health Physics at the point of outfall (after removing soil back to the original surface). If significant results are obtained further samples will be obtained to characterize the course of flow and depth of contamination.

sampled

Samples will be screened by direct counting and selected samples submitted to laboratory procedures. Analyses will be done by Health Physics.

Goal Date

Initial sampling will be completed by May 15, 1971.

5. Building 444 and 881 process drain line suspected subsurface leakage will be identified by the leak checks previously described.

6. Question Regarding Diversion Ditch

Scope

SURFACE 16.64mlg, 20.6 d/mlg

A diversion ditch currently exists which drains surface water from the central portion of the plant eastward to outfall in Walnut Creek below pond 5. This drainage includes the north portion of the 903 former drum storage area.

A PJO has been written and work completion is expected by April 1 to create two separate drainage ditches to collect all surface water from 903 and adjacent area. One ditch will drain south to collect in Pond 9 on Woman Creek. The other ditch will drain north to Walnut Creek to be caught in Pond 2.

Plans For Contamination Evaluation

Since the question exists regarding contamination levels in the old diversion ditch. Soil samples (10) will be obtained from the surface of the bottom of the old ditch. Sampling will be accomplished by Health Physics. Further sampling will be accomplished to characterize extent and depth of contamination if initial results are significant.

Analysis of soil samples will be by Health Physics. Initial screening will be made by direct counting with selected samples submitted to the laboratory.

Goal Date

Initial sampling will be accomplished by May 15, 1971.

Sampled

7. Question Regarding Silt In Holding Ponds

Scope

Silt collected over the years of plant operation in ponds 1 through 9 has retained and accumulated some activity as is to be expected even though releases to the ponds have been well below the standard.

An authorization exists for increasing holding capacity of the ponds. This work should be completed in FY '73. Dam heights will be increased.

An ecology study of the ponds is planned by CSU students for completion in FY '72. This should characterize to some degree contamination levels in silt deposits and possible concentrations in biological systems.

Silt removal, if deemed necessary, has not been planned until after completion of improvements which will decrease radioactivity concentrations in releases. Improvements scheduled are:

Liquid Waste Treatment Facility	- FY '75
Sanitary Sewer Modifications	- FY '74
Elimination of nitrate ponds	- FY '76

Plans For Contamination Evaluation

A planned program does not exist at this time for silt removal or silt contamination evaluation. Planning should be based on extent of information still desired after completion of the CSU study. SEDIMENT POND 5 ~1700 dpm/g

778 Storm Drain SW of bldg.
✓ KIT. Done

W.D. Kittinger

APPENDIX E

Field Notes

OU-8

11/30/93

7:45 Am

Arrived AT Trailer.

Field People

Tracy Wait - JEG
Susan Wyman - JEG
Dave Landes - JEG
Dave Beeler - JEG
Ron Holms - JEG
Mike Visocky - JEG
Steve Barros - EG&G
Bob Christinson - wright water
OU-8 . Footing drain out fall
SITE WALK

8:04 Left Trailer

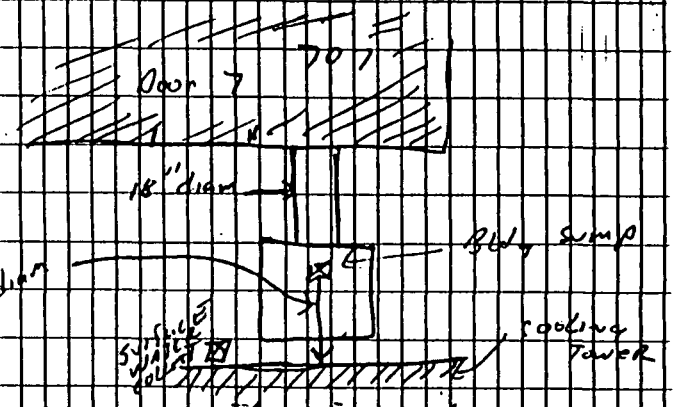
8:10 Arrive AT Portal to
PA.

is it confirmed
that the outfall
is the sewer

B:27 BS-707-2

Building sump

Sump is in concrete
Vault.



There is water in the
sump This is a confined
space

8 valves on Top of Vault

Water from sump is
pumped into cooling Tower
Basin

SOURCE AND

* GAP 1) destination of what STEVE is sampling on south side of 707

2) need to verify west side of 707 FD. Access point

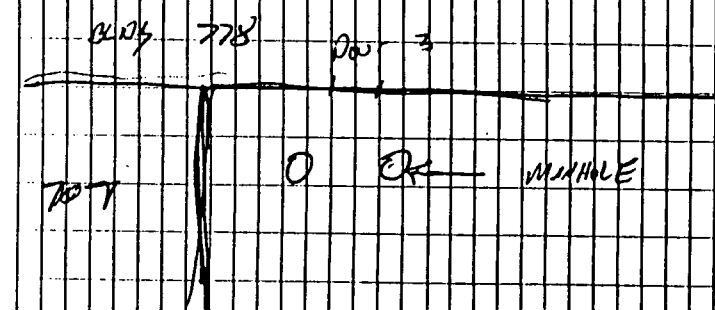
3) source of BS-707-3
Destination of BS-707-3.
why did they sample

COOLING TOWER A60-11481
Building 709

STORM SEWER ON SOUTH SIDE
WATER FLOWS INTO COLLECTION
BASIN ON SOUTH SIDE OF 709
and then into storm sewer.?
PIPING SYSTEM IS BLANKED

MAN HOLE ON SOUTH SIDE OF 709

8:45 BS-707-3
DO NOT SAMPLE. NO WATER.
previously did sample



Sample results did not
show contaminants
Earlier date encountered large
Flow Rate. 1 1/2 yrs BS NO WATER

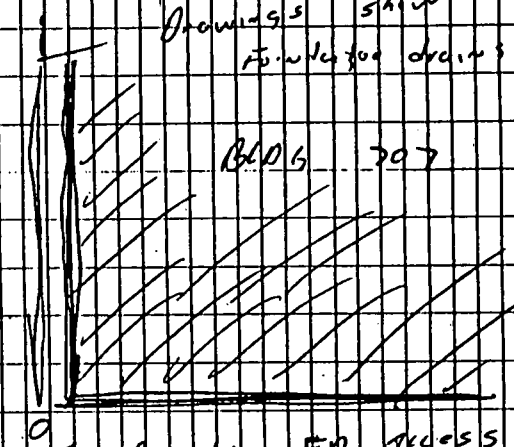
* 1) 559 / 561 MANHOLE
what are the sources
to manhole.

2) what is the destination
of manhole water

do not know
where the outfall
is.

SW corner of 707

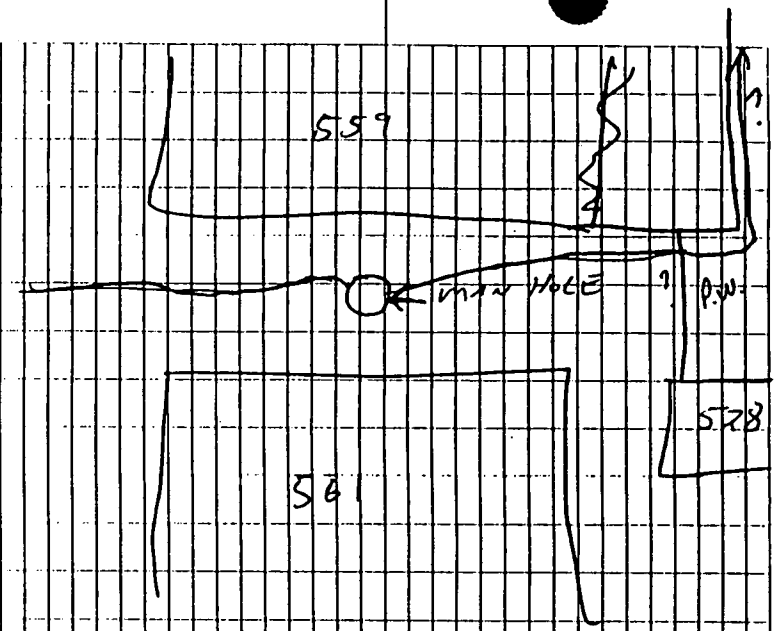
Drawings show
Foundation drains



← Possible FD access
concrete culvert
8" diam. Ties into storm
sewer

8:55 559-561 sample point

were sampling. HAD TOE
HIT. Stopped sampling
piping & culvert are
diverted into the P.W.
lines on the south side
of 559. ?



The system is now used as the plenum Diluse system

Sump has water in it.
20 FT down, very deep sump

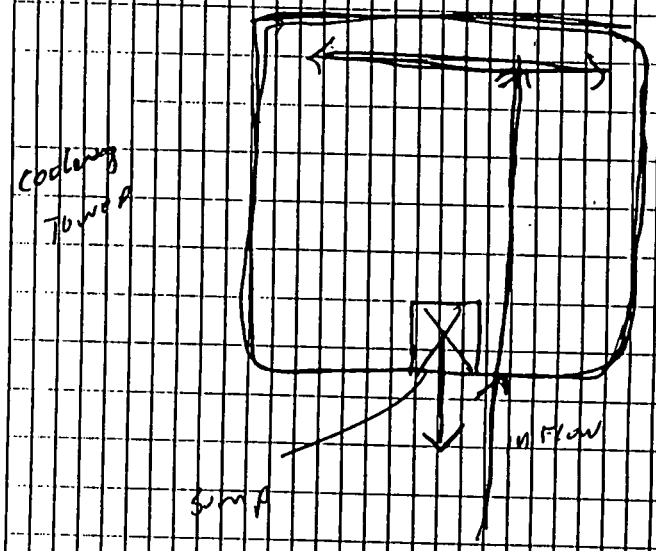
WATER MAY go INTO SEWER?
check,

WATER MAY FLOW INTO AN EVAPORATOR ← Bldg 560

There appears to be discharge into sump on South side

or Cooling Tower?

need to determine where the discharge pipe goes



Y 1) need to determine source

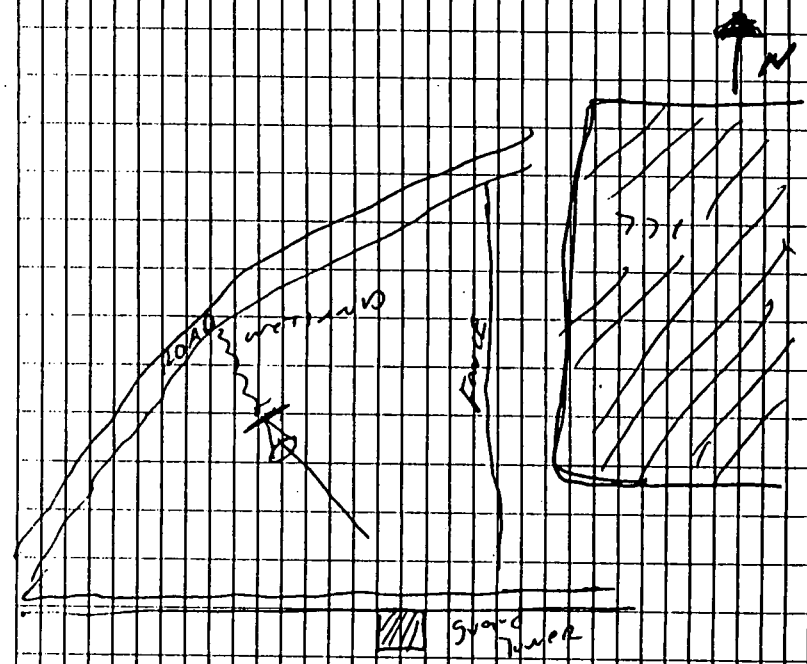
IF STEVE doesn't know where the 559 OUTFALL, How can they replace ~~the~~ FD-516-1 with the 559 sample

9:15

FD-516-1

OUTFALL FOR 516

DRAINS ON TO HILL side
FLOW RATE 1/2 gal/min



They are NOT sampling STORM and moved location TO 559 MANHOLE

1) FD-371-1
need to verify if
discharge in into
concrete culvert

2) verify if FD-371-2
was rerouted to FD-371-3

3) Find FD-371-5 & 6

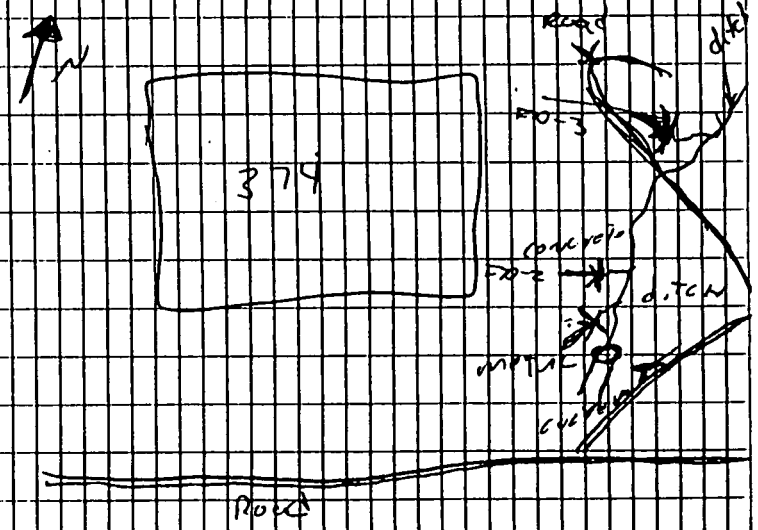
4) Find source of FD-371-3

5) get Monitoring well
Analytical Results for
1986

FD-371-MC
9:24 Metal culvert

Outfall to ditch 1/2 gal/min
Are sampling now. Run off from
Steam line.

FD-371-2 concrete
Outfall ~~[illegible]~~ very little
flow
closed in mid 80'
No sampling. Outfall to FD 374



FO-371-3

concrete and metal pipe
Flow is 1/2 gal/min (est)

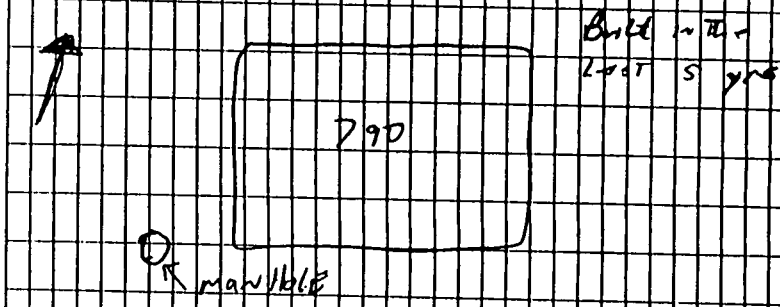
Area around outfall. lot of
cat tails. Pipe shows
great amount of Iron oxidation

FO-371-5+6 not
Found. They are
sampling the [redacted] ditch
A composite sample
FO-371-4 not found.
May be buried

MW-F86 is down gradient
of outfalls in ditch.

9:50 BLW, 790
Analytical Lab
FD-790

Sample from manhole, do not sample. Access problem in manhole



main source is GW

during construction, encountered many springs.

1) Grate is in Roadway
Barried under ICE & mud
need to verify if it is there.

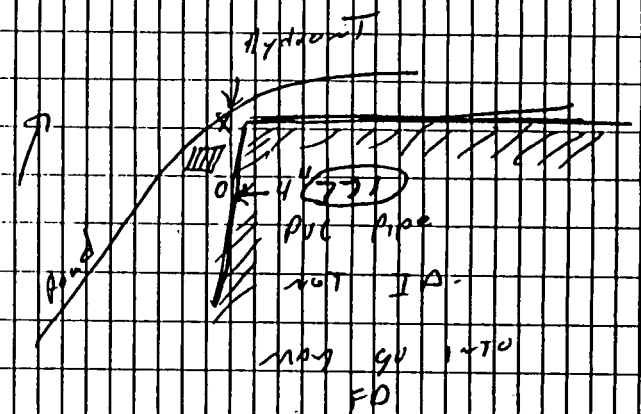
2) what is the white PVC
Pipe used for

3) Find MANHOLE 3, According
To drawings. FD outfall
is to MH3

4) Find FD outfalls for
other Two

954 FD-771-1

drains into drain pipe
From NW corner of Bldg
Location is a grate in
Road

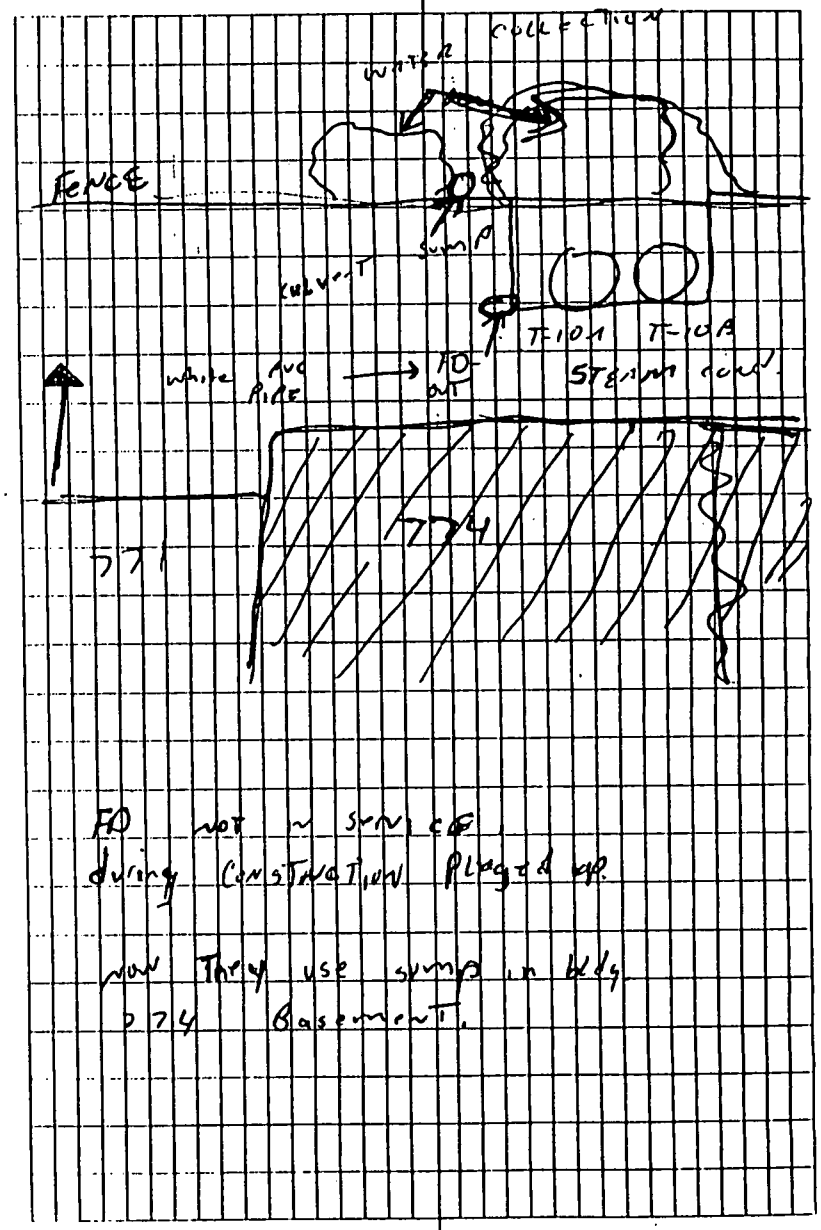


10:00 FD-774-1
on north side of Bldg
MW - P21 9180
SW - 174
SD - 124

1) Find P219189 INFO

2) Need to verify with Bldg Manager that FD are diverted to building sump

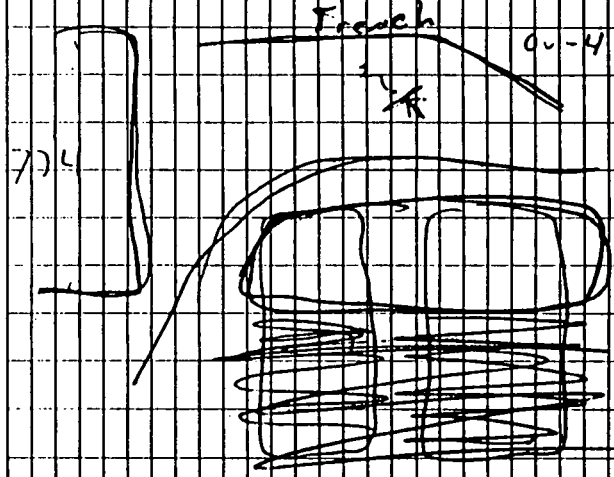
3) Verify location of outfall



FD not in service during construction plugged up.

now they use sump in bldg 774 basement.

10:14 FD-779-1

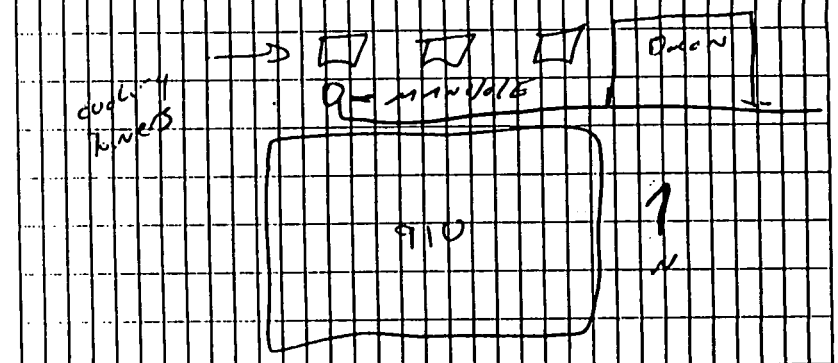


Sample when they end.

1) destination of 991 Building sump water

2) Verify that FD has been diverted to Bldg sump.

10:30 BS- 910-1



910 Treats the cut water (Trench) distills the H_2O, pumps the distillate to the 3 tanks, Recommendation - distillate waste will discharge into sewer.

10:40 Bldg 991

Foundation ~~Foundation~~ drain is plumbed into the Building sump

10:50 FD-707-1
or 750 culvert
ALL 700 - 500 storm
~~[illegible]~~ Drainage
HAS a good flow rate
5 gpm

NOT sampling now

WATER Drains into U-PONDS

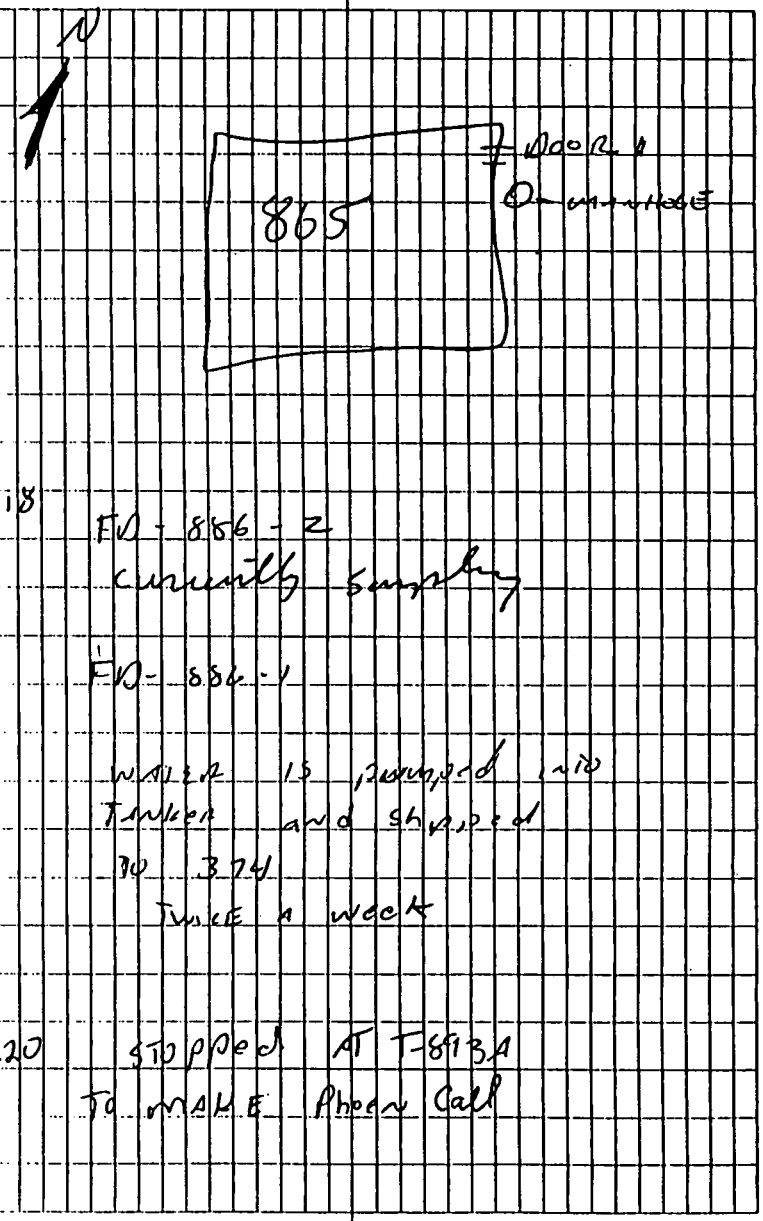
11:00 AT PORTAL to exit P.A.

11:08 AT 800 Portal

11:15 FD-865-2
Building Sump.
currently sampling

1) Re evaluate 886-2 & 886-1

FD-886-2 Just east of
175



11:18 FD-886-2
currently sampling

FD-886-1

Water is pumped into
Tanker and shipped
to 374
Twice a week

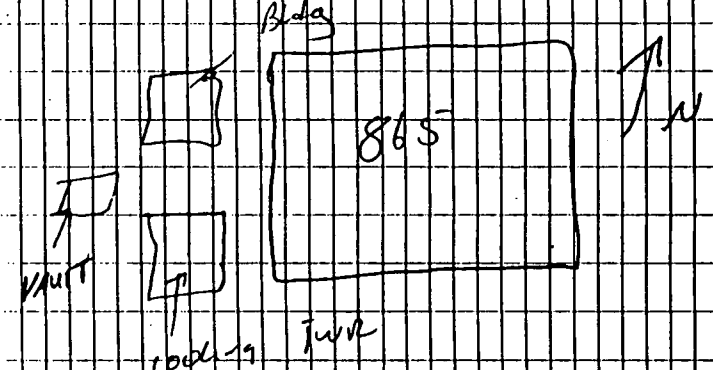
1:20 Stopped at T-813A
To make Phone Call

1) Re Evaluate 865

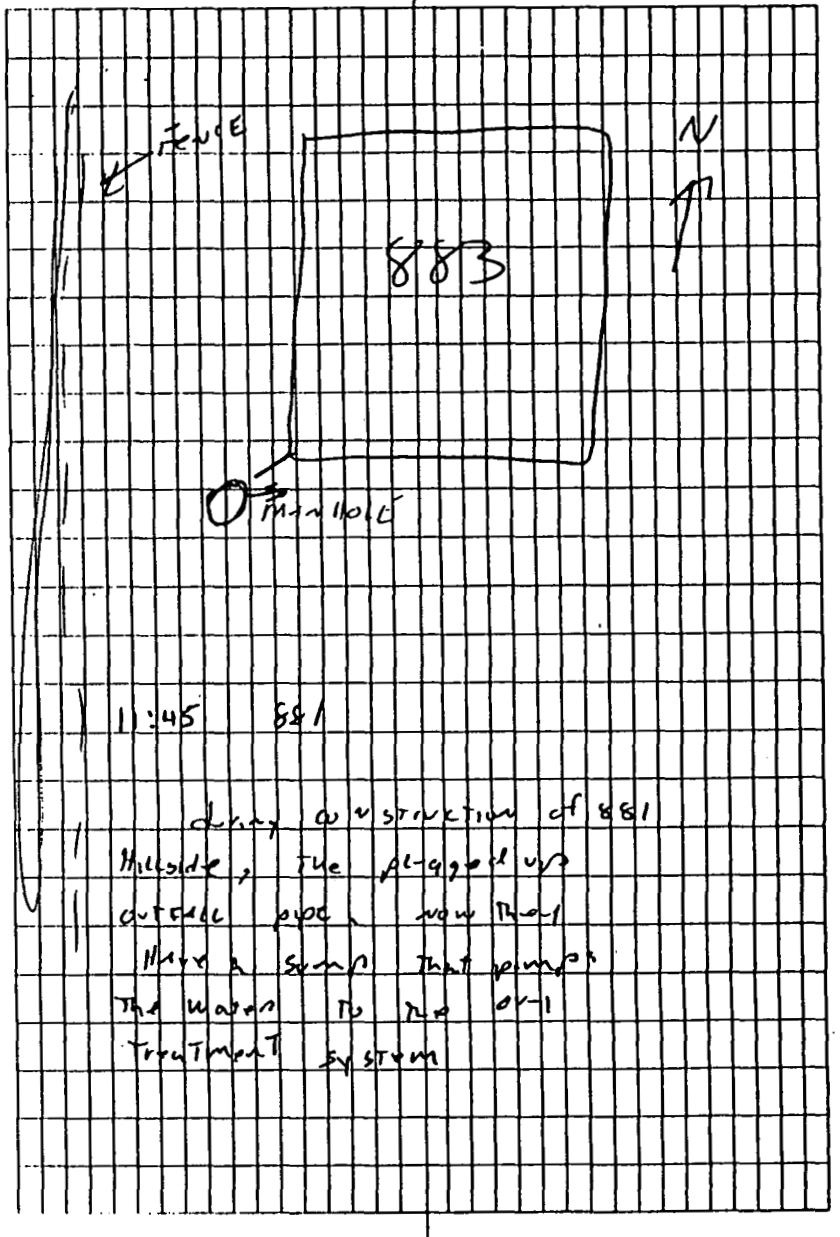
2) do not know destination
a source of water
in ~~[illegible]~~ sump. According
to Steve, FD was rerouted
to new sump location

11:33 ~~[illegible]~~
BS- 865-1

West side of Bldg
currently sampling
quarterly ~ water outfall
to ditch.



11:37 BS- 883-1
Currently sampling
unknown destination



11:45 881

during construction of 881 hillside, the plugged up outfall pipe, now there is a sump that pumps the water to the oil treatment system

1) verify & Re Evaluate
OUTFALL PIPE From 400
Buildings. need sources.

2) need to verify The
Bldg 111 Foundation OUTFALL.

11:55 Left The 800
Secured Area

12:00 8:50 OUTFALL

SE CORNER of 850

12:06 Arrive back at Trailer

12:15 444 / 460 OUTFALL
concrete drains into
ditch on south side

Talk with Ed Mart

12:25 Arrive back at Trailer

[signature]

12/6/93

The 12/6 Site Walk Participants

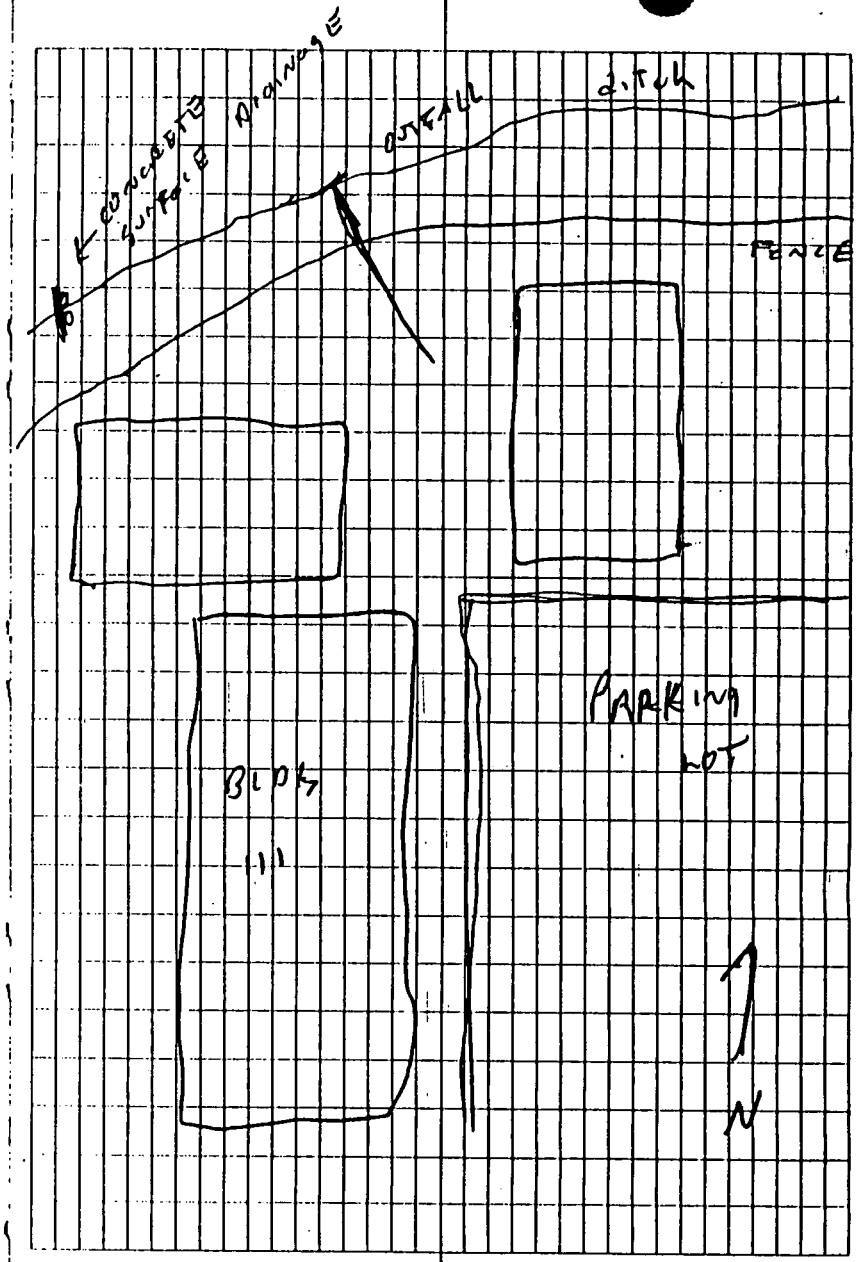
Theresa Jen-Delenport - JEG
Dave Landes - JEG
T.C. Wait - JEG
Mike Visocky - JEG
Ron Holms - JEG
Ed Bianco - JEG

TC Wait Received a Visitor Dosimeter. She Also went Through a Health & Safety Brief From Dave Spruce

7:40 Arrived at Trailer
East Door Combo
3425
Men Shower 1, 2, 4
Women 1, 3, 2

8:35 Arrived at Bldg 111, Tried to Locate Outfall to ditch North of Building. Never Found a physical Pipe Outfall. Found an area where an Outfall May be. Area is covered with Rock and a noticeable settling of the ground where a pipe May be buried. Water samples are currently being collected from the 111 sump. Left Area at 9:55

Arrived at Trailer 9:00


CONCRETE SURFACE DRAINAGE
OUTFALL
DITCH
FENCE
BLDG
PARKING LOT
N

Dec 6

Arrived at Bristol to PA @ 9:25

Arrived at East side of 707 manholes. Simple location in the middle manhole. 3 manholes

Arrived at the 707 SW corner lamp hole to verify it was an access. Could not verify that is was. He's reasonsf, did not want to lift cover (9:44)

9:50 Arrived at 559 submersible pump in manhole. Hose goes to Bldg 500. Line runs to sump pit in Bldg

HAD HOSE going TO SEWER (SANITARY) 300 gal / day sampling WATER QUARTERLY

KEITH MOTEL, previous sampler.

FRANK GIBBS, SSG SHFT Technical advisor

10:10 Arrived AT The 374 OUTFALLS TO Find FD-374-5&6.
Could not find outfalls, water is flowing down the ditch from Hillside. This water may be from FD
Ed BIANCO says That FD OUTFALL may be located near SW-18

10:30 arrived AT 771 FD OUTFALL, grate is filled with mud.

need to determine
where the OU-4 Trench water
goes

$ CAN NOT SEE FD. Can not
Remove CAP TO PVC PIPE.
Located MAN HOLE 3. MH
is north of 771 near
Propane Tank Appx 100' N
of Bldg. corner

10:45 Arrived at 774
FD. SW Flows to the
East to the French drains
The French drain system on the
north side of the solar
ponds. determine the
Final destination of the water
From the OU-4 manager.
The 774 SW ~~water~~ Flows in
the ditch on the north
side of the solar ponds.
water flows to walnut
creek.

11:05 Arrived at Portal to PA
to exit.

11:30 Arrived at Trailer.

DAVE LANKES WILL VERIFY
881 OUTFALL AND determine
883 OUTFALL.

[illegible]

JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT MARCH 13, 1994

BY: DAVID LANDES

1. Building No: 707 2. Sample ID: BS 707-2

3. Description of Sample Location: VALVE VAULT ON NORTH SIDE OF COOLING TOWERS

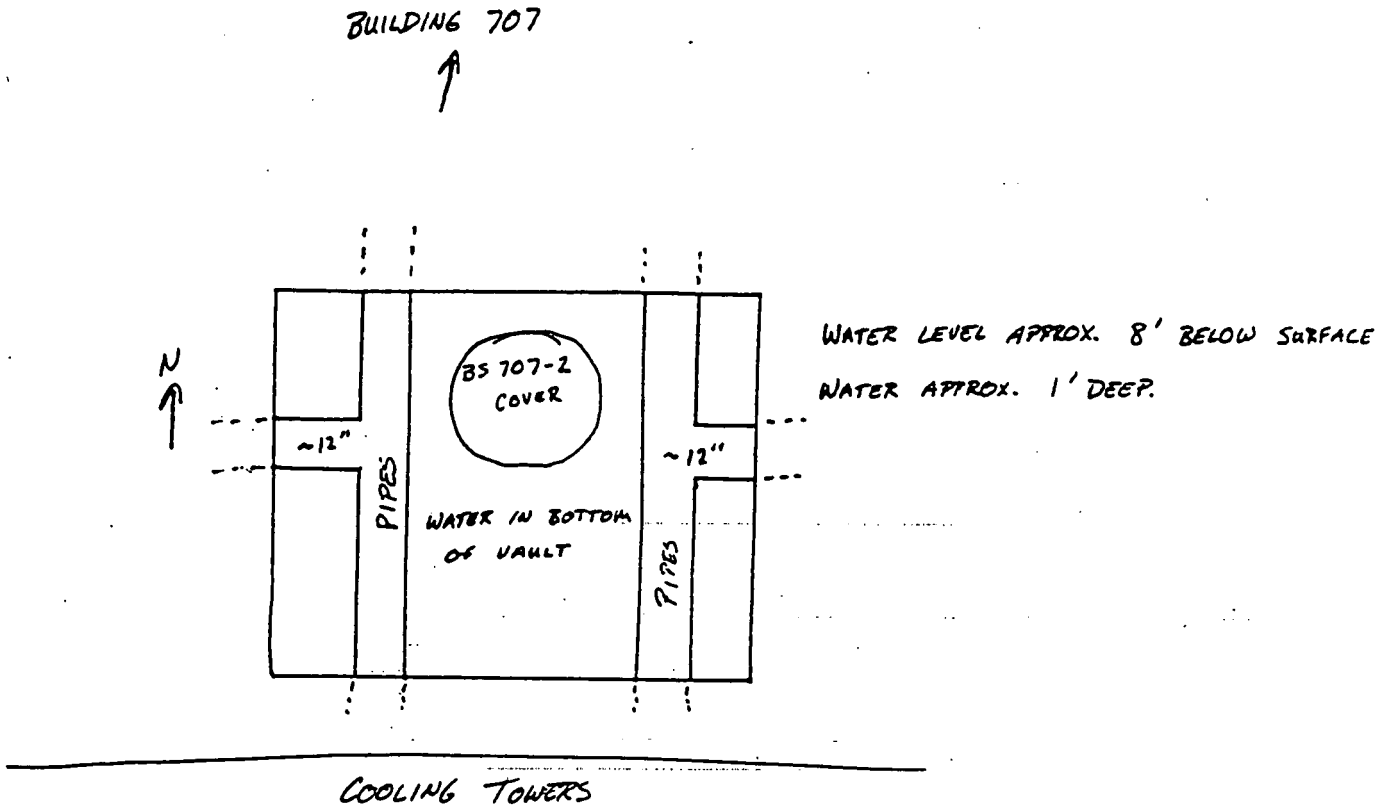
4. If sample location is a manhole:

Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A		N/A STAGNANT	8'		N/A G.W. INFILTRATION
B					
C					
D					

5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket

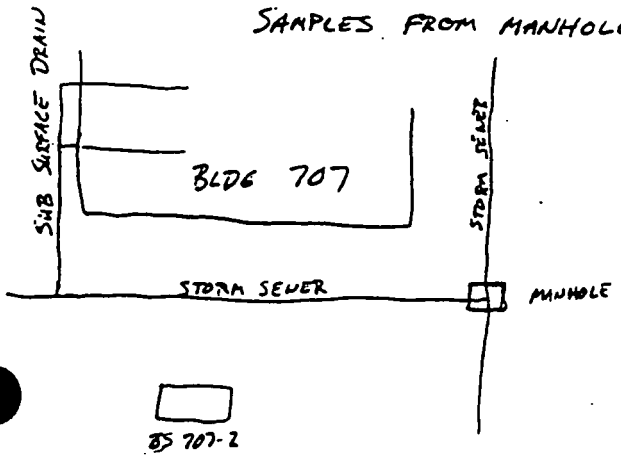
Prepare sketch on back of page.



COULD COLLECT SAMPLES FROM MANHOLE NEAR SE CORNER OF BUILDING IN STORM SEWER. COULD NOT SEE PIPES IN MANHOLE.

SAMPLES FROM MANHOLE PROBABLY NOT REPRESENTATIVE OF FOOTING DRAINS.

DOESN'T APPEAR POSSIBLE TO COLLECT SAMPLES FROM JUST THE WEST ARM OF THE STORM SEWER SINCE THE PIPE WAS NOT VISIBLE.



JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT MARCH 13, 1994

BY: DAVID LANDES

1. Building No: 371

2. Sample ID: FD 371-2 / 371-3 / 371 MC

3. Description of Sample Location: 371-3 AT OUTFALL / 371 MC END OF PIPE / 371-2 NOT SAMPLED

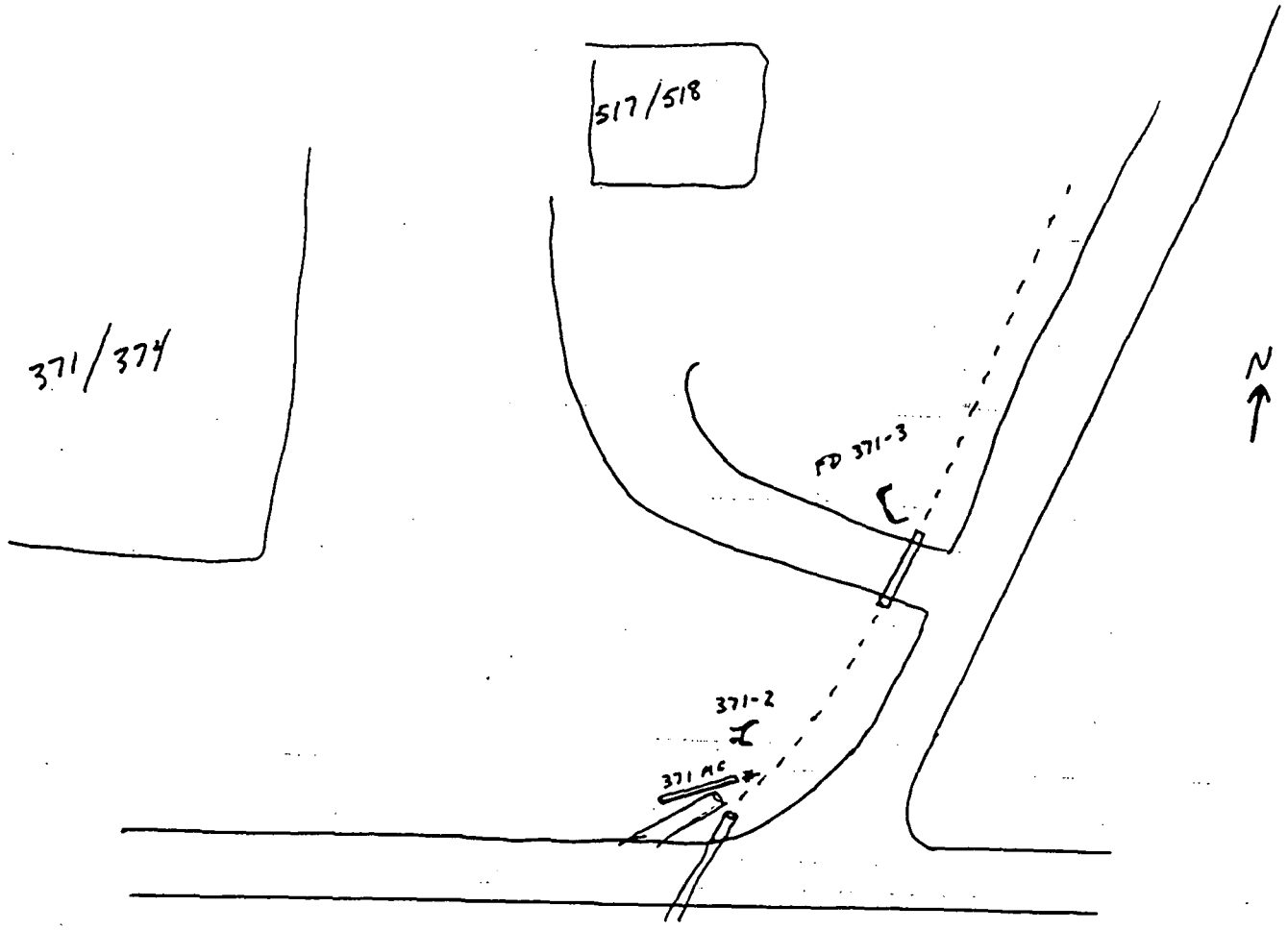
4. If sample location is a manhole:

Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A					
B					
C					
D					

5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket
371-2 NOT VISIBLE PVC ON DRAWING	10"	4 L/MIN. (EST.)
371-3 CAST IRON? UNABLE TO DETERMINE	10"	7 L/MIN
371-MC CORR. METAL PIPE	8"	4 L/MIN

Prepare sketch on back of page.



- 371 M.C IS AN 8" CMP. FLOW FROM THE PIPE WAS MEASURED AT 4 L/MIN.
  TWO OTHER PIPES (CULVERTS) DISCHARGE AT THE SAME LOCATION. 1 - 48" CONCRETE
  1 - 24" CMP
- FD 371-2 APPEARS TO BE AT THE LOCATION SHOWN ON THE PS2 DRAWING.
  COULD NOT SEE ACTUAL PIPE BUT IS SHOWN AS 10" PVC ON DRAWING.
  FLOW WAS OBSERVED. ESTIMATED AT 4 L/MIN. COULD NOT MEASURE ACCURATELY BECAUSE UNABLE TO CAPTURE ALL FLOW IN THE BUCKET.
  THIS IS THE MOST FLOW THAT STEVE BARROS HAS EVER SEEN COMING OUT OF 371-2
  HE INDICATED THAT HE MAY NEED TO START SAMPLING HERE.
- FLOW RATE AT FD 371-3 MEASURED AT 7 L/MIN.
  SAMPLES COLLECTED AT OUTFALL IN THE DRAINAGE DITCH.
- FD 371-2 IS APPROXIMATELY 15' NORTH AND SLIGHTLY EAST OF 371-MC

JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT MARCH 13, 1994

BY: DAVID LANDES

1. Building No: 771 2. Sample ID: FD 771-1

3. Description of Sample Location: SURFACE GRATE TO STORM SEWER
NOT SAMPLED DURING THIS EVENT.

4. If sample location is a manhole:

Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A					
B					
C					
D					

5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket

Prepare sketch on back of page.

SURFACE GRATE WAS UNDER WATER.
SAMPLES NOT COLLECTED PER STEVE BARROS

JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT MARCH 13, 1994

BY: DAVID LANDES

1. Building No: 790 2. Sample ID: FD 790

3. Description of Sample Location: MANHOLE NEAR SOUTHWEST CORNER OF BUILDING

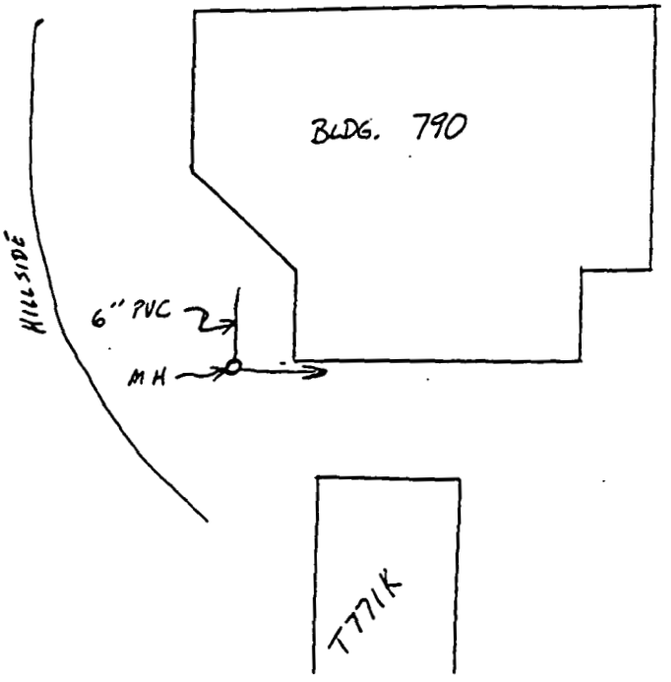
4. If sample location is a manhole:

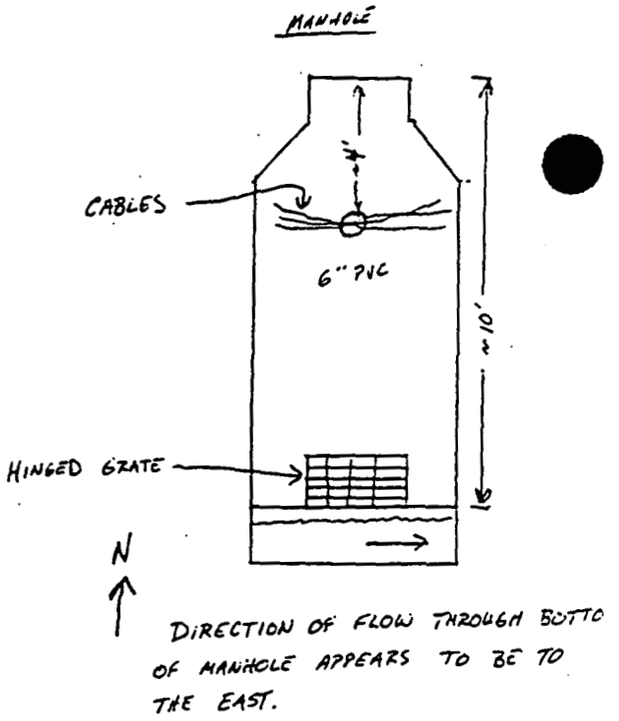
Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A	6"	SOUTH INTO MH	4' BELOW SURFACE	PVC	~4 L/MIN.
B					
C					
D					

5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket

Prepare sketch on back of page.





- THIS IS THE FIRST TIME THIS LOCATION HAS BEEN SAMPLED AND THE FIRST TIME THAT STEVE HAS SEEN FLOW FROM THE FOUNDATION DRAIN.
- 6" PVC PIPE (FD) ENTERS MANHOLE FROM THE NORTH APPROX. 4' BELOW THE SURFACE. SAMPLE WAS COLLECTED FROM WATER IN BOTTOM OF MANHOLE. OBSTRUCTIONS (CABLES) PREVENTED SAMPLES FROM BEING COLLECTED AT END OF PIPE.
- DEPTH OF MANHOLE APPROX. 10'.
- FLOW RATE ESTIMATED AT 4 L/MIN. UNABLE TO COLLECT WATER FROM PIPE TO GET AN ACCURATE MEASUREMENT
- 6" PVC PIPE WAS THE ONLY PIPE VISIBLE IN THE MANHOLE
- THE HINGED GRATE WAS LIFTED BY USING A PRY BAR TIED TO A ROPE AND SAMPLES WERE COLLECTED FROM THE WATER UNDERNEATH THE GRATE.
- I WAS UNABLE TO LOCATE DRAWINGS FOR THIS BLDG. DURING THE DRAWING SEARCH.

JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT MARCH 13, 1994

BY: DAVID LANDES

1. Building No: 774 2. Sample ID: FD 774-1

3. Description of Sample Location: SAMPLES COLLECTED FROM POND AT INFLUENT

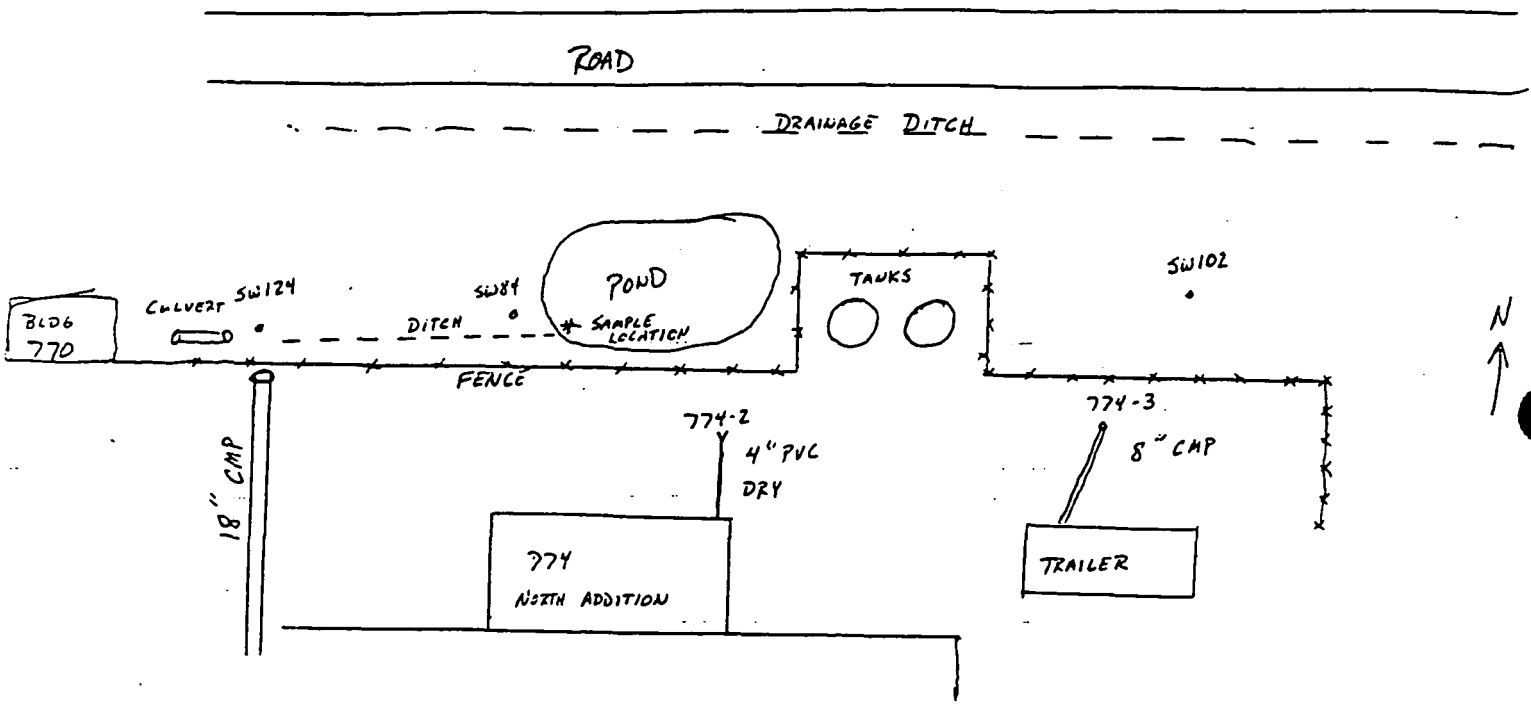
4. If sample location is a manhole:

Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A					
B					
C					
D					

5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket

Prepare sketch on back of page.



- 18" CMP (FD 774-1) OUTFALLS JUST SOUTH OF FENCE. UNABLE TO ESTIMATE FLOW AT OUTFALL DUE TO THE FENCE AND VEGETATION PARTIALLY BLOCKING END OF PIPE.
  ESTIMATED FLOW ENTERING POND FROM DITCH AT 2-3 GAL./MIN. MOST OF THIS FLOW IS FROM THE 18" CMP BUT SOME OF IT IS FROM THE CULVERT TO THE WEST.
  SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS AT THE OUTFALL (SW 124, SED 124)
  SURFACE WATER SAMPLING LOCATION (SW 84) NEAR INLET TO POND.
- OUTFALL 774-2 (4" PVC) WAS DRY
- OUTFALL 774-3 (8" CMP) DAYLIGHTS APPROX. 5' SOUTH OF FENCE. TRICKLE (< 1 L/MIN.) OBSERVED FLOWING FROM OUTFALL PIPE.
  SURFACE WATER SAMPLING LOCATION (SW 102) LOCATED APPROX. 20' N.E. OF OUTFALL
- STEVE IS UNSURE OF THE DESTINATION OF WATER FROM THE POND, PROBABLY WALNUT CREEK.
- FD 774-1 IS THE ONLY SAMPLE COLLECTED.

JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT MARCH 13, 1994

BY: DAVID LANDES

1. Building No: 779 2. Sample ID: FD 779-1

3. Description of Sample Location: 18" CMP ON HILLSIDE NORTH OF SOLAR PONDS

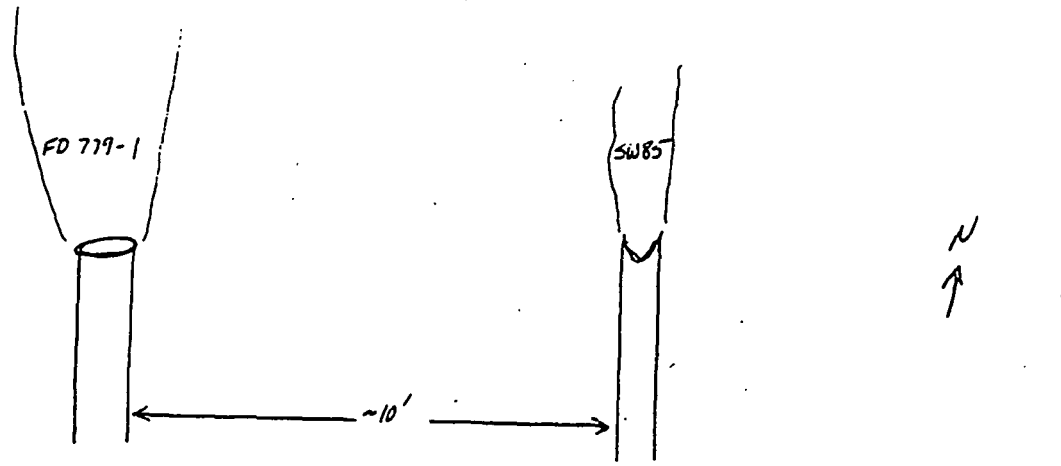
4. If sample location is a manhole:

Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A					
B					
C					
D					

5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket
FD 779-1 CORRUGATED METAL PIPE	18"	TRICKLE ~ 1 L/MIN
SW 85 VITRIFIED CLAY OR CONCRETE	10"	DRY

Prepare sketch on back of page.



FD 779-1

18" CMP OUTFALLS ONTO HILLSIDE NORTH OF SOLAR PONDS

SMALL TRICKLE OF WATER WAS OBSERVED, ESTIMATED AT 1 L/MIN.

UNABLE TO GET AN ACCURATE MEASUREMENT DUE TO VEGETATION AND DEBRIS AT OUTFALL

THIS LOCATION WAS NOT SAMPLED DUE TO THE LOW DISCHARGE RATE.

SW 85

10" PIPE, EITHER VITRIFIED CLAY OR CONCRETE. NO FLOW WAS OBSERVED

OUTFALL PIPE IS PARTIALLY BURIED.

STEVE BARROS THINKS THAT THIS IS THE OUTFALL FOR THE BLDG 779 F.D.

SW 85 IS APPROX. 10' EAST OF FD 779-1

JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT MARCH 13, 1994

BY: DAVID LANDES

1. Building No: 910 2. Sample ID: FD 910

3. Description of Sample Location: SUMP/MANHOLE NEAR NW CORNER OF BUILDING (OUTSIDE)

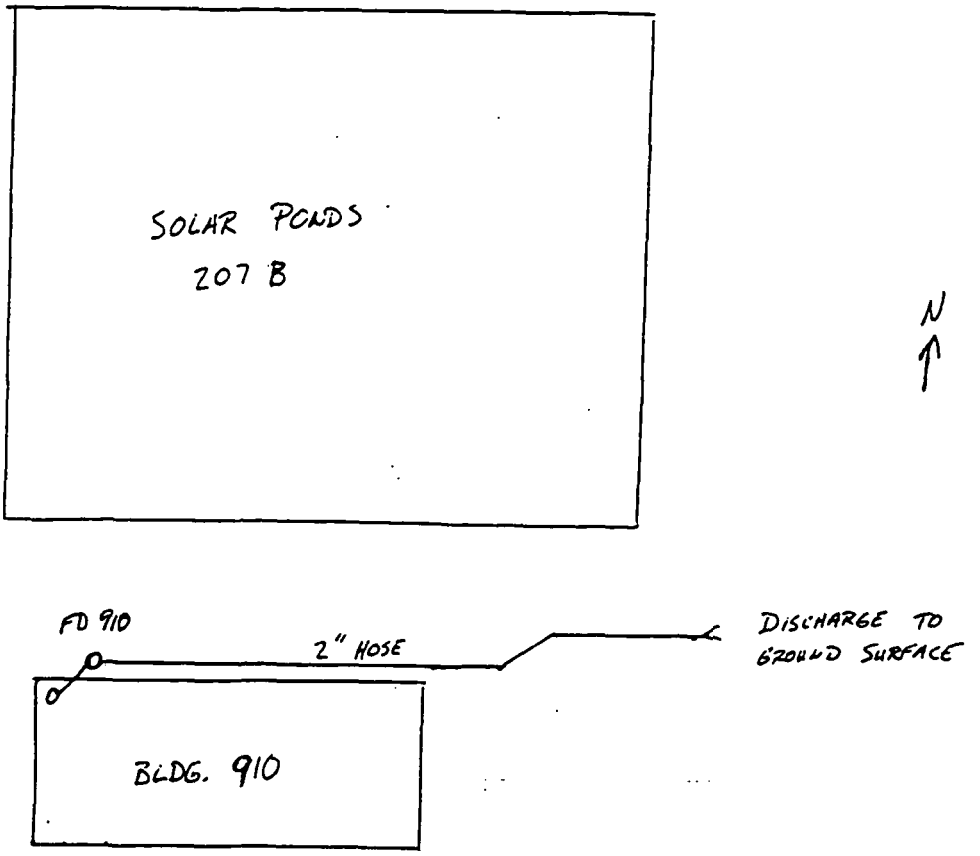
4. If sample location is a manhole:

Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A					
B					
C					
D					

5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket

Prepare sketch on back of page.



- SAMPLES COLLECTED FROM MANHOLE/SUMP NEAR NORTHWEST CORNER OF BUILDING. DEPTH TO WATER IN MANHOLE IS APPROX. 14' FROM SURFACE. NO PIPES WERE VISIBLE INSIDE MANHOLE. DISCHARGE FROM SUMP IS THROUGH A 2" HOSE. UNABLE TO ESTIMATE FLOW RATES.
- ACCORDING TO STEVE BARROS A SUMP IS LOCATED IN THE NORTHWEST CORNER OF THE BUILDING AND THE SUMP DISCHARGES TO THE MANHOLE/SUMP OUTSIDE THE BUILDING. THERE IS NO CONFIRMATION THAT DRAINS EXIST FOR THE BUILDING BUT THE WATER COLLECTED IN THE SUMPS IS BELIEVED TO BE GROUND WATER.
- STEVE SAID THAT KATHY LONDON OR RAY BOYLE MAY HAVE DRAWINGS FOR THE BUILDING OR KNOW WHERE TO FIND THEM. (INTERLOCHEN)
- I WAS UNABLE TO LOCATE DRAWINGS WHICH SHOW THESE SUMPS.

JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT MARCH 13, 1994

BY: DAVID LANDES

1. Building No: 991 2. Sample ID: BS 991-2

3. Description of Sample Location: SUMP IN SE CORNER OF BLDG. (UTILITY TUNNEL)

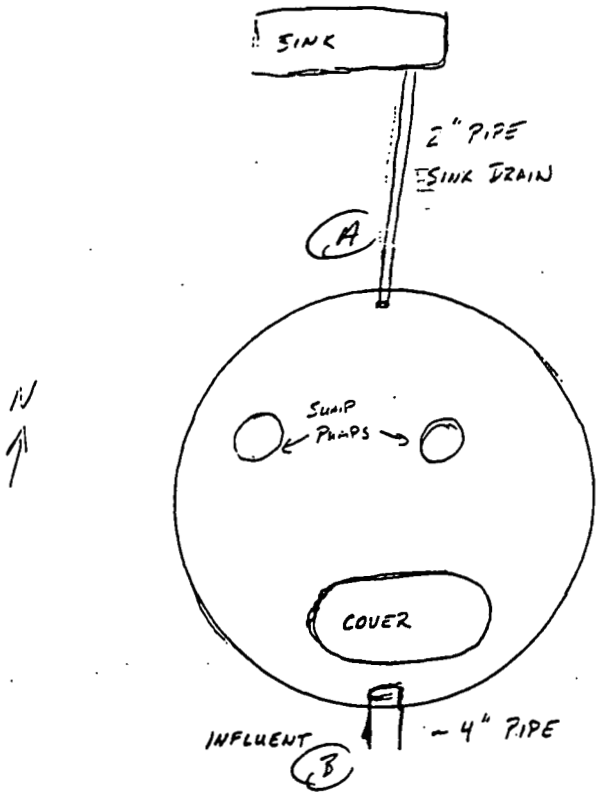
4. If sample location is a manhole:

Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A	2"	N TO S INTO SUMP	~ 1'	STEEL	NO FLOW OBSERVED SINK DRAIN
B	~4"		~3'	UNK.	2 L/MIN
C					
D					

5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket

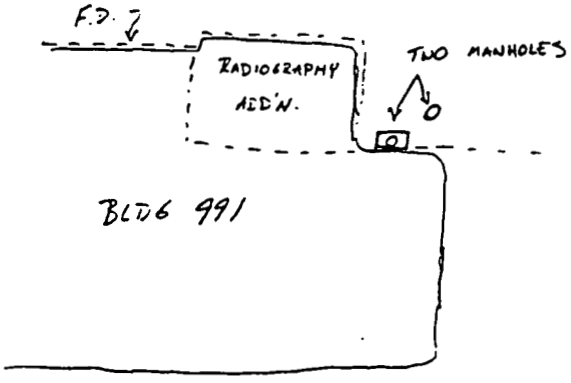
Prepare sketch on back of page.



- SUMP LOCATED IN SOUTH EAST CORNER OF BLDG IN UTILITY TUNNELS
- SUMP DISCHARGES TO SANITARY SEWER
- ONLY 2 PIPES VISIBLE ENTERING SUMP. 2" PIPE ENTERS ON N SIDE, THIS IS THE SINK DRAIN, APPROX. 1' BELOW THE SURFACE.
- APPROX. 4" PIPE DISCHARGES TO SUMP (FROM S SIDE, APPROX. 3' BELOW THE SURFACE. FLOW WAS OBSERVED, ESTIMATED AT 2 L/MIN.

  I THOUGHT THIS PIPE WAS FOR THE FLOOR DRAINS IN THE TUNNEL BUT I HAVE MY DOUBTS BECAUSE OF THE FLOW, UNLESS G.W. IS INFILTRATING INTO THE PIPES. CHECK THE DRAWING TO DETERMINE THE SOURCE OF THE PIPE.
- WATER LEVEL IN SUMP WAS APPROX. 4' BELOW SURFACE
- THE SAMPLE I.D. USED FOR THIS SAMPLE WA. FD991. THE ID CODE SHOULD BE BS 991-2. I POINTED THIS OUT TO STEVE AND ASKED THAT HE WRITE A MEMO. TO RFEDS SO THE CORRECT I.D. IS ENTERED

APPROX. 100 - 55 GAL. DRUMS ARE STORED IN THE UTILITY TUNNELS
DRUMS ARE SOLID WASTE (BERYLLIUM SCRAPS).



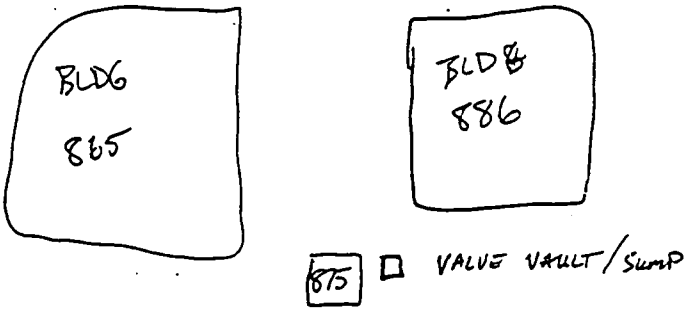
NO ACCESS TO STORM SEWER IN THIS REGION.

- I WALKED THE AREA WHERE THE OUTFALL IS SHOWN ON THE DWGS. AND DID NOT LOCATE THE PIPE. IT MAY BE BURIED OR WAS HIDDEN FROM VIEW BY THE CAT TAILS.
- TWO MANHOLES LOCATED AT NE CORNER OF BLDG. FOOTING DRAIN MAY BE ROUTED TO THE ONE CLOSEST TO THE BUILDING, IT IS LOCATED IN LINE WITH THE FD AND COULD HAVE BEEN EASILY REROUTED
- THERE ARE NO MANHOLES OR SURFACE INLETS TO THE STORM SEWER ON THE SOUTH SIDE OF THE BUILDING. IF THE DRAIN FROM THE 996, 997, + VAULTS DOES CONNECT TO THE SEWER, SAMPLING IS NOT POSSIBLE NEAR THE BLDG.

JACOBS ENGINEERING GROUP INC.

DATE _____ SUBJECT _____ SHEET NO. _____

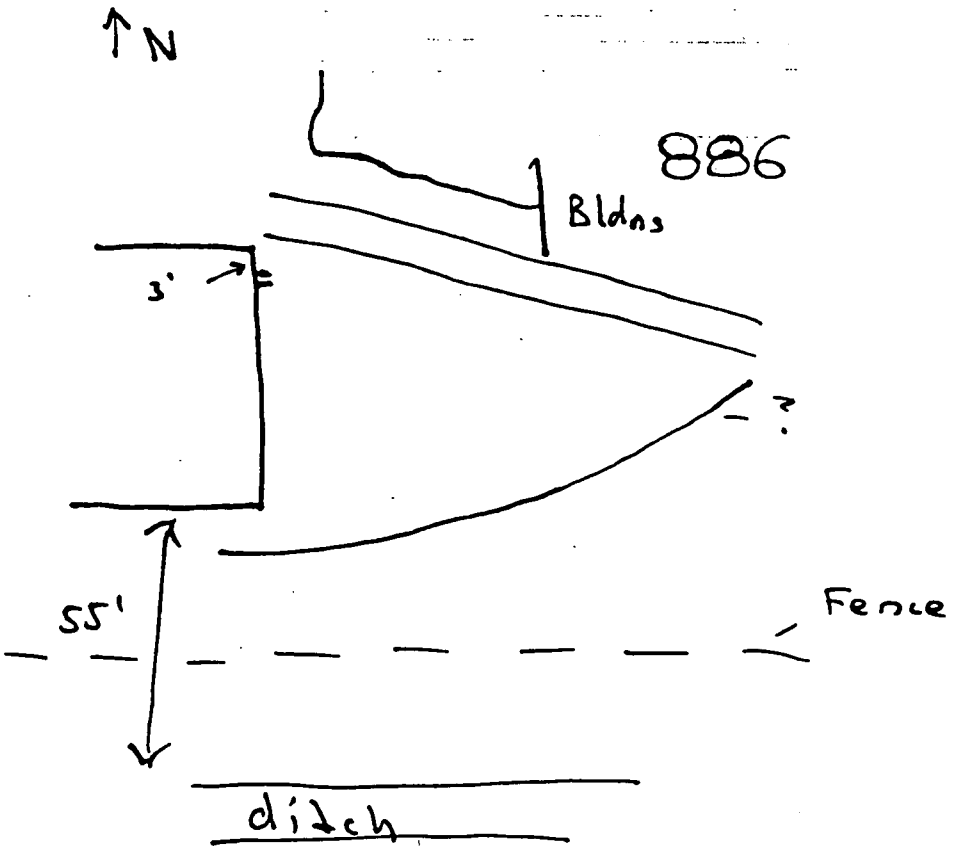
BY _____ CHKD. _____ JOB NO. _____



- discharge to ditch ?

distance ?

bearing ?



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JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT

MARCH ~~15~~ 20, 1994

BY: DAVID LANDES

1. Building No: 447

2. Sample ID: FD 444 - 460

3. Description of Sample Location: OUTFALL ON HILLSIDE SOUTH OF BLDG 664. APPROX. 200 FEET SOUTH OF SECURITY FENCE

4. If sample location is a manhole:

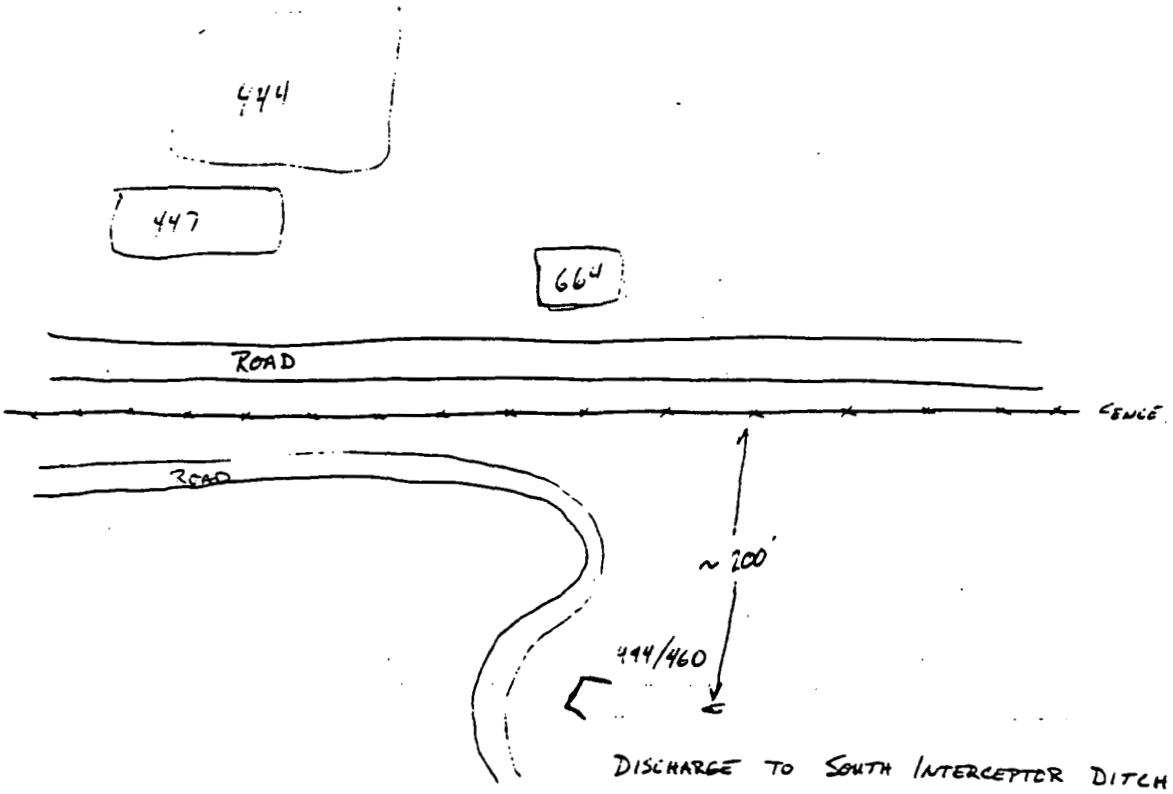
Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A					
B					
C					
D					

5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket
CMP	~ 36" DID NOT MEASURE	> 20 GAL/MIN. UNABLE TO CAPTURE ALL FLOW IN BUCKET

* LIGHT RAIN AND SNOW DURING THE MORNING HOURS.

Prepare sketch on back of page.



DISCHARGE TO SOUTH INTERCEPTOR DITCH → C-1 POND

UNABLE TO CAPTURE ALL FLOW IN BUCKET TO GET AN ACCURATE FLOW MEASUREMENT BUT IS ESTIMATED AT > 20 GAL/MIN. LIGHT RAIN AND SNOW ALL MORNING IS LIKELY CONTRIBUTING TO FLOW.

THE OUTFALL PIPE IS APPROX. 36 INCHES (I COULDN'T FIND A TAPE TO MEASURE) AT A CONCRETE HEADWALL.

JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT

MARCH ~~13~~ 20, 1994

BY: DAVID LANDES

1. Building No: 865

2. Sample ID: FD 865-1 BS

3. Description of Sample Location: VAULT ON WEST SIDE OF BUILDING

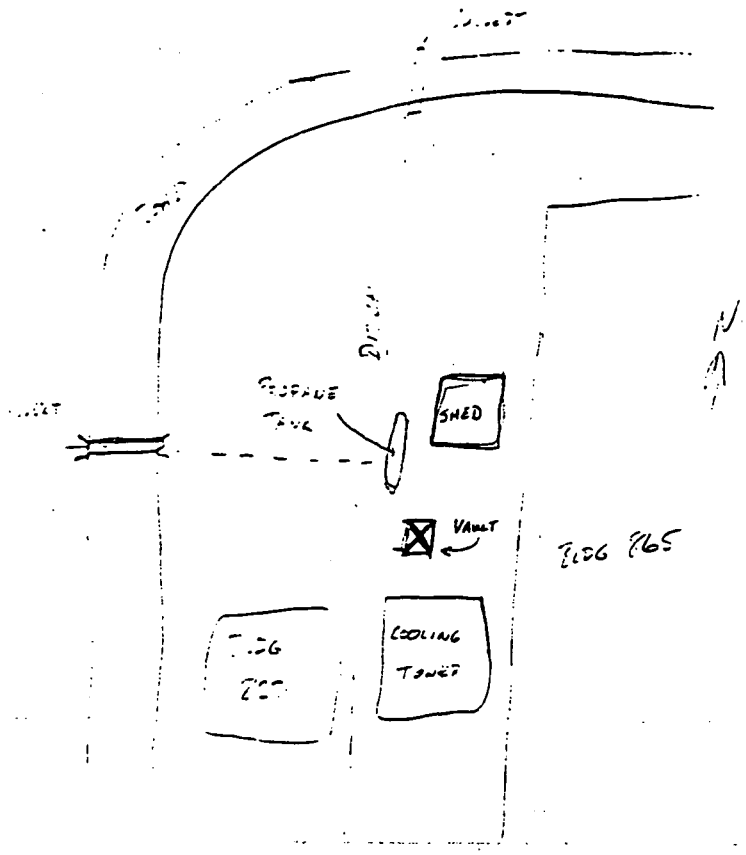
4. If sample location is a manhole: UTILITY MANHOLE, NO VISIBLE PIPES ENTERING VAULT

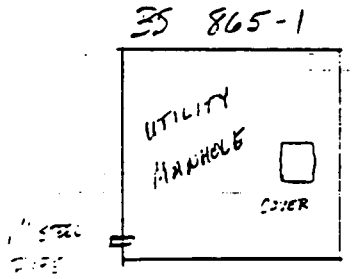
Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A					
B					
C					
D					

5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket

Prepare sketch on back of page.





VAULT IS 5' DEEP. APPROX. 3' OF WATER IN BOTTOM OF VAULT.

GROUND WATER INFILTRATION

SUMP PUMP DISCHARGES THROUGH THE 1" PIPE TO THE DITCH

DITCH WOULD FLOW TO THE NORTH DRY AT THIS TIME.

SEWER DUMPED DISCHARGE TO THE DITCH.

NO VISIBLE PIPES IN THE VAULT LAST CASES.

JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT

MARCH ~~15~~ 20, 1994

BY: DAVID LANDES

1. Building No: 865

2. Sample ID: BS 865-2

3. Description of Sample Location: SUMP OUTSIDE DOOR #1 ON EAST SIDE OF BLDG.

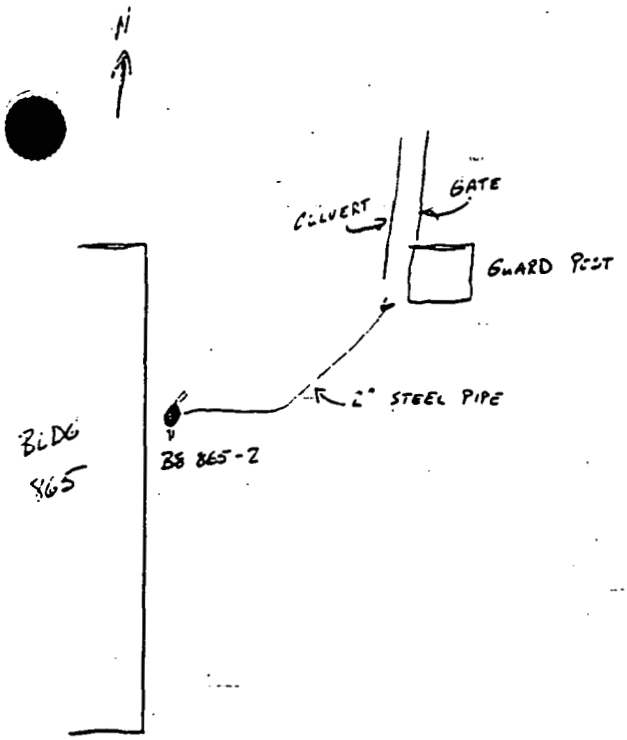
4. If sample location is a manhole:

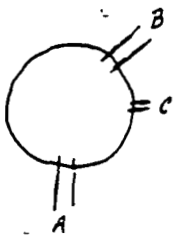
Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A	8"	N INTO SUMP	10'	VCP	3 L/MIN
B	8"	SW INTO SUMP	15'	VCP	3 L/MIN
C	2"	EAST	~3'	STEEL	
D					

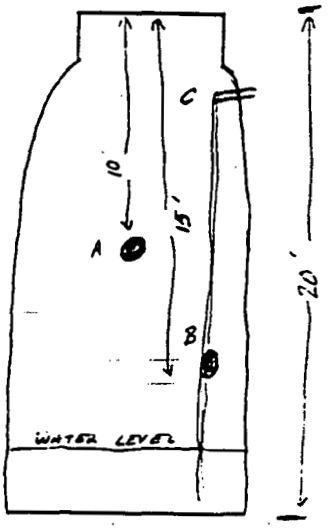
5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket

Prepare sketch on back of page.







SUMP IS APPROX. 20' DEEP

WATER LEVEL IN SUMP IS APPROX. 18' BELOW SURFACE. SUMP WAS DISCHARGING DURING SAMPLING.

DISCHARGE WAS OBSERVED FROM A 2" PIPE NEAR THE GUARD POST. THIS IS BELIEVED TO BE FROM THE SUMP. THE DISCHARGE ENTERED A CULVERT WHICH FLOWS TO THE DITCH ALONG CENTRAL AVE.

STORM DRAIN LINE (FROM FOUNDATION DRAINS) ENTERS MANHOLE ~ 10' BELOW SURFACE (FROM SOUTH). THE PIPE IS EITHER 6" OR 8" (CHECK DRAWING) AND APPEARS TO BE VCP. THE FLOW FROM THE PIPE IS ESTIMATED AT 3 L/MIN.

ANOTHER PIPE ENTERS THE SUMP FROM THE NW AT APPROX. 15' BELOW SURFACE. THIS PIPE IS THE SAME DIAMETER AND MATERIAL AS THE STORM DRAIN PIPE. FLOW FROM THIS PIPE IS ALSO APPROX. 3 L/MIN. I DON'T RECALL SEEING THIS PIPE ON THE DRAWINGS.

DISCHARGE THROUGH A 2" STEEL PIPE.

JACOBS ENGINEERING GROUP, INC.
DATA COMPILATION OPERABLE UNIT 8

FOOTING DRAIN SAMPLING EVENT

MARCH ~~18~~ 20, 1994

BY: DAVID LANDES

1. Building No: 883

2. Sample ID: FD 883 - 1

3. Description of Sample Location: SUMP NEAR SW CORNER OF BLDG

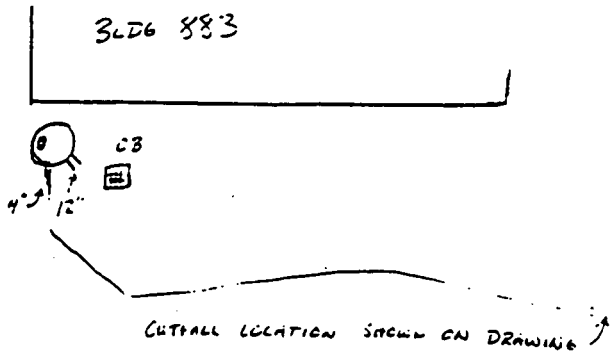
4. If sample location is a manhole:

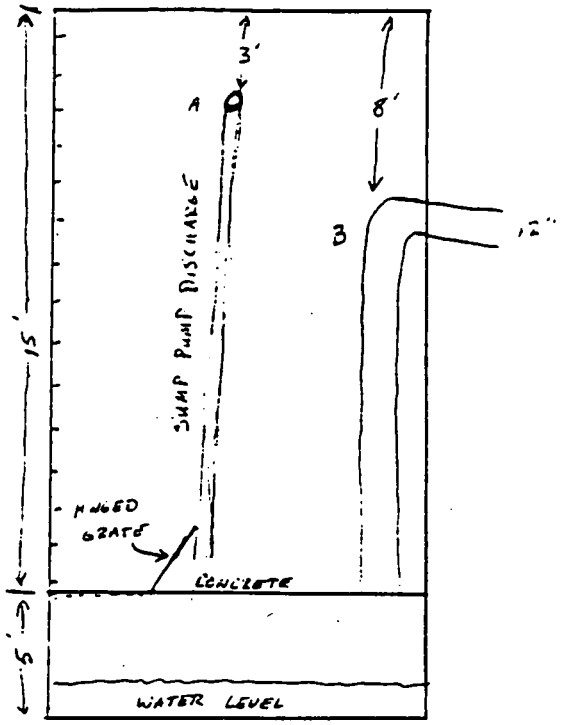
Pipe	Size (ID)	Direction of flow	Depth (bls)	Pipe Material	Estimation of flow rate
A	4"	SOUTH OUT OF SUMP	3'	PVC	SUMP PUMP DISCHARGE
B	12"	~~S~~ N W ?	8'	STEEL ?	UNK.
C					
D					

5. If sample location is an outfall:

Pipe Material	Size (ID)	Flow Rate/Stop Watch 5 gallon bucket

Prepare sketch on back of page.





SUMP IS 20' DEEP

ONLY 2 PIPES WERE OBSERVED IN THE SUMP.

PIPE "A" IS THE 4" DISCHARGE PIPE.

PIPE "B" IS A 12" PIPE (STEEL ?) WHICH ENTERS THE SUMP FROM THE SE SIDE APPROX. 8' BELOW SURFACE

I THINK THIS IS THE 12" STORM SEWER SHOWN ON UTILITY DRAWINGS.

THE END OF PIPE WAS NOT VISIBLE TO DETERMINE IF THERE WAS ANY FLOW.

I DID NOT SEE THE FOUNDATION DRAIN PIPE INSIDE THE SUMP BUT I COULD HEAR WATER ENTERING THE SUMP BELOW THE HINGED GRATE.

I DID NOT FIND THE OUTFALL AT THE LOCATION SHOWN ON THE DRAWINGS, IT IS APPARENTLY BURIED

I DO NOT KNOW IF THE 12" PIPE DISCHARGES TO THE SUMP. IT MAY BE AN OVERFLOW PREVENTOR IN CASE THE SUMP PUMP FAILS.

APPENDIX F

Conversation Confirmers

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: Mike Visocky TIME: 2:45 ~~AM~~ PM DATE: 12/1/93

PROJECT: OU-9 OPWL PROJECT NO.: CSH6C020

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER:

CONVERSATION WITH: Bldg 774 Rick WAGNER
COMPANY: EG & G RFP
TEL. NO.: 966 - 3102

SUBJECT: IM/IRA Footing drains, & OU-9 TANKS & SUMPS

Rick WAGNER says That when the new CONSTRUCTION of Bldg 774 occured, The Footings & WALLS diverted The Groundwater Flow path into The Bldg. The 774 Foundation drain That Flows To The North is not plugged up. Engineering has Tested The Line To prove This ground water is presently seeping into the Basement of 774. There is a Sump in Room 103 That Collects inflow water. water is Then Treated (Precipitation with $FeSO_4$) and Then sent To Bldg 374, sludge is made into cocie. Bldg 774 ALSO Treats process WATER From Bldg 771 & what is known a Bottled Water Treatment Flow is as described as above. 774 Did treat organics at one Time, EARLY system was known as The Jelly PLANT and The LATTER AS OASIS. 774 will accept water up to 100,000 pC/L.

ACTION:

DISTRIBUTION:

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: (AM) PM DATE: 12/02/93

PROJECT: 111/124 IOU PROJECT NO.:

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER:

CONVERSATION WITH: LEON McGOVERN
COMPANY: EG&G CIVIL ENGINEERING
TEL. NO.: 966-4874

SUBJECT: I ASKED MR. McGOVERN FOR ASSISTANCE IN LOCATING "AS-BUILT" DRAWINGS FOR THE RE-ROUTING OF THE STORM SEWER SYSTEM IN THE 400 AREA AND HE STATED THAT DOCUMENT CONTROL SHOULD HAVE THE DRAWINGS AND SUGGESTED PERFORMING A DATABASE SEARCH USING THE KEYWORD "OUTFALL". HE SAID IF JACOBS NEEDED FURTHER ASSISTANCE FROM THE ENGINEERING DEPARTMENT THAT MARK BUDDY WOULD HAVE TO CONTACT HIM AND GIVE AUTHORIZATION AND A BILLING CODE.

I INQUIRED ABOUT THE BUILDING 371/374 FOUNDATION DRAIN OUTFALLS AND HE STATED THAT HE HAD NO KNOWLEDGE OF THEM BEING RE ROUTED. HE SAID THAT OUTFALL #2 SHOULD NOT BE SEALED AND SHOULD STILL BE FUNCTIONING PROPERLY. HE SAID THAT THE OUTFALL #3 WAS CLEANED OUT APPROX. ONE WEEK AGO.

MR McGOVERN ALSO STATED THAT AN EXTENSIVE SURVEY OF THE STORM DRAIN SYSTEM FOR ALL OF PLANT SITE WAS RECENTLY PERFORMED AND THE VIDEO TAPE IS AVAILABLE (APPROX. 24 hrs OF VIDEO)

ACTION: I WAS UNABLE TO LOCATE THE DRAWINGS FOR THE RE ROUTING OF THE 400 AREA STORM SEWER SYSTEM. THE DATABASE SEARCH USING THE KEYWORD "OUTFALL" REVEALED NO DRAWINGS. I DISCONTINUED MY SEARCH FOR THESE DRAWINGS.

DISTRIBUTION:
MIKE VISOCKY
T C WAIT
ART HIRSCH
FARREL HOBBS
DAVE BEEHLER

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: (AM) PM DATE: 12/02/93

PROJECT: IM/IRA 1011 PROJECT NO.:

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER:

CONVERSATION WITH: JIM KOELMEL
COMPANY: EG&G 460 AREA OPS
TEL. NO.: 966-7957

SUBJECT: MR KOELMEL HAD LITTLE KNOWLEDGE ABOUT THE LAYOUT OF THE STORM SEWER SYSTEM IN THE 460 AREA. HE REFERRED ME TO TOM TRUJILLO (EG&G) WHO WAS THE PROJECT ENGINEER FOR THE RE ROUTING OF THE SYSTEM.

I INQUIRED ABOUT THE BUILDING SUMP IN THE BASEMENT OF BUILDING 444 AND THE DESTINATION OF THE "WATER" IN THE SUMP HE STATED THAT HE KNOWS THAT THE FOUNDATION DRAINS DISCHARGE TO THE SUMP AND WAS NOT AWARE OF ANY OTHER DISCHARGE POINTS FOR THE DRAINS. HE STATED THAT THE SUMP DISCHARGE ENTERS THE PROCESS WASTE SYSTEM AND IS TREATED AT 371/374

HE ALSO STATED THAT FOLLOWING THE CHROMIC ACID INCIDENT, THE MODIFICATIONS TO THE PIPING SYSTEM WERE VERY MINOR AND CONSISTED OF RE ROUTING ONE SMALL SECTION OF PIPE. HE REFERRED ME TO MISS MICKEY JOHNSON FOR INFORMATION REGARDING THE CHROMIC ACID INCIDENT.

ACTION: I WAS UNABLE TO CONTACT TOM TRUJILLO ON 12/2/93
HE WAS OUT OF HIS OFFICE (I WAS TOLD).
I MADE NO EFFORT TO CONTACT MS MICKEY JOHNSON.

DISTRIBUTION:
MIKE VISOCKY
TC WAIT
DAVE BEEHLER

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: T.C. WAIT TIME: 8:20 (AM) PM DATE: 12-2-93

PROJECT: ROCKY FLATS IM/IRA PROJECT NO.: 054600300

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER:

CONVERSATION WITH: SHARON WILSON
COMPANY: EG&G
TEL. NO.: 966-4193

SUBJECT: BLDG 991 FOUNDATION DRAIN

(1) VERIFY THAT FD-991-1 HAS BEEN REROUTED TO THE BUILDING SUMP.

ACCORDING TO SHARON, WHO'S BEEN BUILDING MANAGER FOR 10 YRS, THIS IS NOT DOCUMENTED AND SHE DOES NOT RECALL ANY REROUTING. SHE BELIEVES THAT PART, IF NOT ALL, THE FD-991-1 IS GOING TO BLDG 990(?) AS PART OF THE SEWER SYSTEM.

ACTION:

DISTRIBUTION:

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: T.C. WAIT TIME: 8:00 AM PM DATE: 12-2-93

PROJECT: ROCKY FLATS IN/ARA PROJECT NO.: 05H60300

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER:

CONVERSATION WITH: MARK BURNEISTER
COMPANY: EG&G
TEL. NO.: 966-5891

SUBJECT: BUILDING 881

(1) IS OUTFALL OF FOOTING DRAINS ROUTED TO OU1?
yes it is.

(2) ARE THERE ANY FLOW MEASUREMENTS OF 881 OUTFALL?
recent data from 881 outfall only - no data from earlier years

ACTION:

MARK will fax outfall data to TC today.

DISTRIBUTION:

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: 9:50 AM ____ PM DATE: 2-9-94

PROJECT: OU8 PROJECT NO.: 05H6C020

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: RICK WAGNER
COMPANY: EG+G BLDG. 774
TEL. NO.: 966-3102

SUBJECT: GROUNDWATER ACCUMULATION SYSTEM IN BLDG. 774

RICK STATED THAT THE QUANTITY OF WATER PUMPED BY THE GROUNDWATER ACCUMULATION SYSTEM VARIES FROM 3,500 - 6,000 GALLONS PER MONTH

ACTION:

DISTRIBUTION:

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: I.C. Wait TIME: _____ AM 1:28 (PM) DATE: 12-2-93

PROJECT: Rocky Flats IM/IRA PROJECT NO.: OSH60300

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: _____

CONVERSATION WITH: Russ Cirillo
COMPANY: EG&G
TEL. NO.: 966-5876

SUBJECT:

881 Flow readings - flowmeter data is bad because instruments have de-calibrated over time.

Russ gave approximate flow measurements as follows:

Jan., Feb. ≈ 4.0 → 4.25 GPM
March, April, May ≈ 7.0 GPM
June, July, Sept., Oct. ≈ 2.3 GPM (DRY SEASON)
Nov., Dec. ≈ 3.5 GPM

ACTION:

DISTRIBUTION: B.J.
M.V.
D.L.

JE DENVER OPERATIONS

BY: TC Wait, Theresa John-Dellaport, Mike Visocky, Dave Landes TIME: 10:45 AM PM DATE: 12/6/93

PROJECT: ~~Rocky Flats JM/IRA~~ PROJECT NO.: 05H60300

☐ TELEPHONE CALL

☐ OFFICE MEETING

☒ OTHER: Site walk #2 Conversation

CONVERSATION WITH: Frank Gibbs

COMPANY: EG&G

TEL. NO.: N/A

SUBJECT: 559 Footing Drain

Mr. Gibbs approached us on our site walk while we were trying to trace the green hose from the manhole by 559/561 to building 560.

Mr. Gibbs said the hose pumps water from FD 559/561 to the Sewer System at about 300 gal/day.

The water is sampled quarterly and reads about 200 ppb of Carbon Tetra Chloride.

We were advised to check with building personnel before field checking, especially in the P.A.

ACTION:

DISTRIBUTION:

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: 8:40 AM ____ PM DATE: 12/21/93

PROJECT: OU8 IM/IRA PROJECT NO.: 05H60020/05H6030

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: LESLIE DUNSTAN
COMPANY: E6&G SURFACE WATER DIVISION
TEL. NO.: 966-2002

SUBJECT: SAMPLING PROGRAM FOR FOUNDATION DRAINS AND BUILDING SUMPS

LESLIE MANAGES THE DATA FOR THE SAMPLING PROGRAM. SHE JOINED THE SURFACE WATER PROGRAM IN 1988. PROGRAM (FD AND BS) BEGAN IN THE 1970'S BUT ONLY HAS ANALYTICAL DATA FROM 1988 TO PRESENT. SHE HAS NEVER SEEN DATA FROM PRIOR TO 1988 AND DOESN'T KNOW IF ANY EXISTS. SHE WAS UNDER THE IMPRESSION THAT THE DRAINS WERE SAMPLED QUARTERLY SINCE THE PROGRAM BEGAN. SHE SAID IF THE DATA EXISTS IT WOULD BE IN THE "ENVIRONMENTAL MASTER FILE."

SHE STATED THAT THE PROGRAM WAS INITIATED AS AN INTERNAL MONITORING PROGRAM AND WAS NOT REQUIRED BY REGULATORY AGENCIES. CONSEQUENTLY IT WAS A LOW PRIORITY PROGRAM AND MAY HAVE BEEN PUT ON HOLD "WHEN THINGS GOT HECTIC".

LESLIE RECOMMENDED CONTACTING NANCY KIRK (HOFFMAN) FOR INFORMATION ABOUT THE PROGRAM WHEN IT BEGAN.

ACTION: LEFT A MESSAGE FOR NANCY TO CALL. 273-6167 DENVER WEST

DISTRIBUTION: ____

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANTES TIME: 10:20 AM ____ PM DATE: 1/4/94

PROJECT: OU 8 / IM/IRA ROCKY FLATS PROJECT NO.: 05H60020

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: PAUL GRABOWSKI
COMPANY: EG+G
TEL. NO.: 966-6389

SUBJECT: INVERT ELEVATIONS OF DRAINS

I ASKED MR GRABOWSKI IF THE INVERT ELEVATIONS SHOWN ON THE ENGINEERING DRAWINGS CORRESPONDS TO "MEAN SEA LEVEL" ELEVATION. HE STATED THAT IN MOST CASES THE ELEVATIONS SHOWN ON THE DRAWINGS ARE TAKEN FROM A KNOWN BENCH MARK ELEVATION, WHICH DOES CORRESPOND TO MEAN SEA LEVEL ELEVATION. HOWEVER, IT HAS BEEN HIS EXPERIENCE THAT MOST OF THE ELEVATIONS GIVEN ON DRAWINGS ARE NOT ACCURATE AND HE WOULD NOT USE THEM FOR DESIGN CRITERIA. HE RECOMMENDED SURVEYING THE BUILDINGS OF INTEREST TO DETERMINE THE ACTUAL ELEVATIONS.

HE ALSO STATED THAT HE HAS WORKED WITH SEVERAL SUB-CONTRACTORS AND HAS ALREADY SURVEYED MANY OF THE CULVERTS AND OUTFALLS AROUND THE PLANT SITE. HE SAID THAT HE MAY HAVE THE ELEVATIONS FOR MANY OF THE OUTFALLS AND CULVERTS OF INTEREST FOR THIS STUDY. HE WOULD NEED A BILLING CODE TO CHECK THIS.

ACTION: ____

DISTRIBUTION:
M VISOCKY
T C WAIT
THERESA JEUN-DELLAPORT
BRUCE JONES
ART HIRSCH

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: 11:30 AM ____ PM DATE: 1/10/94

PROJECT: OU8 - IM/IRA PROJECT NO.: 05H60070

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: ZEKE HOLK
COMPANY: EG&G OU1 MANAGER
TEL. NO.: 966-8714

SUBJECT: ZEKE STATED THAT VIDEO INSPECTION OF THE FD 444/460 OUTFALL SHOWED DOWNSPOUTS FROM ~~FT~~ BUILDING 460 ROOF DRAINS TYING IN TO THE STORM DRAIN SYSTEM. HE DID NOT RECALL IF THE VIDEO SHOWED ANY FOUNDATION DRAINS FOR THE BUILDING TYING IN.

I ASKED IF HE KNEW HOW I COULD VIEW THE VIDEO TAPE AND HE STATED THAT IT MAY BE CLASSIFIED INFORMATION. HE RECOMMENDED CONTACTING ED MAST FOR INFORMATION ABOUT THE VIDEO.

ACTION: ____

DISTRIBUTION: ____

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: 9:00 AM ____ PM DATE: 1-12-94

PROJECT: OU8 RFP DRAIN IDENTIFICATION PROJECT NO.: 05H60020

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: ED MAST
COMPANY: EG+G
TEL. NO.: 966-8589

SUBJECT: I ASKED ED IF I COULD VIEW THE VIDEOTAPE OF THE INSPECTION OF THE FD 444/460 OUTFALL. HE SAID THAT THE VIDEO IS NOT CLASSIFIED INFORMATION AND THAT I COULD VIEW IT. HE SAID THAT HE WOULD CALL MR. DOUG DENNISON AT A.S.I. AND ARRANGE FOR ME TO GET A COPY OF THE TAPE.

ACTION: I PHONED DOUG DENNISON AND ARRANGED TO PICK UP A COPY OF THE VIDEO AND THE DOCUMENTATION WHICH GOES ALONG WITH IT. DOUG SAID THAT I COULD MAKE A COPY OF THE VIDEO IF JACOBS DESIRES. I WILL PICK ~~THE~~ UP THE INFORMATION ON 1/13/94

DISTRIBUTION: THERESA JEHN-DELLAPORT
FARREL HOBBS

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: 11:30 AM ____ PM DATE: 1/24/94

PROJECT: OU8 DRAIN IDENTIFICATION STUDY PROJECT NO.: C5H6CC2C

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: TYLER SMART
COMPANY: ADVANCED SCIENCES INC. (ASI)
TEL. NO.: 980-0036

SUBJECT: 400 AREA STORM SEWER VIDEO INSPECTION

Tyler said that the figure which shows the layout of sewer system was generated before the work began in order to get the IWCP permit. The figure was not revised after the work was completed. The segment of pipe between MH 2 and MH 2.1 does not exist. A 6" pipe does enter MH2, which had a continuous flow, but that pipe comes from building 440 (Roger Wisehart told him this)

- He said that the downspouts entering the pipe on the west side of 460 are from roof drains based on visual observation. The scope of their task was not to verify pipes entering the system and they did not attempt to determine their origins.
- 4.2.2 and 4.2.3 (on figure) are curb inlets and he does not recall a connection from the 124 FD discharge
- The 6" pipe entering MH 5 is connected to a pump of some kind During the work the pump turned on and water flowed from the pipe at a high velocity. He said it may be associated with an air conditioning unit which is located nearby because he was told the discharge from that unit was pumped.

ACTION: ____

DISTRIBUTION: ____

JE JACOBS ENGINEERING GROUP INC. **CONVERSATION CONFIRMER**
DENVER OPERATIONS

BY: DAVID LANDES TIME: 9:25 AM ____ PM DATE: 1/28/94
PROJECT: OU8 DRAIN IDENTIFICATION PROJECT NO.: 05H60020

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: RICK WAGNER
COMPANY: EG+G
TEL. NO.: 966-3102

SUBJECT: BUILDING 774 SUB DRAIN SYSTEM

Because of the flooding of the basement following the construction of the WASTE TREATMENT ADDITION (NORTH SIDE) a groundwater accumulation system (well sump) was installed in Room 103. (Details of sump shown on DWG 29655-470). The sump is about 3 feet below the finished floor. The discharge from the sump is to the 200 series tanks and is eventually treated in Building 374.

Rick thinks the system was installed in 1987 or 1988. Very shortly after the addition was constructed.

He said that to his knowledge, all of the foundation drains discharge to the small pond north of the building

ACTION: ____

DISTRIBUTION: ____

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: 0930 AM ____ PM DATE: 2-03-94

PROJECT: ____ PROJECT NO.: ____

☐ TELEPHONE CALL
☒ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: DAVE WEBB
COMPANY: EG&G BLDG 124 MANAGER
TEL. NO.: ____

SUBJECT: FOUNDATION DRAINS ON BUILDING 124

THE MANHOLE ON THE EAST SIDE OF THE BLDG. IS DRY AND THERE IS NO DISCHARGE INTO IT. A SUMP IS LOCATED NEXT TO THE MANHOLE AND ALL DRAINS DISCHARGE TO THIS SUMP. THE SUMP DISCHARGES TO THE BASINS EAST OF THE BUILDING WHICH ARE PART OF THE BACKWASH TREATMENT SYSTEM. ALL WASTEWATER FROM THE BACKWASH SYSTEM IS PUMPED TO THE COOLING TOWERS IN THE 400 AREA. FROM THERE THE WATER IS DISTRIBUTED AROUND PLANT SITE FOR PROCESS NEEDS.

THE ONLY CHEMICALS STORED IN THE BUILDING ARE THOSE THAT ARE USED FOR THE WATER TREATMENT. (POTABLE)

A 25 GALLON DIESEL FUEL TANK IS LOCATED IN THE ~~BASEMT~~ D/L BASEMENT OF THE BLDG. IF THIS TANK LEAKED THE FUEL COULD ENTER THE SUMP. THERE ARE TWO AREAS WITHIN THE BACKWASH TREATMENT SYSTEM WHERE THE FUEL COULD BE CONTAINED IN THE EVENT OF A SPILL.

ACTION: ____

DISTRIBUTION: THERESA JOHN-DELLAPORT
DAVE BEEHLER
T.C. WAIT

PRINTED ON RECYCLED PAPER

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: 1005 AM ____ PM DATE: 2-03-94

PROJECT: OU8 DRAIN IDENTIFICATION PROJECT NO.: ____

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: CARL GIBSON
COMPANY: EG&G 779 UTILS. MANAGER.
TEL. NO.: PAGE X 1062

SUBJECT: FOUNDATION DRAINS ON BUILDING 779

CARL IS NOT AWARE OF ANY DRAINS OR GROUNDWATER COLLECTION SYSTEM AROUND THE BASEMENT STRUCTURE. HE SAYS THAT THERE IS A PROBLEM WITH GROUNDWATER INFILTRATION DURING THE HIGH WATER TABLE MONTHS. THERE ARE SOME CONCRETE TANKS BENEATH THE BASEMENT FLOOR WHICH EXTEND DOWN APPROXIMATELY 30' BELOW THE FLOOR. GROUNDWATER DOES INFILTRATE THROUGH CRACKS IN THE TANKS. THE TANKS ARE CHECKED DAILY AND PUMPED OUT WHEN NEEDED. THE WATER IS PUMPED TO BLDG 776 AND THEN TO BLDG. 374 FOR TREATMENT. THERE IS A SUMP LOCATED EAST OF BLDG 779 WHICH DISCHARGES TO SANITARY SEWER. HE IS UNCERTAIN OF THE SOURCE OF WATER IN THE SUMP BUT IS GOING TO CHECK HIS DRAWINGS FOR ME.
HE IS UNAWARE OF ANY DRAINS ON BLDG. 776 BUT KNOWS THAT THERE IS A PROBLEM WITH GROUNDWATER INFILTRATION THERE ALSO. HE RECOMMENDED THAT I CONTACT MR JERRY RENZINGER ABOUT UTILITIES IN THAT BUILDING. (PAGE X 1493)
CARL RECORDS THE QUANTITY OF WATER PUMPED OUT OF THE TANKS BELOW THE BASEMENT IN A LOG BOOK. AND HAS BEEN DOING SO FOR ~ 4 YEARS.

ACTION: ____

DISTRIBUTION: THERESA JOHN-DELLAPORT, DAVE BEEHLER, MIKE VISOCKY, T.C. WAIT, FARREL HOBBS

PRINTED ON RECYCLED PAPER

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: 10:20 AM ____ PM DATE: 2-9-94

PROJECT: OU 8 FOUNDATION DRAINS PROJECT NO.: 05H60020

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: JOHN LYONS
COMPANY: EG&G 800 AREA UTILITIES
TEL. NO.: 966-2137

SUBJECT: FOUNDATION DRAINS AND SUMPS BLDGS. 881, 865, 883

- JOHN STATED THAT THE FLOOR DRAINS IN THE UTILITY TUNNELS DO DISCHARGE TO THE SUMP. THE SUMP IS PUMPED TO THE SANITARY SEWER. THE SUMP IS ACCESSIBLE FOR SAMPLING.
- THE STORM DRAIN SYSTEM IS FOR THE ROOF DRAINS. HE IS NOT AWARE OF ANY OTHER CONNECTIONS TO THIS SYSTEM.
- HE IS NOT SURE OF THE DISCHARGE LOCATION FROM BLDG. 883 SUMP. HE RECALLS SOMETHING BEING DONE WITH THE CULVERT WHERE THE DISCHARGE PIPE FROM THE SUMP IS SHOWN TO BE TO. HE SAID IT MAY HAVE BEEN BURIED.
- HE DOESN'T KNOW ANYTHING ABOUT THE VAULT ON THE WEST SIDE OF BLDG. 865. HE SAID THAT IT IS GROUND WATER IN THE VAULT BUT IS NOT KNOWLEDGEABLE ABOUT THE PIPING IN THAT VAULT.

ACTION: ____

DISTRIBUTION: ____

JE JACOBS ENGINEERING GROUP INC. CONVERSATION CONFIRMER
DENVER OPERATIONS

BY: DAVID LANDES TIME: 9:20 AM ____ PM DATE: 2-10-94

PROJECT: OU8 PROJECT NO.: 05H60020

☒ TELEPHONE CALL CONVERSATION WITH: CARL GIBSON

☐ OFFICE MEETING COMPANY: EG&G 559 779 Utilities

☐ OTHER: ____ TEL. NO.: 966-4000 x 1062 (PAGE)

SUBJECT: DRAINS ON BLDGS 779 AND 559

TANK 2A UNDERNEATH THE BASEMENT (3 OR GALLON) IS THE TANK WHICH GROUNDWATER INFILTRATES INTO. THE TANK HAS BEEN DRY SINCE OCTOBER. GROUNDWATER ONLY INFILTRATES DURING THE HIGH WATER TABLE MONTHS.

THE ONLY FOUNDATION DRAINS FOR BUILDING 559 ARE AROUND THE PIT AND TUNNEL TO 561. THE OTHER TUNNEL DOES NOT HAVE DRAINS AND THE SUMP IS DRY. IF THE SUMP OUTSIDE THE BUILDING (FD 559/561) FILLS TO A DEPTH OF 66" THEN THE TUNNEL WILL FLOOD. THIS HAS ONLY HAPPENED ONCE.

ACTION:

DISTRIBUTION:

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: 10:00 AM ____ PM DATE: 2-10-94

PROJECT: 048 DRAIN IDENTIFICATION PROJECT NO.: 05H60020

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: JERRY BENTZINGER
COMPANY: EG&G (BLDG 776 UTILITIES)
TEL. NO.: 966-4000 x 1493 (page)

SUBJECT: EXISTENCE OF DRAINS ON BUILDINGS 776/777

HE IS NOT AWARE OF ANY FOUNDATION DRAINS ON THE BUILDINGS.
THE ONLY FLOODING PROBLEMS HE IS AWARE OF IS IN THE TUNNEL WHICH LEADS TO BLDG. 771.
HE IS GOING TO ASK AROUND TO OTHER BUILDING PERSONNEL ABOUT DRAINS AND GROUNDWATER INFILTRATION
HE RECOMMENDED CALLING JEFF HIGLEY AT X3561 FOR QUESTIONS ABOUT BLDG. 771

ACTION: ____

DISTRIBUTION: ____

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: 1020 AM ____ PM DATE: 2-15-94

PROJECT: OU8 DRAIN IDENTIFICATION PROJECT NO.: 15H6000.

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: ____

CONVERSATION WITH: STEVE BARROS
COMPANY: EG&G SWD
TEL. NO.: 966-5288

SUBJECT: Building 779 Sampling Location

The outfall which has been sampled in the past may not be the correct outfall. The outfall which may be the foundation drain outfall is located just to the east of FD 779-1 and was a surface water sampling location until about 1 year (one year) ago. The site is SW89 and data should exist in REEDS

The sampling program is still not required for regulatory compliance but is driven by DOE Order 5400.1

FD 559/561 IS NOT BEING SAMPLED BECAUSE THE WATER IS BEING ROUTED TO THE SANITARY SEWER

ACTION: ____

DISTRIBUTION: ____

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: _____ AM 2:15 PM DATE: 2-17-94

PROJECT: OU8 Drain Identification PROJECT NO.: 05H6CC2C

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: _____

CONVERSATION WITH: NANCY KIER
COMPANY: EG+G
TEL. NO.: 273-6167 D 4575

SUBJECT: FOUNDATION DRAIN OUTFALLS

Nancy was involved with the program from April 1980 → July 1984. She said that the outfalls were sampled 3 times per year or quarterly (she didn't recall for certain) during that time so there should be data somewhere.

She does recall a time period when the outfalls and sumps were not sampled (maybe a 2 year time period) but she doesn't recall when or why they weren't sampled.

She had little recollection of the outfalls locations and was not able to answer any specific questions.

ACTION: _____

DISTRIBUTION: _____

JE JACOBS ENGINEERING GROUP INC. **CONVERSATION CONFIRMER**
DENVER OPERATIONS

BY: DAVID LANDES TIME: _____ AM 2:30 PM DATE: 2-17-94
PROJECT: OU8 Drain Identification PROJECT NO.: 05H60020

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: _____

CONVERSATION WITH: RON STECKLINE
COMPANY: EG&G 400 AREA UTILITIES
TEL. NO.: 966-2600 D 0460

SUBJECT: FOUNDATION DRAINS IN THE 400 AREA

- Building 460 does not have any foundation drains

- The pipe which I suspected to be the inlet to the sump is the inlet. He is not aware of any other discharge locations for the drains. There are no other inlets to the sump. He wasn't sure what Area Way 2 is but thinks he knows what I was referring to. He ~~[illegible]~~ said he was told that there is a process waste vault located there but is not aware of any connection to the FD

- The cooling tower west of 440 has a gravity drain to the sanitary sewer. ~~[illegible]~~ Ron has no idea what the 6" PVC pipe entering the manhole is connected to

ACTION: _____

DISTRIBUTION: _____

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: DAVID LANDES TIME: _____ AM 4:45 PM DATE: 3-10-94

PROJECT: OU8 DRAIN IDENTIFICATION PROJECT NO.: 05H6C208

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: _____

CONVERSATION WITH: TOM TRUJILLO
COMPANY: EG&G CIVIL ENGINEERING
TEL. NO.: 966-5428

SUBJECT: REROUTING / CONSTRUCTION OF OUTFALL FD 444/460

TOM SAID THAT THE OUTFALL WAS CONSTRUCTED IN 1987. THE PROJECT WAS COMPLETED IN AUGUST OR SEPTEMBER.

ACTION:

DISTRIBUTION:

JACOBS ENGINEERING GROUP INC.
DENVER OPERATIONS

CONVERSATION CONFIRMER

BY: Karen Hancock TIME: _____ AM 3:10 PM DATE: 3/30/94

PROJECT: _____ PROJECT NO.: 05H 60208

☒ TELEPHONE CALL
☐ OFFICE MEETING
☐ OTHER: _____

CONVERSATION WITH: Bob Fiore
COMPANY: EG&G Technical Support for PU Operations at Bldg 707
TEL. NO.: 966-8142/966-4000 x 1672

SUBJECT: Aboveground tank associated with IHSS 118.2 (OU8)

Asked Bob whether the 5,000 gallon aboveground carbon tetrachloride tank located between the north side of Building 707 and the alleyway south of Building 778 has been removed:

Bob said the tank has not been removed and currently contains approximately 3,500 gallons of liquid. He knows of no plans for removal

ACTION: _____

DISTRIBUTION: _____

APPENDIX G

Graphs Depicting UTL Exceedances for Radionuclides and Metals
(Foundation Drains and Building Sumps)

APPENDIX G
Table of Contents

Figure Number	Sample Station	Analyte
G-1	FD111-1	Gross Alpha
G-2	FD111-1	Gross Beta
G-3	FD111-1	Aluminum
G-4	FD111-1	Beryllium
G-5	FD111-1	Cadmium
G-6	FD111-1	Chromium
G-7	FD111-1	Copper
G-8	FD111-1	Manganese
G-9	FD371-1	Gross Alpha
G-10	FD371-1	Gross Beta
G-11	FD371-2	Gross Alpha
G-12	FD371-2	Gross Beta
G-13	FD371-3	Gross Alpha
G-14	FD371-3	Gross Beta
G-15	FD371-3	Arsenic
G-16	FD371-3	Mercury
G-17	FD371-3	Lead
G-18	FD371-3	Aluminum
G-19	FD371-3	Beryllium
G-20	FD371-3	Cadmium
G-21	FD371-3	Chromium
G-22	FD371-3	Copper
G-23	FD371-3	Manganese
G-24	FD371 COMP	Gross Alpha
G-25	FD371 COMP	Gross Beta
G-26	FD371 COMP	Aluminum
G-27	FD371 COMP	Beryllium
G-28	FD371 COMP	Cadmium
G-29	FD371 COMP	Chromium
G-30	FD371 COMP	Copper
G-31	FD371 COMP	Manganese
G-32	FD444-1	Gross Alpha
G-33	FD444-1	Gross Beta
G-34	FD444-2	Gross Alpha
G-35	FD444-2	Gross Beta
G-36	FD444-460	Gross Alpha
G-37	FD444-460	Gross Beta
G-38	FD444-460	Aluminum
G-39	FD444-460	Beryllium
G-40	FD444-460	Cadmium
G-41	FD444-460	Chromium
G-42	FD444-460	Copper
G-43	FD444-460	Manganese
G-44	FD516-1	Gross Alpha
G-45	FD516-1	Gross Beta
G-46	FD707-1	Gross Alpha
G-47	FD707-1	Gross Beta

APPENDIX G
Table of Contents

G-48	FD707-1	Aluminum
G-49	FD707-1	Beryllium
G-50	FD707-1	Cadmium
G-51	FD707-1	Chromium
G-52	FD707-1	Copper
G-53	FD707-1	Manganese
G-54	BS707-2	Gross Alpha
G-55	BS707-2	Gross Beta
G-56	BS707-2	Arsenic
G-57	BS707-2	Mercury
G-58	BS707-2	Lead
G-59	BS707-2	Aluminum
G-60	BS707-2	Beryllium
G-61	BS707-2	Cadmium
G-62	BS707-2	Chromium
G-63	BS707-2	Copper
G-64	BS707-2	Manganese
G-65	BS707-3	Gross Alpha
G-66	BS707-3	Gross Beta
G-67	BS771-2	Gross Alpha
G-68	BS771-2	Gross Beta
G-69	BS771-4	Gross Alpha
G-70	LBS771-4	Gross Beta
G-71	FD774-1	Gross Alpha
G-72	FD774-1	Gross Beta
G-73	FD779-1	Gross Alpha
G-74	FD779-1	Gross Beta
G-75	FD881-1	Gross Alpha
G-76	FD881-1	Gross Beta
G-77	FD881-1	Aluminum
G-78	FD881-1	Beryllium
G-79	FD881-1	Cadmium
G-80	FD881-1	Chromium
G-81	FD881-1	Copper
G-82	FD881-1	Manganese
G-83	BS881-3	Gross Alpha
G-84	BS881-3	Gross Beta
G-85	BS881-3	Arsenic
G-86	BS881-3	Mercury
G-87	BS881-3	Lead
G-88	FD883-1	Gross Alpha
G-89	FD883-1	Gross Beta
G-90	FD883-1	Aluminum
G-91	FD883-1	Beryllium
G-92	FD883-1	Cadmium
G-93	FD883-1	Chromium
G-94	FD883-1	Copper
G-95	FD883-1	Manganese

APPENDIX G
GRAPHS DEPICTING UTL EXCEEDANCES FOR RADIONUCLIDES AND METALS (FOUNDATION DRAINS AND BUILDING SUMPS)

The graphs included in Appendix G (G-1 through G-95) show the upper tolerance limit (UTL) exceedances for radionuclides and metals at selected sampling stations. Data from sampling stations were presented on UTL exceedance graphs if a sufficient number of data points were available and the data were reliable. In each graph, metals or radionuclide results are compared to the "99/99 UTLs" for groundwater, surface water, and seeps and springs. If the UTL data were not available for a source (or sources), it is noted on the graph as "n/r."

Radionuclide graphs include gross alpha and gross beta concentrations that were detected in foundation drains and building sumps. These values are presented on the UTL exceedance graphs in picoCuries per liter. With a few exceptions, gross alpha and gross beta results were graphed on a linear scale.

Graphs showing metal concentrations detected in foundation drains and building sumps include metals analyzed by Atomic Absorption methods (arsenic, mercury, and lead) and metals tested using Inductively Coupled Plasma (ICP) methods (aluminum, beryllium, cadmium, chromium, copper, and manganese). These values are presented on the UTL exceedance graphs in micrograms per liter. In most cases, metal concentrations were graphed logarithmically.

Definitions of Acronyms and Symbols Used In Figures G-1 Through G-95

Al	Aluminum
As	Arsenic
Be	Beryllium
Cd	Cadmium
Cr	Chromium
Cu	Copper
Hg	Mercury
ICP	Inductively Coupled Plasma
Mn	Manganese
n/r	Not Reported
Pb	Lead
pCi/L	picoCuries per liter
UTL	Upper Tolerance Limit
μg/L	micrograms per liter
<	Not Detected - the associated value is the sample quantification limit
*	Sample not analyzed for that element

FIGURE G-1

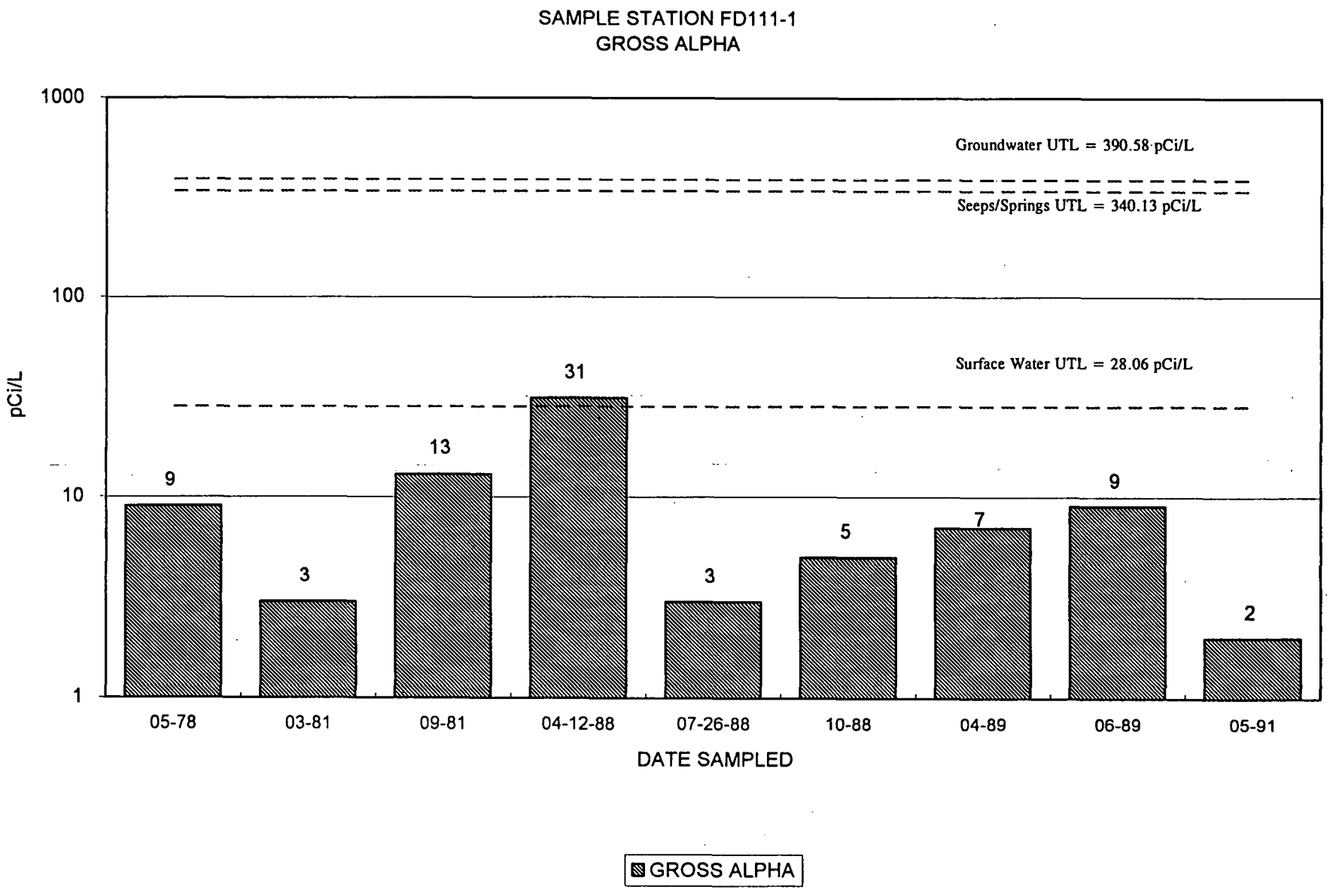


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FIGURE G-2

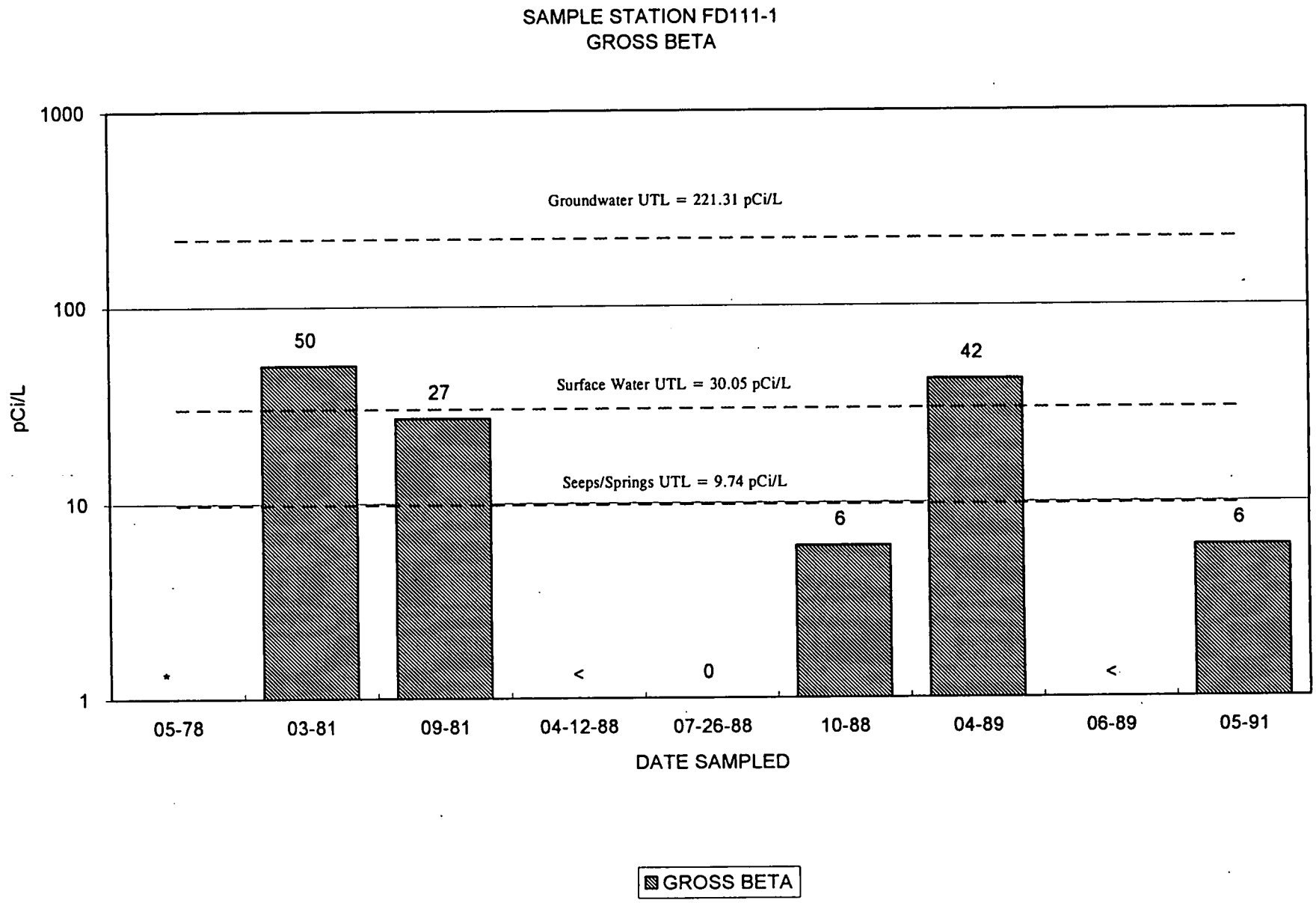

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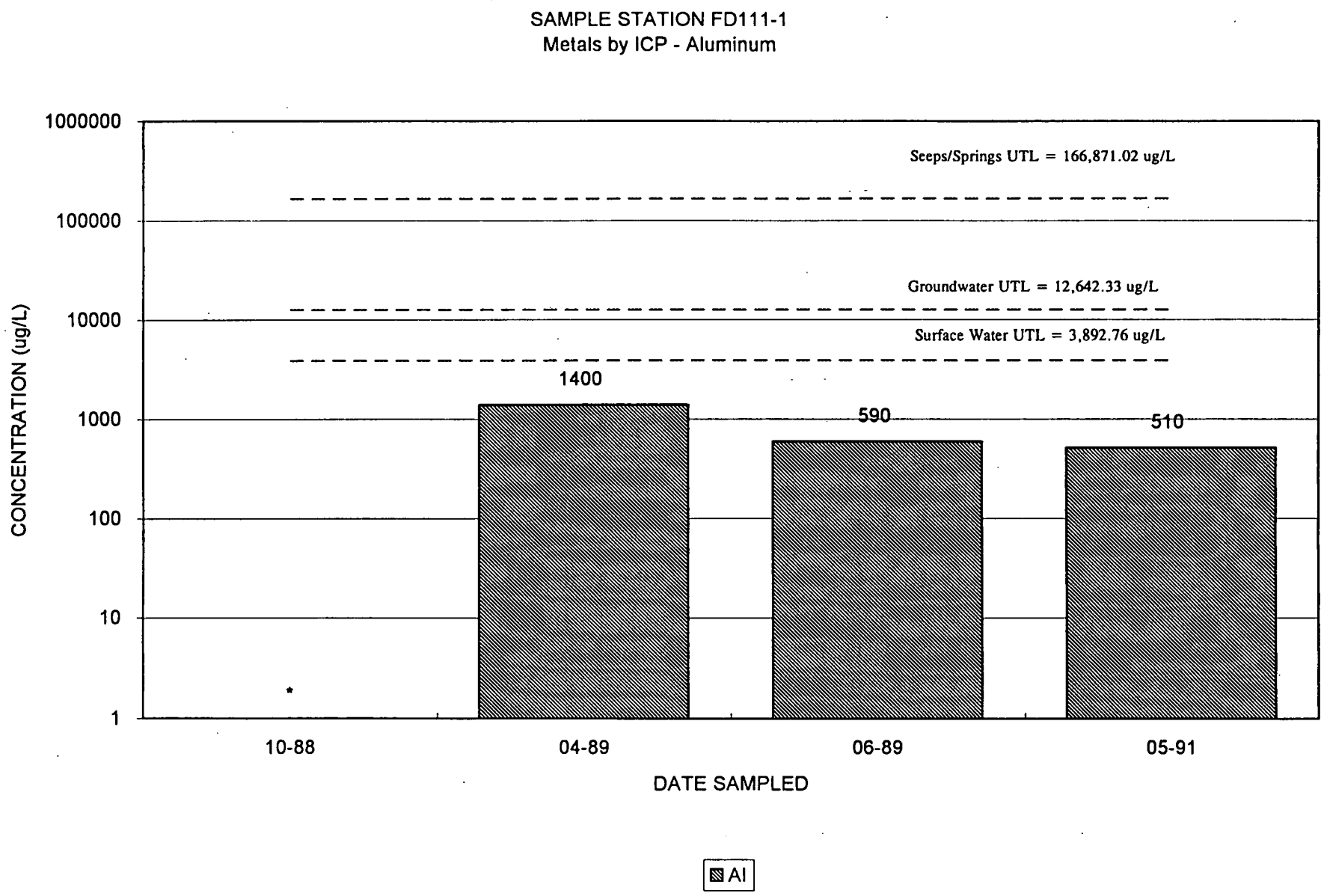
FIGURE G-3



A:\METGRPH.XLS\ICPFD111-1.AL

FIGURE G-4

SAMPLE STATION FD111-1
Metals by ICP - Beryllium

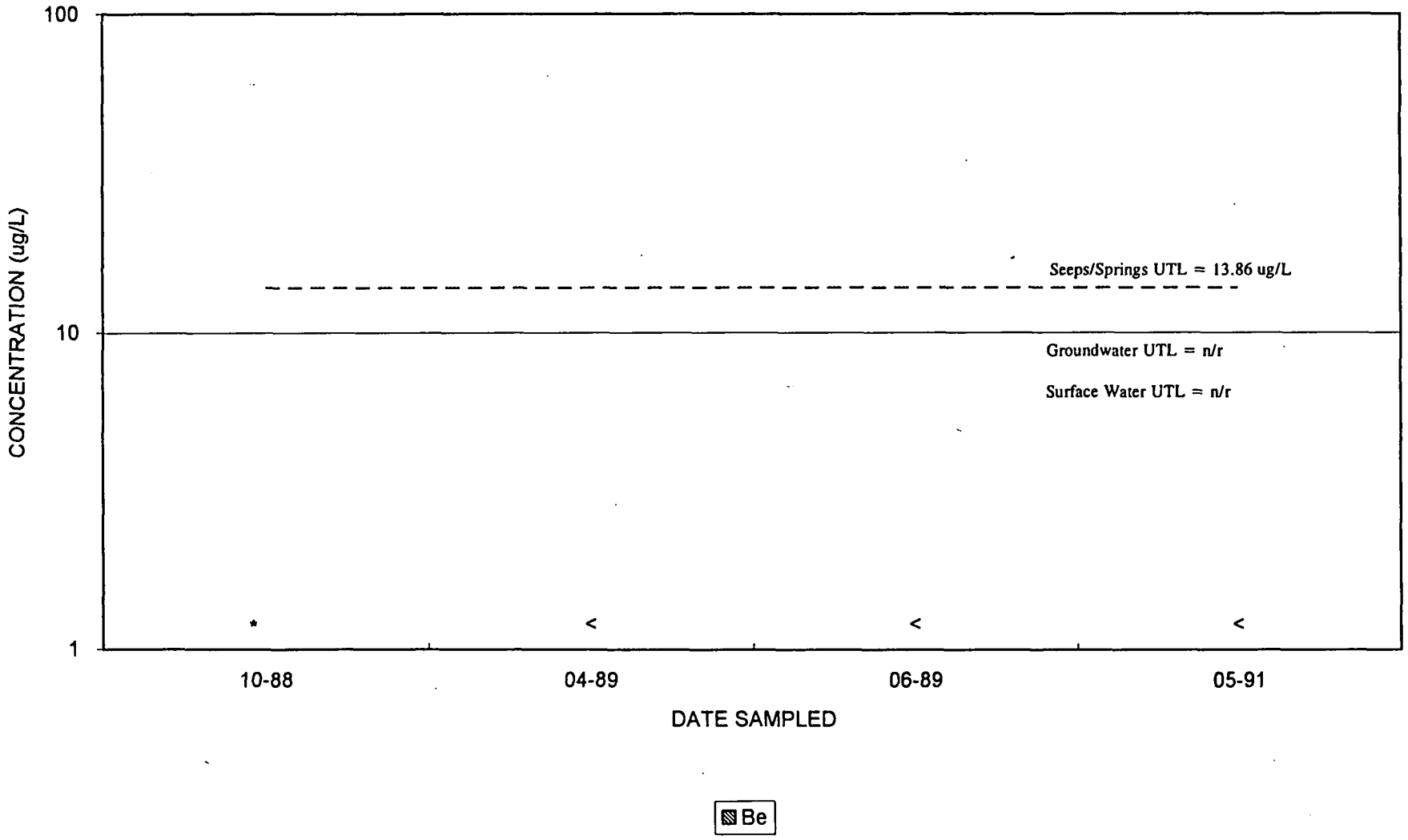


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FIGURE G-5

SAMPLE STATION FD111-1
Metals by ICP - Cadmium

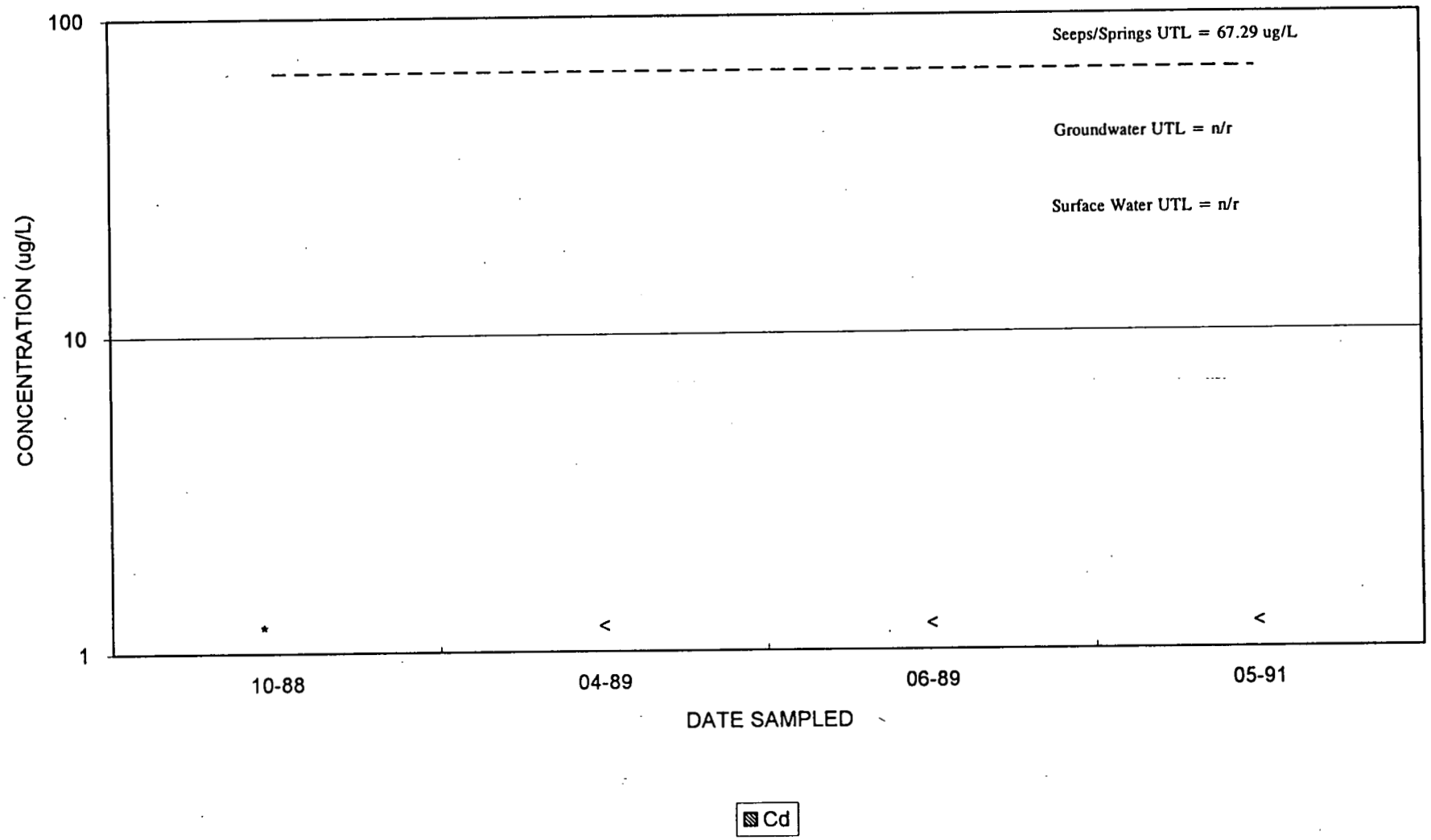

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FIGURE G-6

SAMPLE STATION FD111-1
Metals by ICP - Chromium

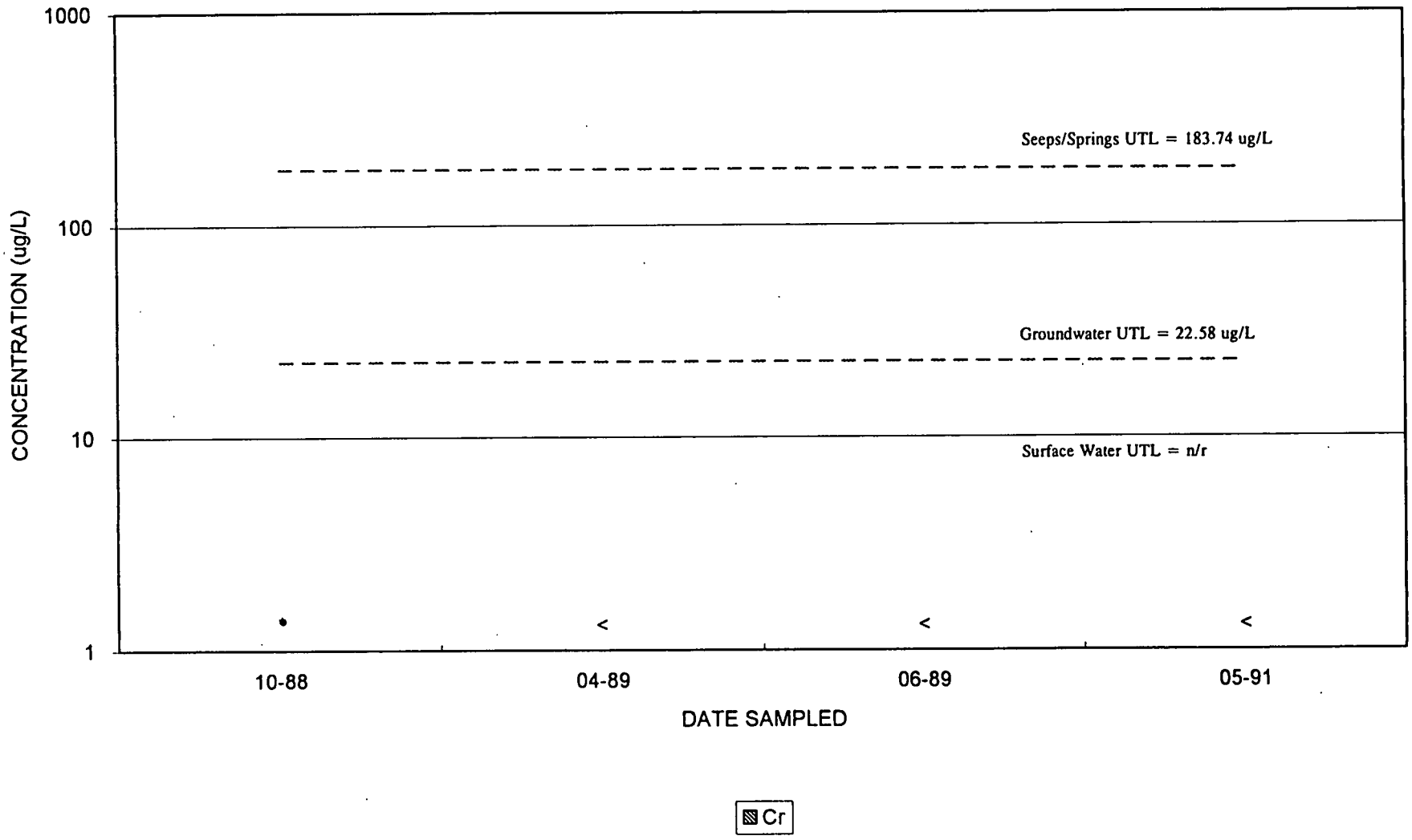

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FIGURE G-7

SAMPLE STATION FD111-1
Metals by ICP - Copper

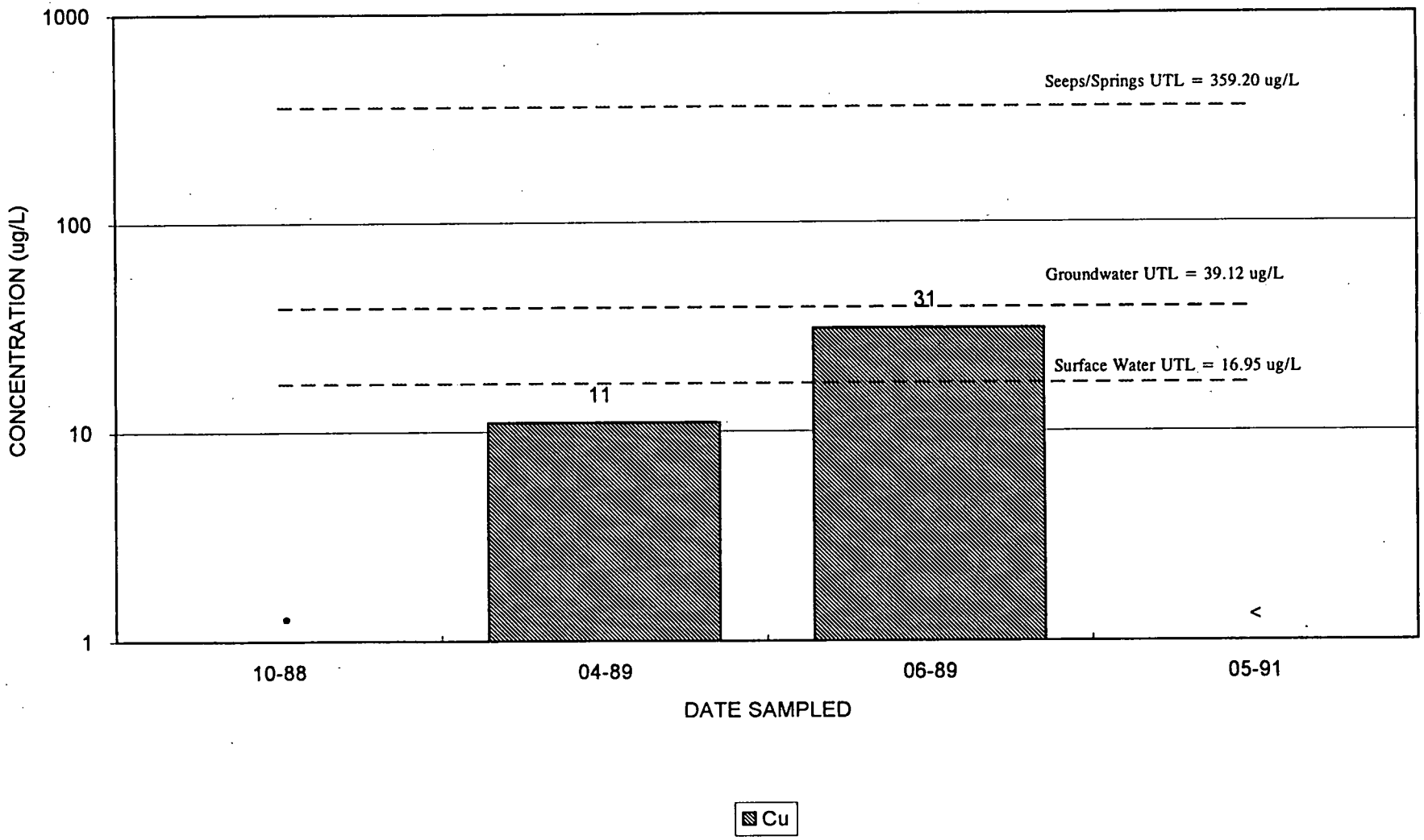

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FIGURE G-8

SAMPLE STATION FD111-1
Metals by ICP - Manganese

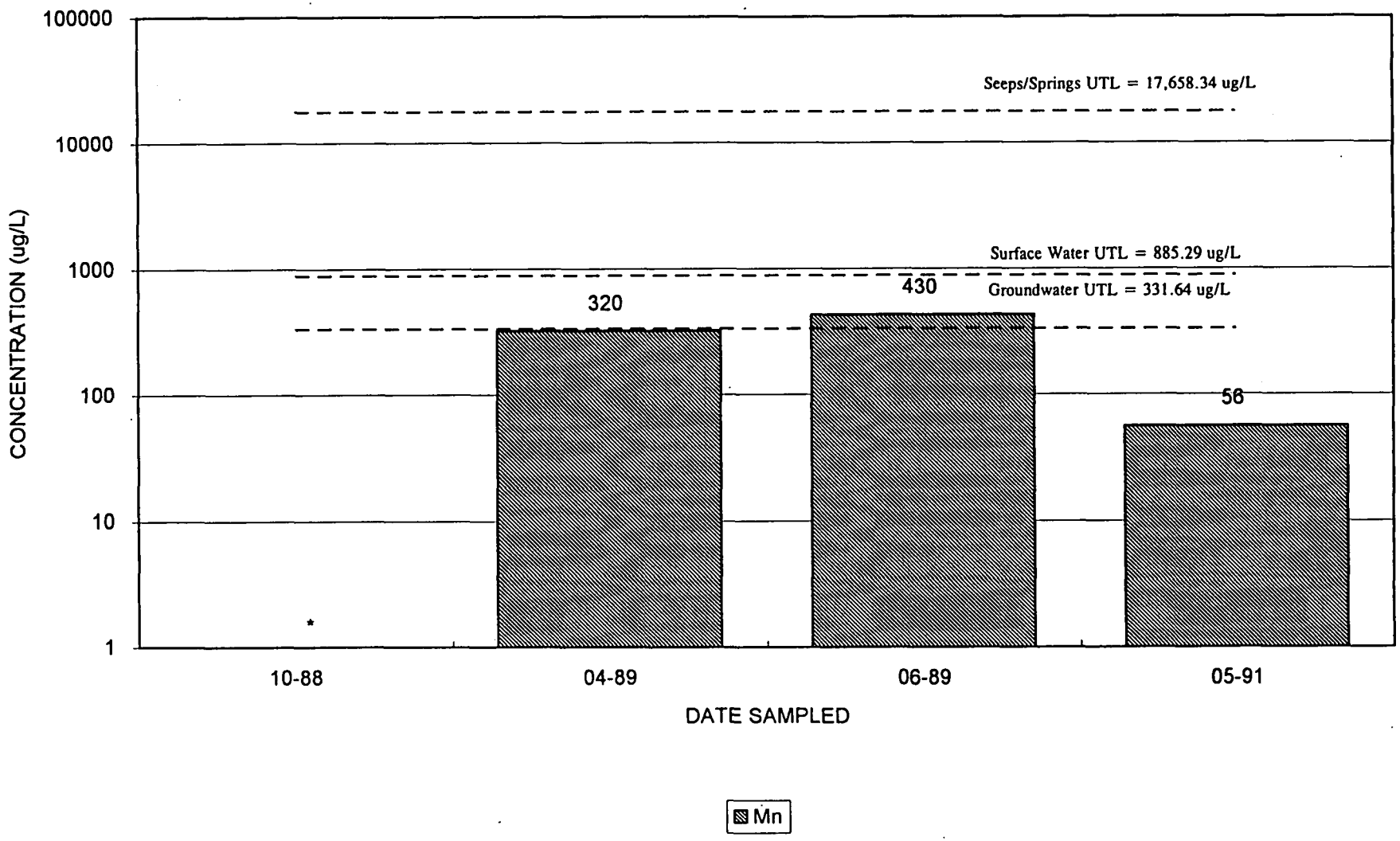

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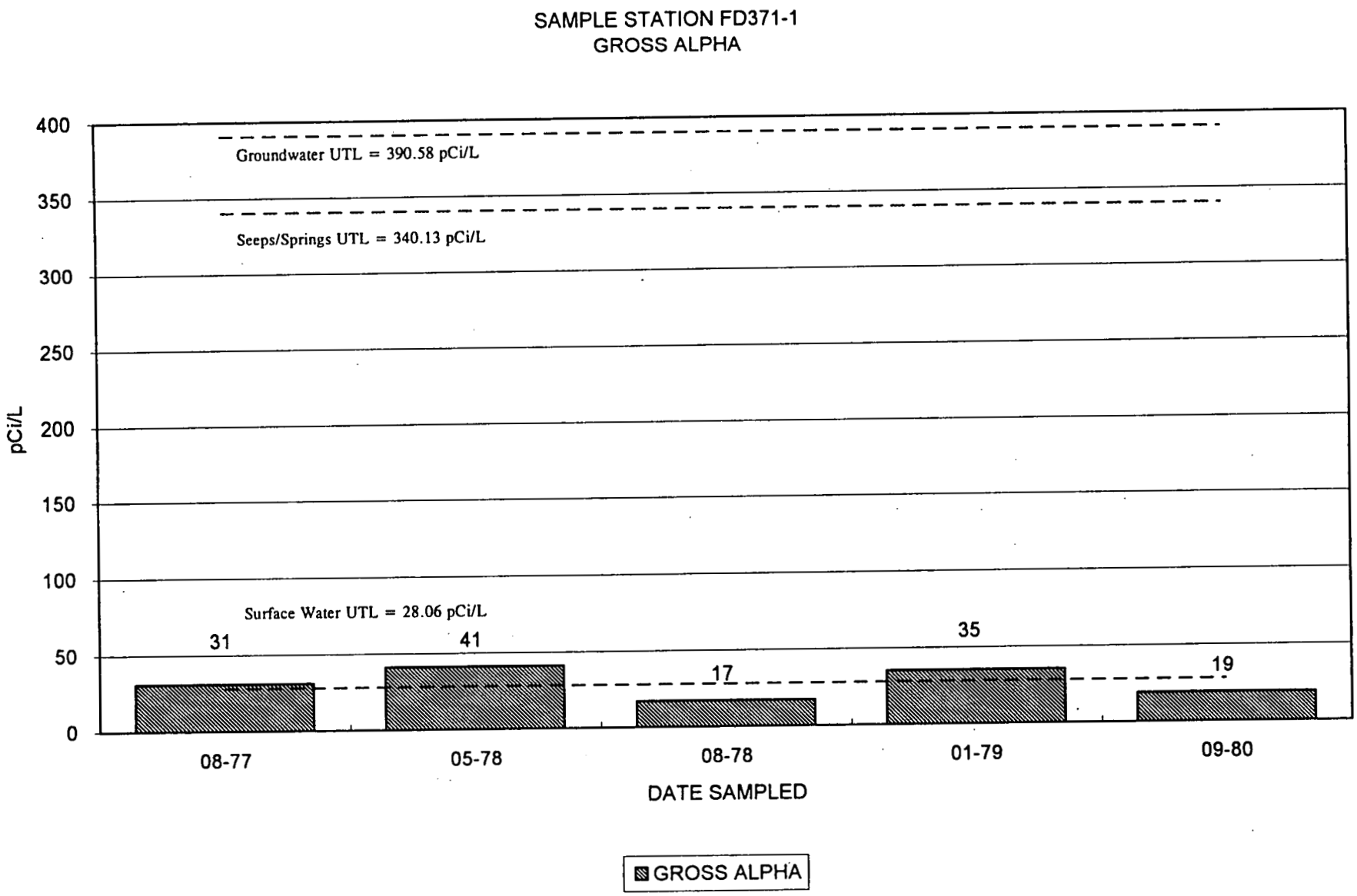
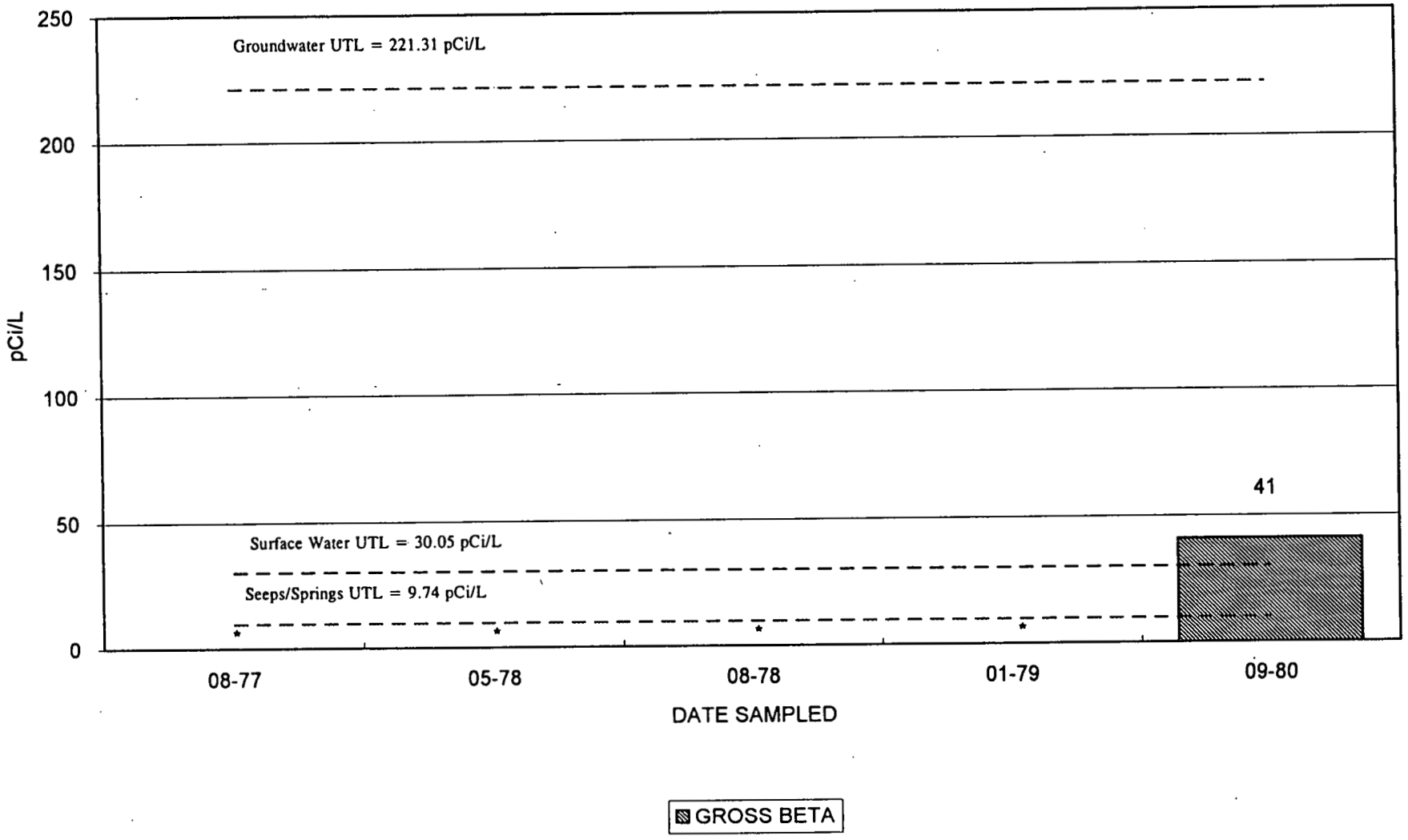
FIGURE G-9



A:\METGRPH2.XLS\ABFD371-1.A

FIGURE G-10

SAMPLE STATION FD371-1
GROSS BETA



A:\METGRPH2.XLS\ABFD371-1.B

FIGURE G-11

SAMPLE STATION FD371-2
GROSS ALPHA

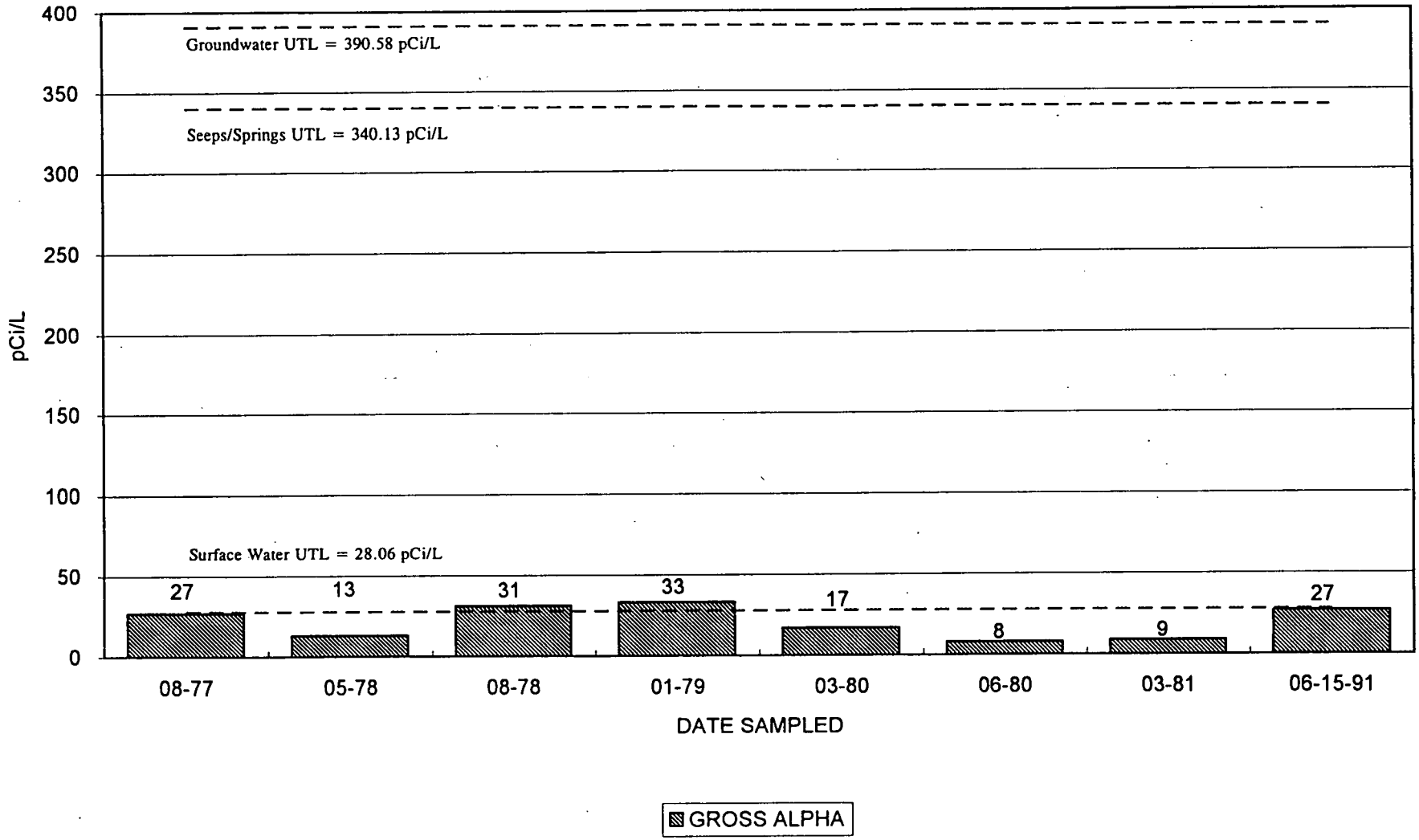


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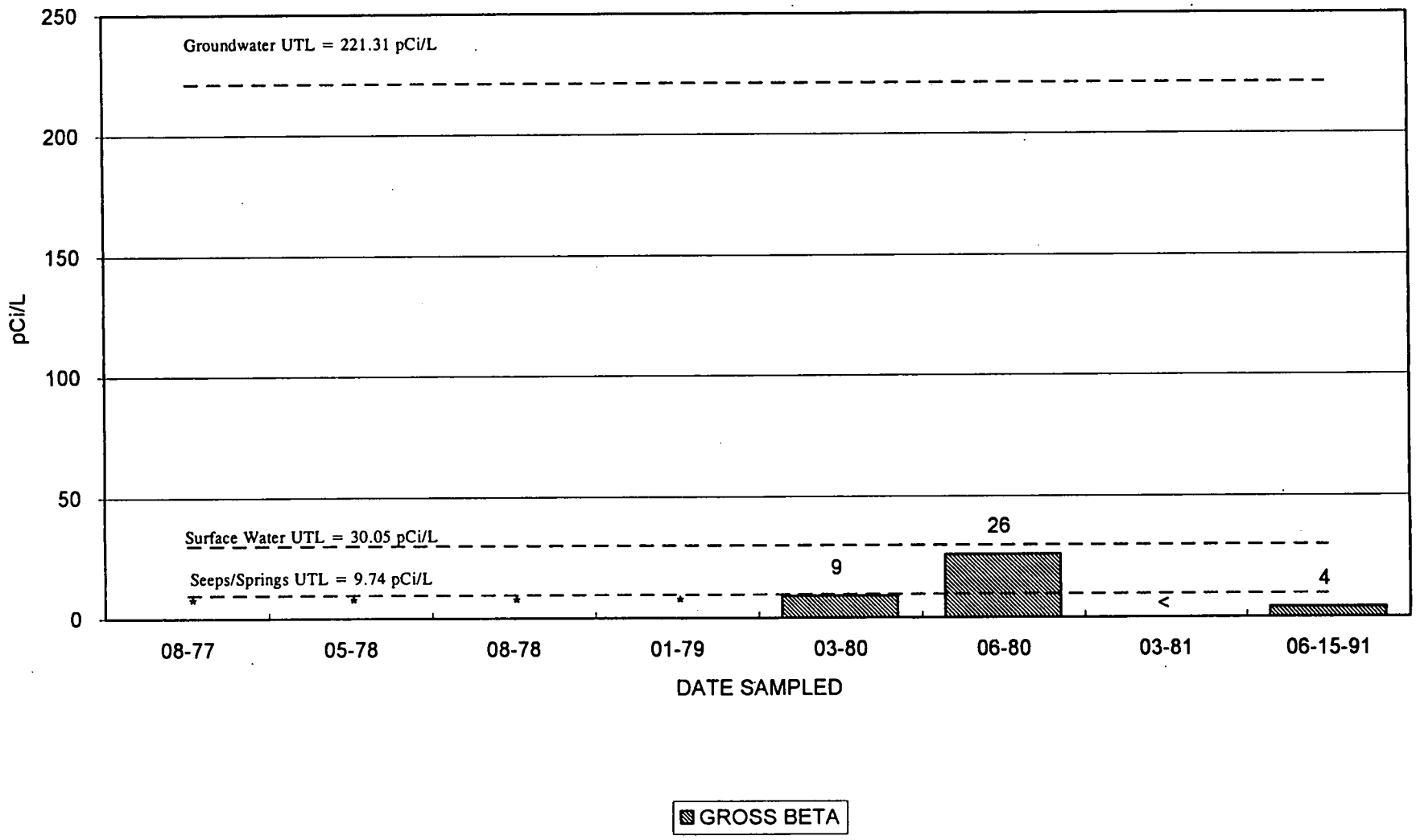
FIGURE G-12

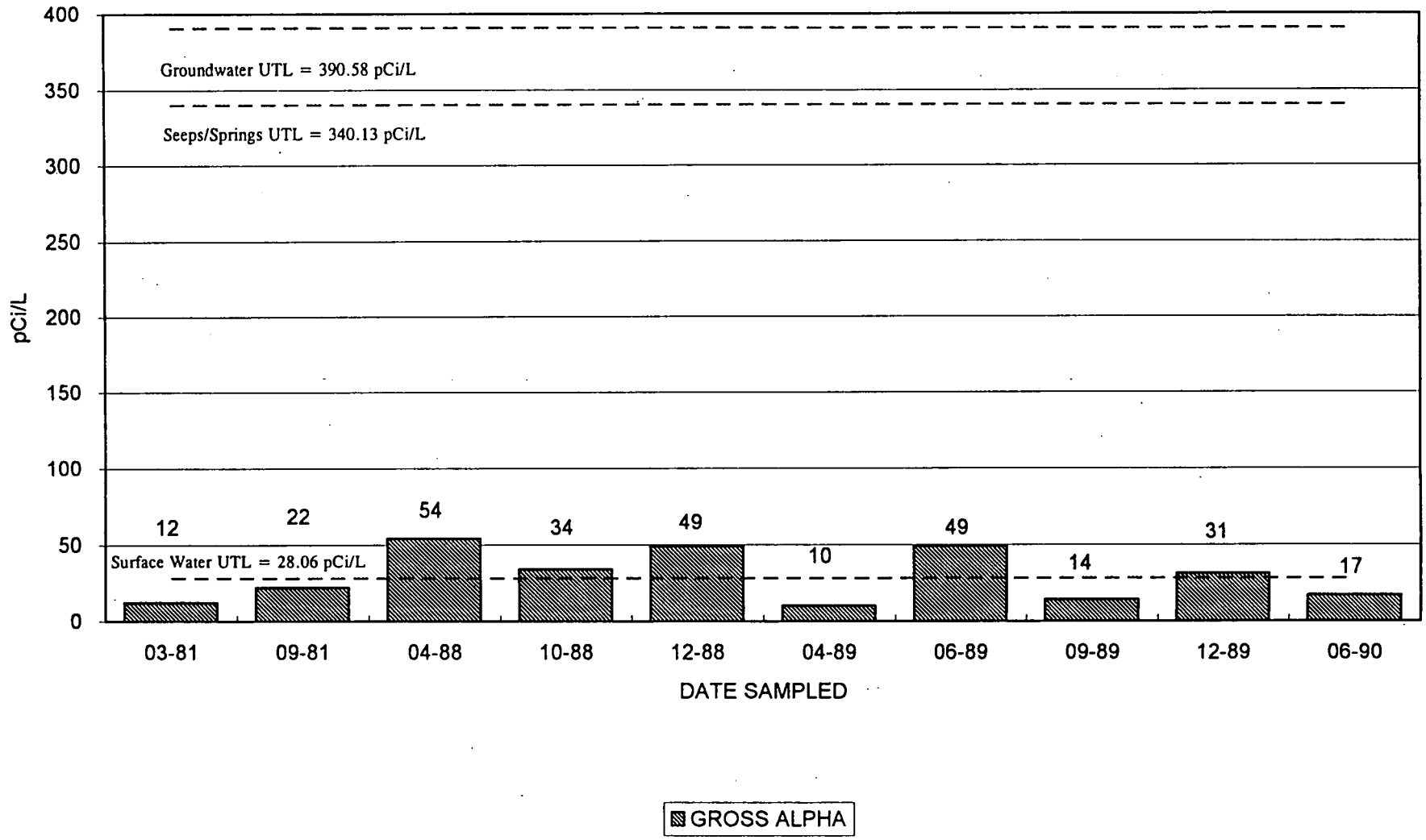
SAMPLE STATION FD371-2
GROSS BETA



A:\METCRH2.XLS\ABFD371-2.B

FIGURE G-13

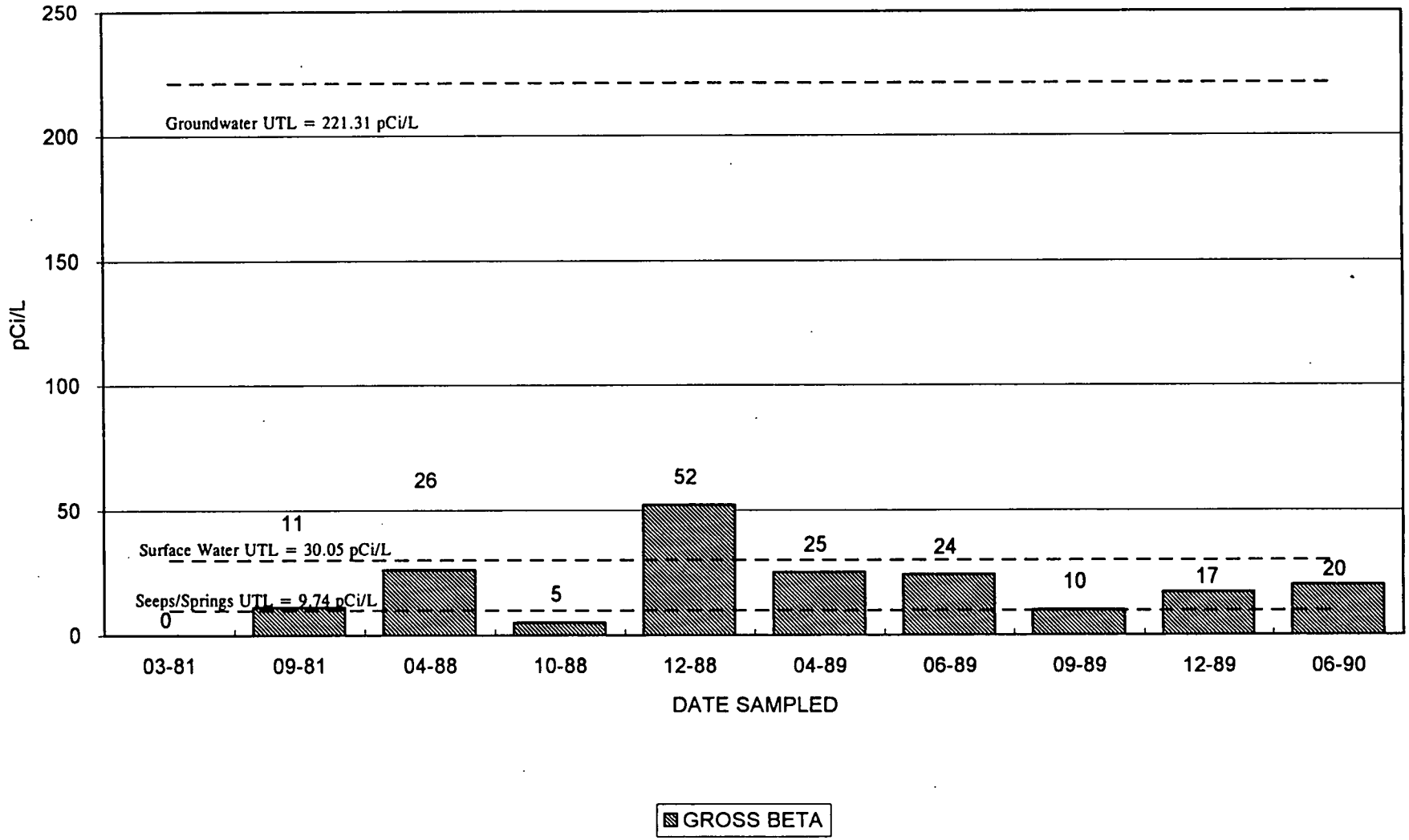
SAMPLE STATION FD371-3
GROSS ALPHA



A:\METGRPH2.XLS\ABFD371-3.A

FIGURE G-14

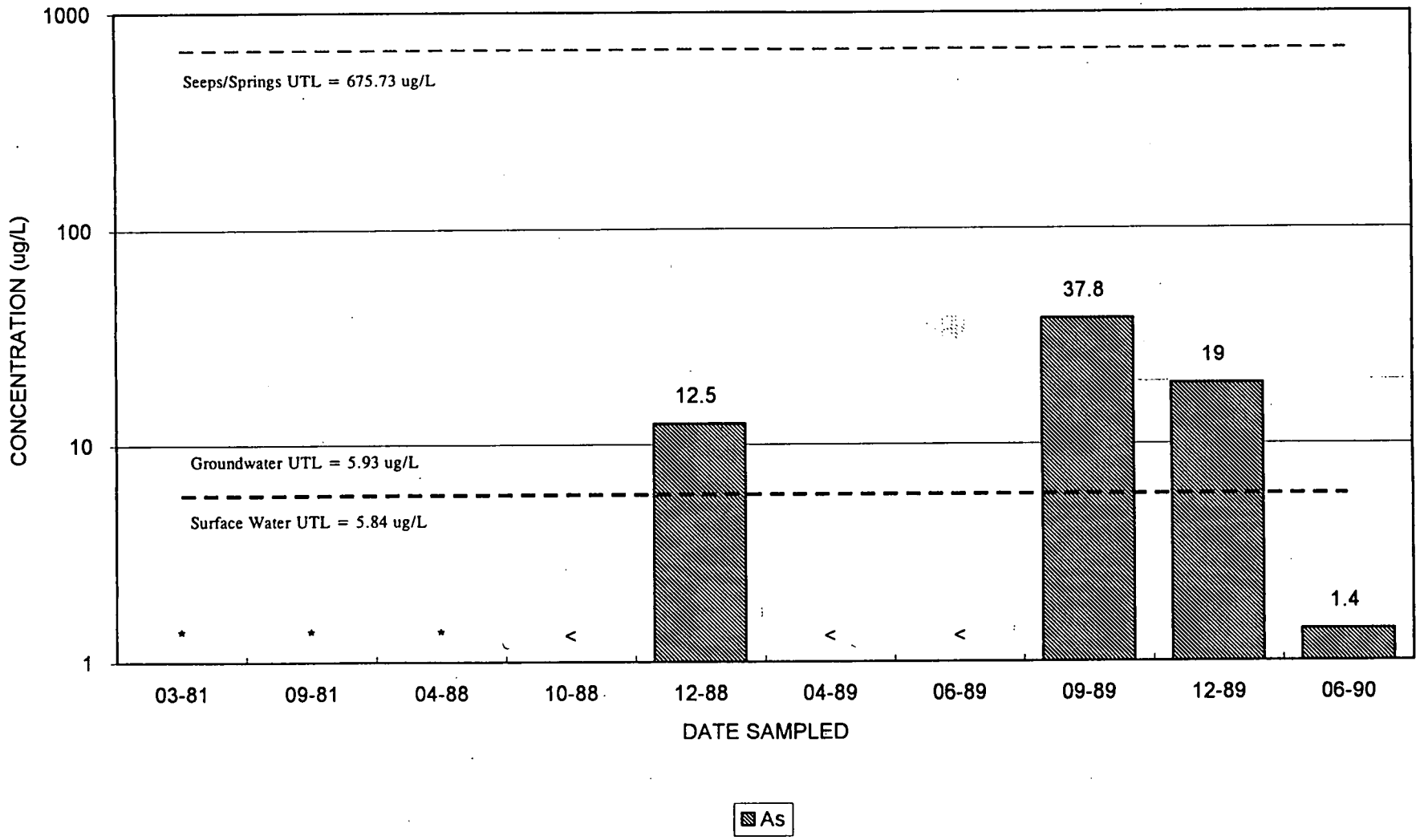
SAMPLE STATION FD371-3
GROSS BETA



A:\METGRPH2.XLS\ABFD371-3.B

FIGURE G-15

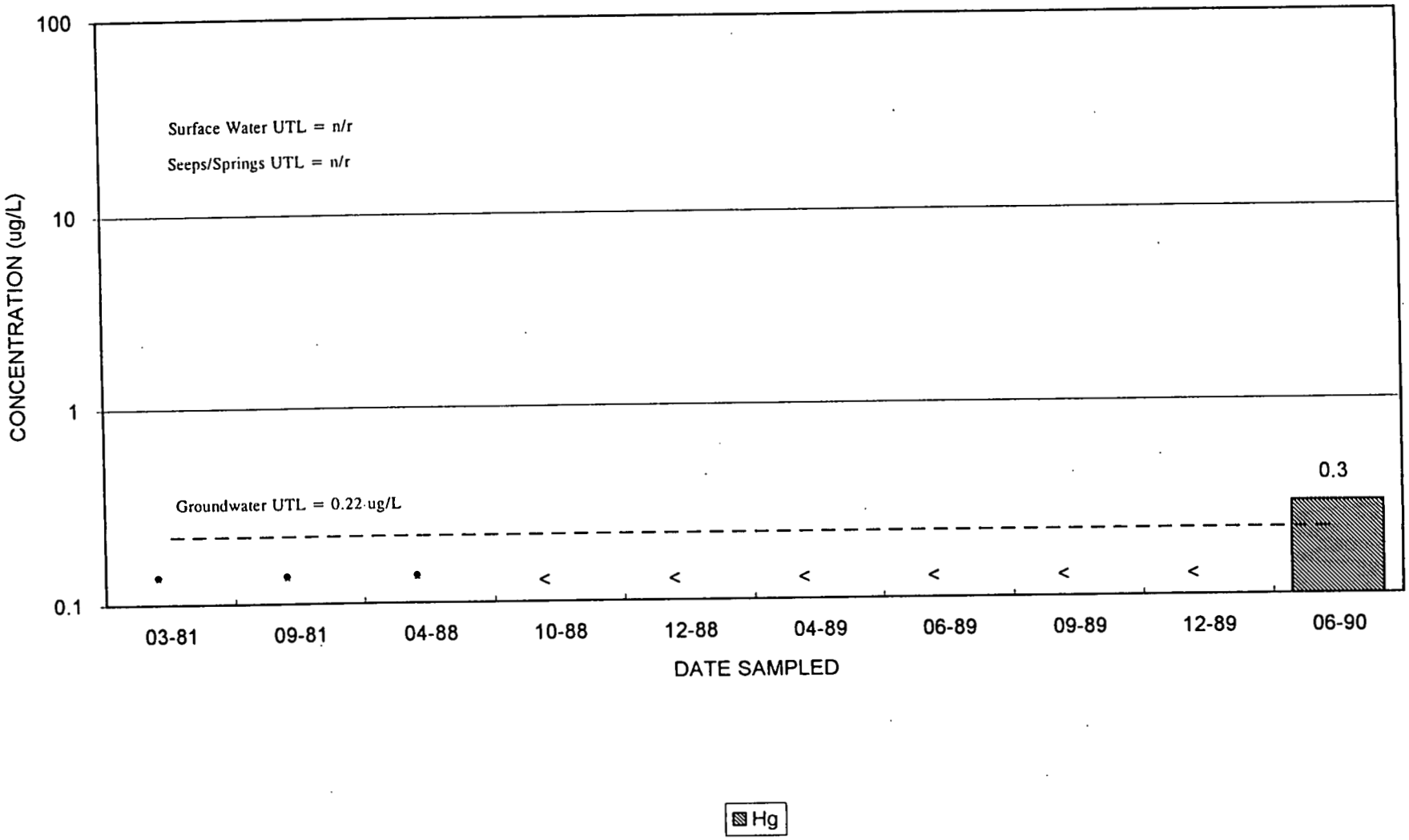
SAMPLE STATION FD371-3
Metals by Atomic Absorption - Arsenic



METGRPH.XLSAAFD371-3.AS

FIGURE G-16

SAMPLE STATION FD371-3
Metals by Atomic Absorption - Mercury



A:\ME[illegible]PH.XLS\AAFD371-3.HG

FIGURE G-17

SAMPLE STATION FD371-3
Metals by Atomic Absorption - Lead

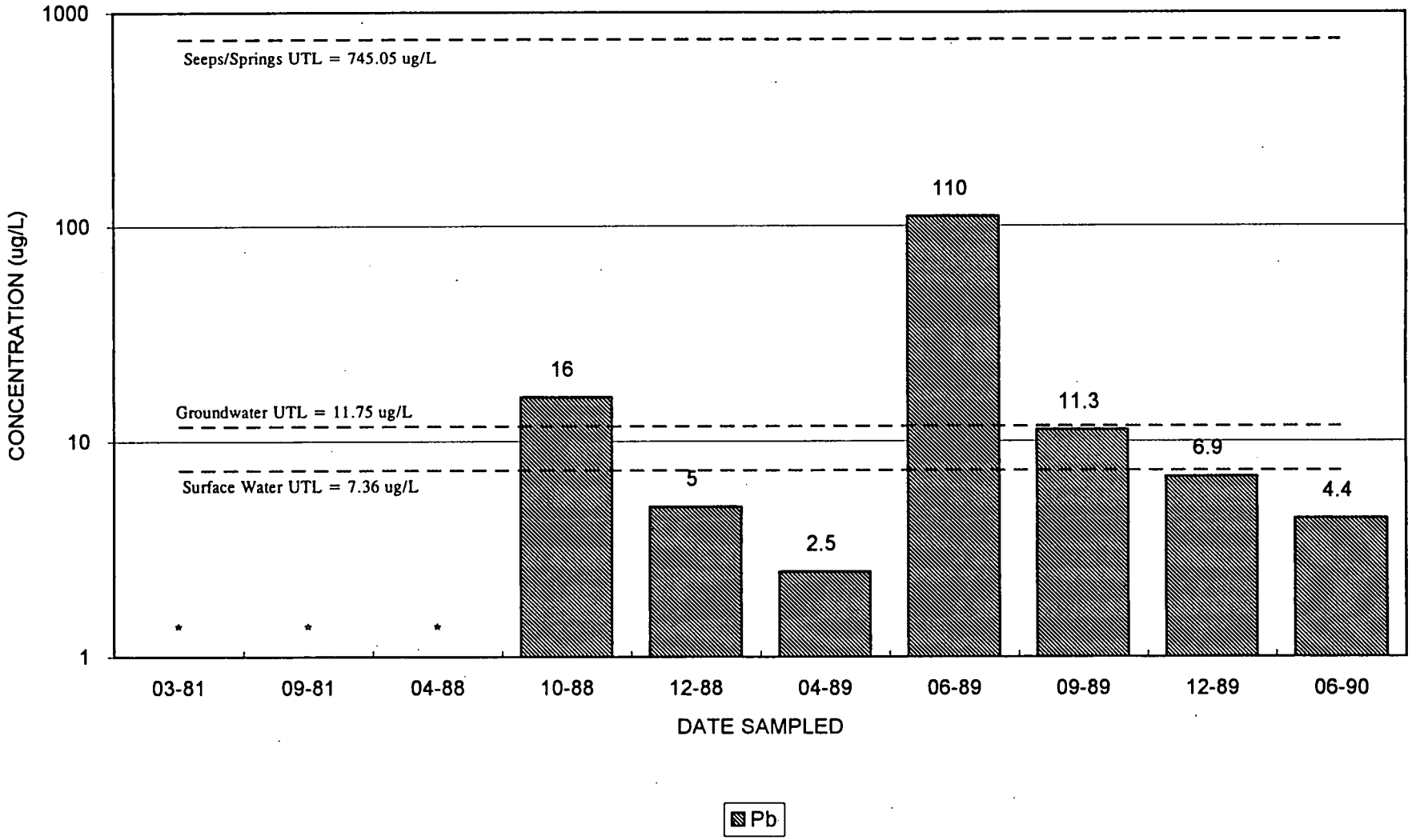


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FIGURE G-18

SAMPLE STATION FD371-3
Metals by ICP - Aluminum

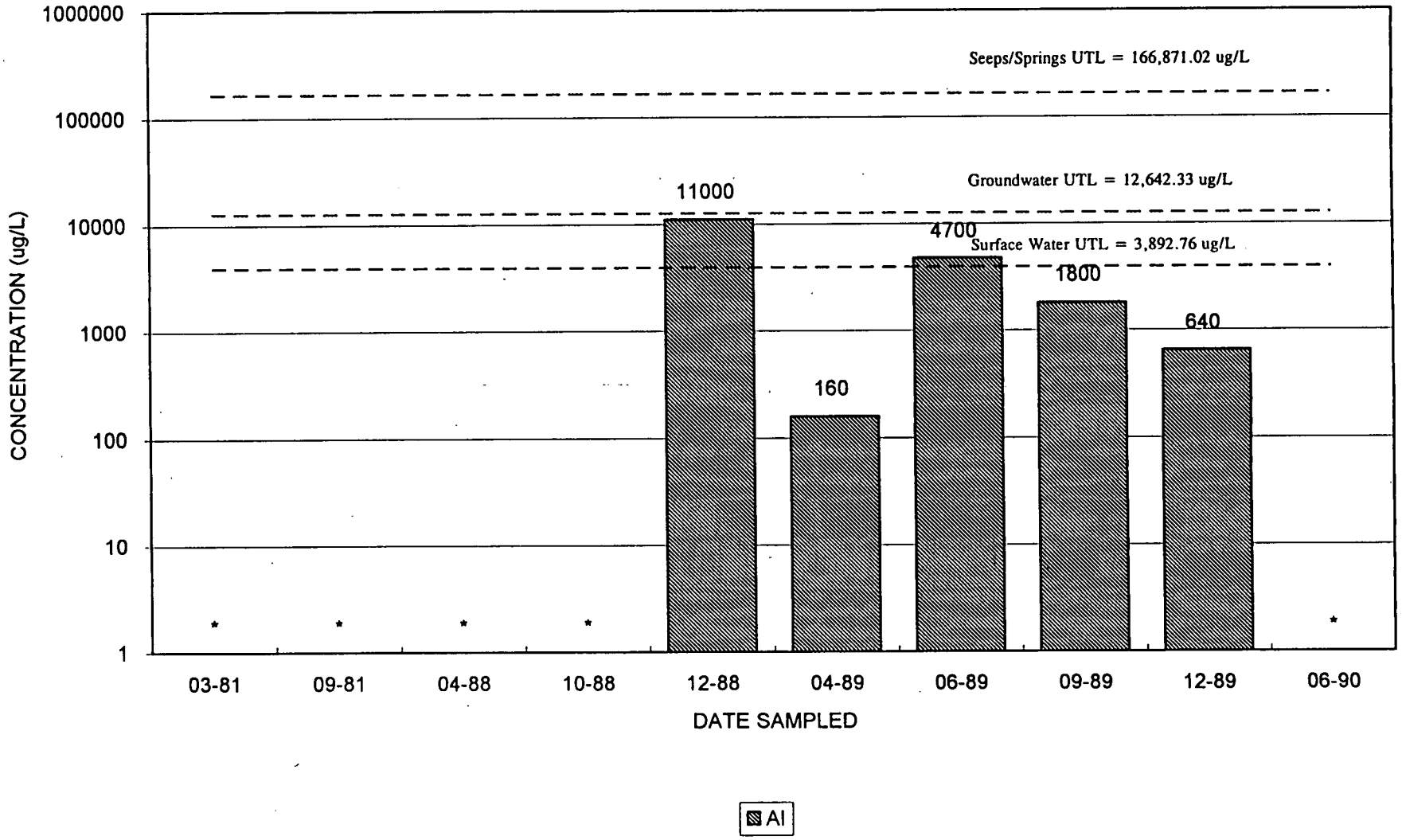

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FIGURE G-19

SAMPLE STATION FD371-3
Metals by ICP - Beryllium

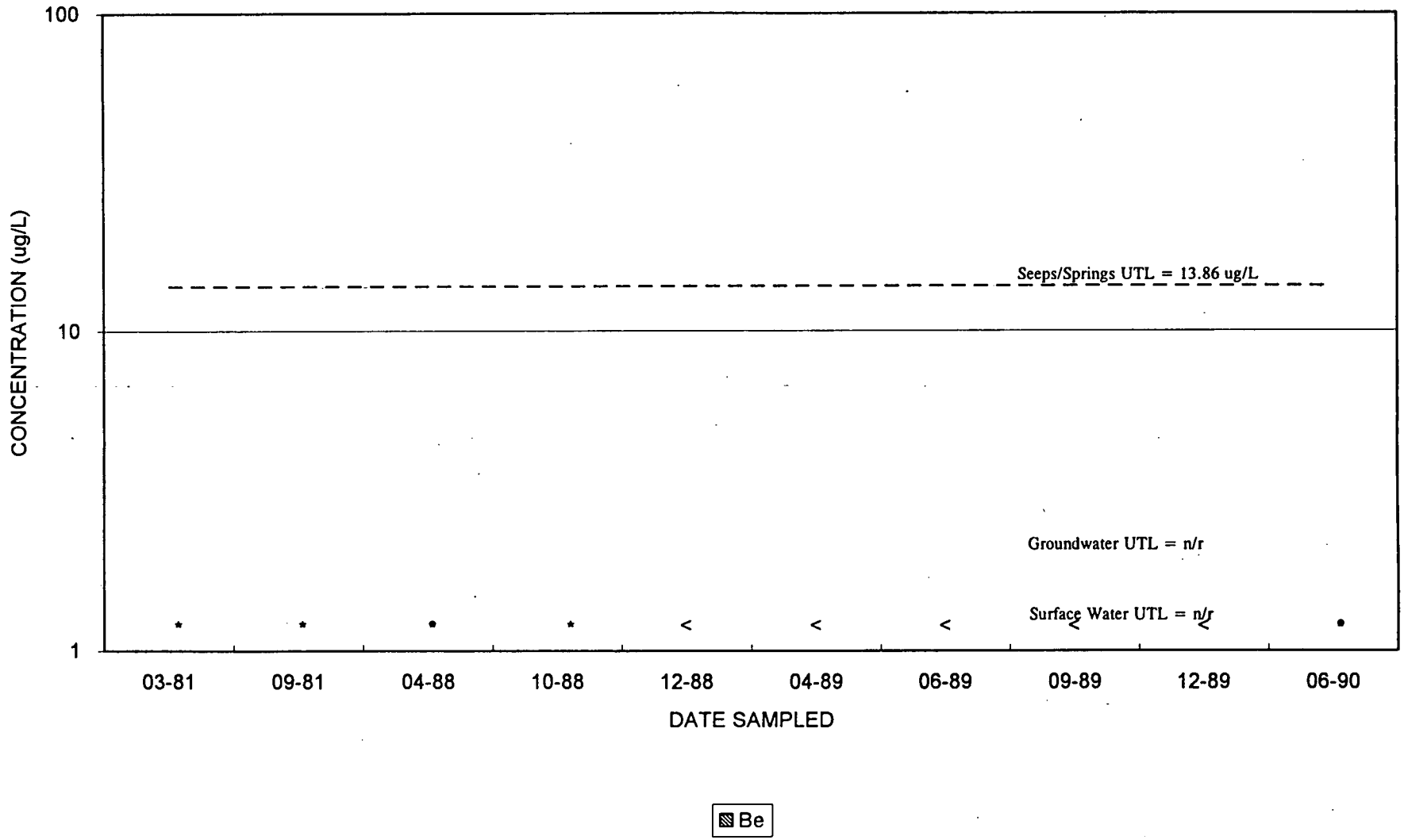

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FIGURE G-20

SAMPLE STATION FD371-3
Metals by ICP - Cadmium

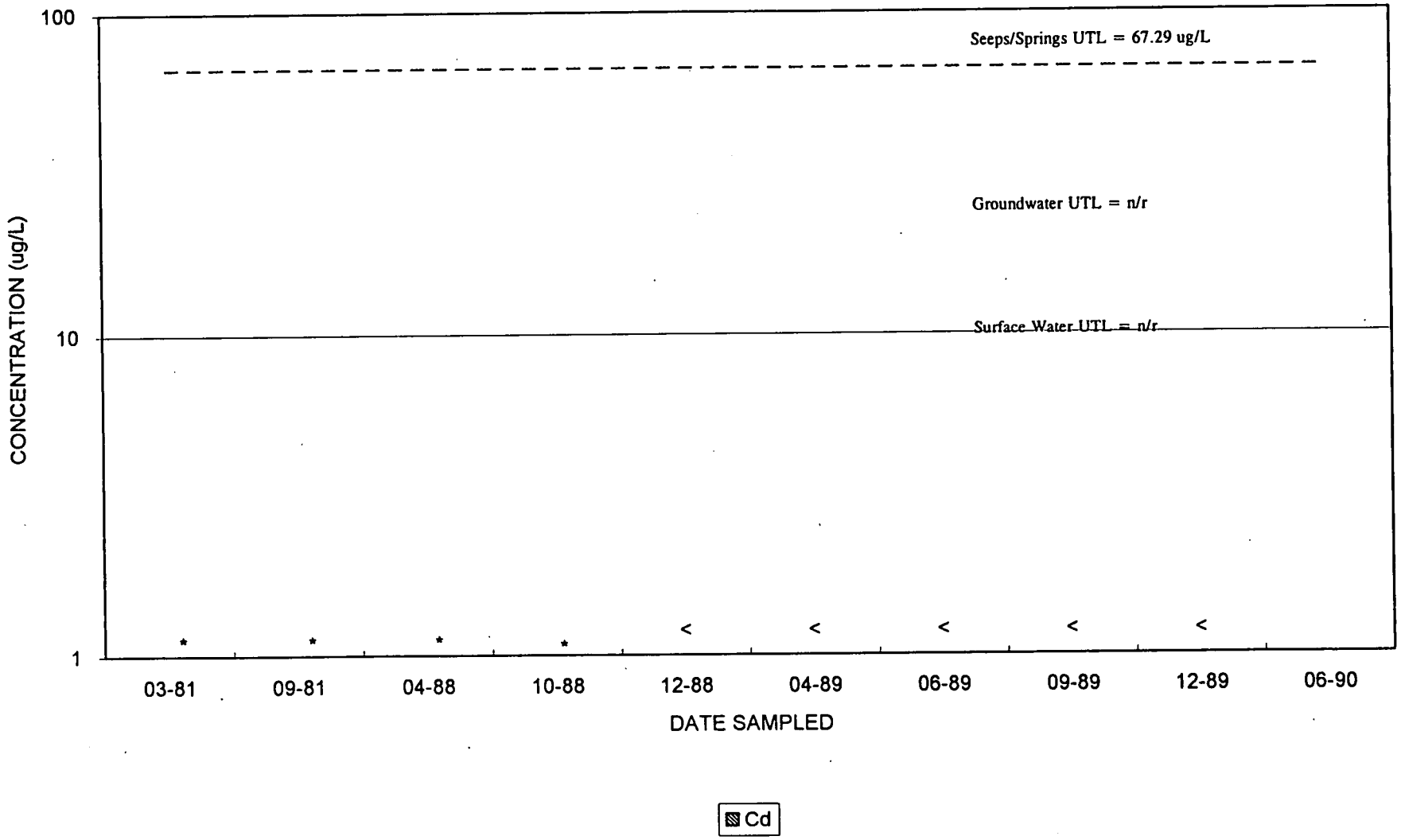

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FIGURE G-21

SAMPLE STATION FD371-3
Metals by ICP - Chromium

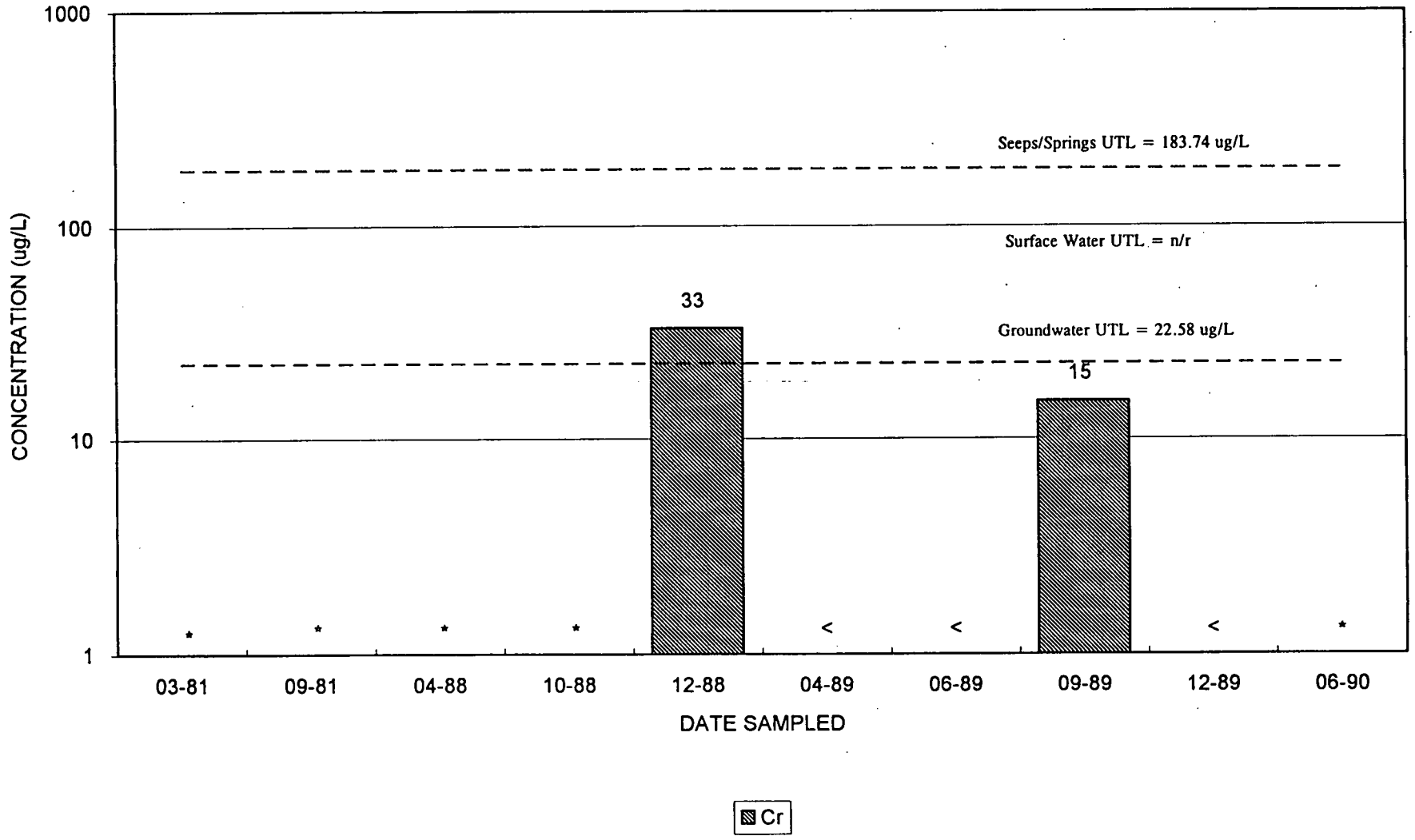

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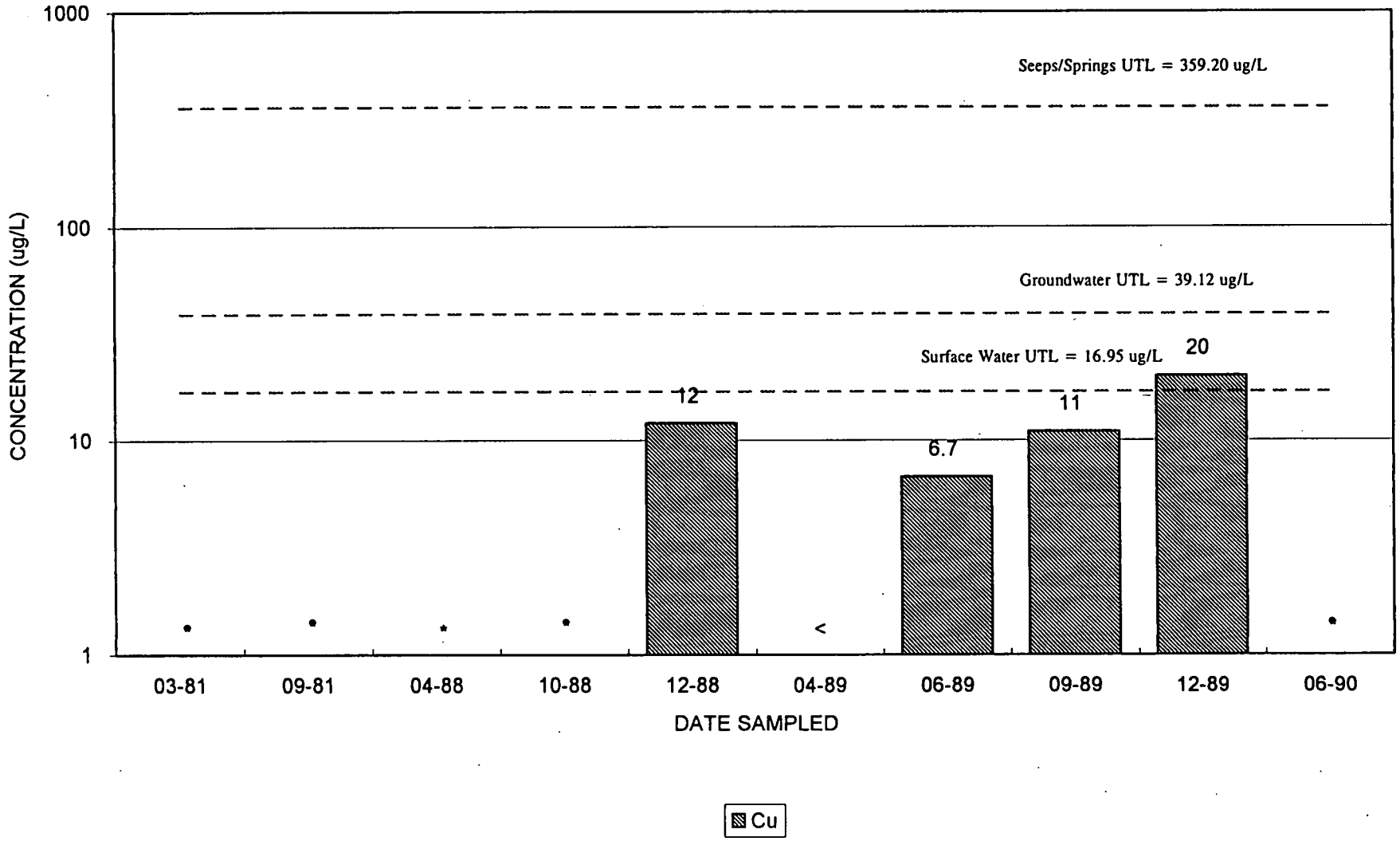
FIGURE G-22

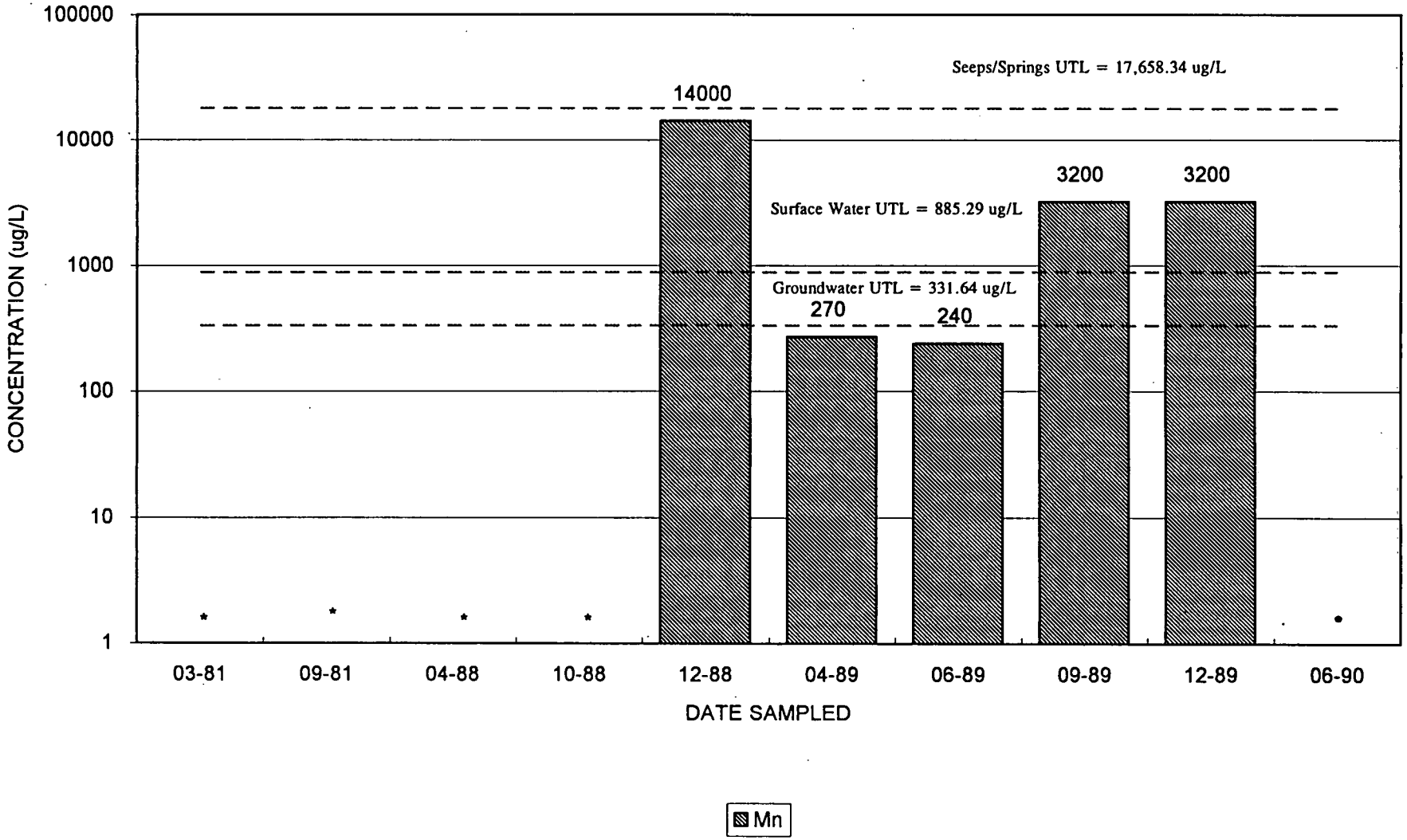
SAMPLE STATION FD371-3
Metals by ICP - Copper



A:\METGRPH.XLS\ICPFD371-3.CU

FIGURE G-23

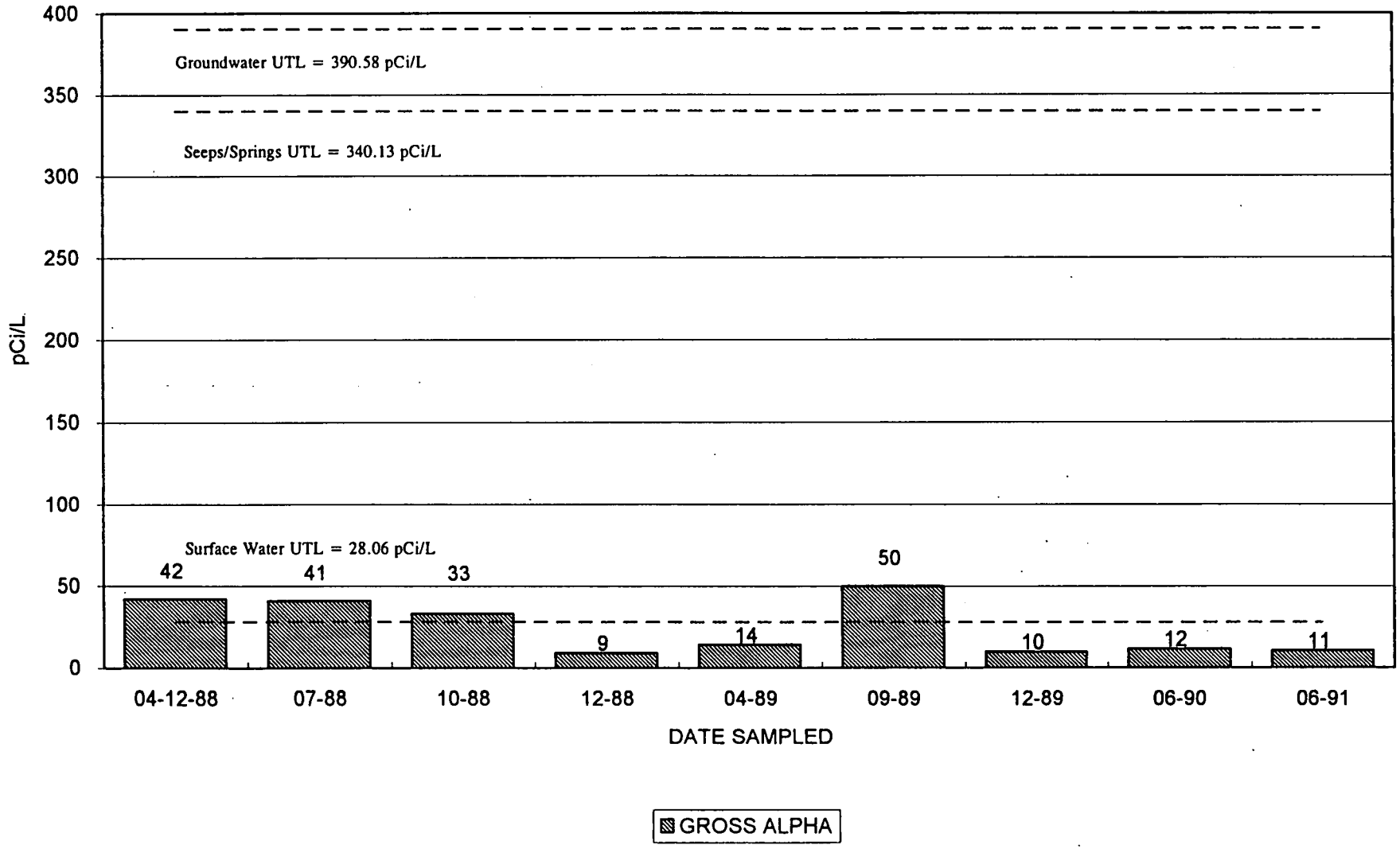
SAMPLE STATION FD371-3
Metals by ICP - Manganese



A:\METGRPH.XLS\ICPFD371-3.MN

FIGURE G-24

SAMPLE STATION FD371 COMP
GROSS ALPHA



A:\METCRRH2.XLS\ABFD371-COMP.A

FIGURE G-25

SAMPLE STATION FD371 COMP
GROSS BETA

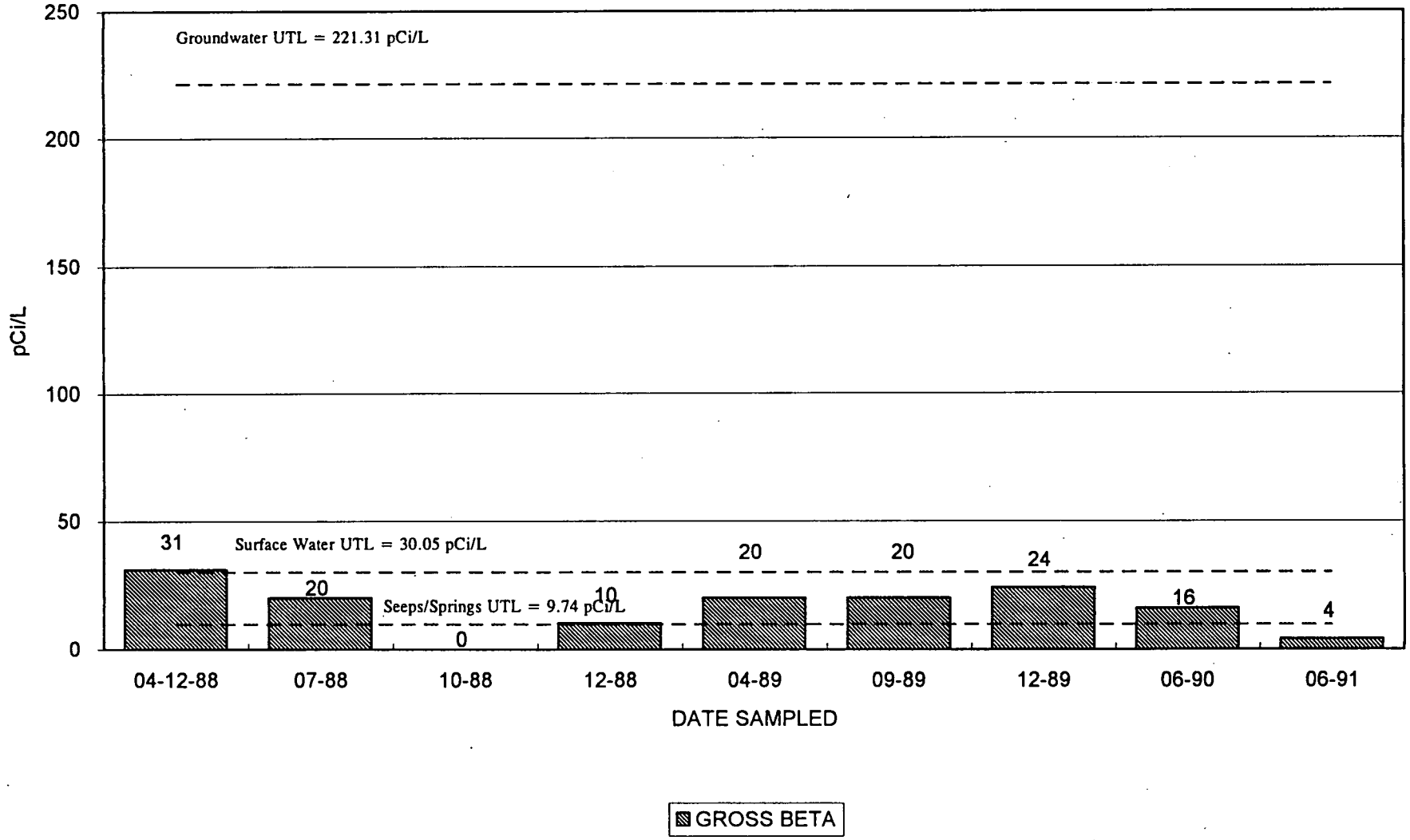


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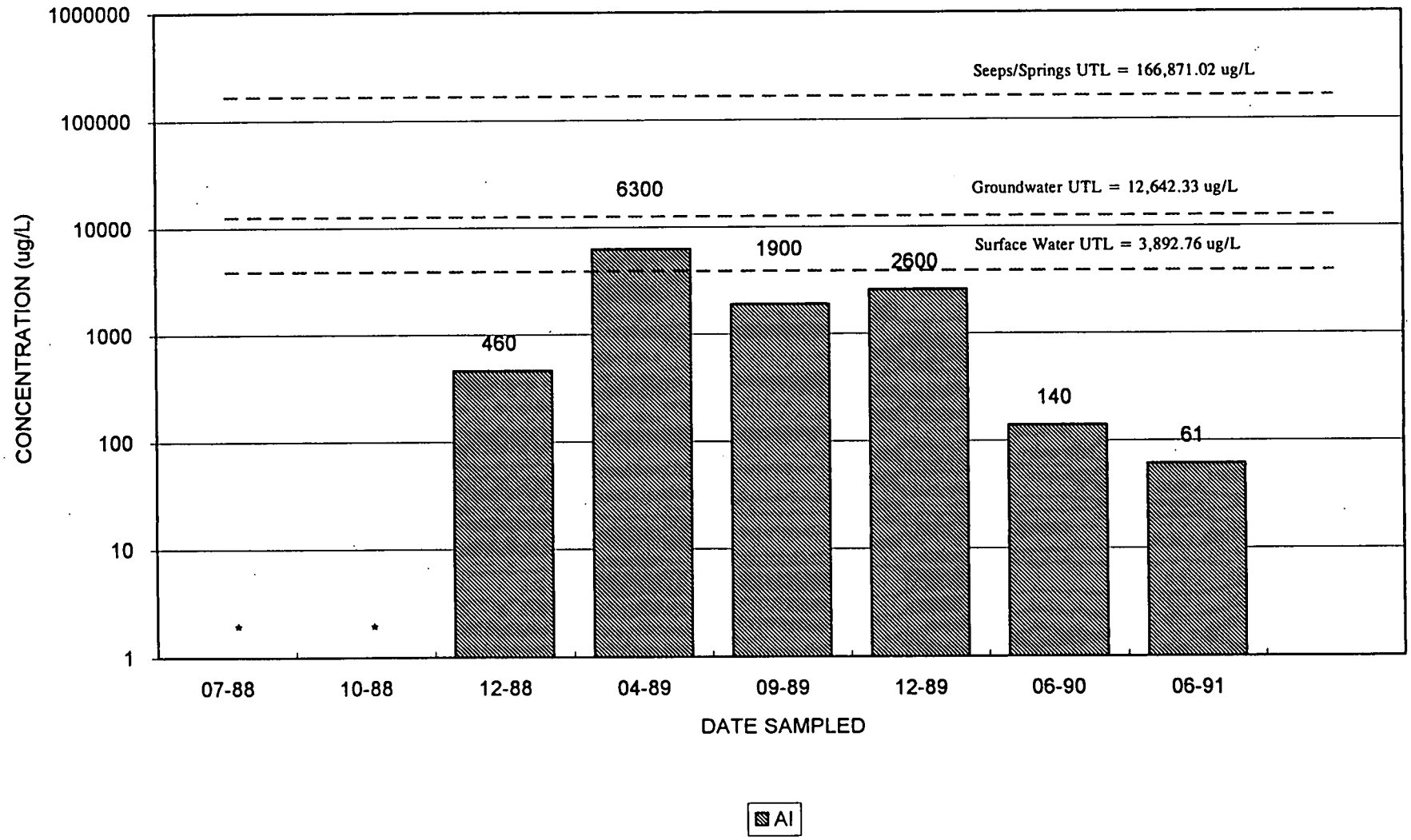
FIGURE G-26

SAMPLE STATION FD371 COMP
Metals by ICP - Aluminum



A:\METGRPH.XLS\ICPFD371COMP.AL

FIGURE G-27

SAMPLE STATION FD371 COMP
Metals by ICP - Beryllium

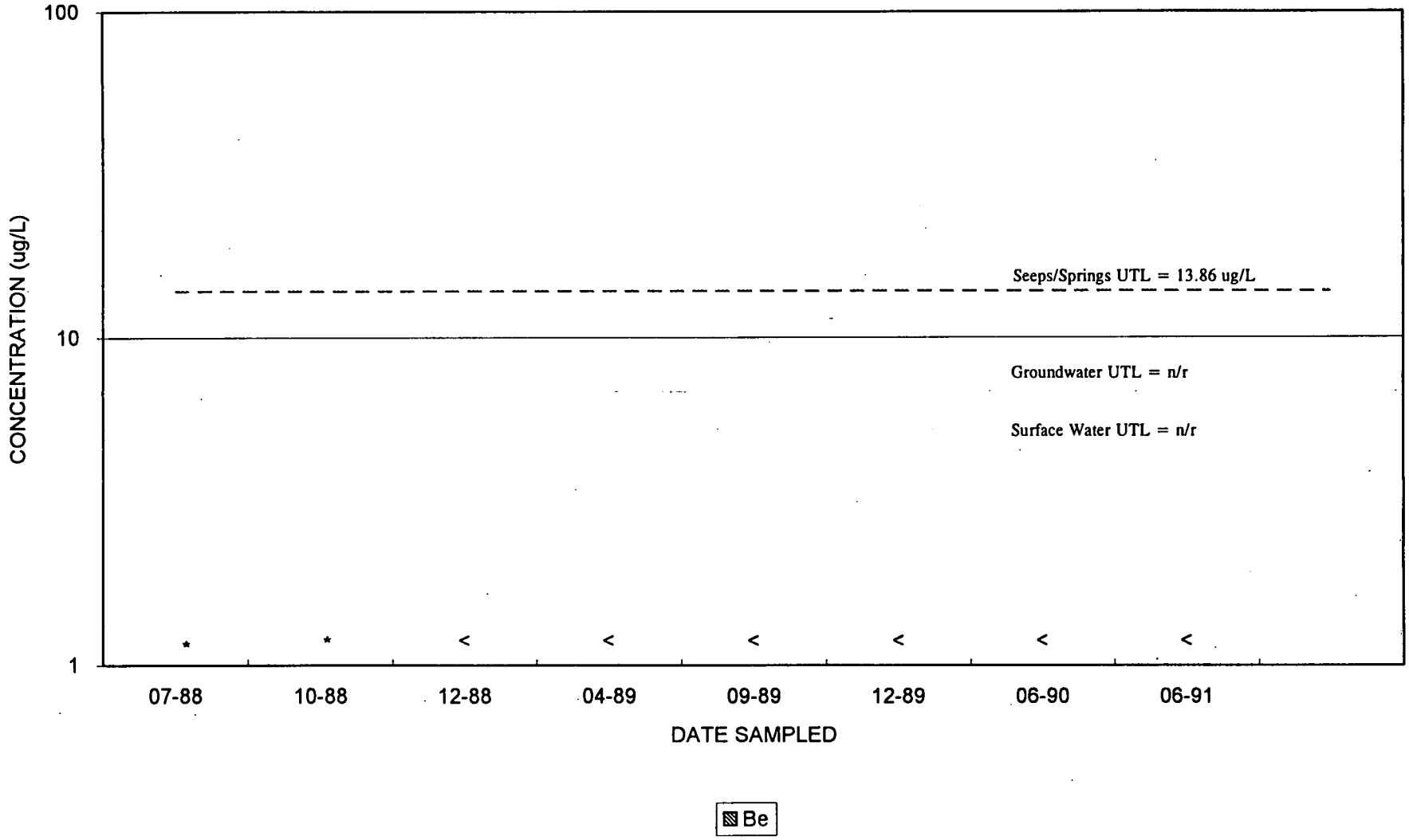


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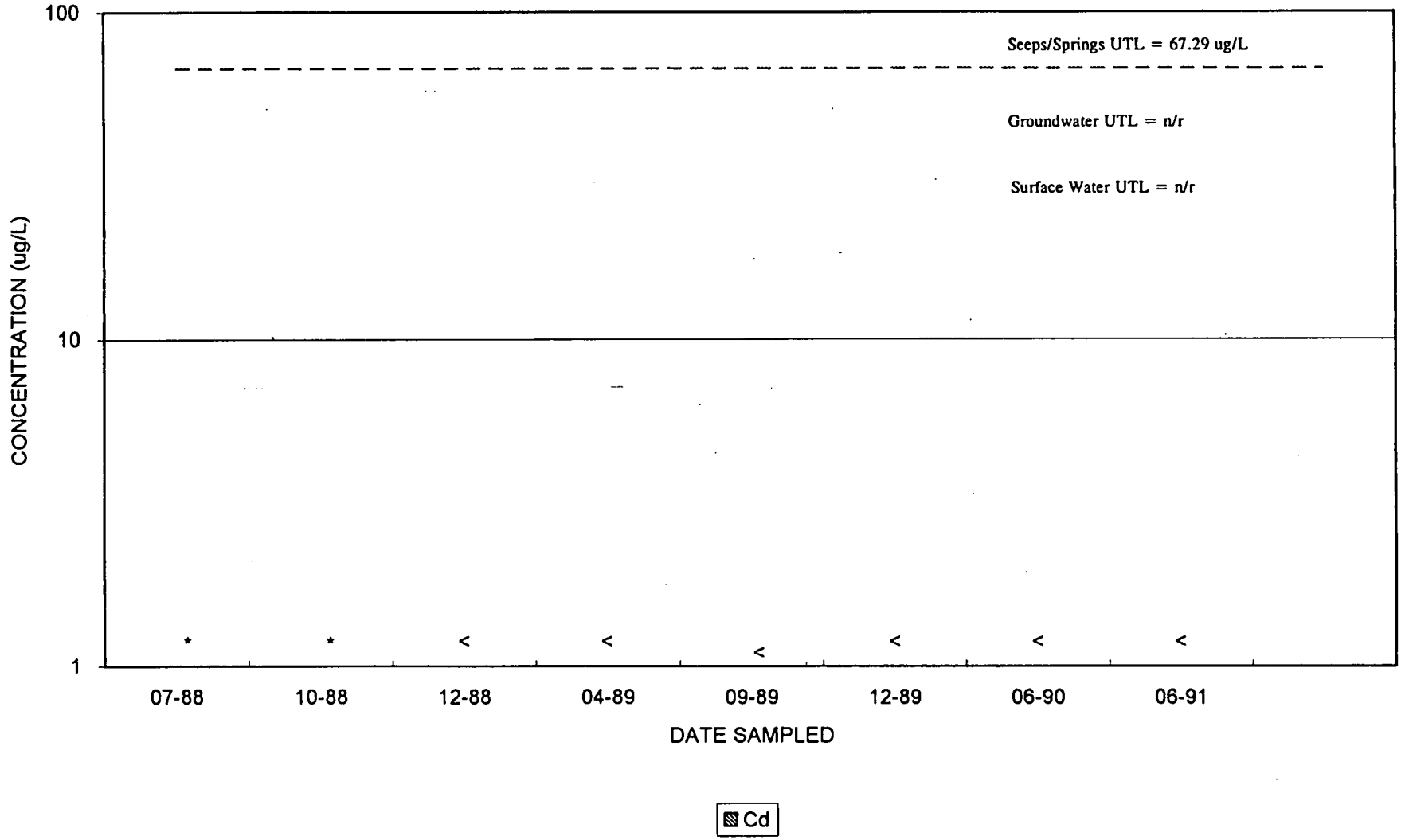
FIGURE G-28

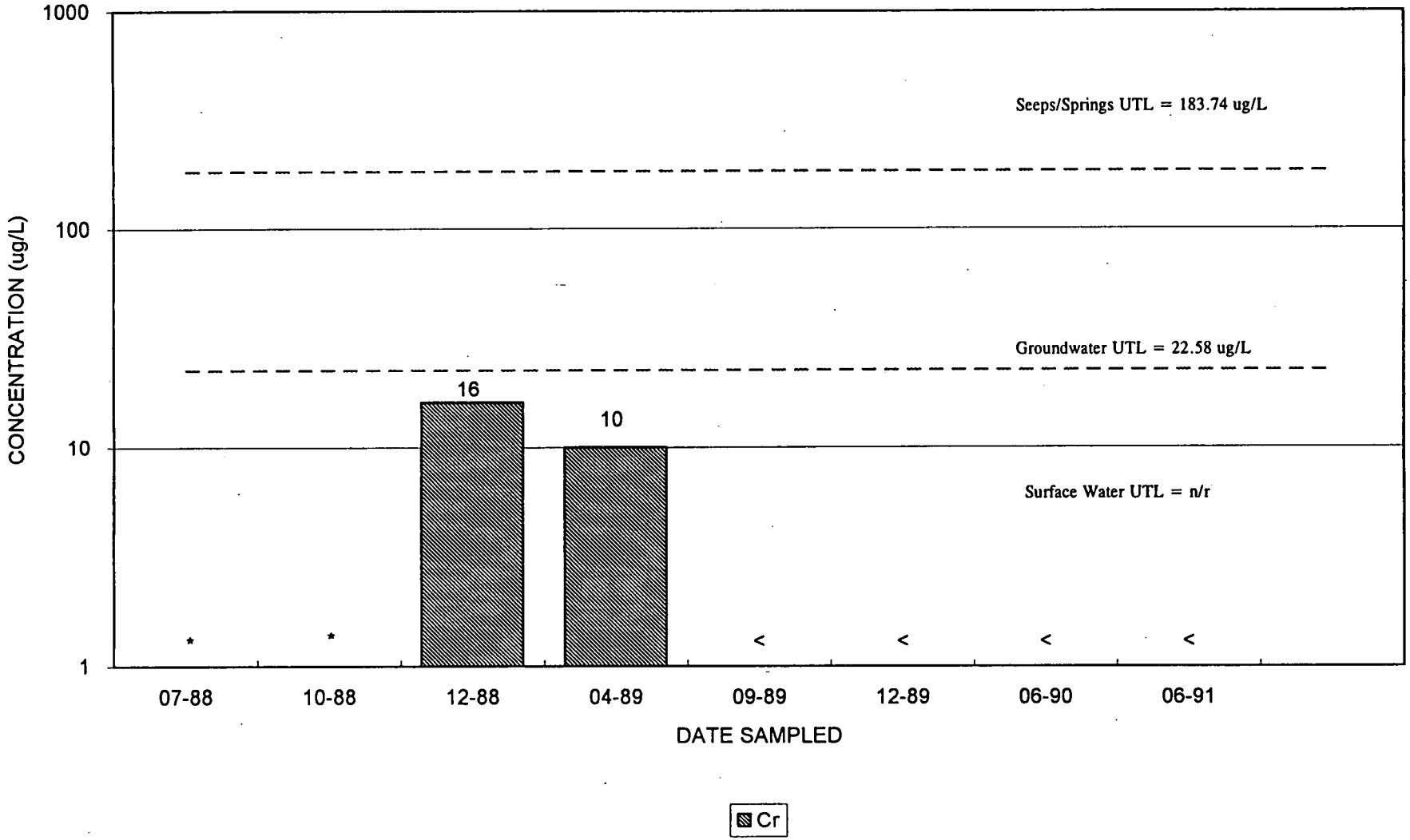
SAMPLE STATION FD371 COMP
Metals by ICP - Cadmium



A:\METGRPH.XLS\ICPFD371COMP.CD

FIGURE G-29

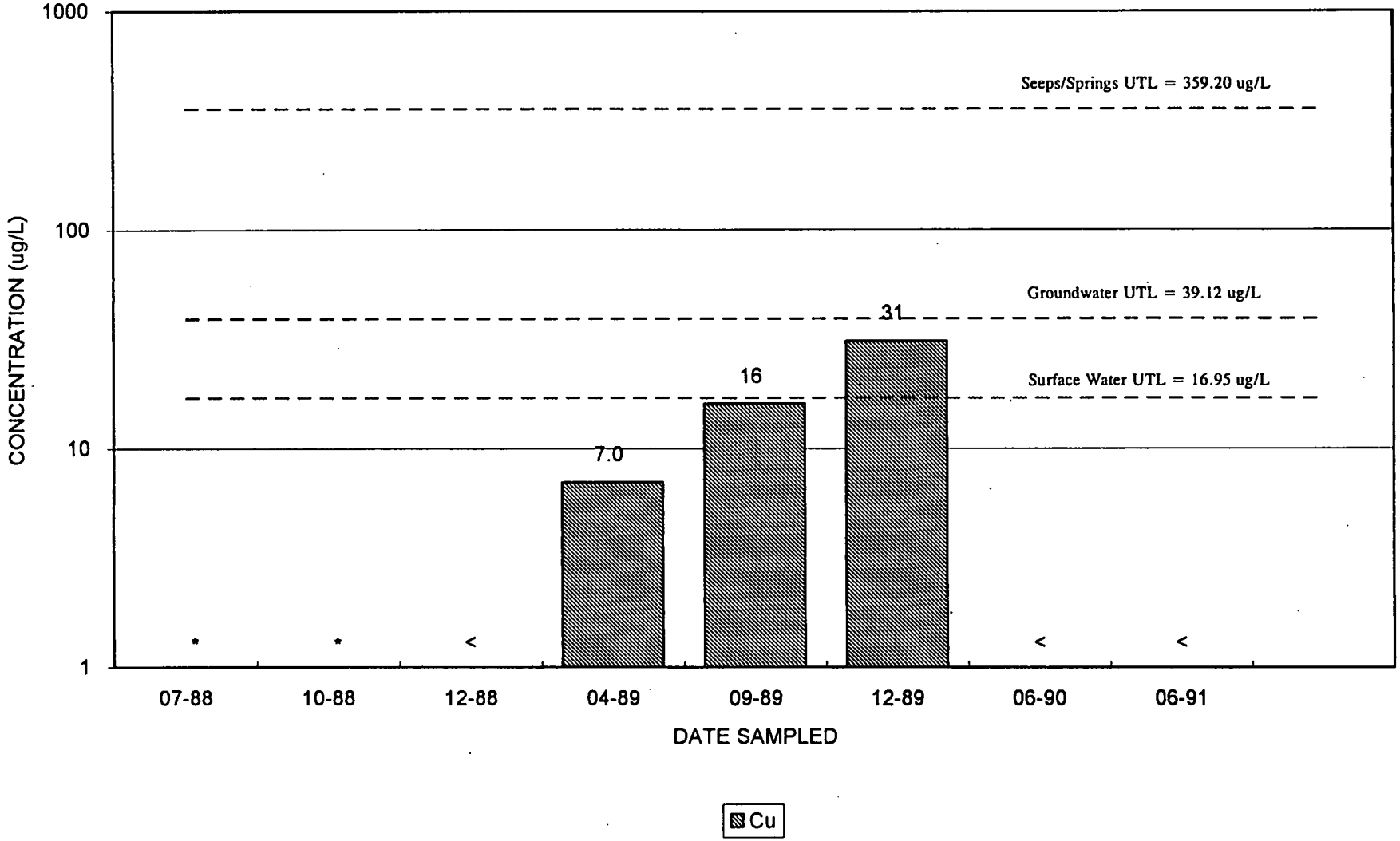
SAMPLE STATION FD371 COMP
Metals by ICP - Chromium



A:\METGRPH.XLS\ICPFD371COMP.CR

FIGURE G-30

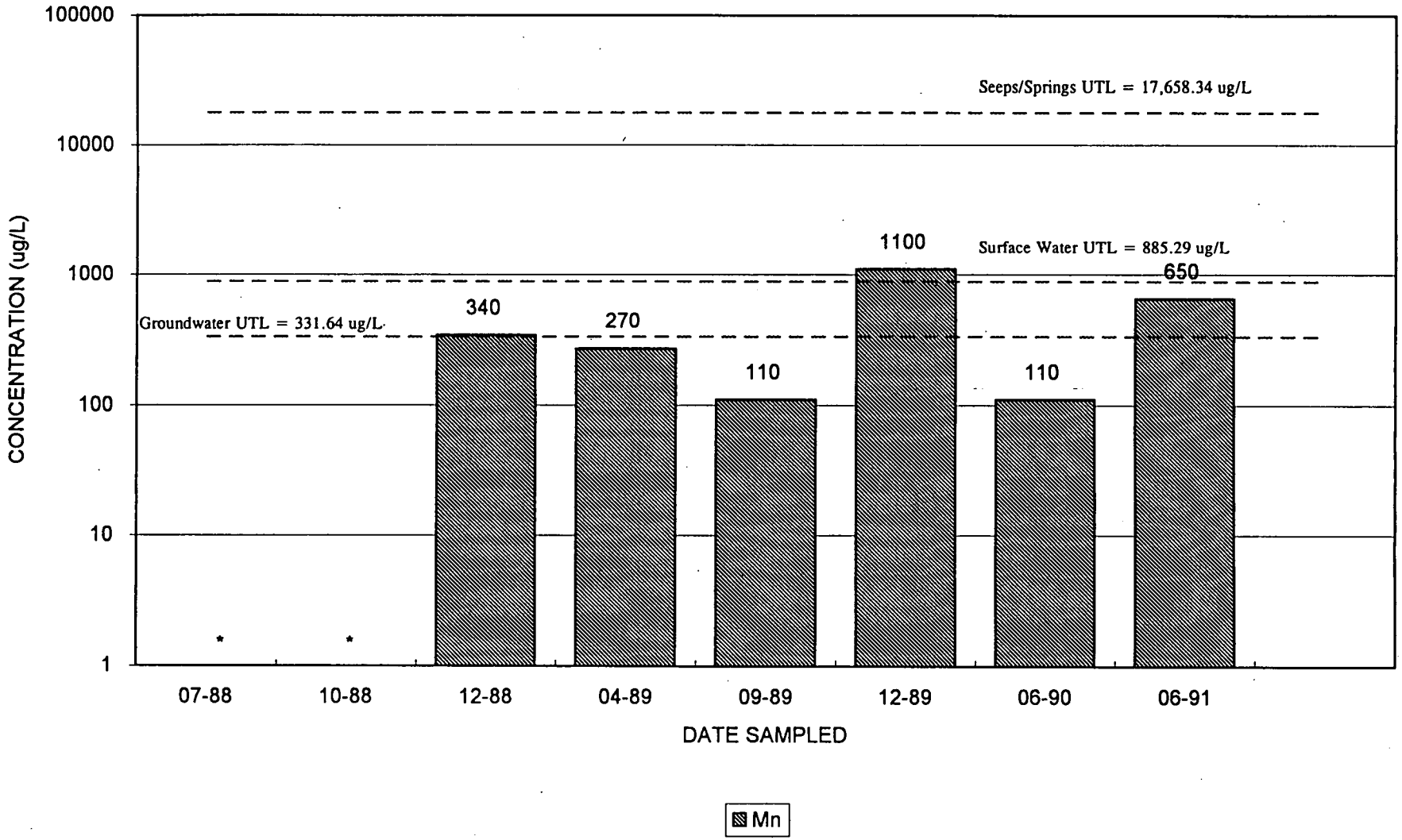
SAMPLE STATION FD371 COMP
Metals by ICP - Copper



A:\METGRPH.XLS\CPFD371COMP.CU

FIGURE G-31

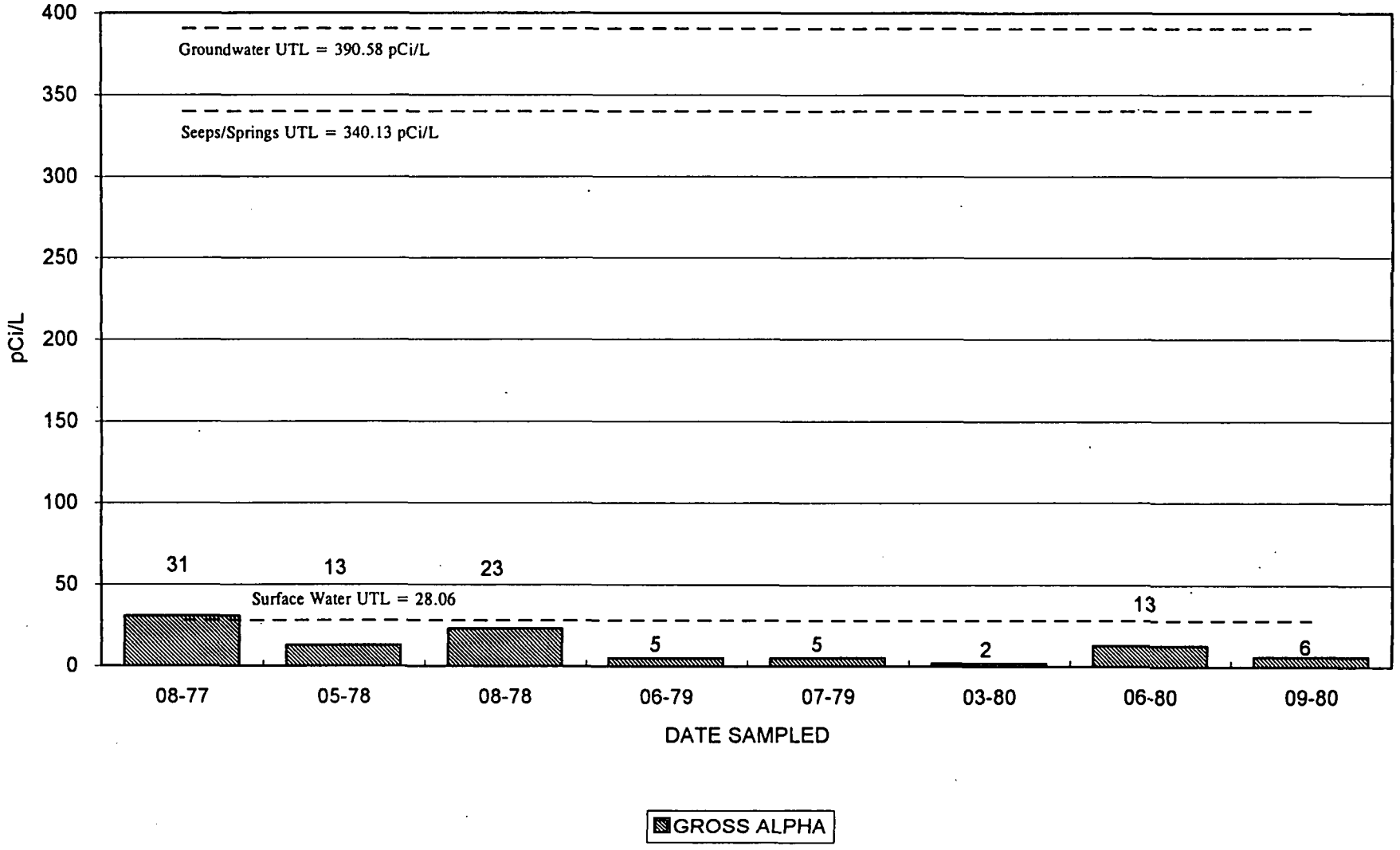
SAMPLE STATION FD371 COMP
Metals by ICP - Manganese



A:\METGRPH.XLS\ICPFD371COMP.MN

FIGURE G-32

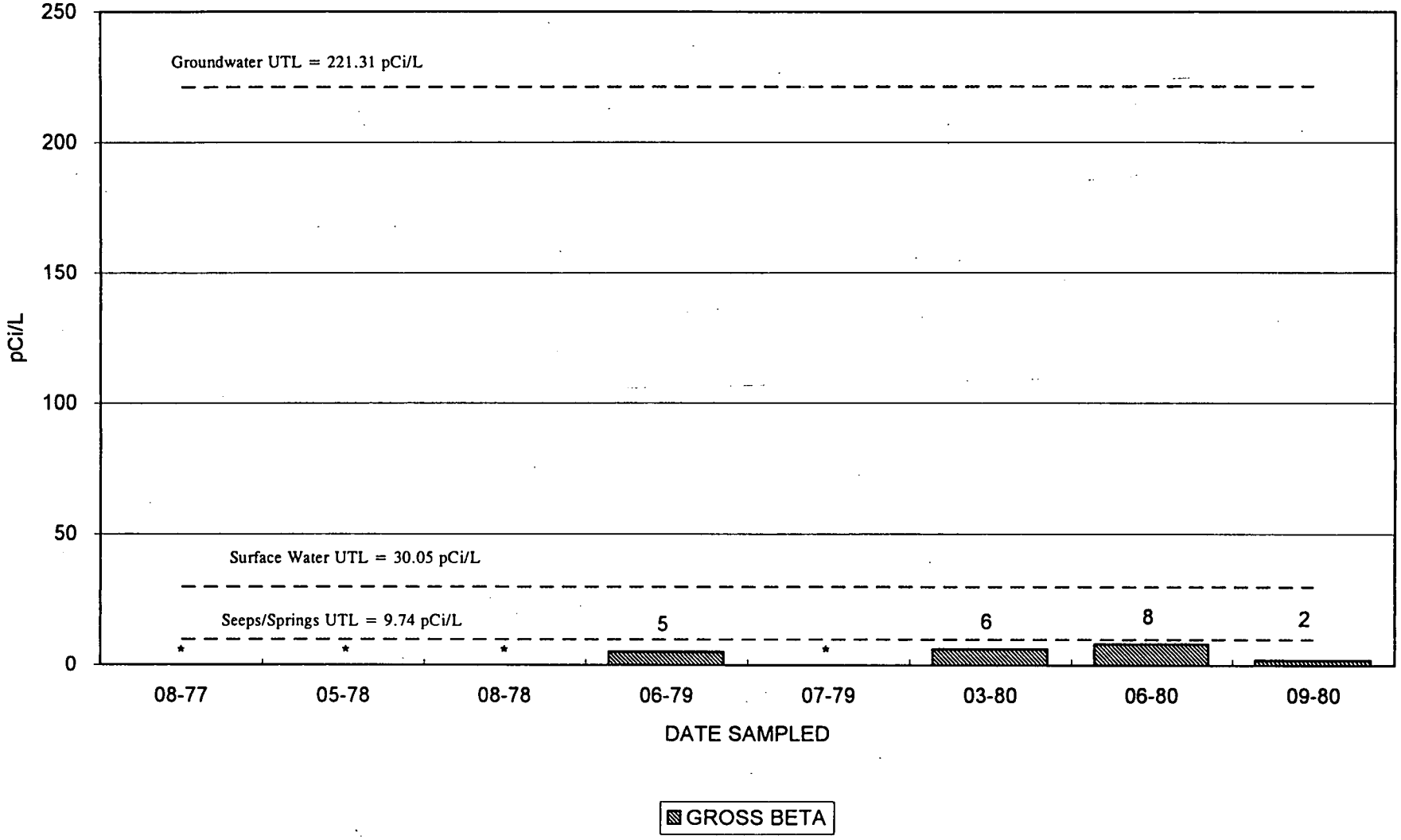
SAMPLE STATION FD444-1
GROSS ALPHA



A:\METGRPH2.XLS\ABFD444-1.A

FIGURE G-33

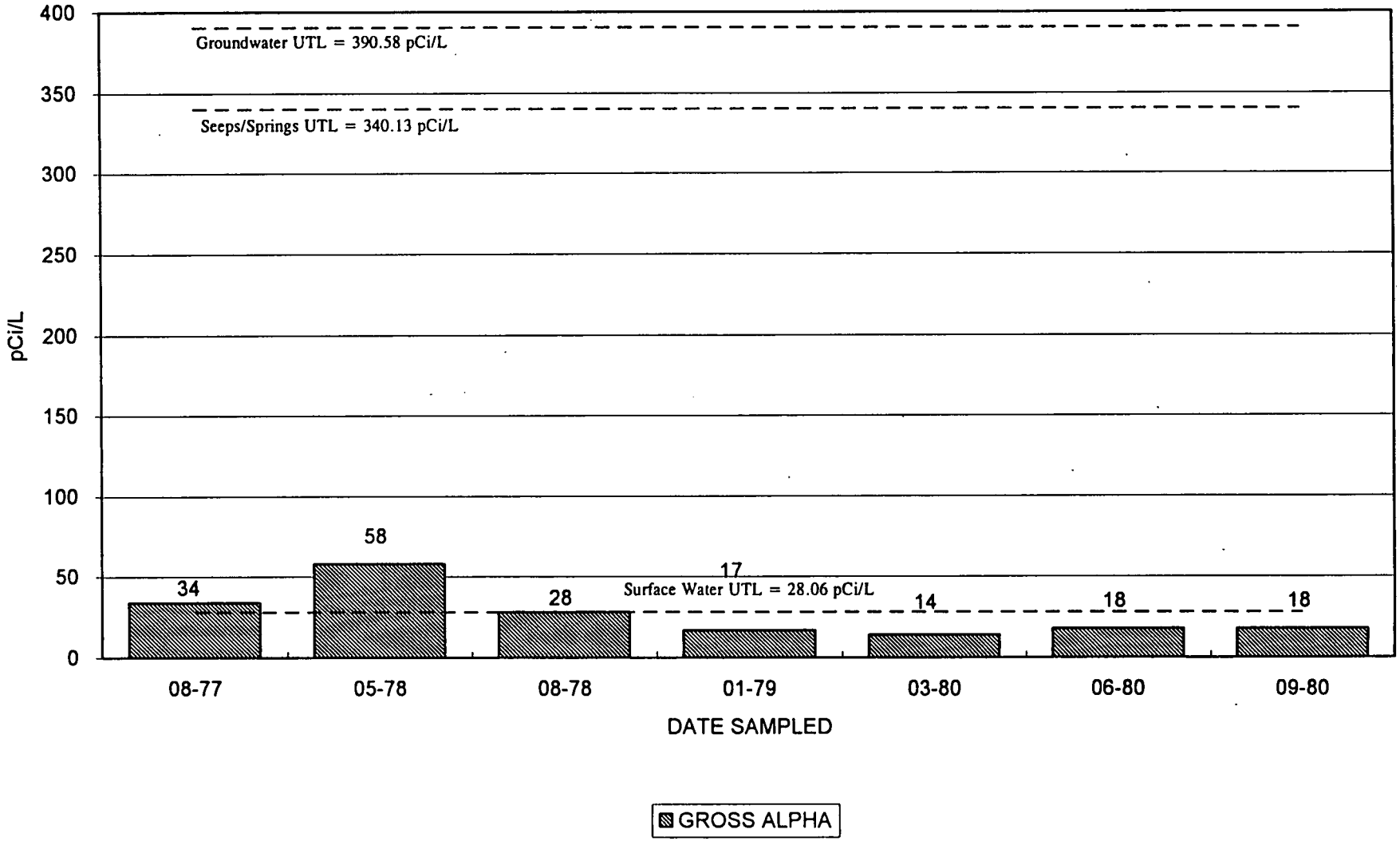
SAMPLE STATION FD444-1
GROSS BETA



A:\METGRPH2.XLS\ABFD444-1.B

FIGURE G-34

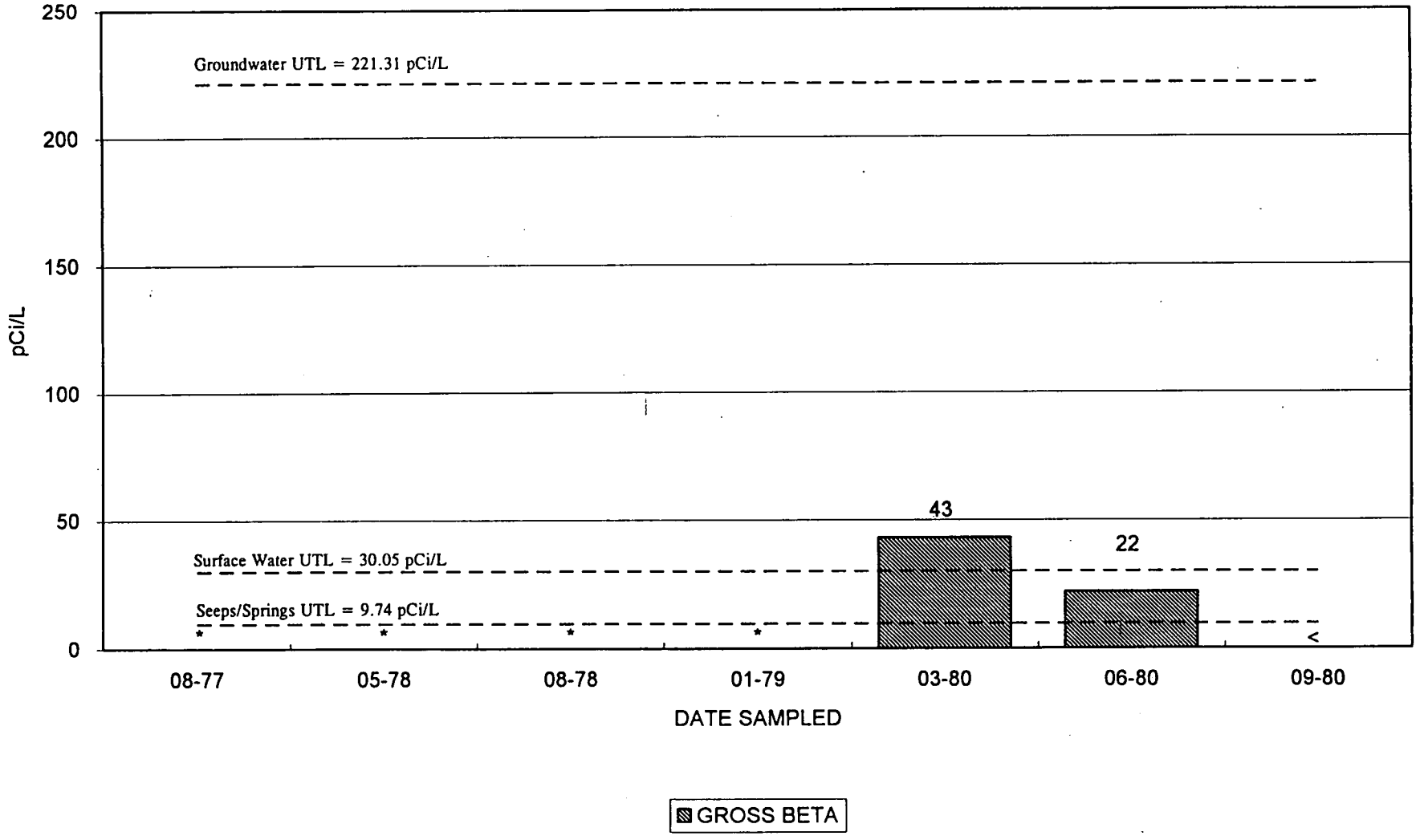
SAMPLE STATION FD444-2
GROSS ALPHA



A:\METGRPH2.XLS\ABFD444-2.A

FIGURE G-35

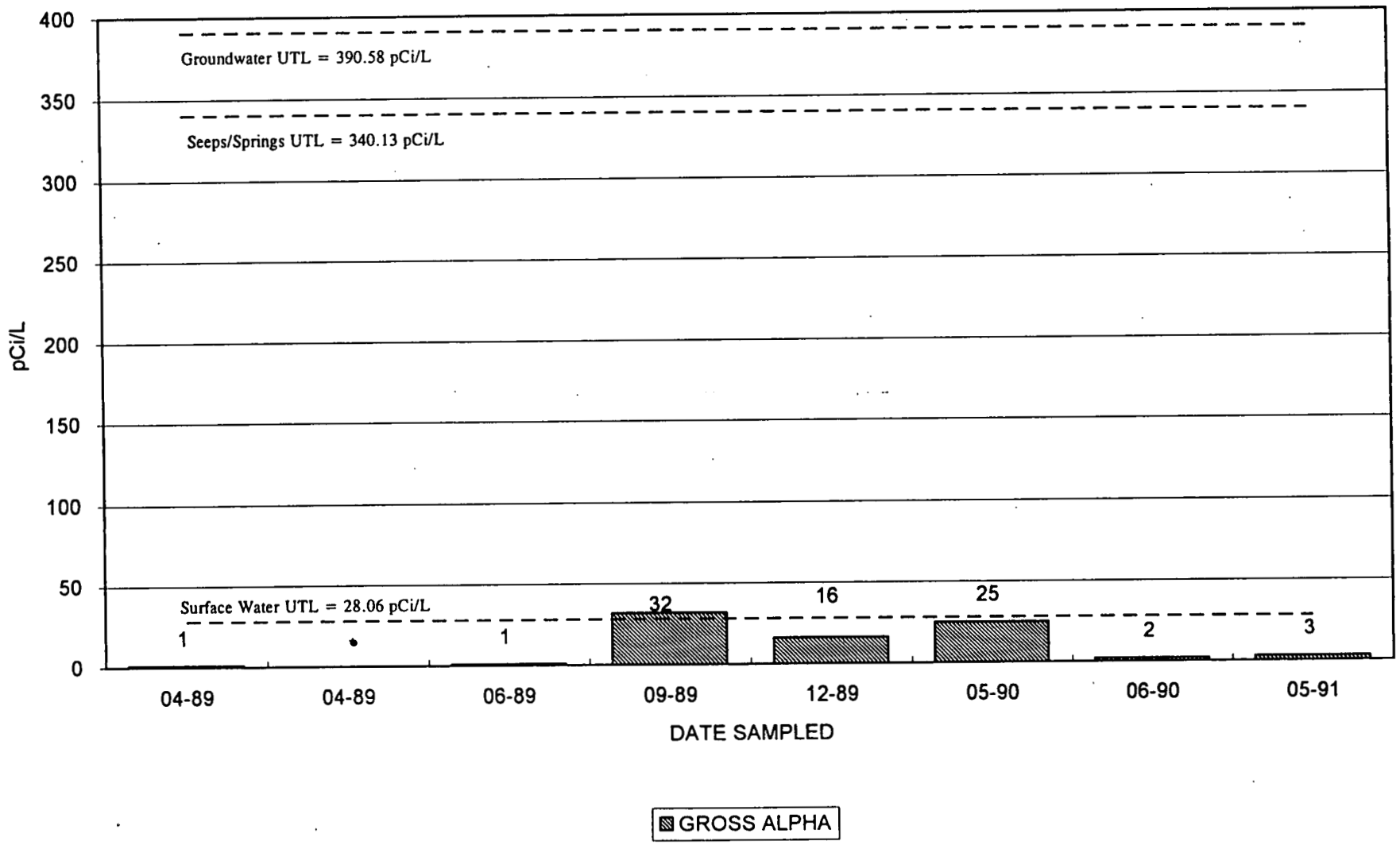
SAMPLE STATION FD444-2
GROSS BETA



A:\METGRPH2.XLS\ABFD444-2.B

FIGURE G-36

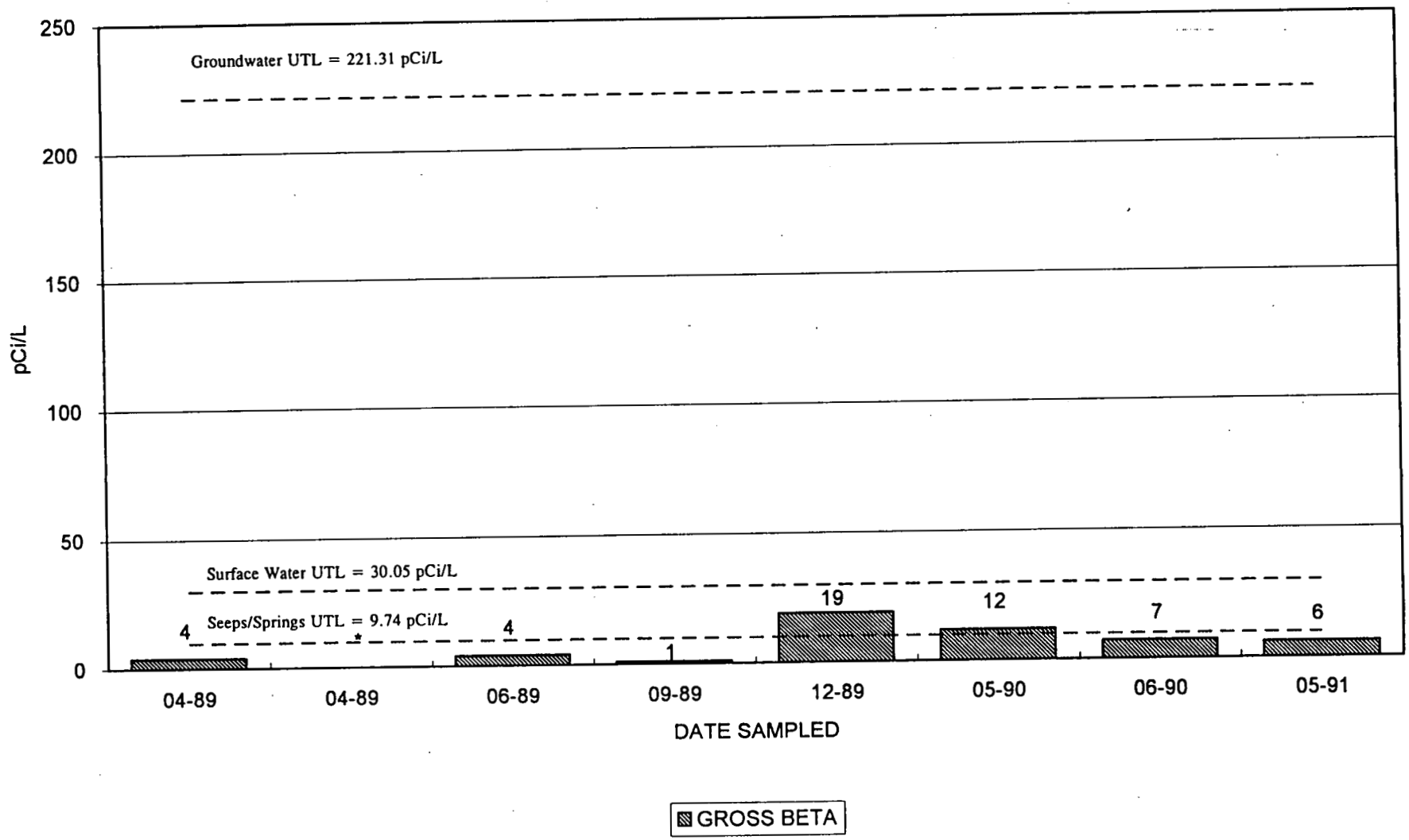
SAMPLE STATION FD444-460
GROSS ALPHA



A:\MET[illegible]PH2.XLS\ABFD444-460.A

FIGURE G-37

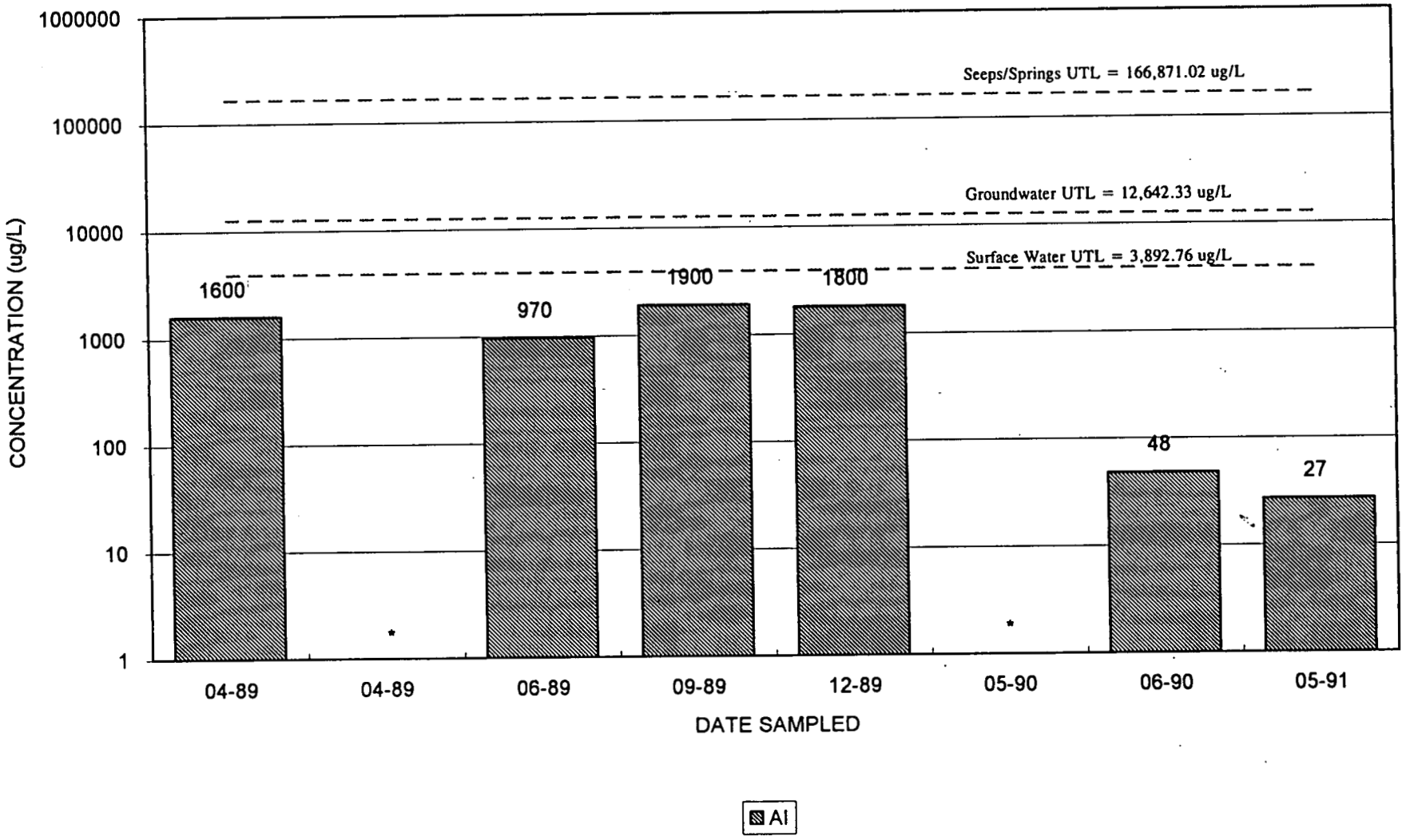
SAMPLE STATION FD444-460
GROSS BETA



A:\METGRPH2.XLS\ABFD444-460.B

FIGURE G-38

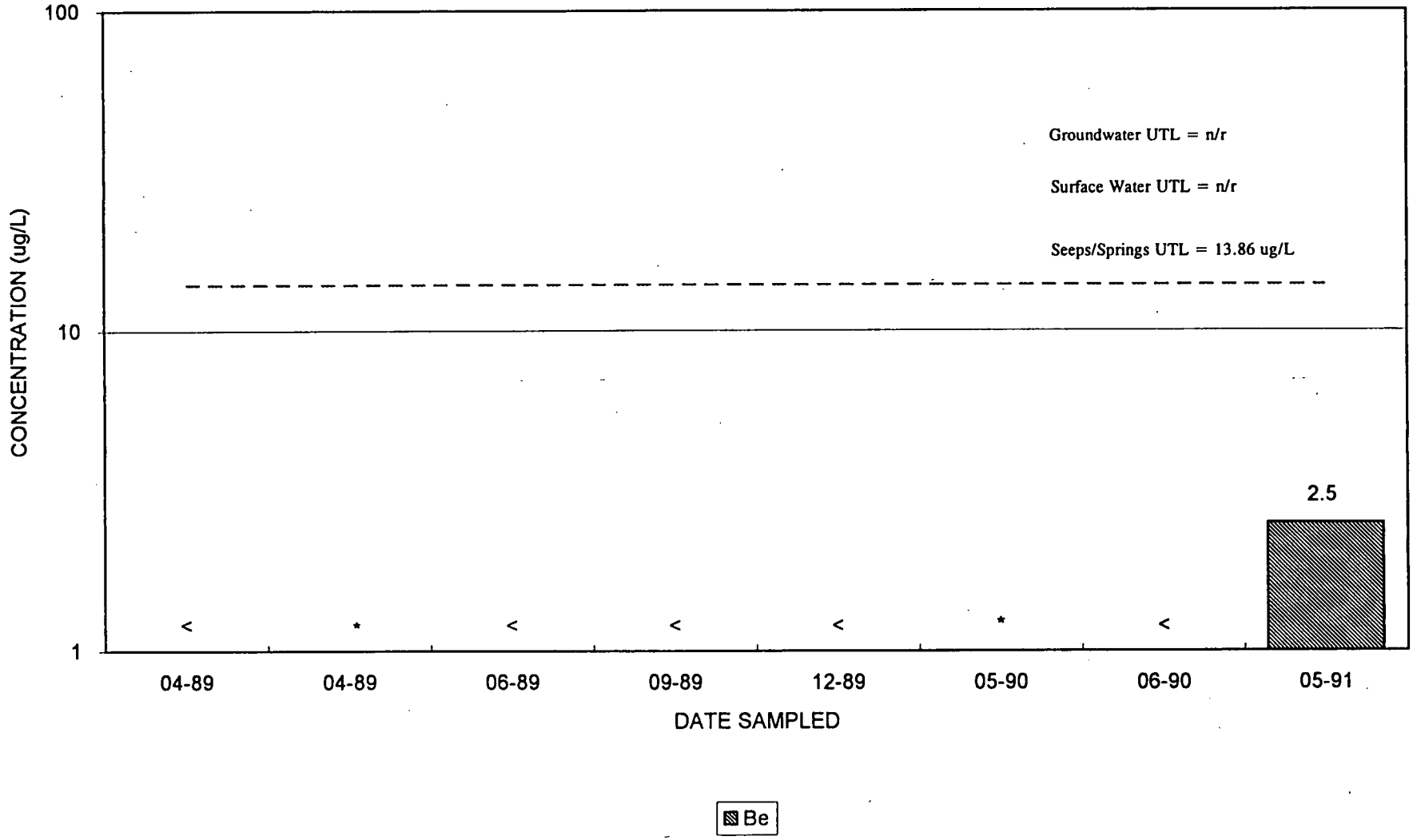
SAMPLE STATION FD444-460
Metals by ICP - Aluminum



A:\MET[illegible]RH.XLS\ICPFD444-460.AL

FIGURE G-39

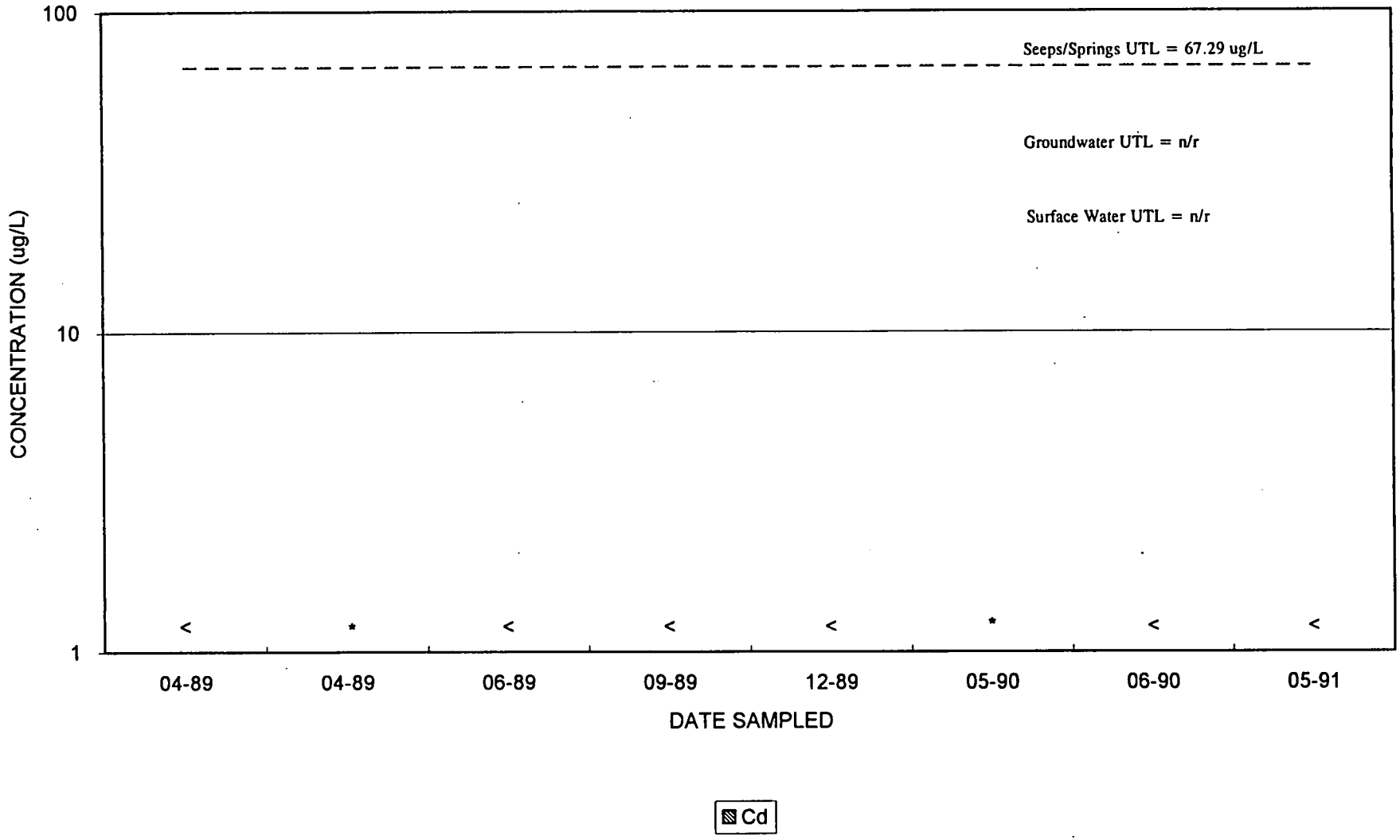
SAMPLE STATION FD444-460
Metals by ICP - Beryllium



A:\METGRPH.XLS\ICPFD444-460.BE

FIGURE G-40

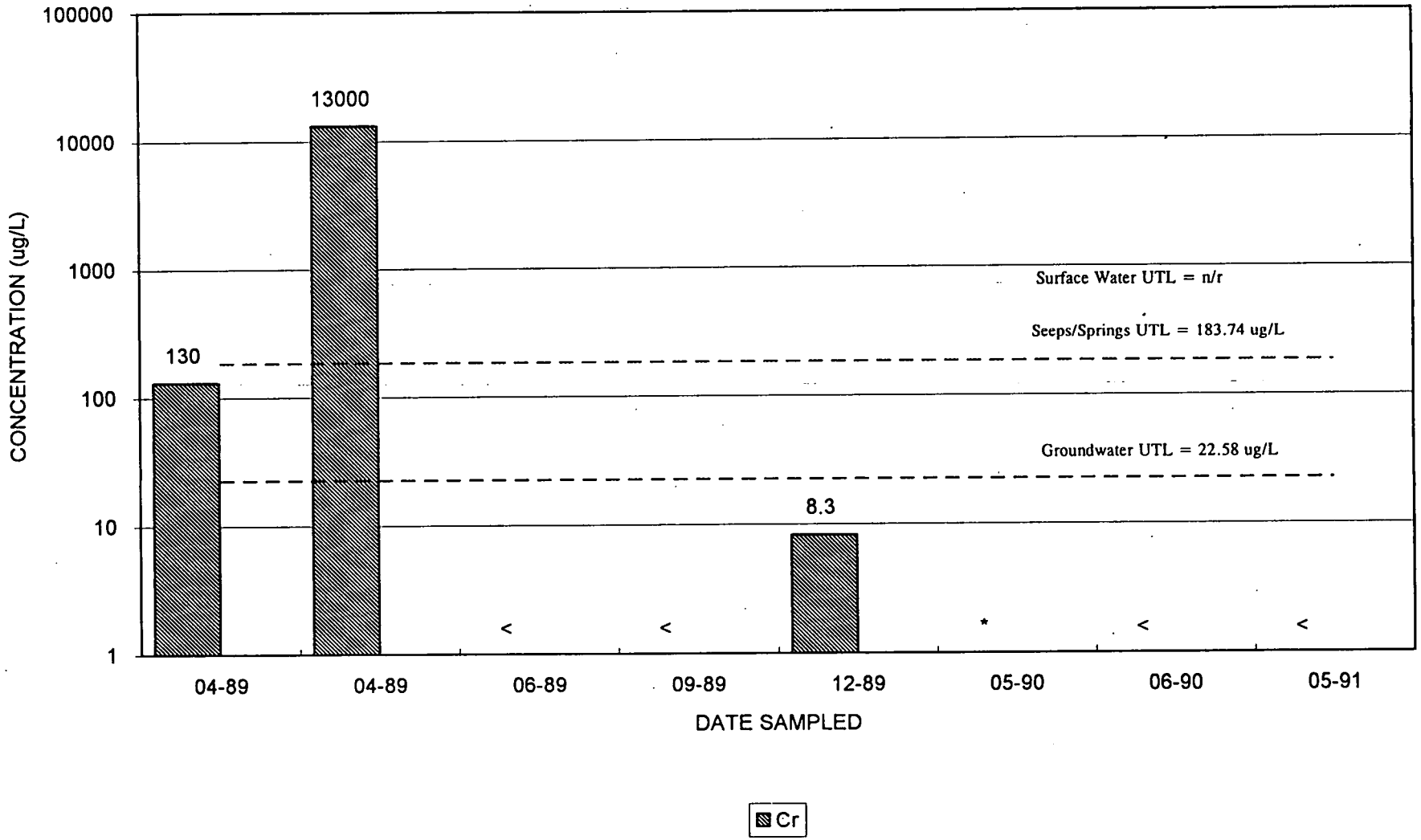
SAMPLE STATION FD444-460
Metals by ICP - Cadmium



A:\METCPRH.XLS\ICPFD444-460.CD

FIGURE G-41

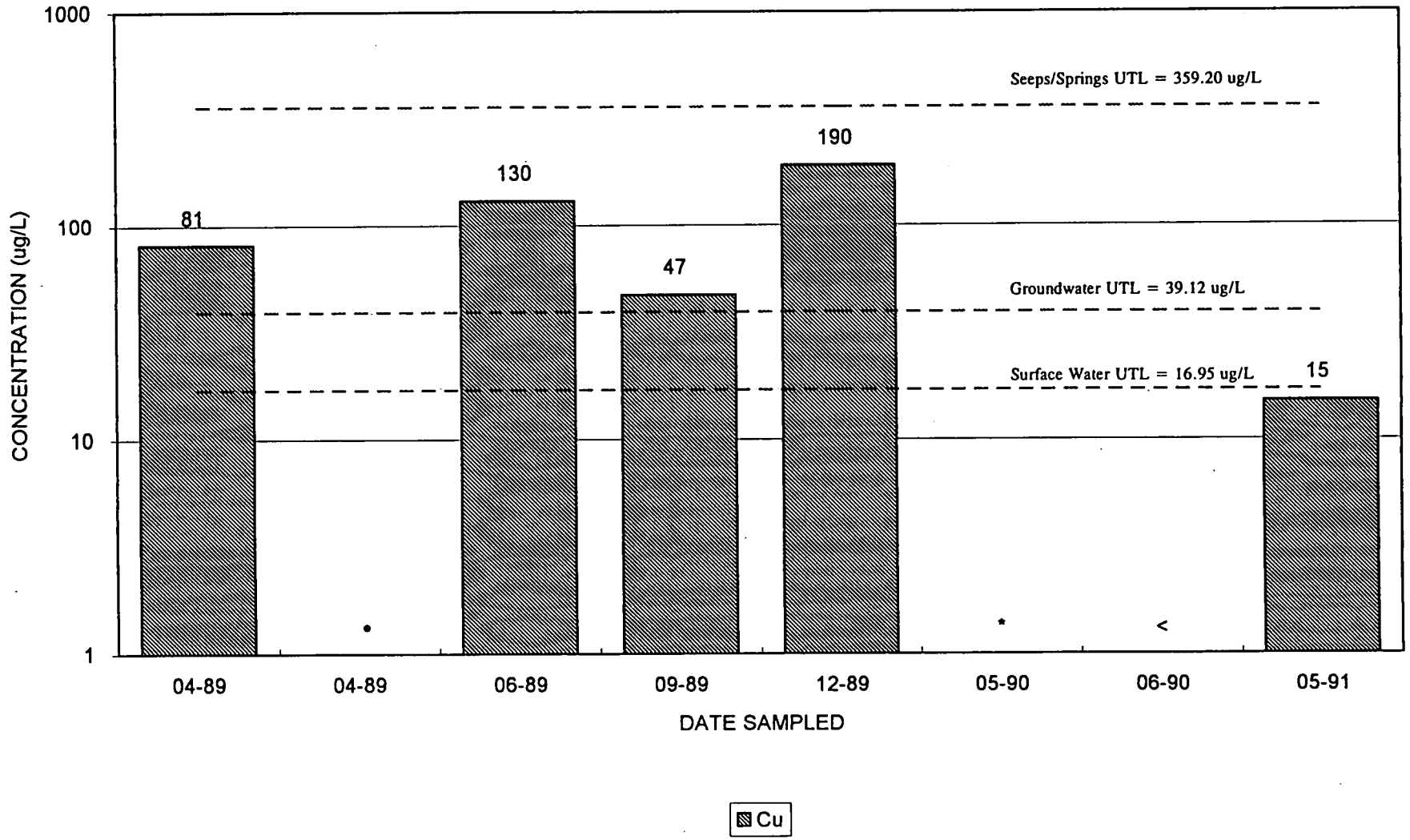
SAMPLE STATION FD444-460
Metals by ICP - Chromium



A:\METGRPH.XLS\CPFD444-460.CR

FIGURE G-42

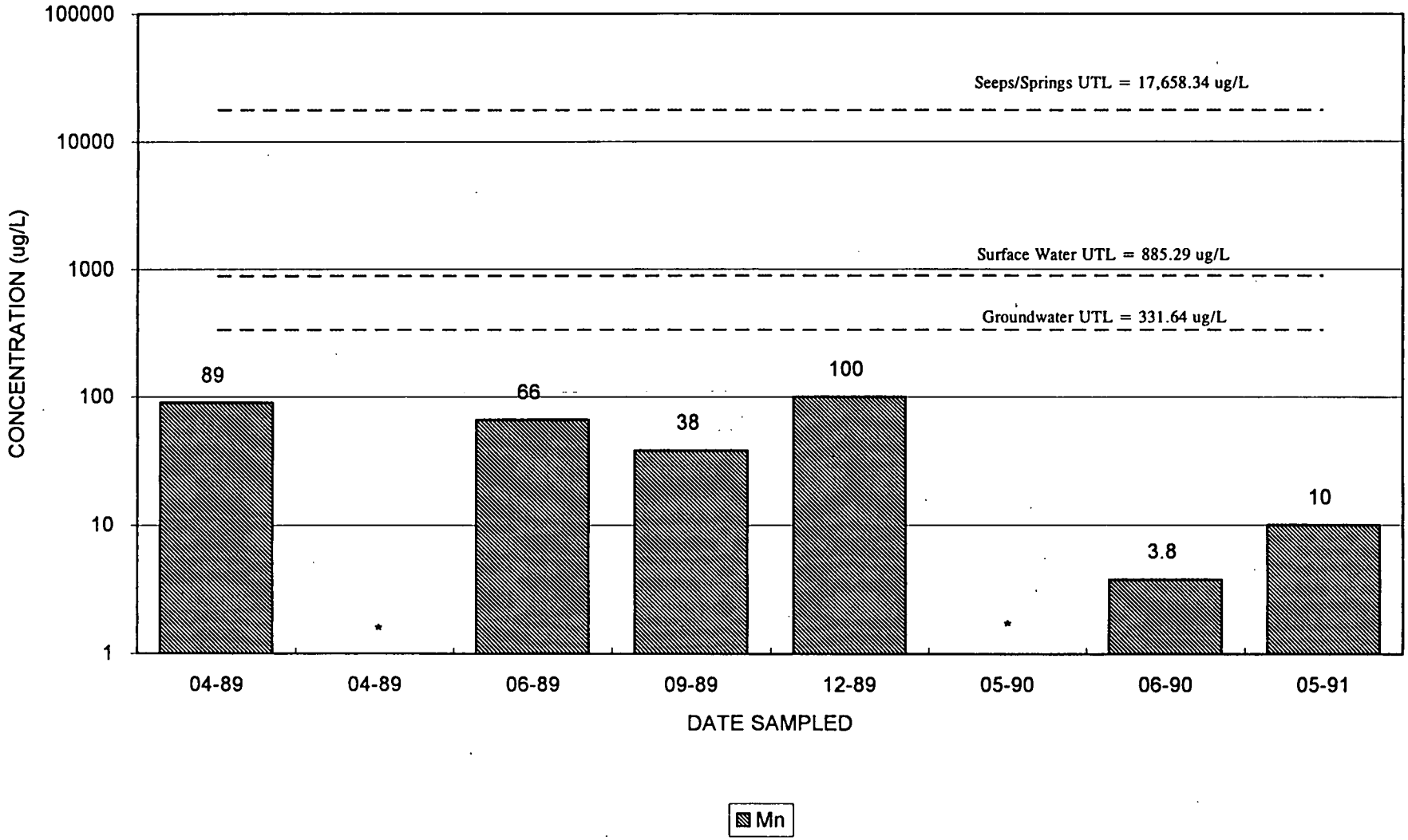
SAMPLE STATION FD444-460
Metals by ICP - Copper



A:\METGRPH.XLS\ICPFD444-460.CU

FIGURE G-43

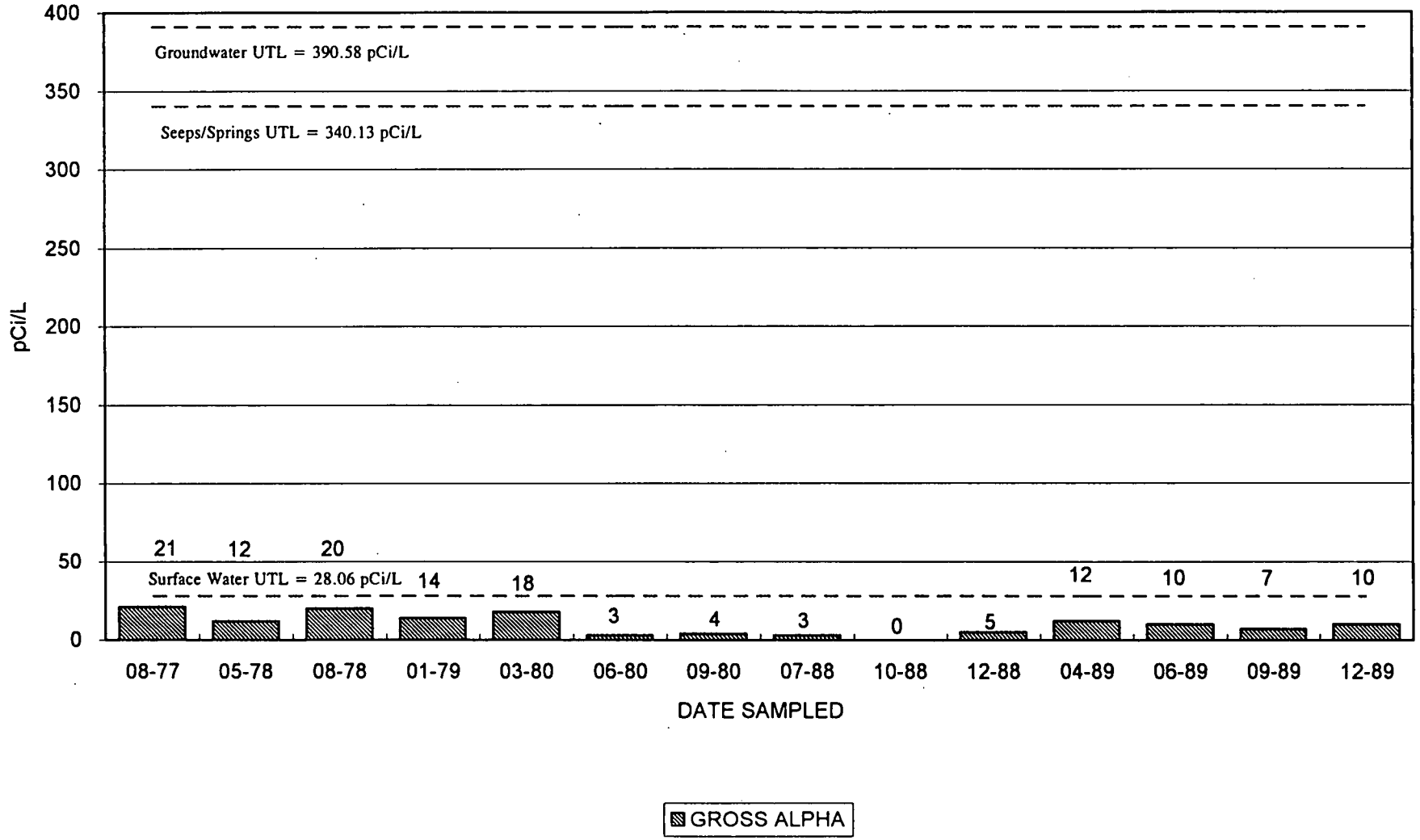
SAMPLE STATION FD444-460
Metals by ICP - Manganese



A:\METGRPH.XLS\ICPFD444-460.MN

FIGURE G-44

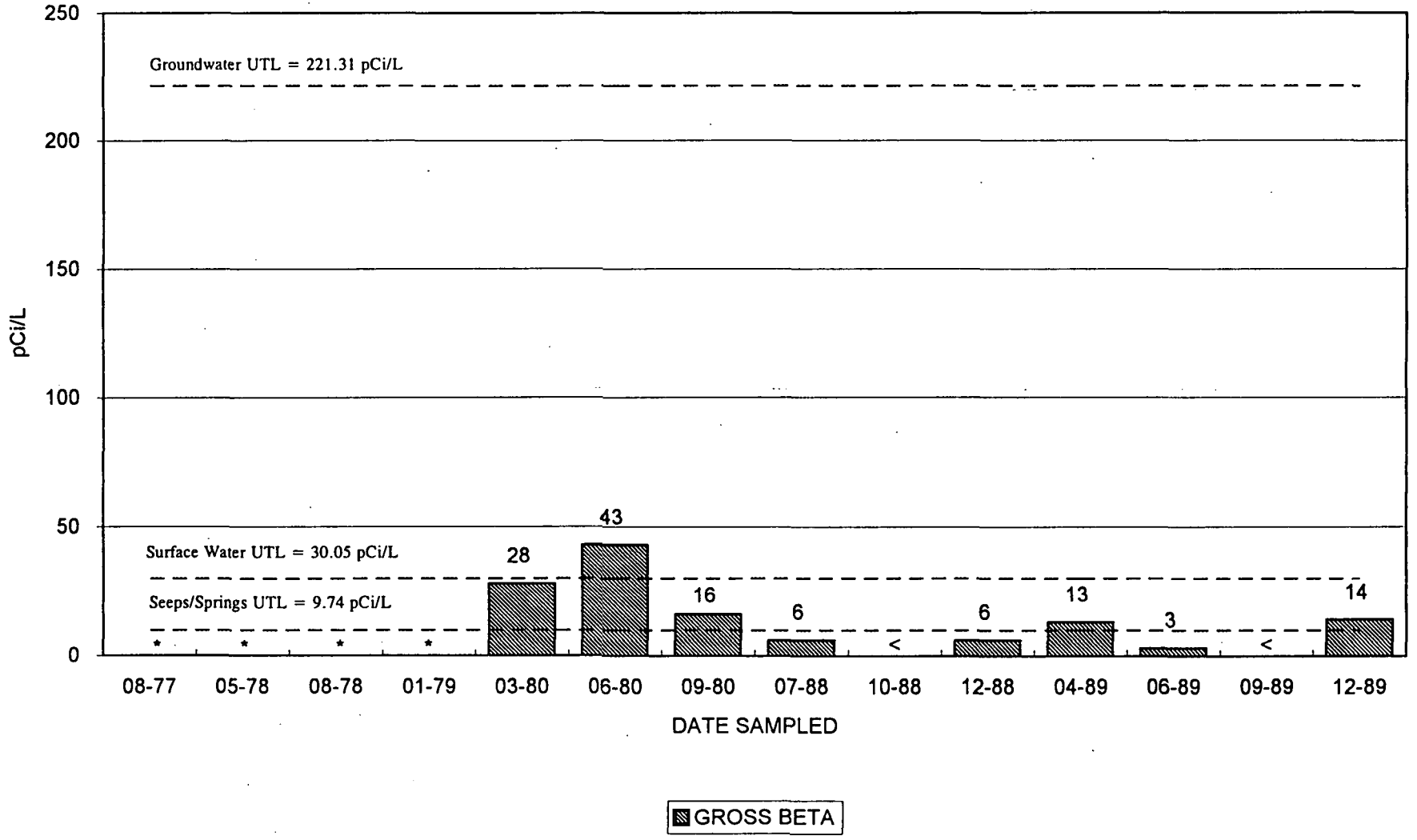
SAMPLE STATION FD516-1
GROSS ALPHA



A:\METGRPH2.XLS\ABFD516-1.A

FIGURE G-45

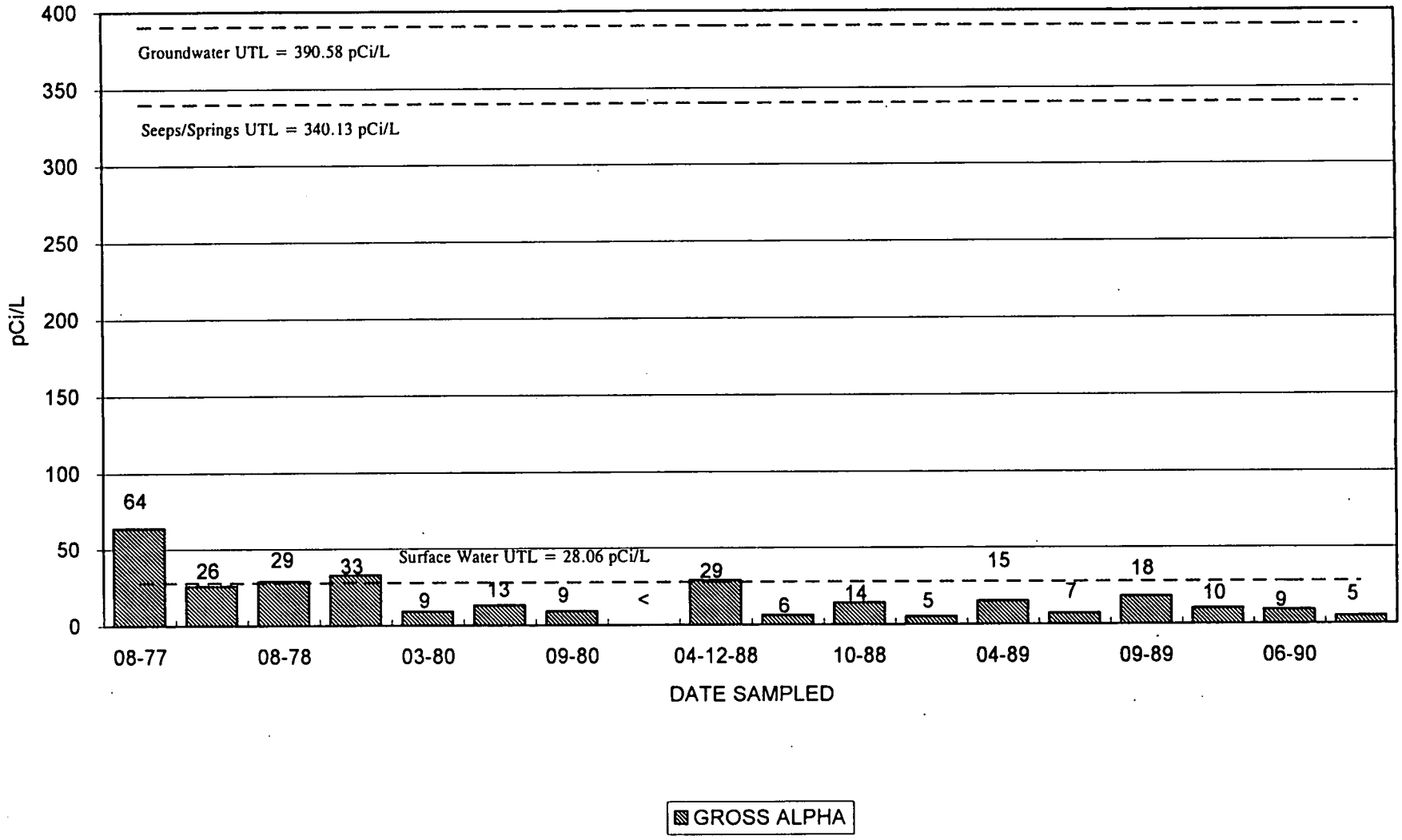
SAMPLE STATION FD516-1
GROSS BETA



A:\METGRPH2.XLS\ABFD516-1.B

FIGURE G-46

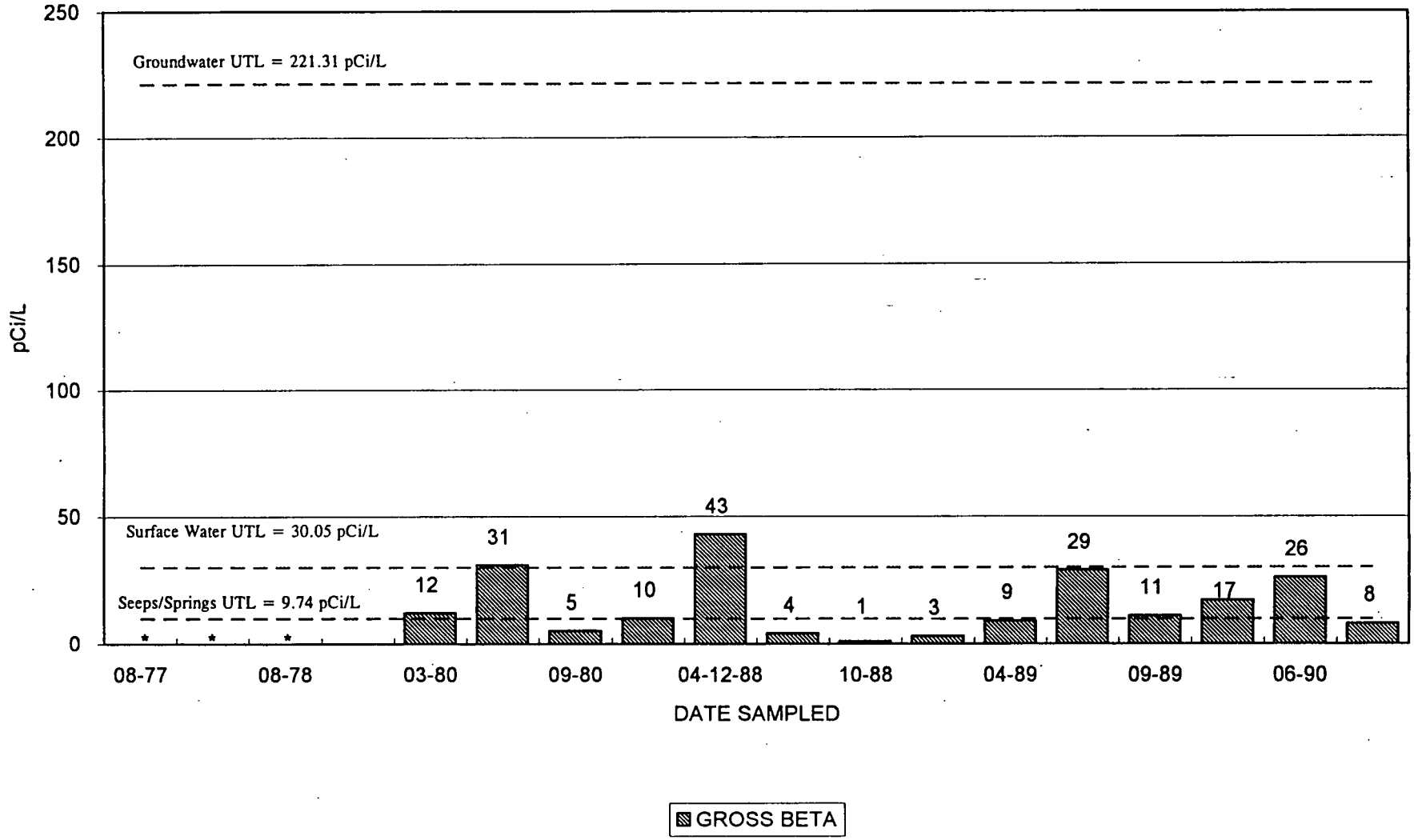
SAMPLE STATION FD707-1
GROSS ALPHA



A:\METCRPH2.XLS\ABFD707-1.A

FIGURE G-47

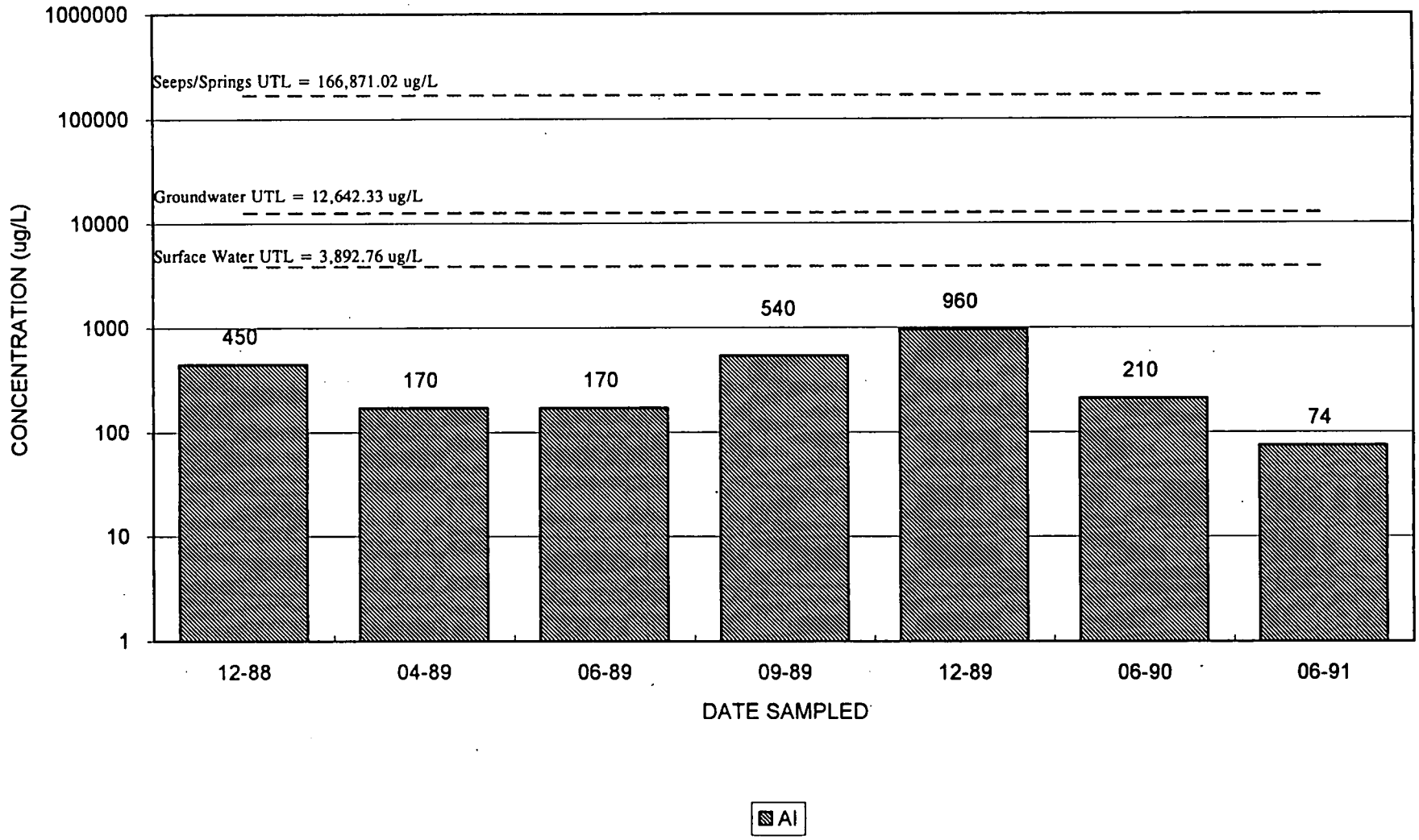
SAMPLE STATION FD707-1
GROSS BETA



A:\METGRPH2.XLS\ABFD707-1.B

FIGURE G-48

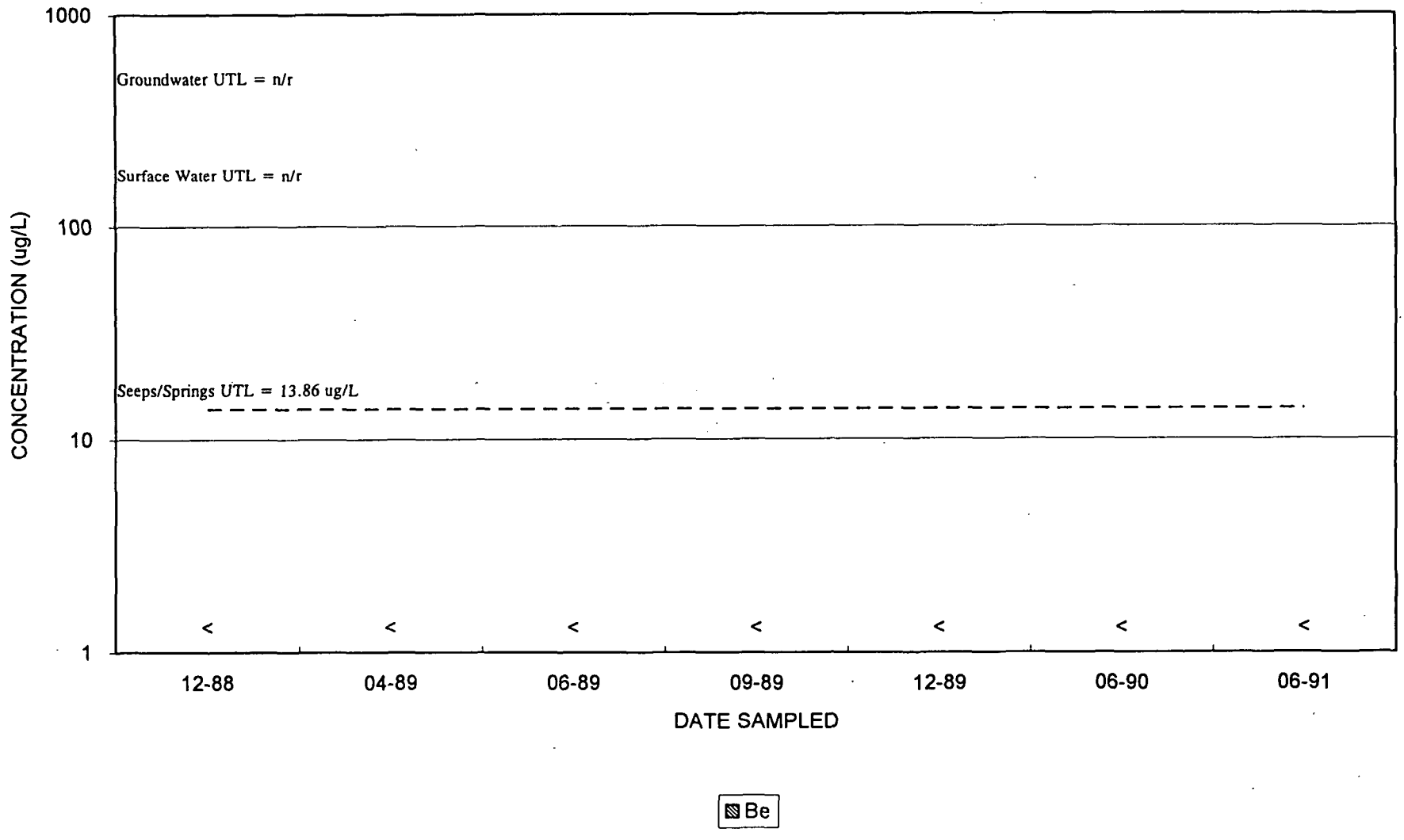
SAMPLE STATION FD707-1
Metals by ICP - Aluminum



A:\METGRPH2.XLS\ICP707-1.AL

FIGURE G-49

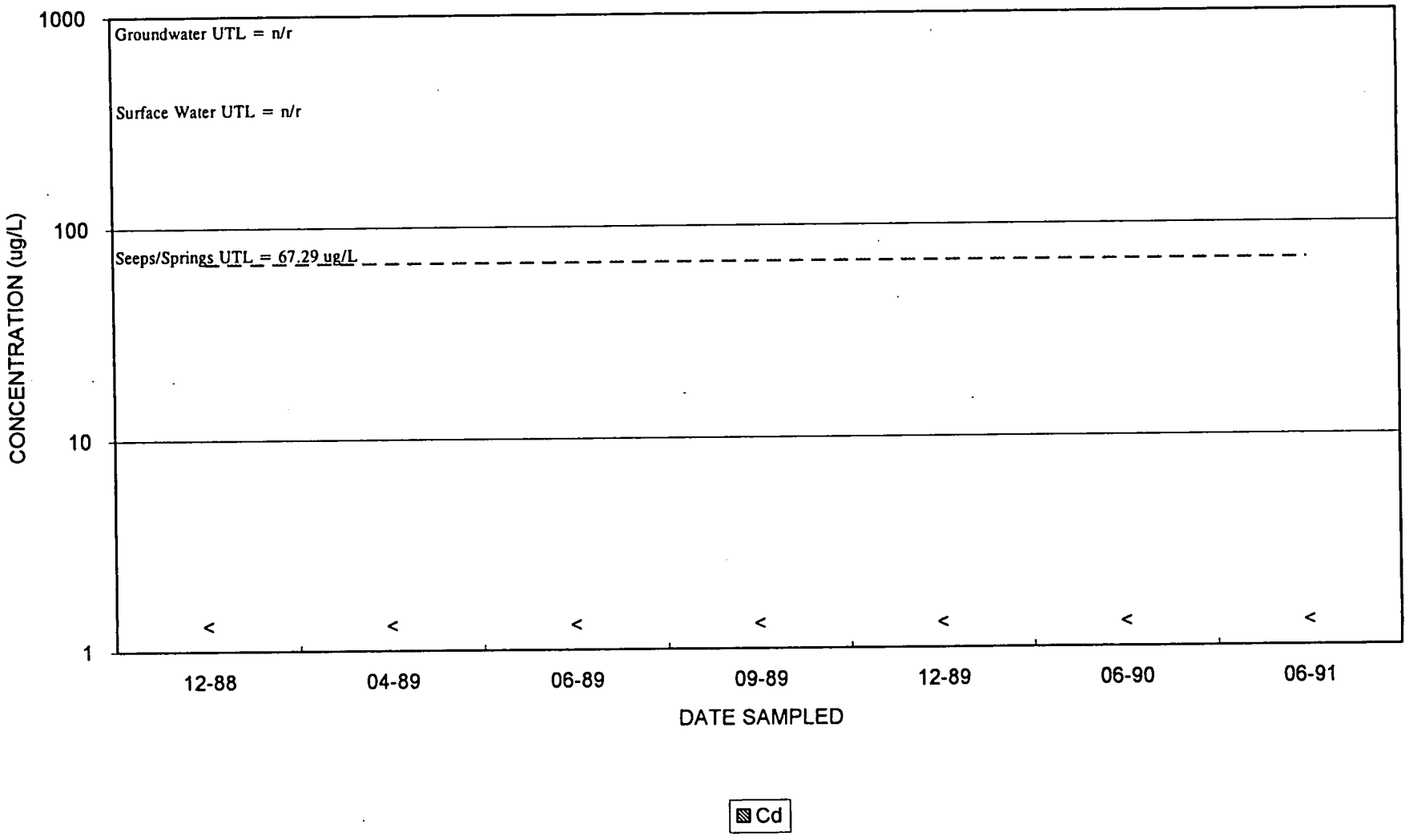
SAMPLE STATION FD707-1
Metals by ICP - Beryllium



A:\METGRPH2.XLS\ICP707-1.BE

FIGURE G-50

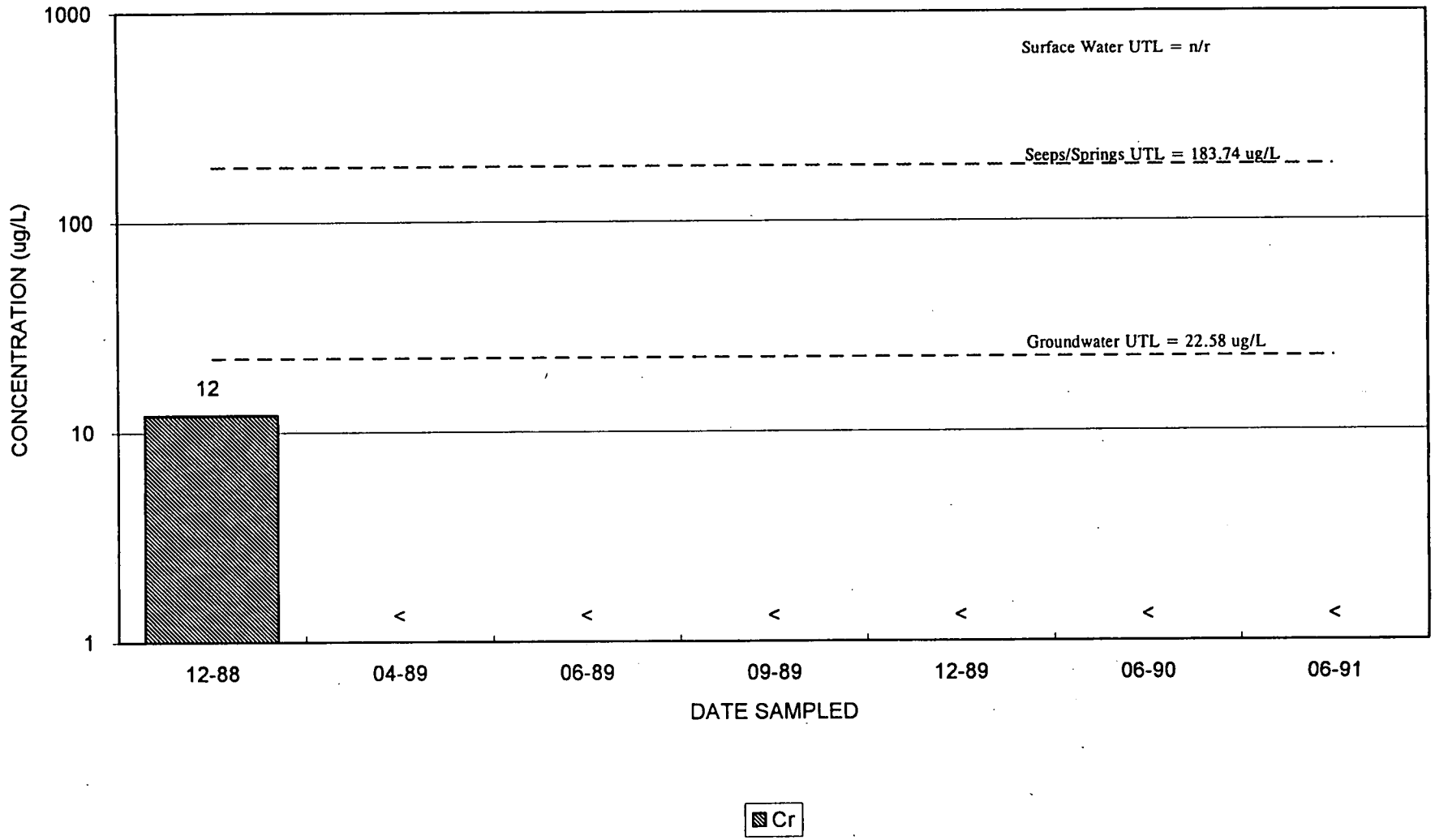
SAMPLE STATION FD707-1
Metals by ICP - Cadmium



A:\METCRPH2.XLS\ICP707-1.CD

FIGURE G-51

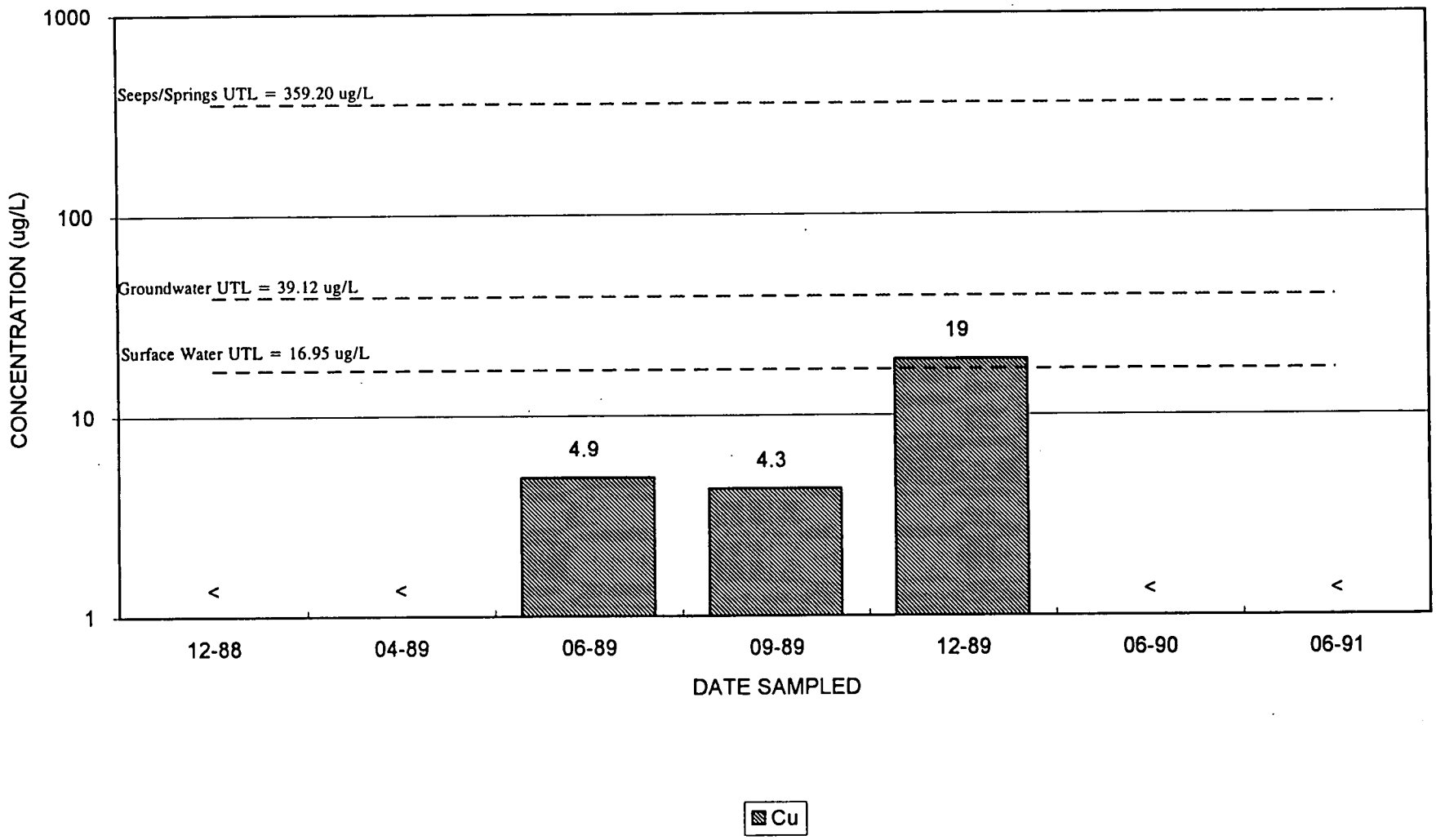
SAMPLE STATION FD707-1
Metals by ICP - Chromium



A:\METGRPH2.XLS\ICP707-1.CR

FIGURE G-52

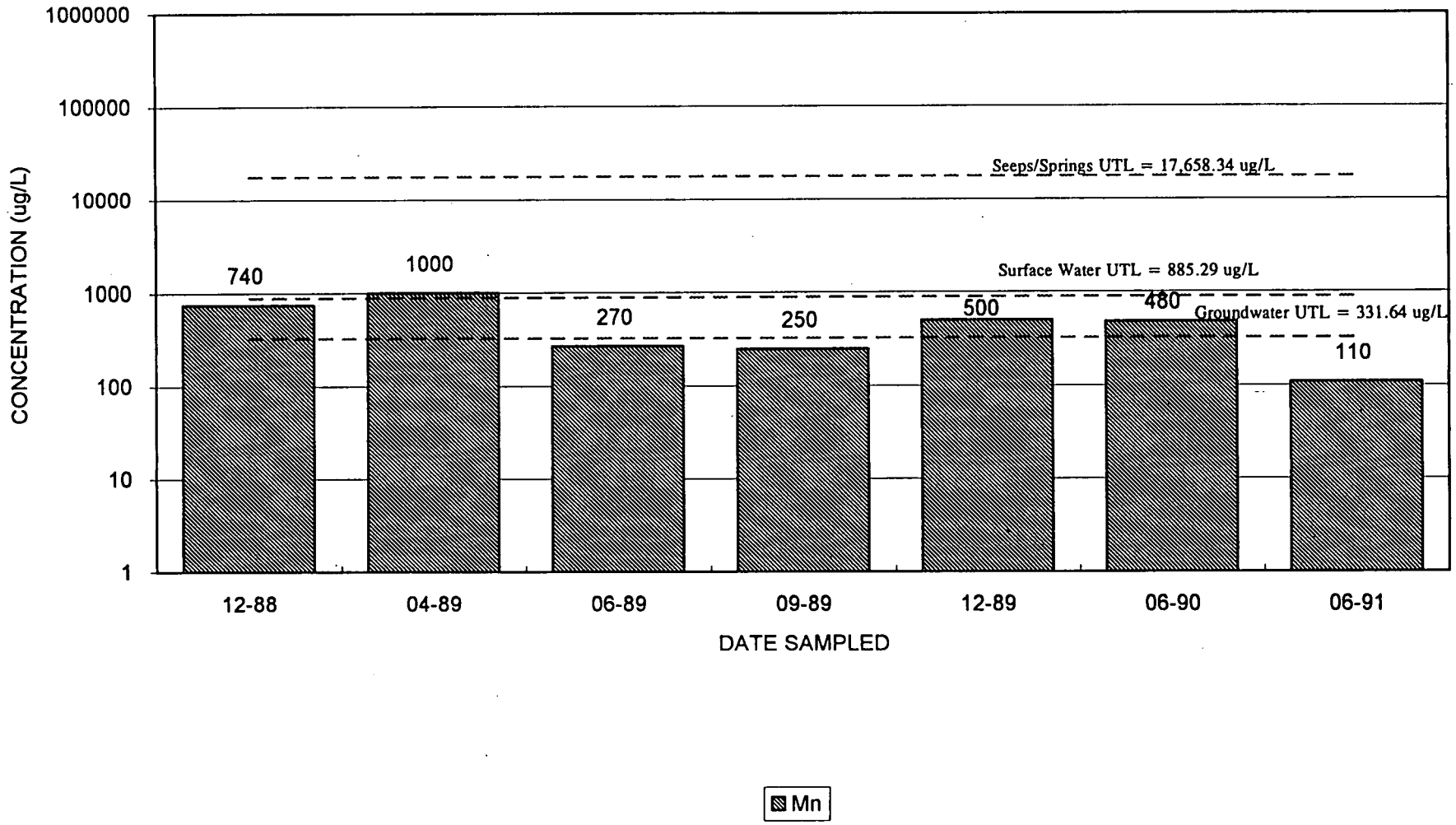
SAMPLE STATION FD707-1
Metals by ICP - Copper



A:\METCRPH2.XLS\ICP707-1.CU

FIGURE G-53

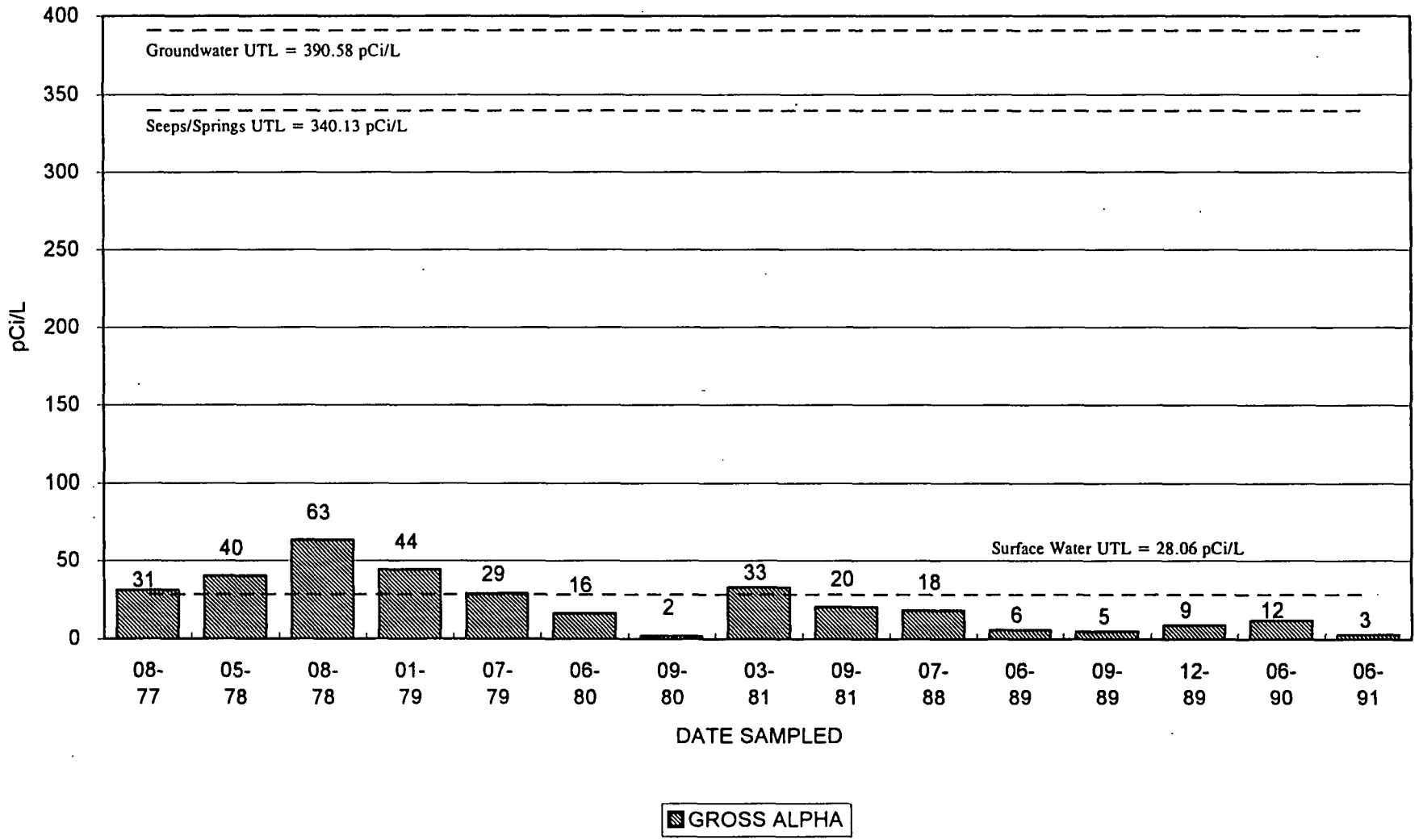
SAMPLE STATION FD707-1
Metals by ICP - Manganese



A:\METGRPH2.XLS\ICP707-1.MN

FIGURE G-54

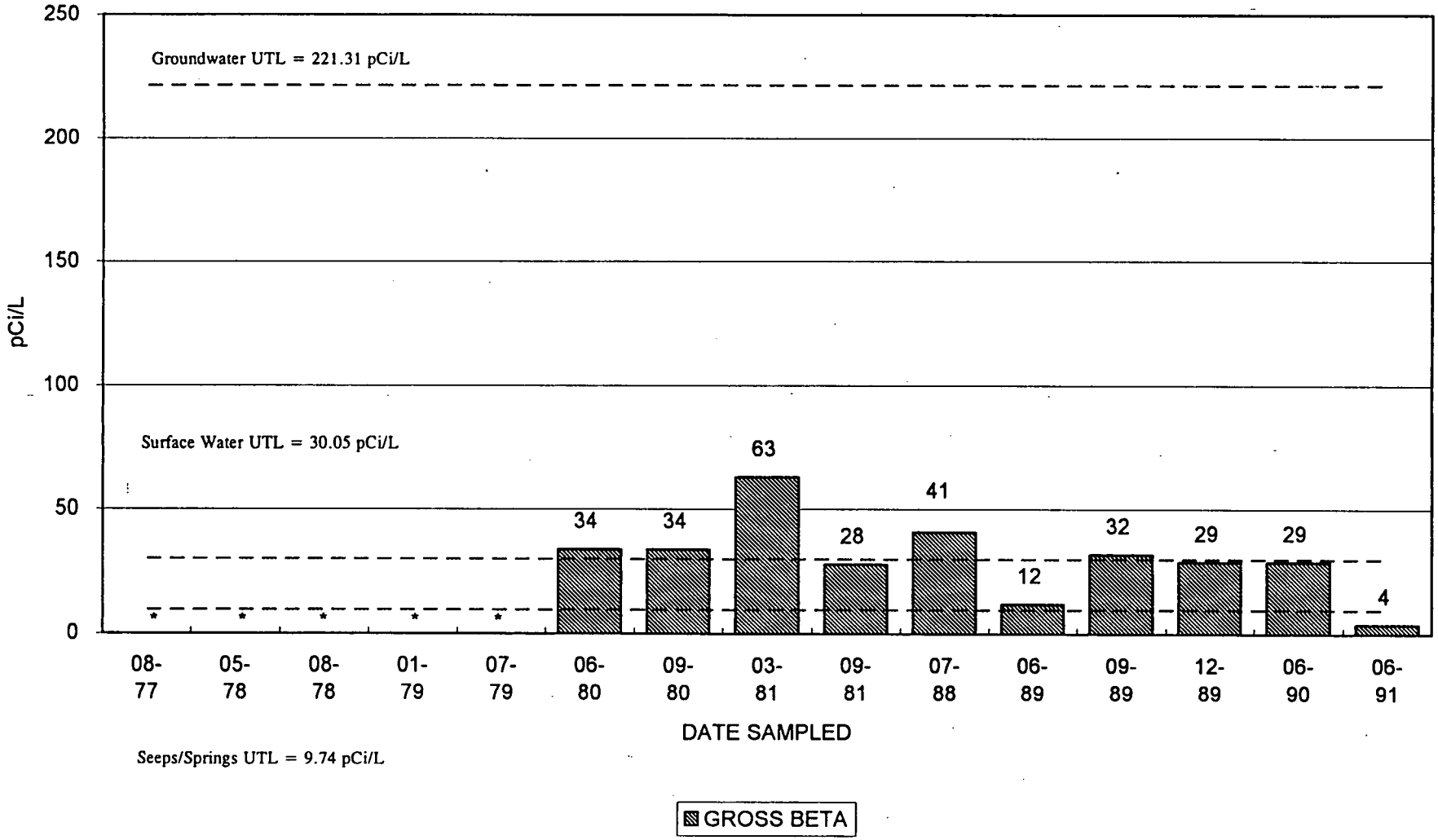
SAMPLE STATION BS707-2
GROSS ALPHA



A:\MET[illegible]RH2.XLS\ABBS707-2.A

FIGURE G-55

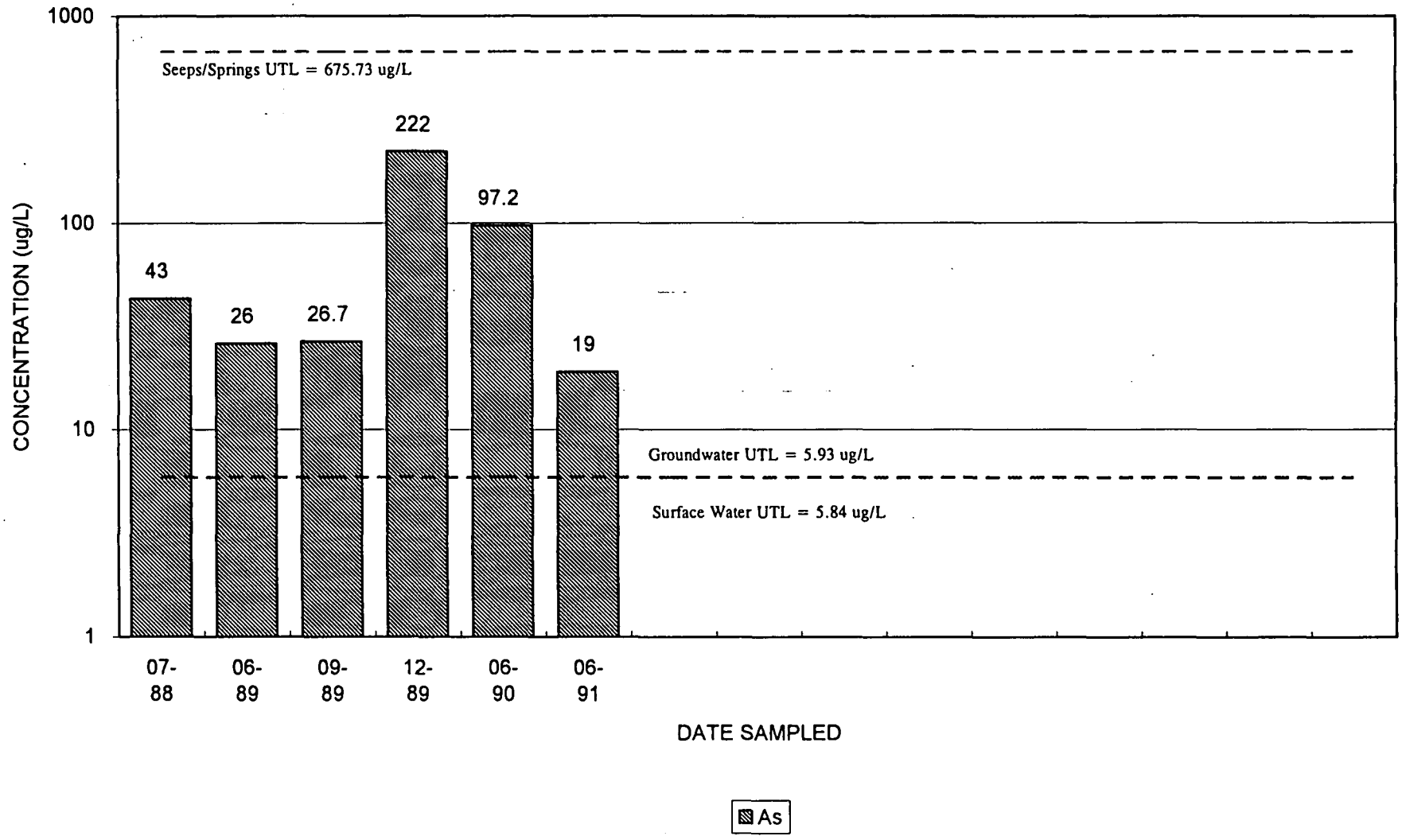
SAMPLE STATION BS707-2
GROSS BETA



A:\METGRPH2.XLS\ABBS707-2.B

FIGURE G-56

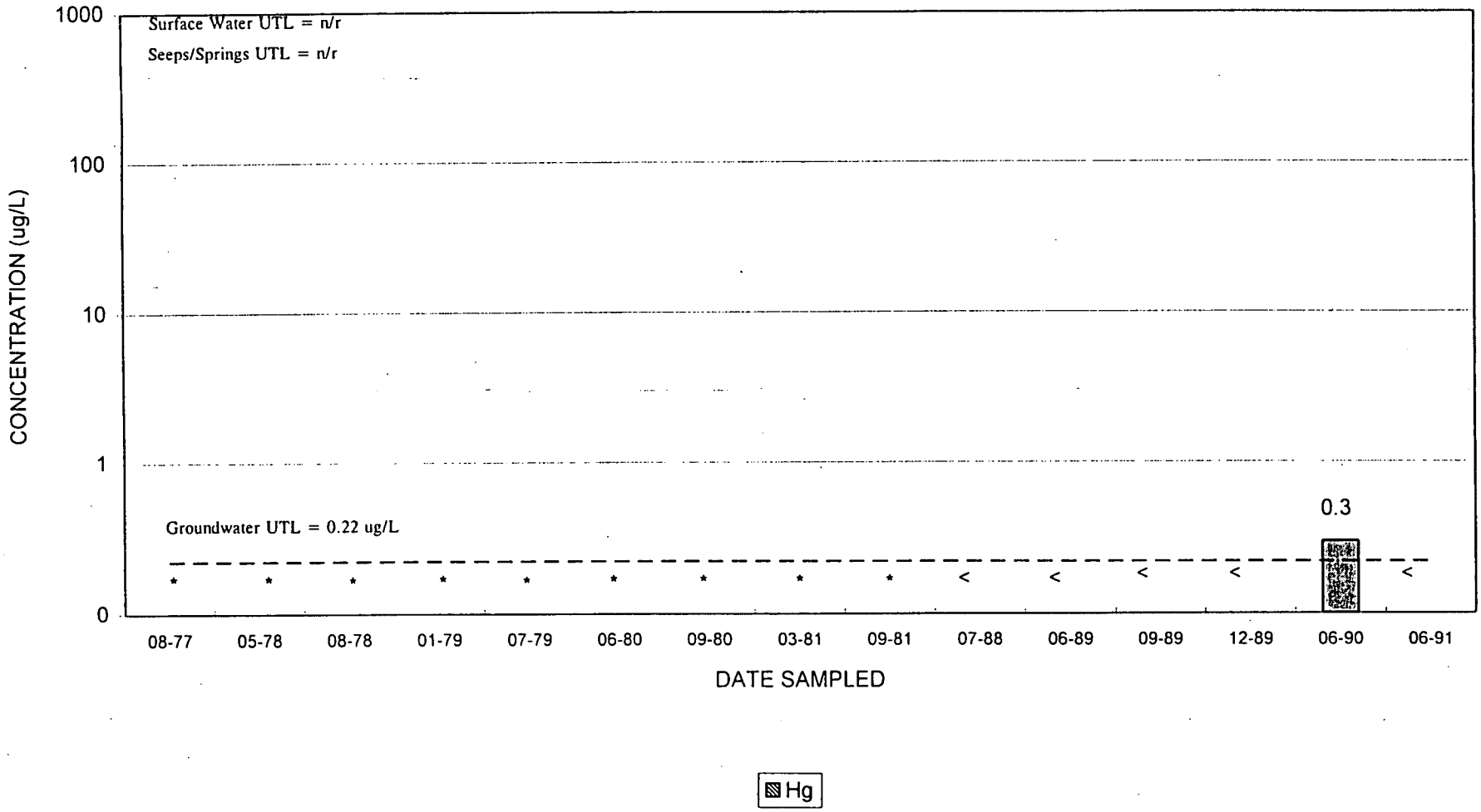
SAMPLE STATION BS707-2
Metals by Atomic Absorption - Arsenic



A:\METGRPH2.XLS\AABS707-2.AS

FIGURE G-57

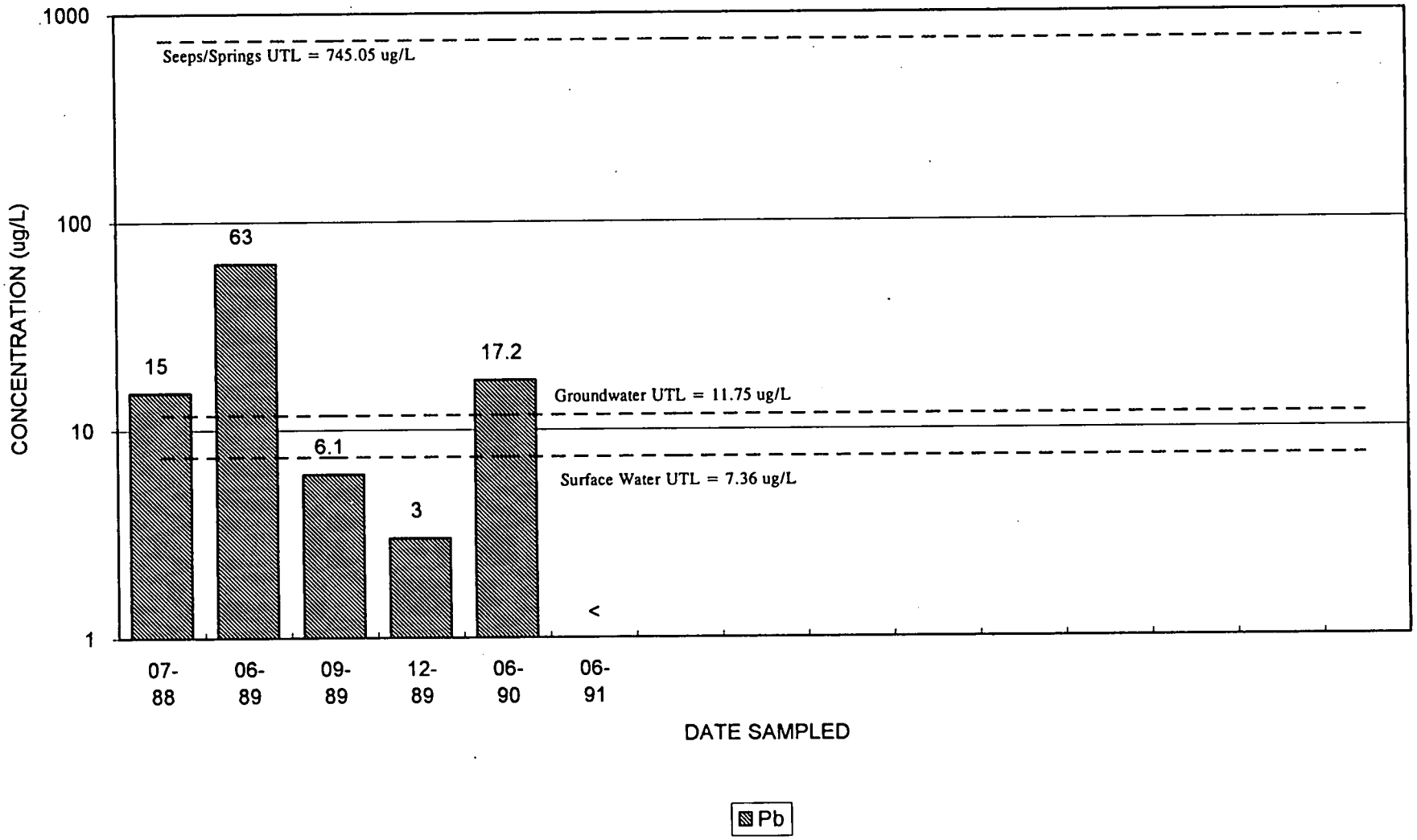
SAMPLE STATION BS707-2
Metals by Atomic Absorption - Mercury



A:\METGRPH.XLS\AABS707-2.HG

FIGURE G-58

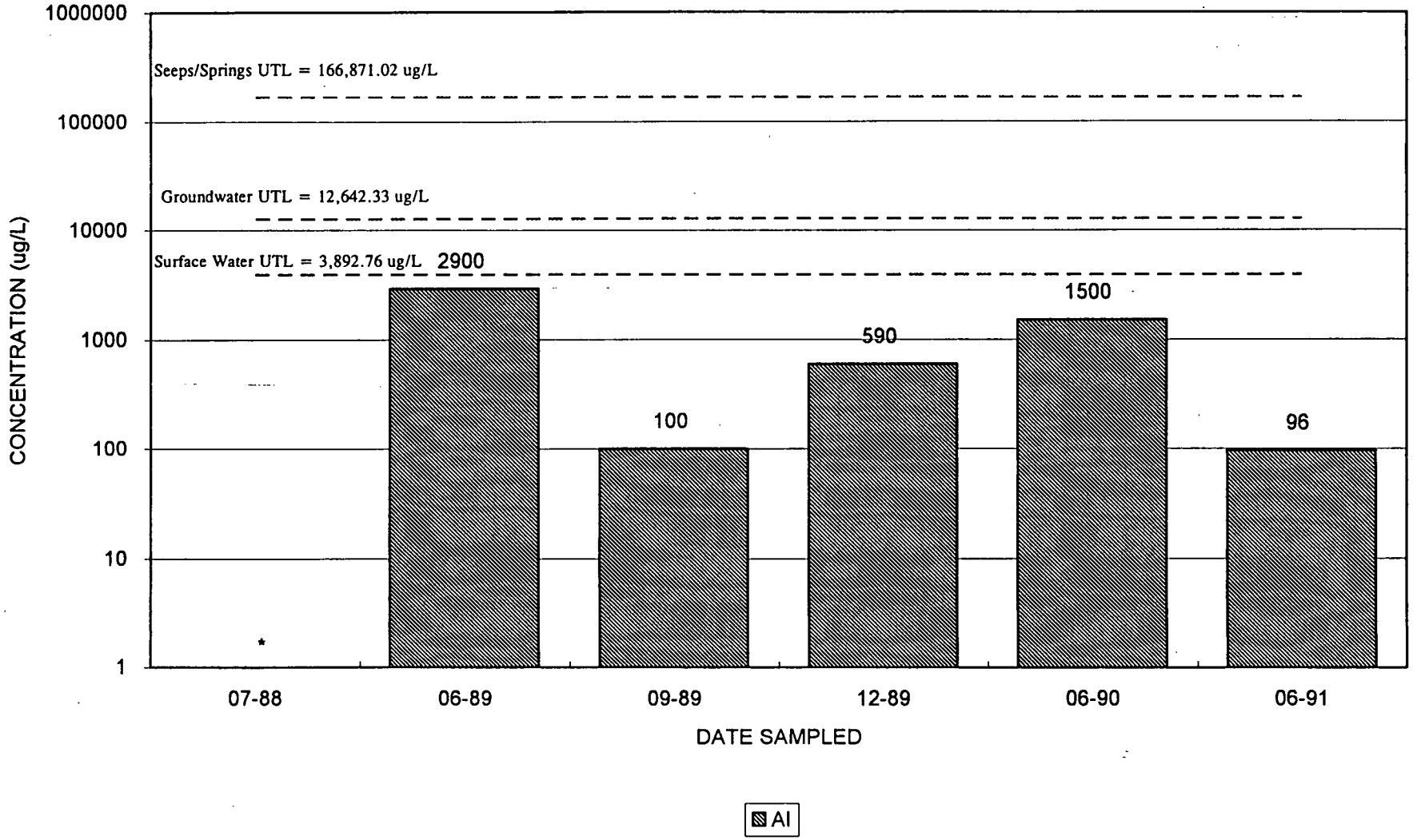
SAMPLE STATION BS707-2
Metals by Atomic Absorption - Lead



A:\METGRPH2.XLS\AABS707-2.PB

FIGURE G-59

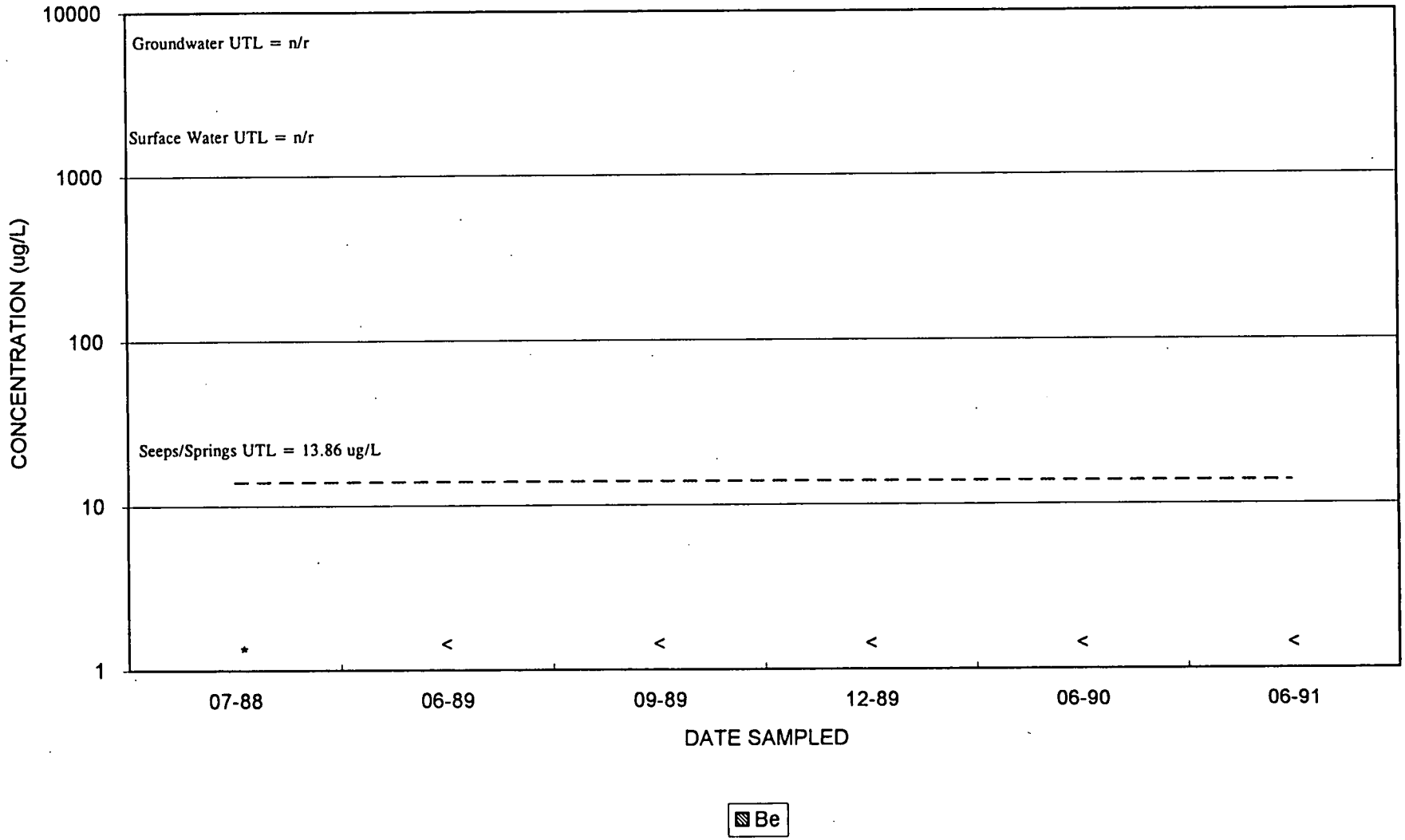
SAMPLE STATION BS707-2
Metals by ICP - Aluminum



A:\METGRPH.XLS\ICPBS707-2.AL

FIGURE G-60

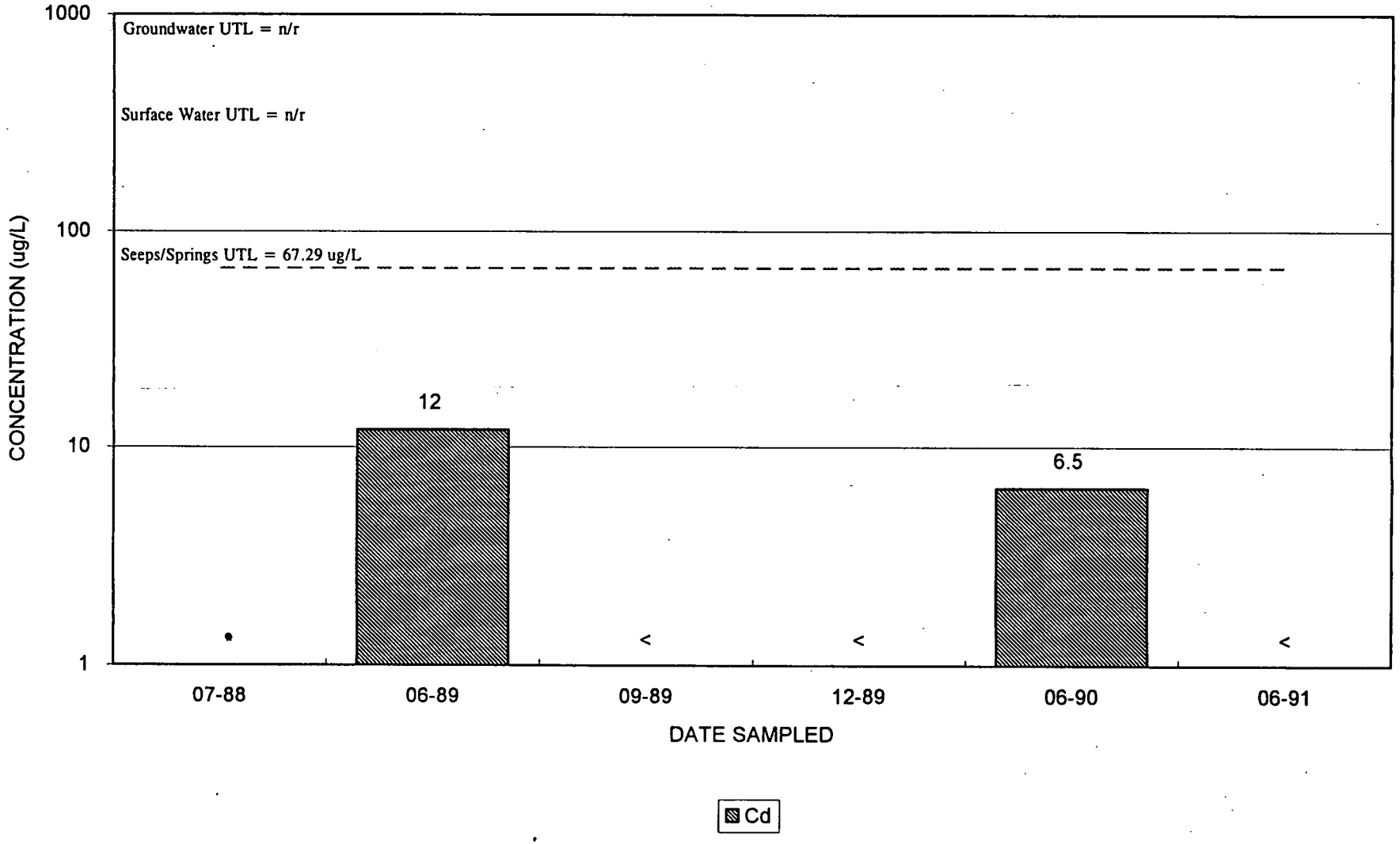
SAMPLE STATION BS707-2
Metals by ICP - Beryllium



A:\METGRPH.XLS\ICPBS707-2.BE

FIGURE G-61

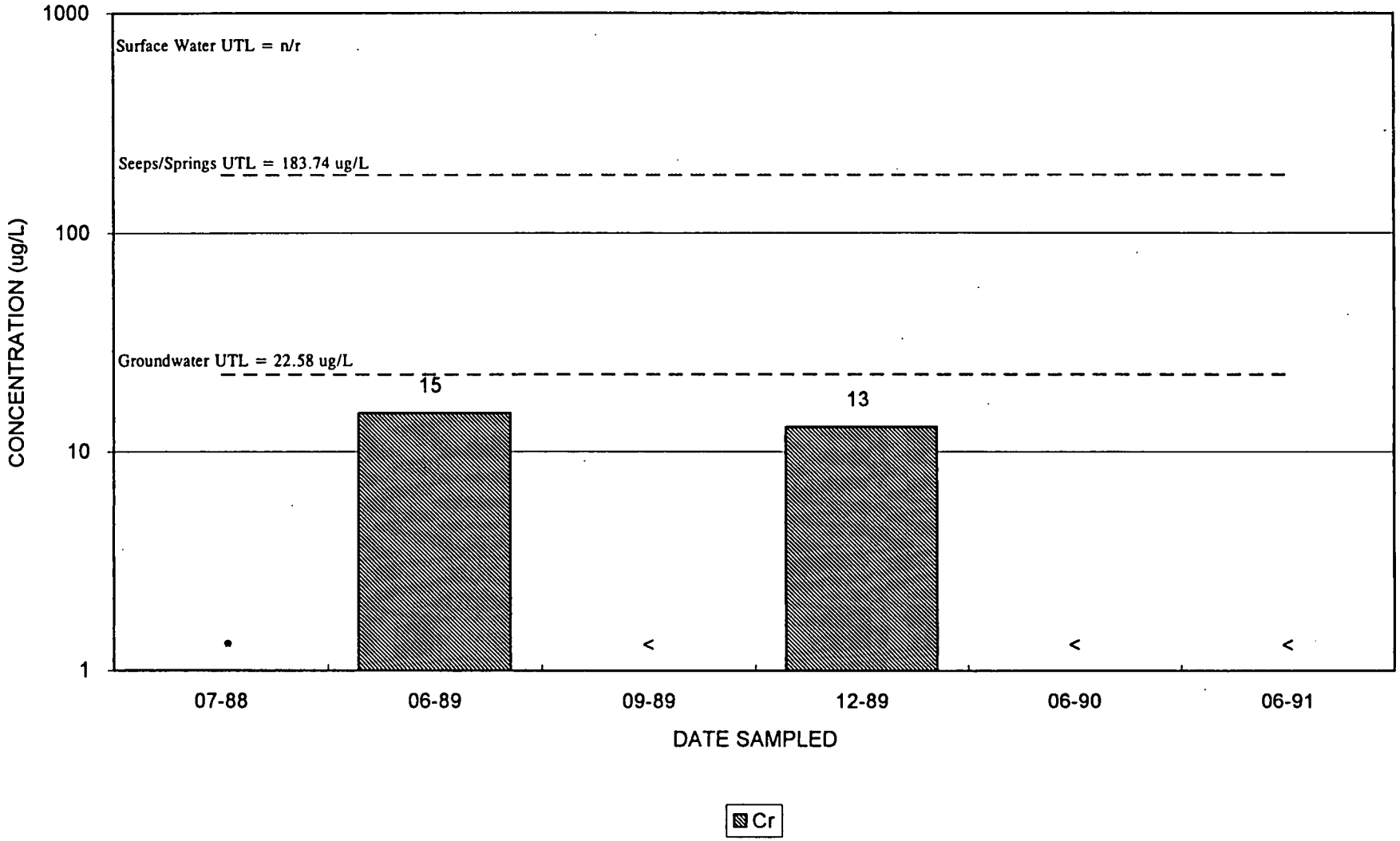
SAMPLE STATION BS707-2
Metals by ICP - Cadmium



A:\METGRPH.XLS\CPBS707-2.CD

FIGURE G-62

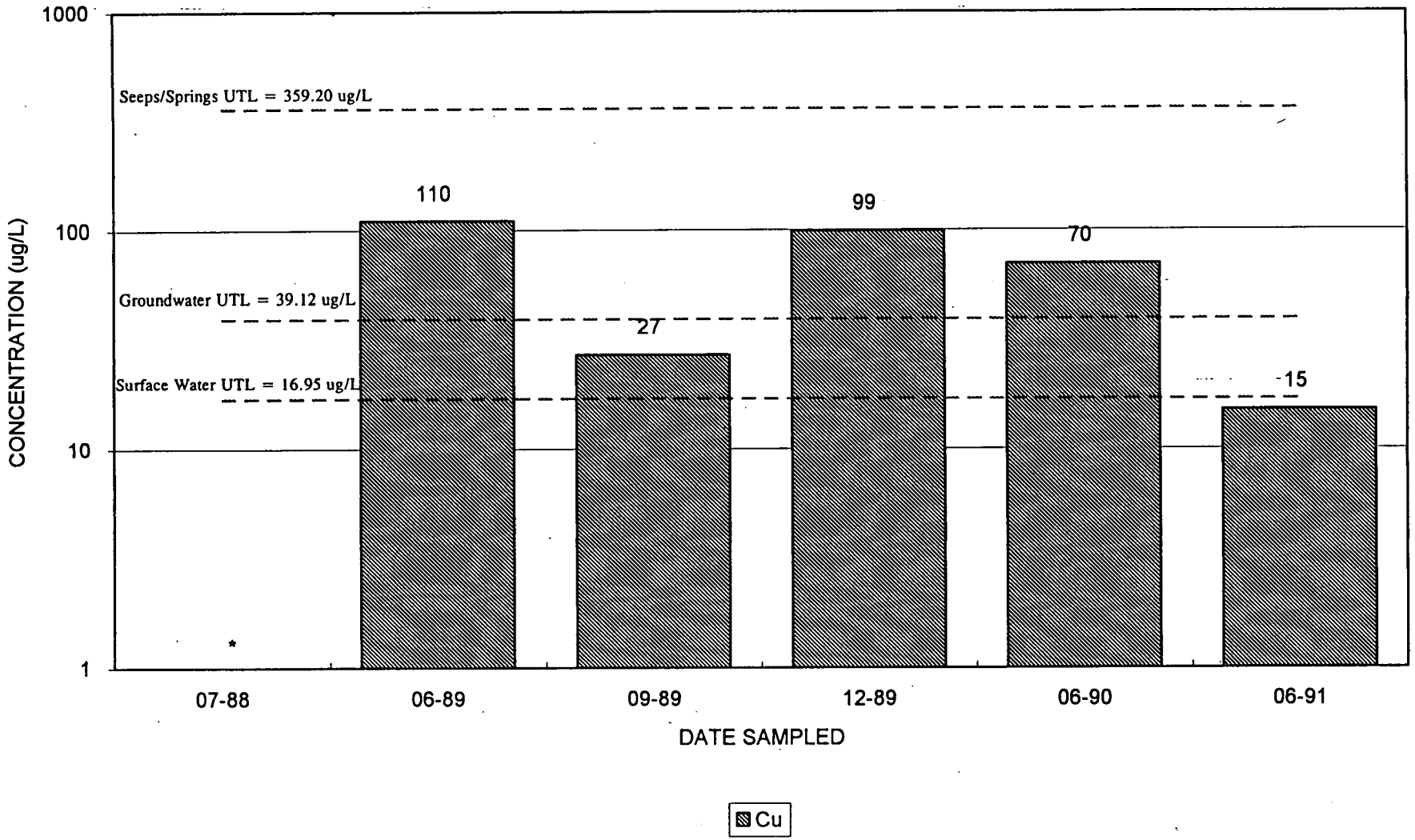
SAMPLE STATION BS707-2
Metals by ICP - Chromium



A:\METGRPH.XLS\ICPBS707-2.CR

FIGURE G-63

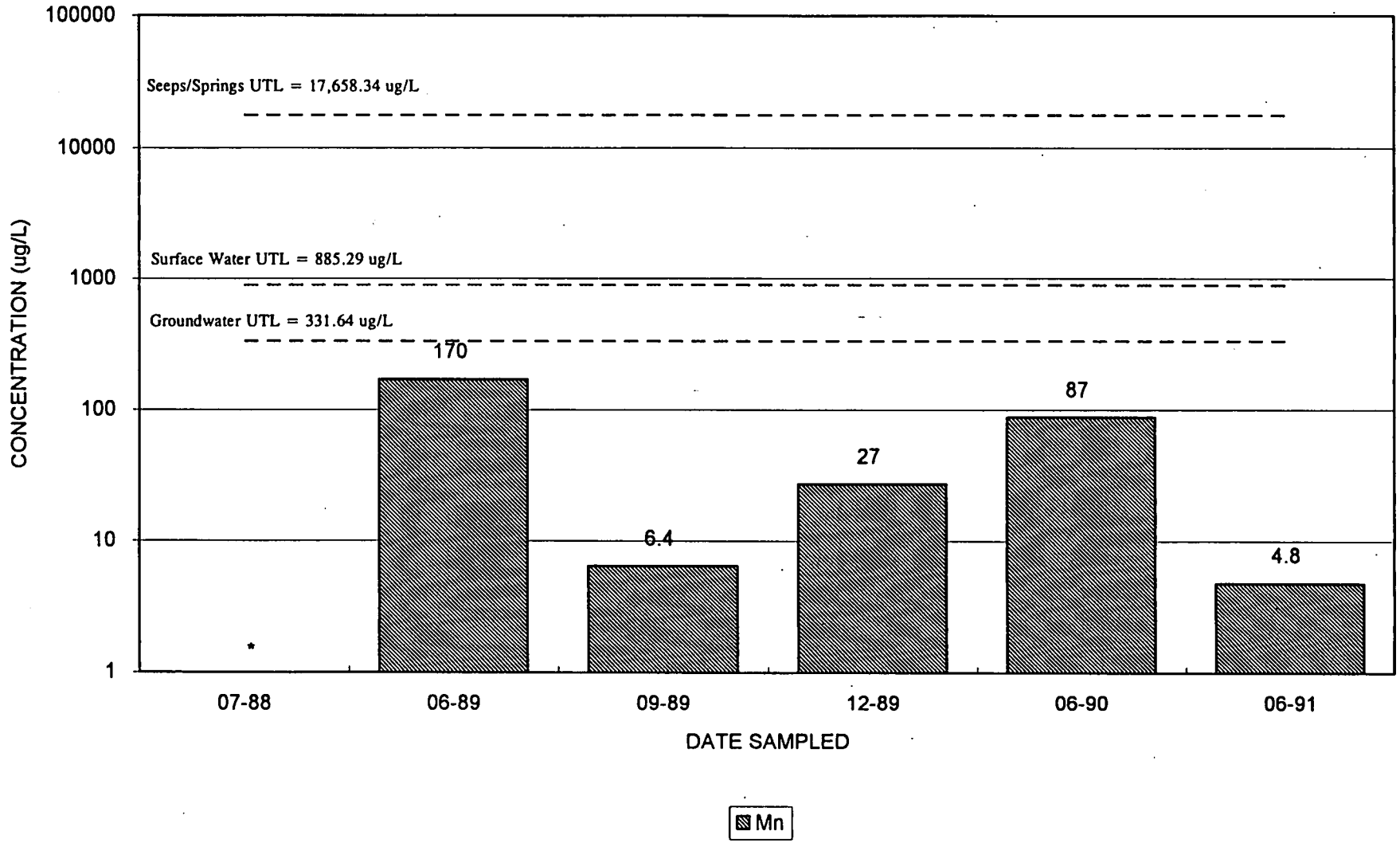
SAMPLE STATION BS707-2
Metals by ICP - Copper



A:\METGRPH.XLS\ICPBS707-2.CU

FIGURE G-64

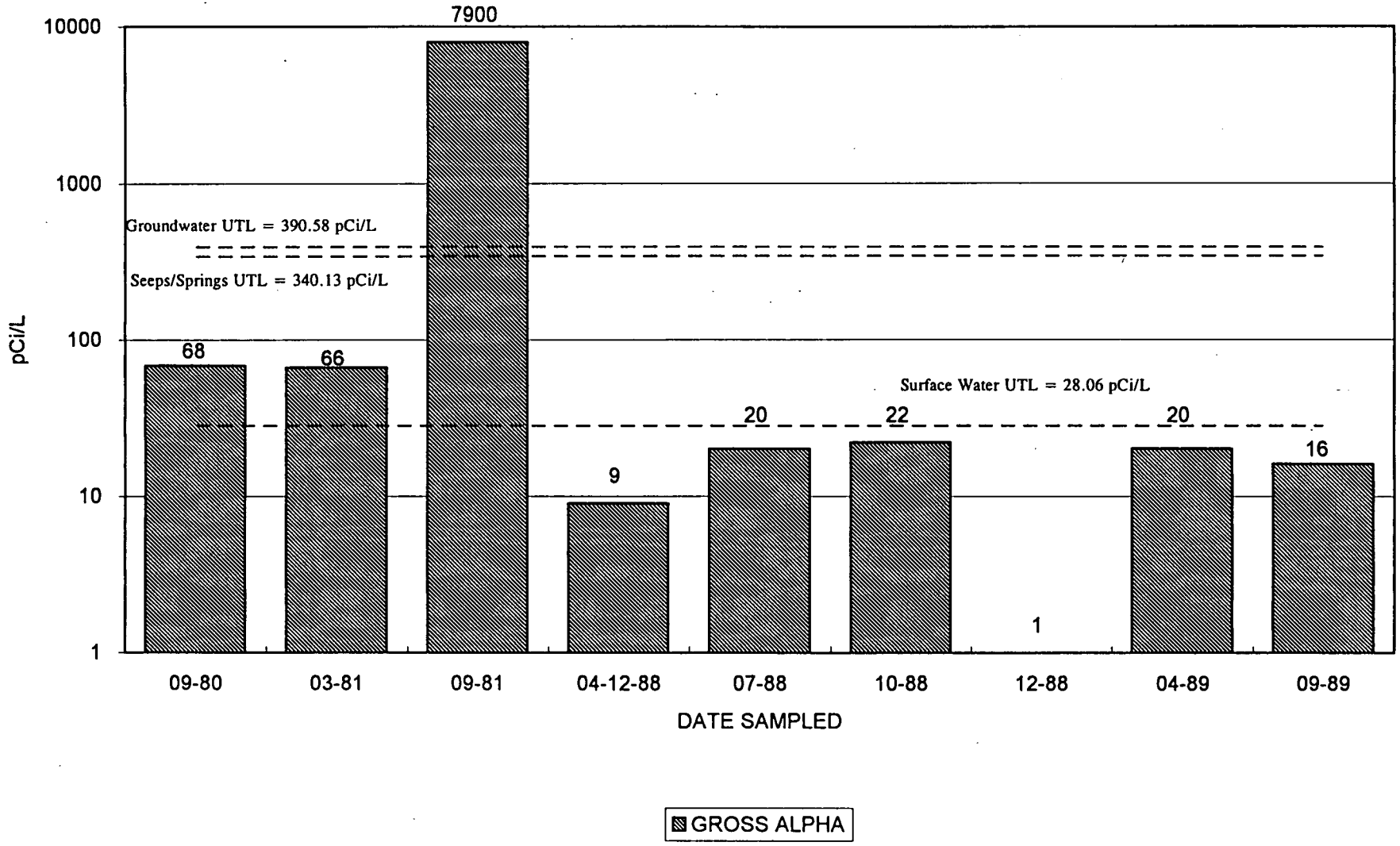
SAMPLE STATION BS707-2
Metals by ICP - Manganese



A:\METGRPH.XLS\ICPBS707-2.MN

FIGURE G-65

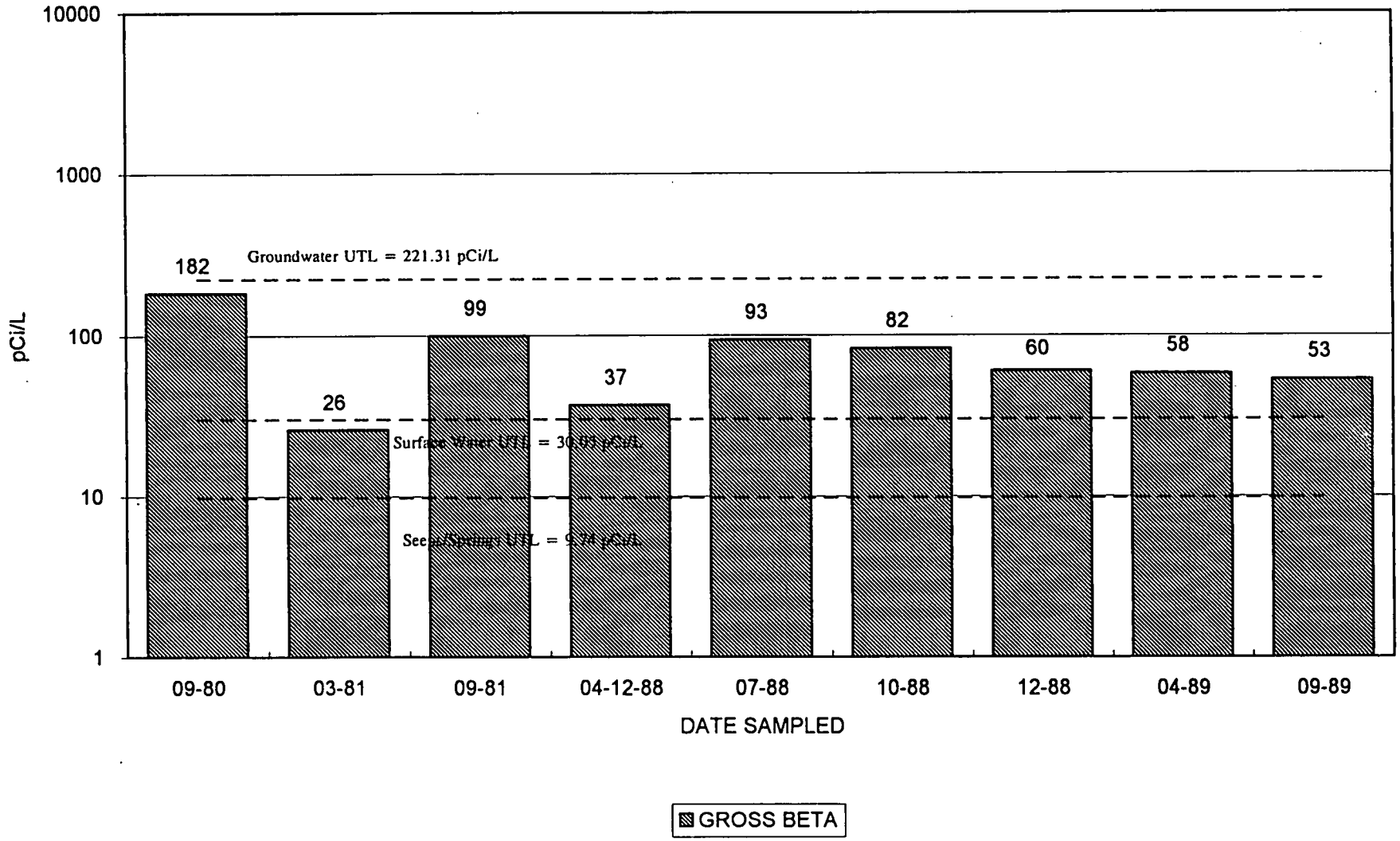
SAMPLE STATION BS707-3
GROSS ALPHA



A:\METGRPH2.XLS\ABBS707-3.A

FIGURE G-66

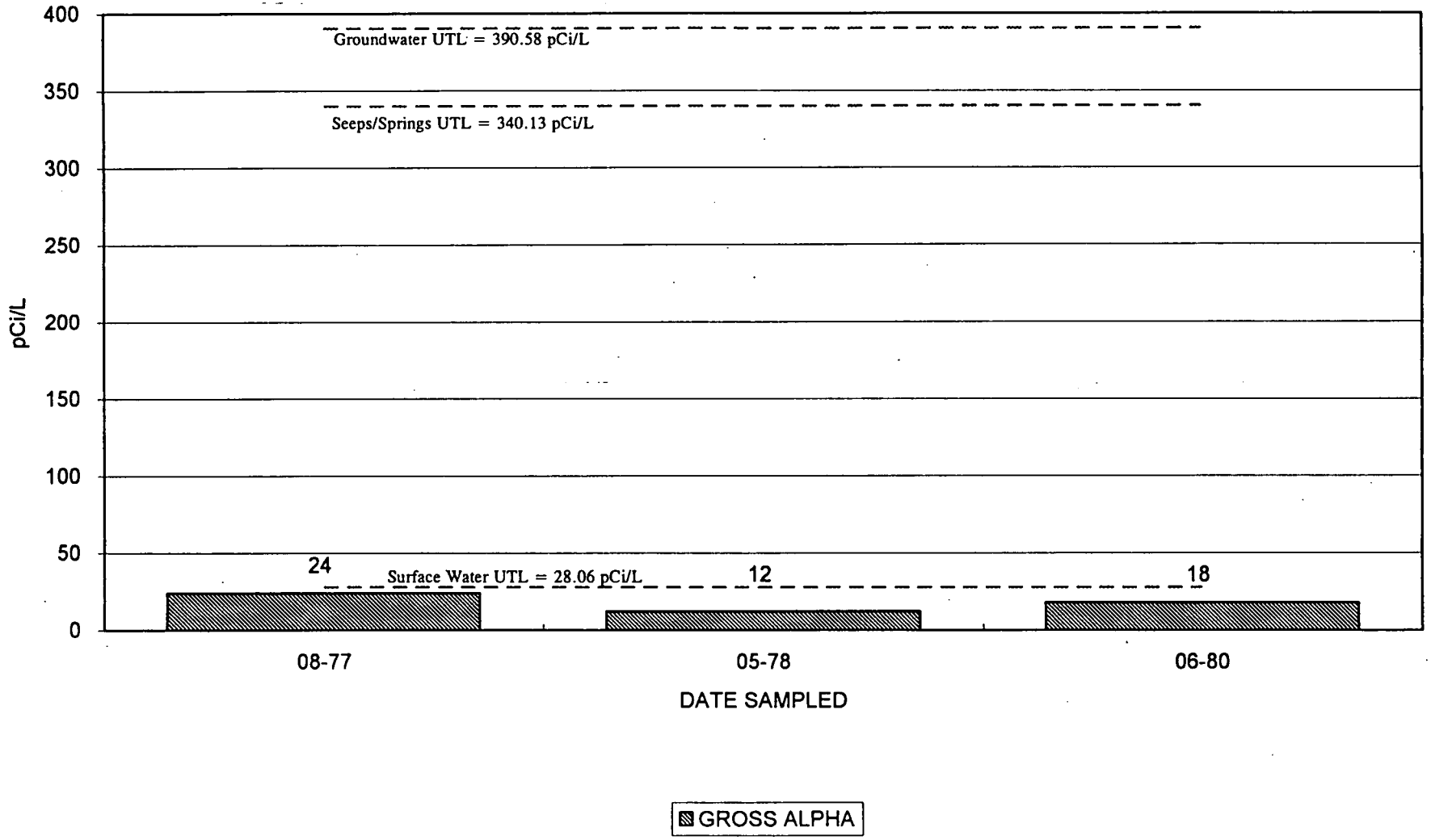
SAMPLE STATION BS707-3
GROSS BETA



A:\METGRPH2.XLS\ABBS707-3.B

FIGURE G-67

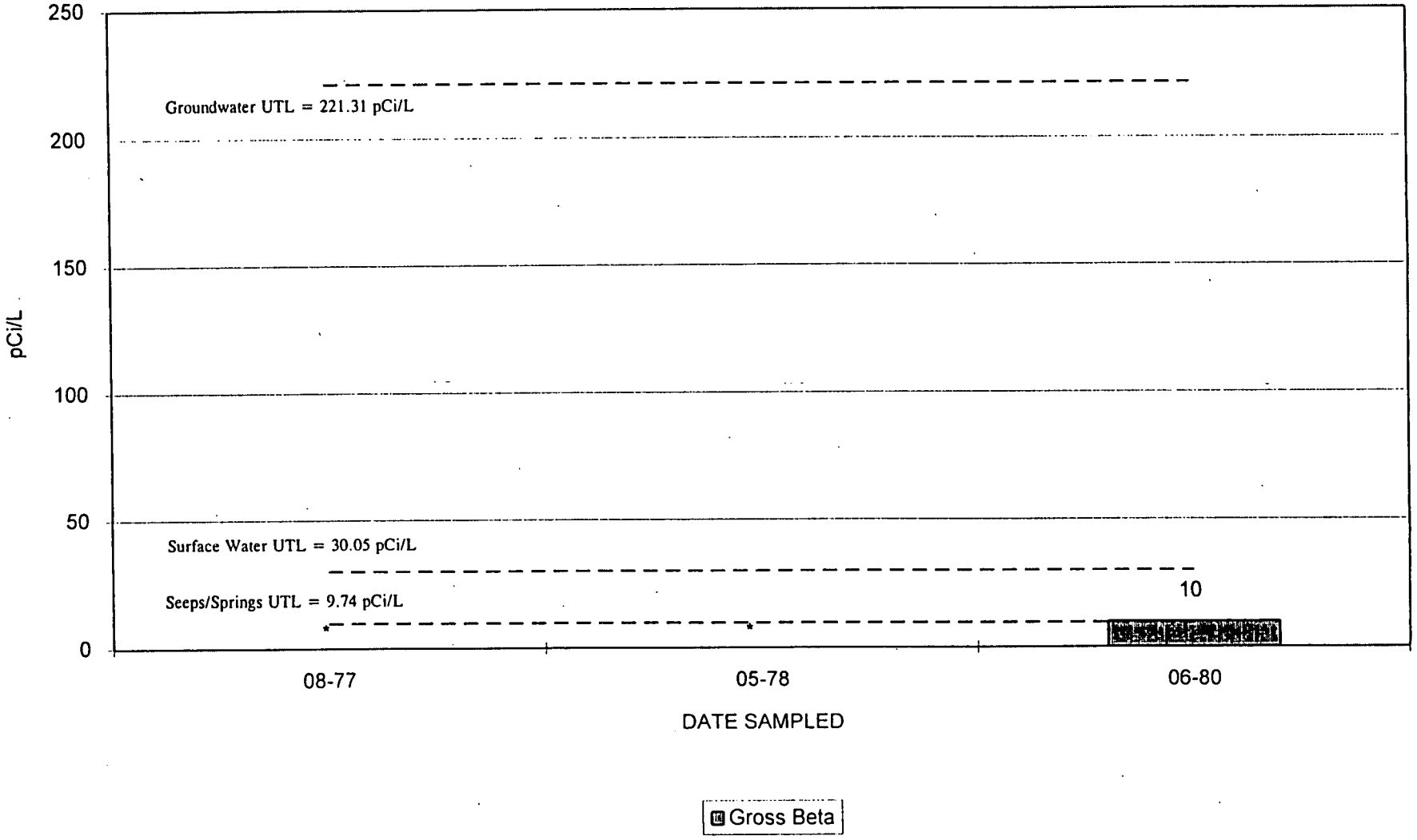
SAMPLE STATION BS771-2
GROSS ALPHA



A:\METGRPH2.XLS\ABFD771-2.A

FIGURE G-68

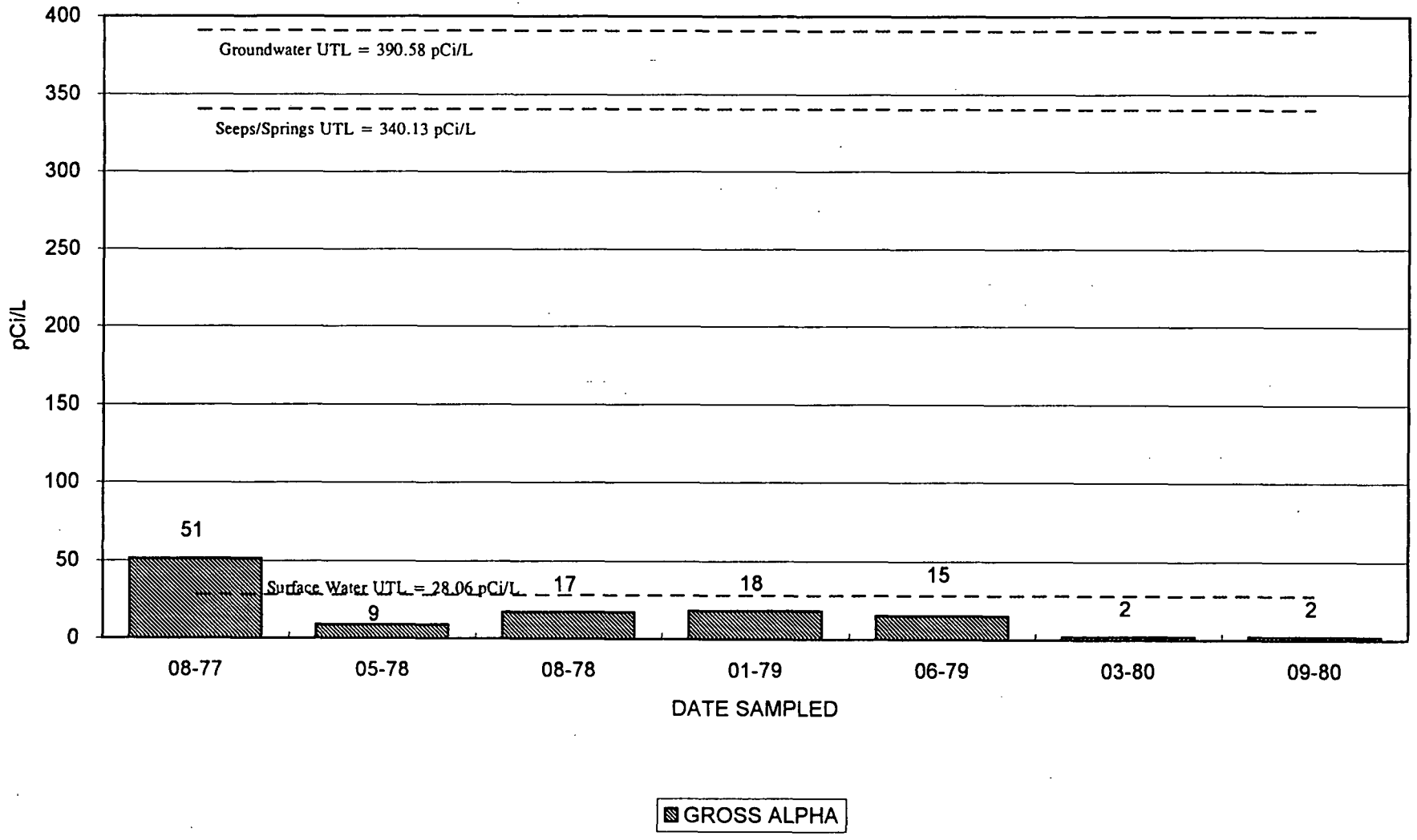
SAMPLE STATION FD771-2
GROSS BETA



A:\METGRPH.XLS\ABFD771-2.B

FIGURE G-69

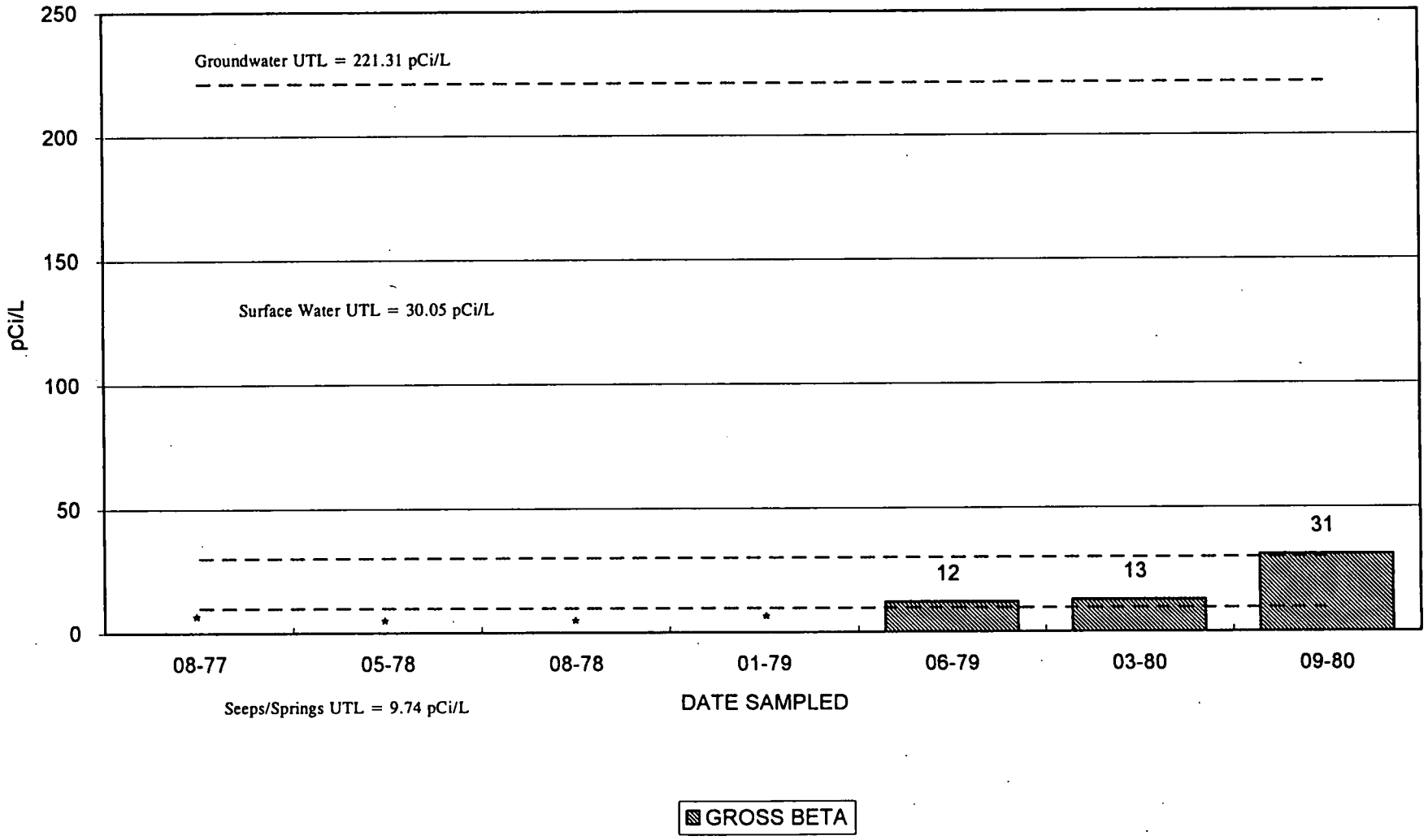
SAMPLE STATION BS771-4
GROSS ALPHA



A:\METGRPH2.XLS\ABFD771-4.A

FIGURE G-70

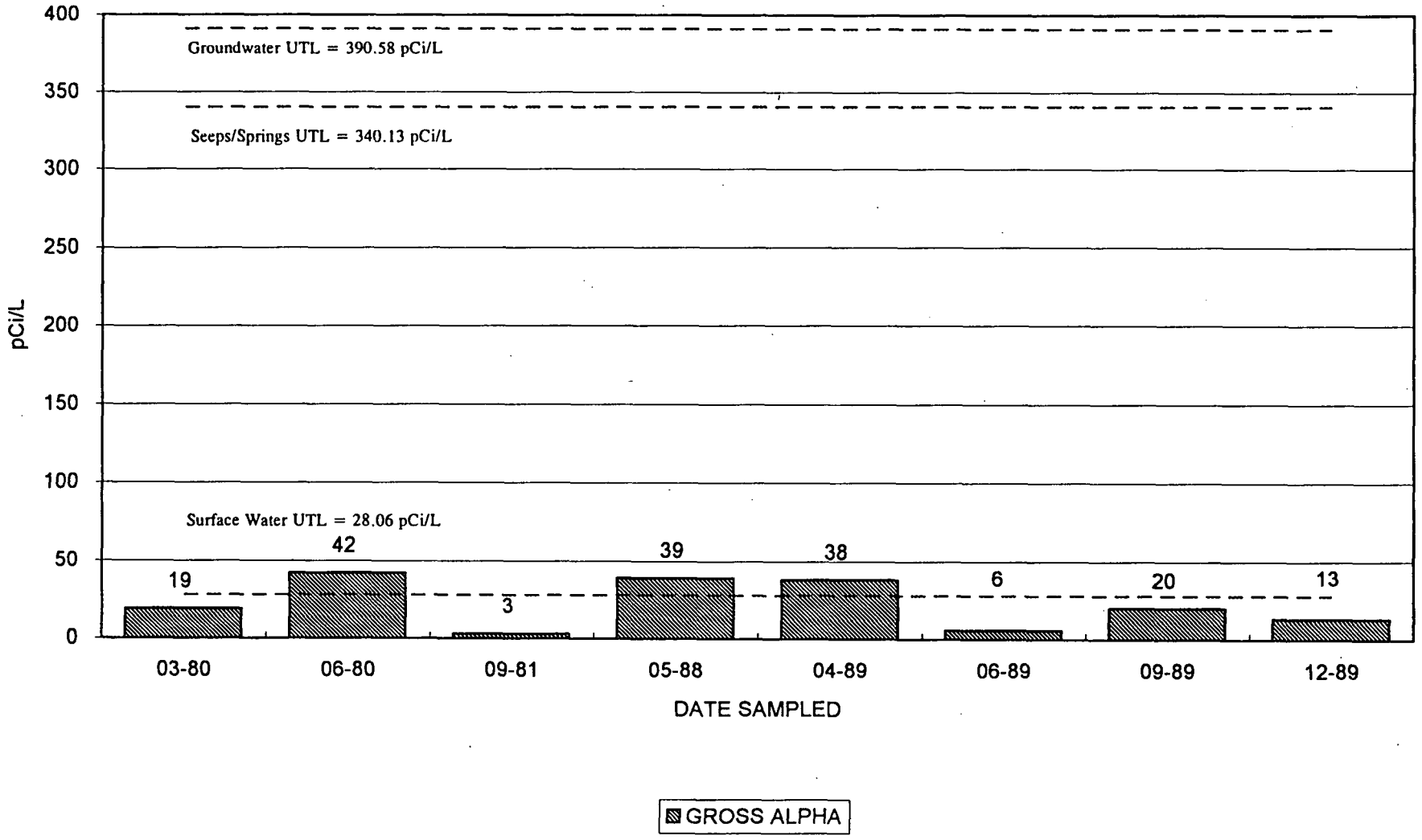
SAMPLE STATION BS771-4
GROSS BETA



A:\METCRPH2.XLS\ABFD771-4.B

FIGURE G-71

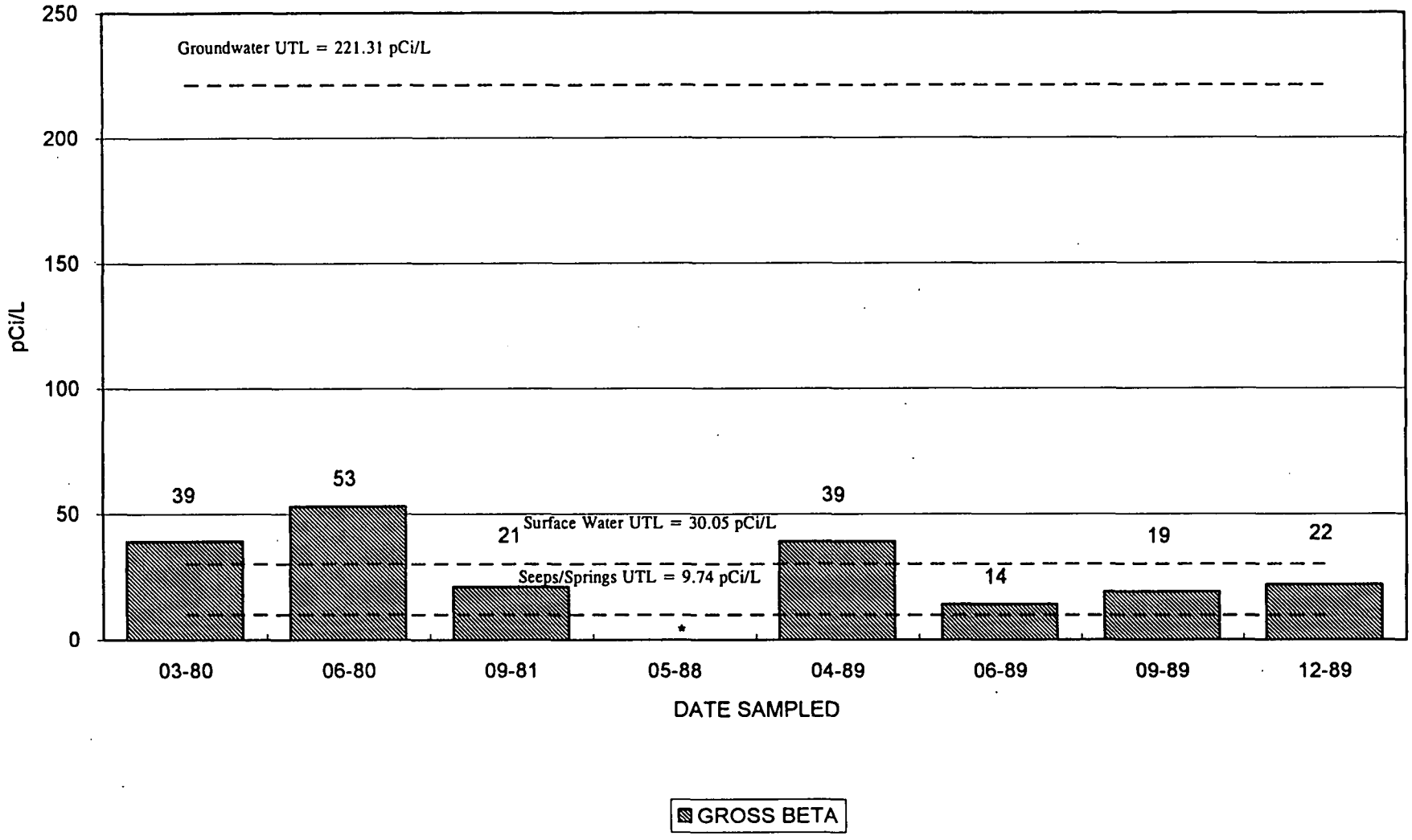
SAMPLE STATION FD774-1
GROSS ALPHA



A:\METGRPH2.XLS\ABFD774-1.A

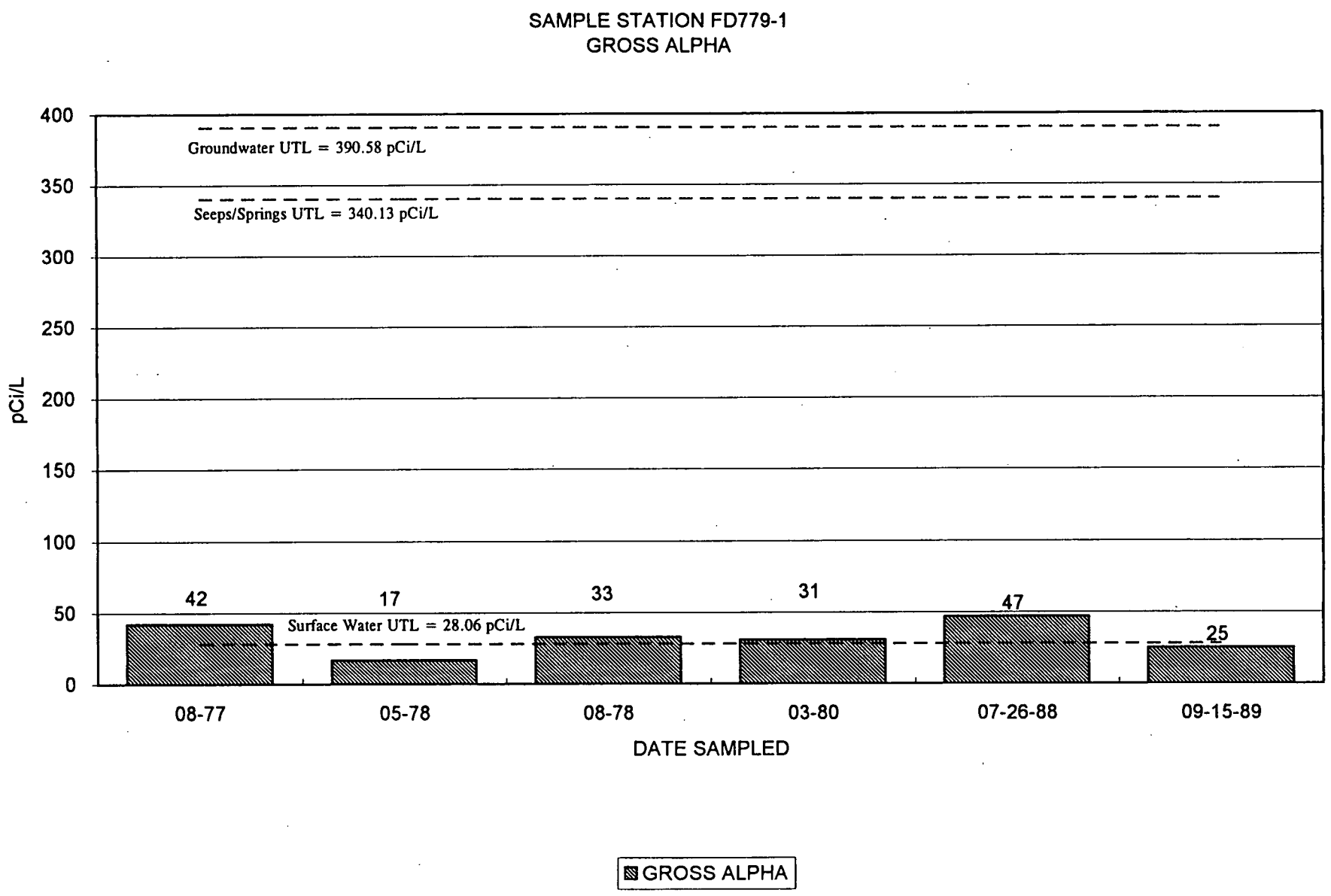
FIGURE G-72

SAMPLE STATION FD774-1
GROSS BETA



A:\METCRPH2.XLS\ABFD774-1.B

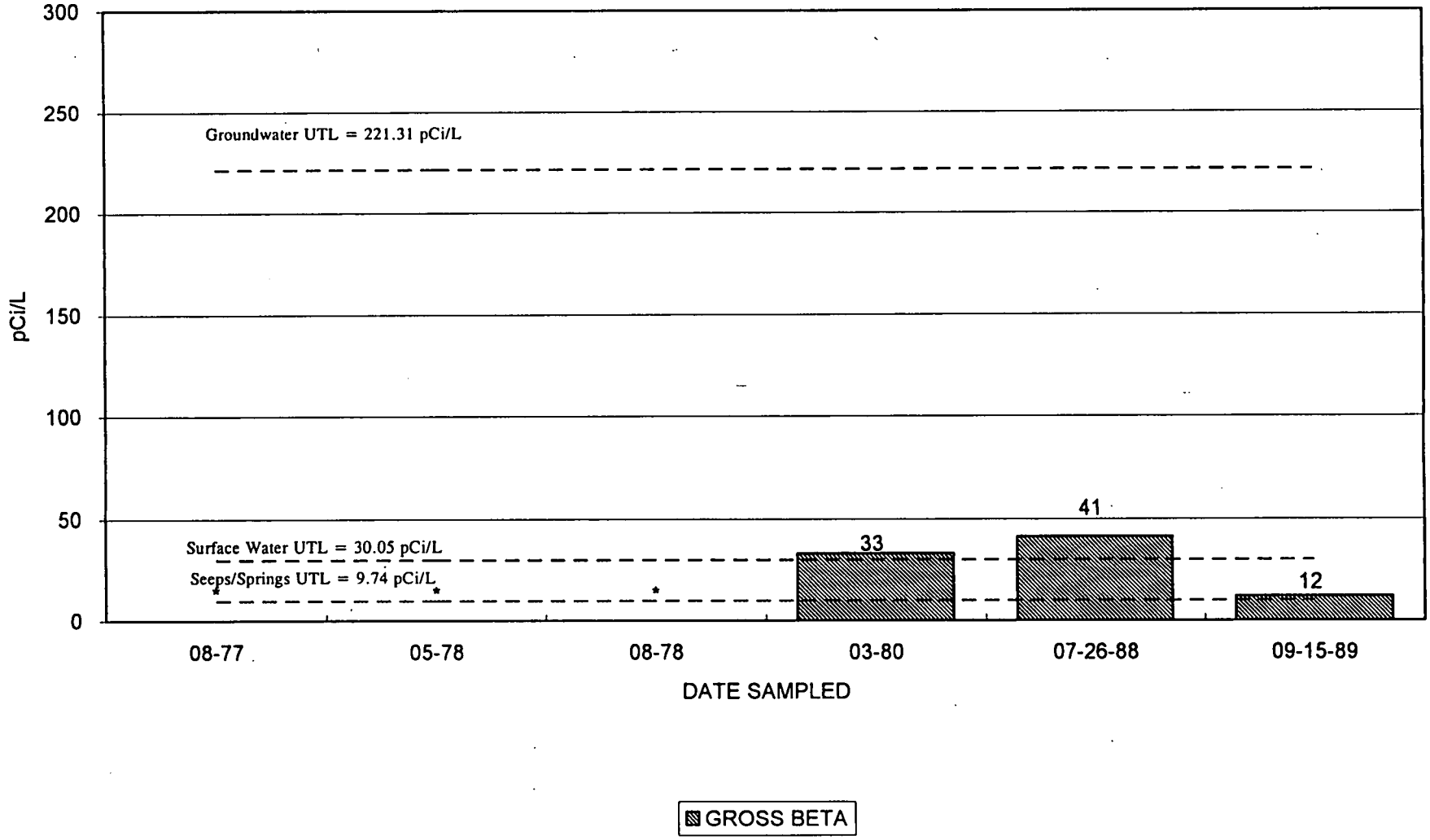
FIGURE G-73



A:\METGRPH2.XLS\ABFD779-1.A

FIGURE G-74

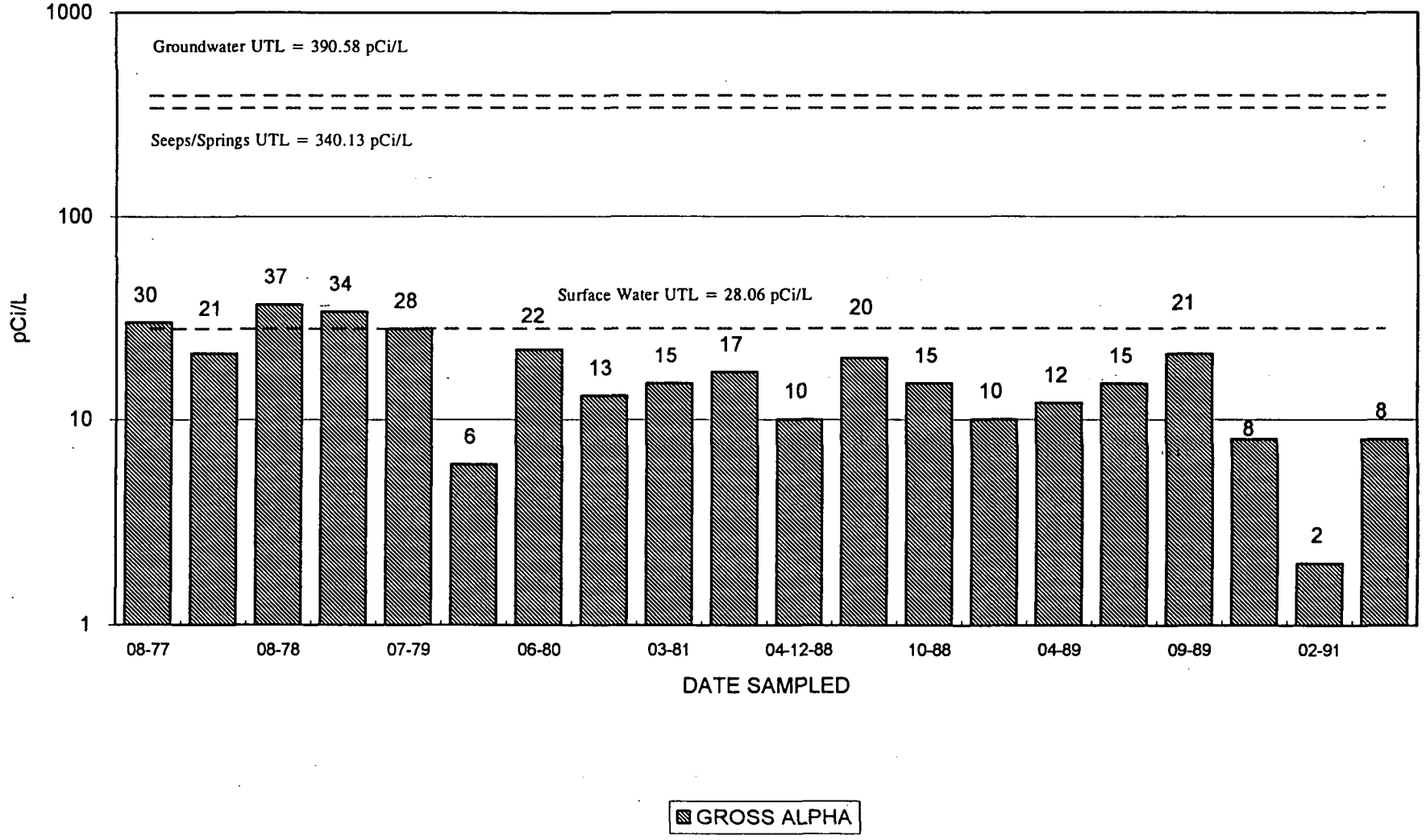
SAMPLE STATION FD779-1
GROSS BETA



A:\METOBPH2.XLS\ABFD779-1.B

FIGURE G-75

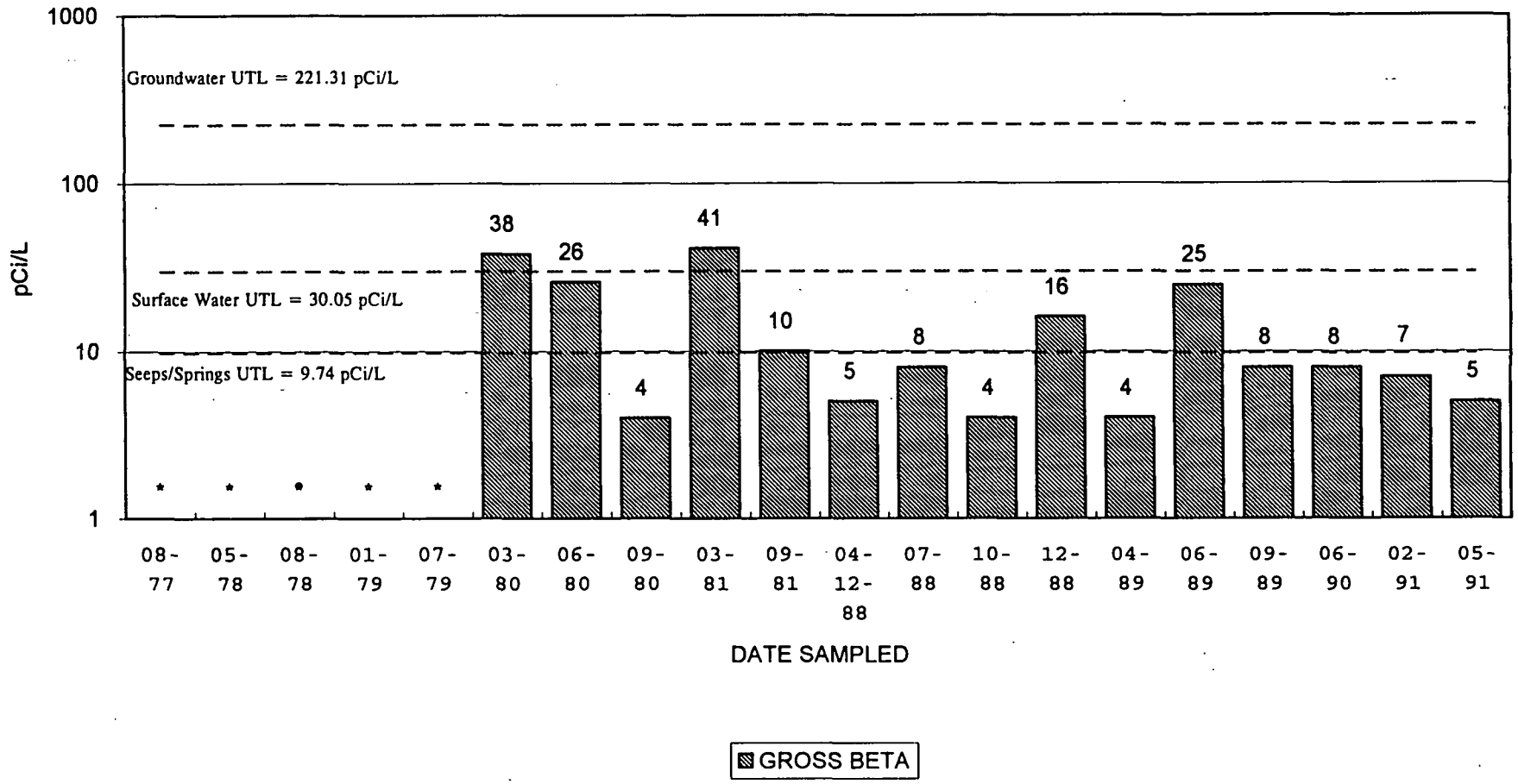
SAMPLE STATION FD881-1
GROSS ALPHA



A:\METGRPH2.XLS\ABFD881-1.A

FIGURE G-76

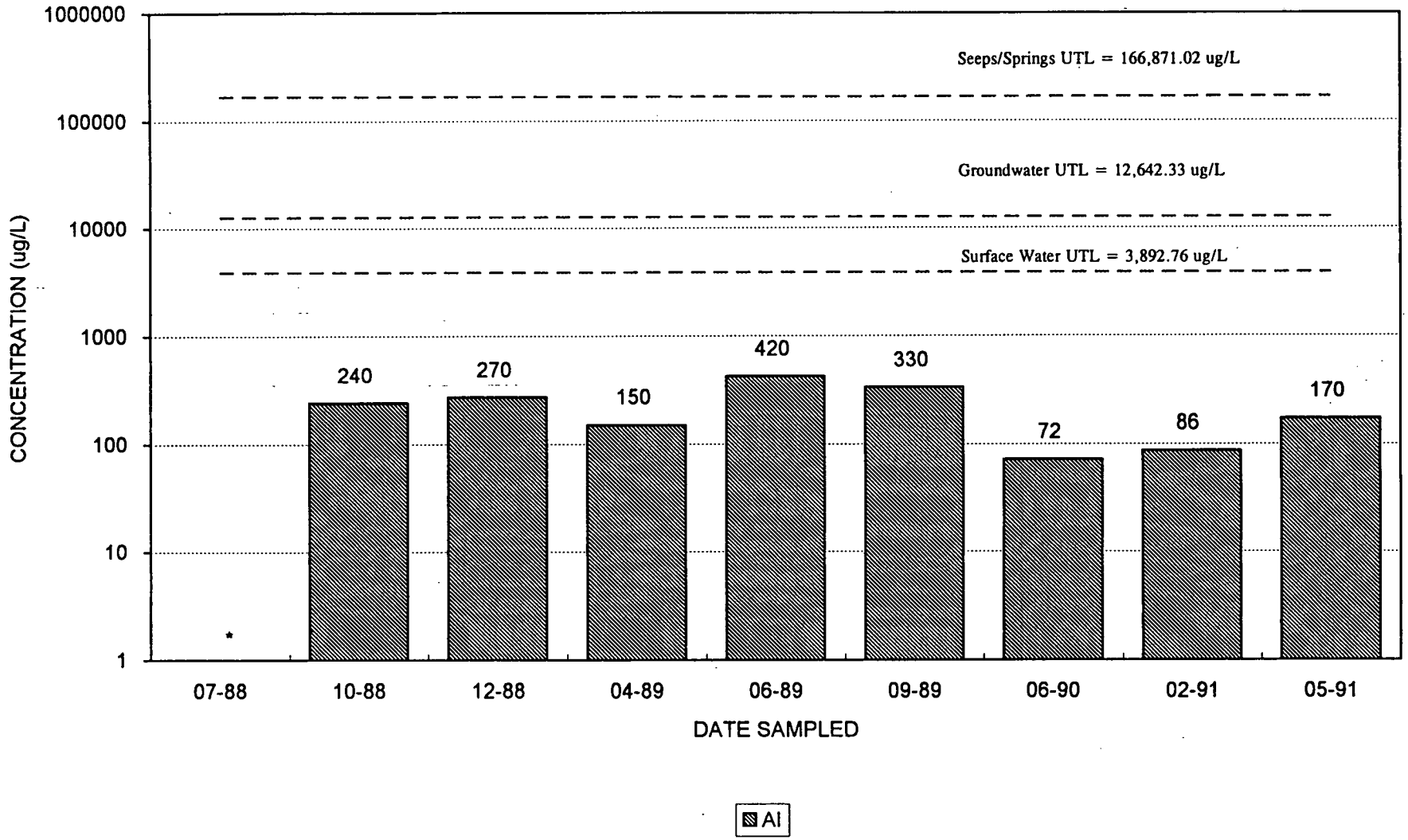
SAMPLE STATION FD881-1
GROSS BETA



A:\METGRPH2.XLS\ABFD881-1.B

FIGURE G-77

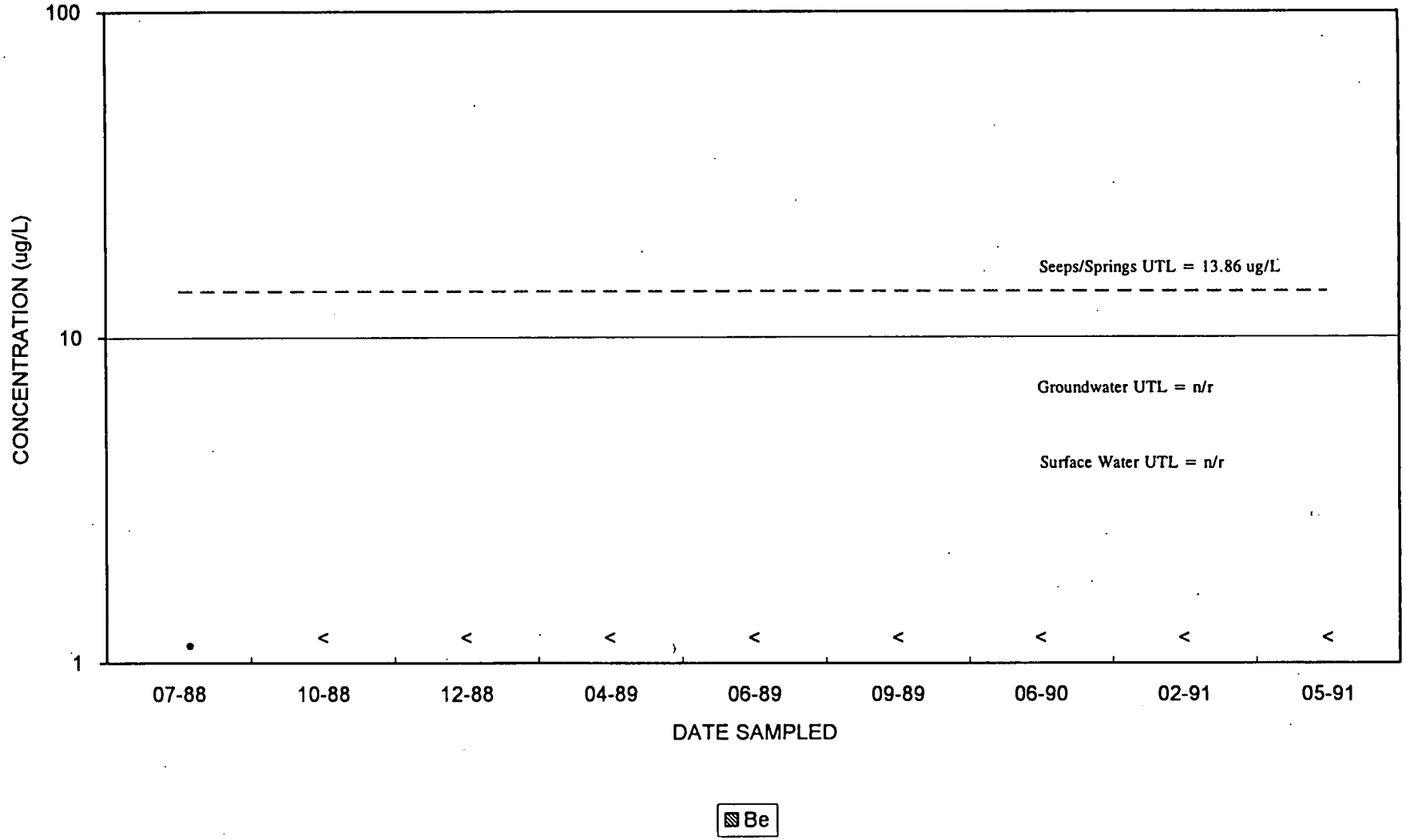
SAMPLE STATION FD881-1
Metals by ICP - Aluminum



A:\METGRPH.XLS\ICPFD881-1.AL

FIGURE G-78

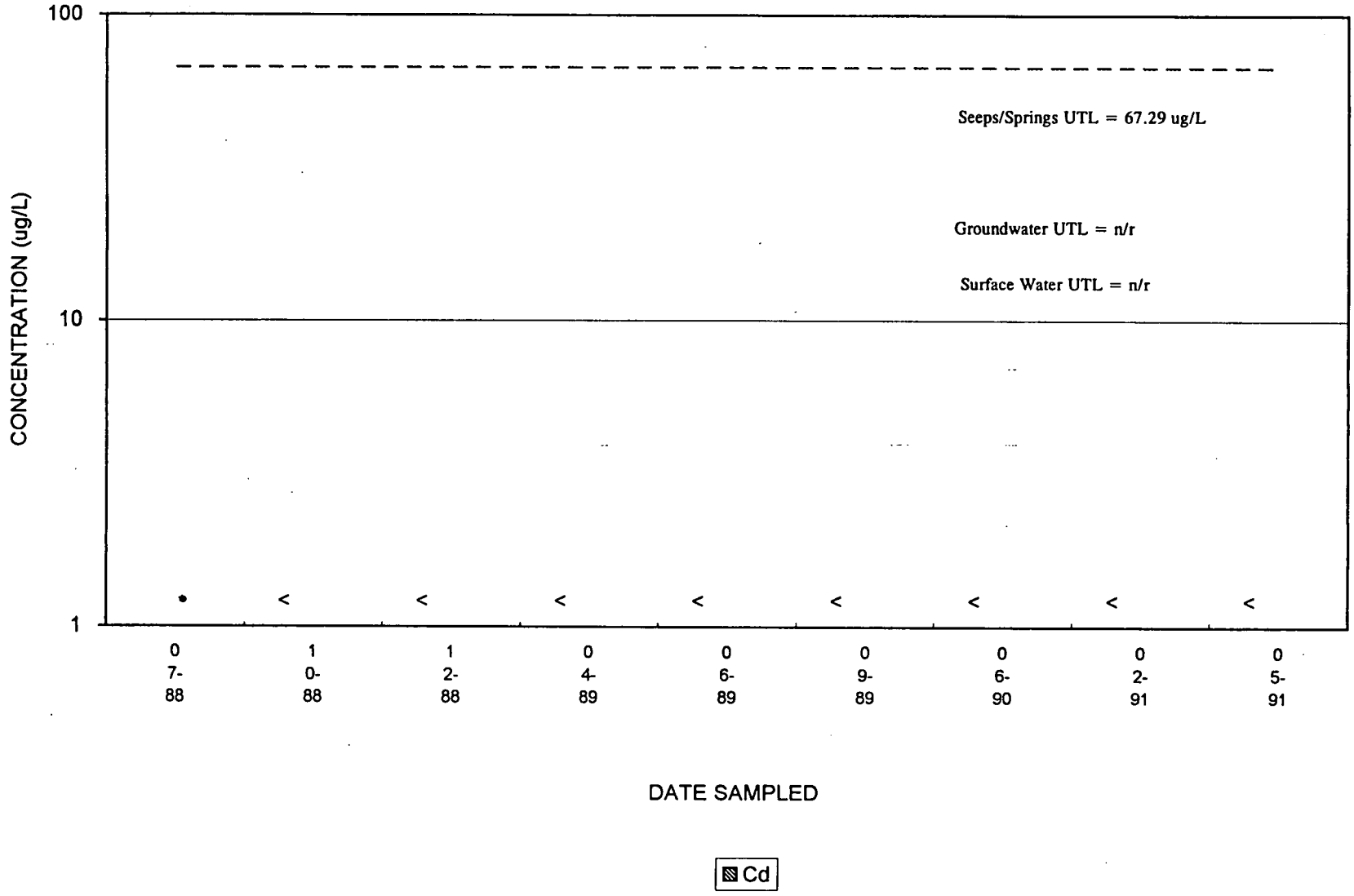
SAMPLE STATION FD881-1
Metals by ICP - Beryllium



A:\METGRPH.XLS\ICPFD881-1.BE

FIGURE G-79

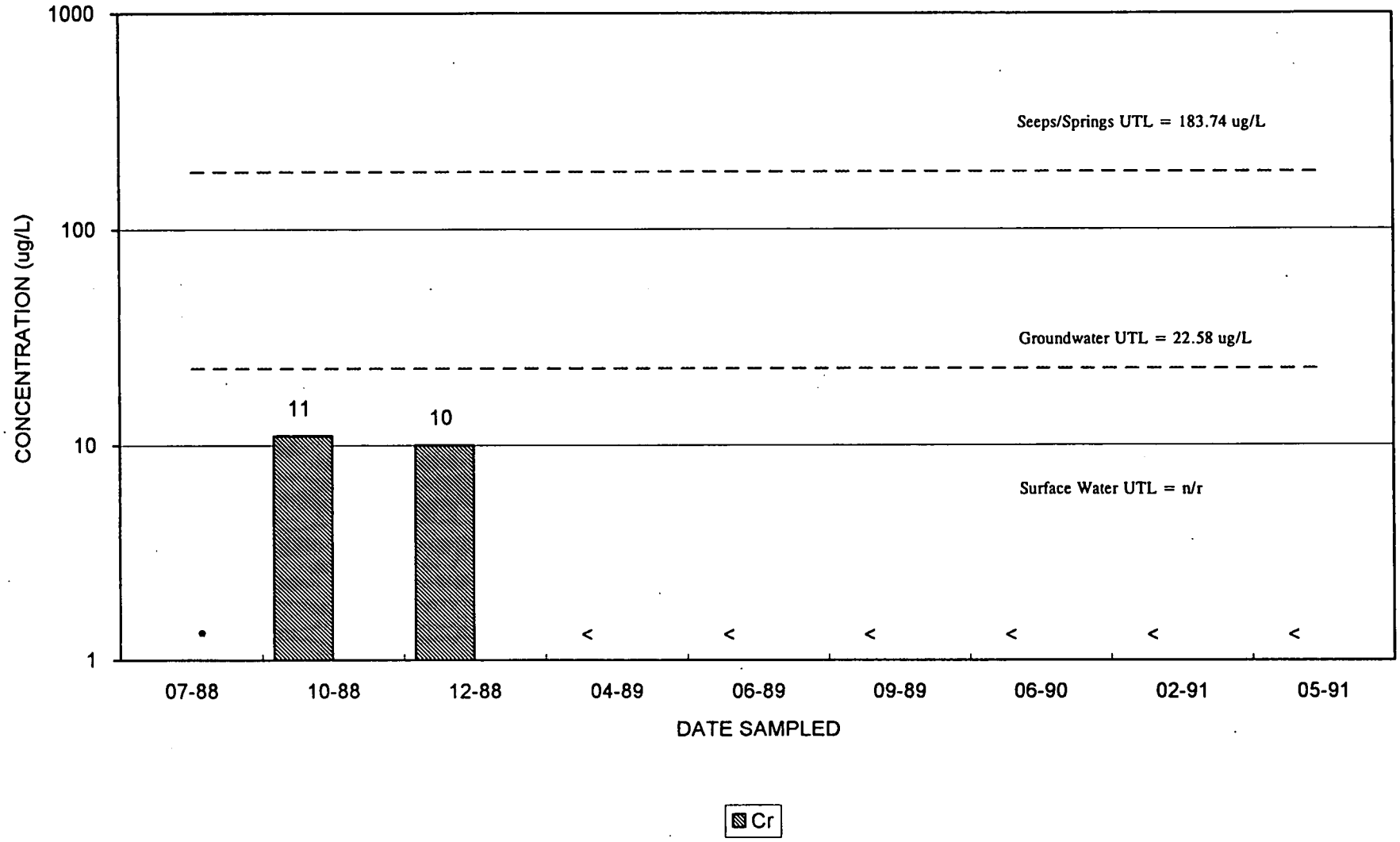
SAMPLE STATION FD881-1
Metals by ICP - Cadmium



A:\METGRPH.XLS\ICPFD881-1.CD

FIGURE G-80

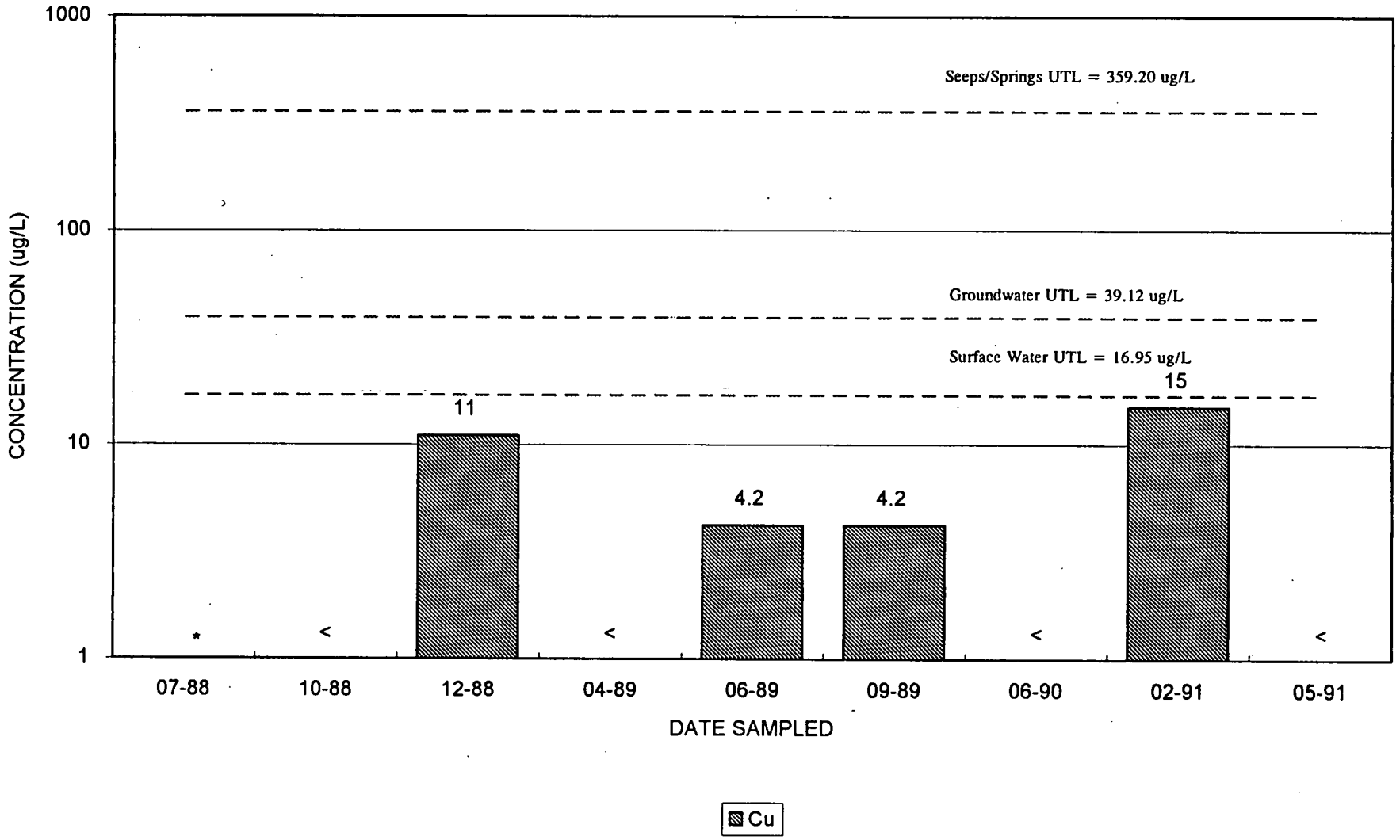
SAMPLE STATION FD881-1
Metals by ICP - Chromium



A:\METCRPH.XLS\ICPFD881-1.CR

FIGURE G-81

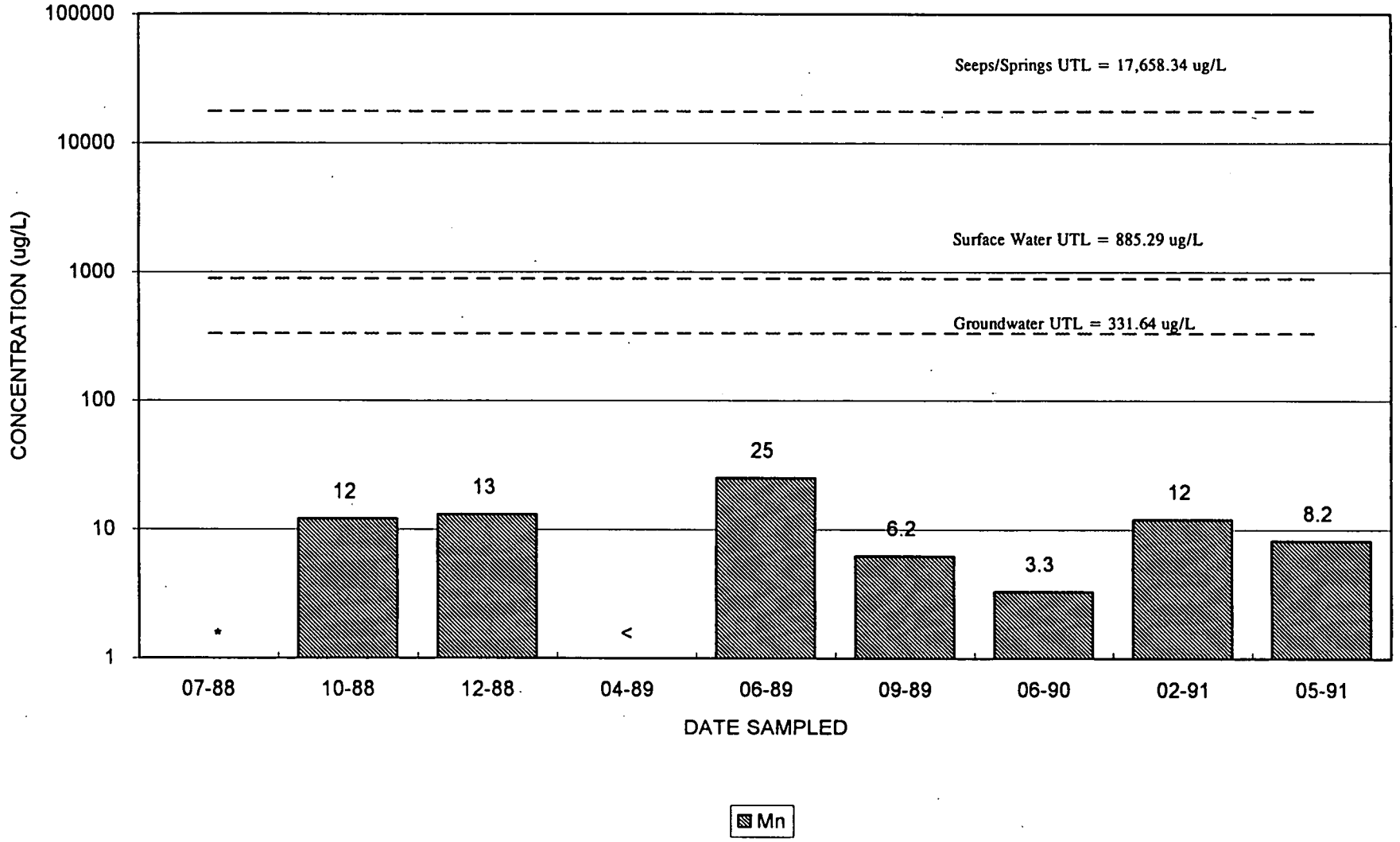
SAMPLE STATION FD881-1
Metals by ICP - Copper



A:\METGRPH.XLS\CPFD881-1.CU

FIGURE G-82

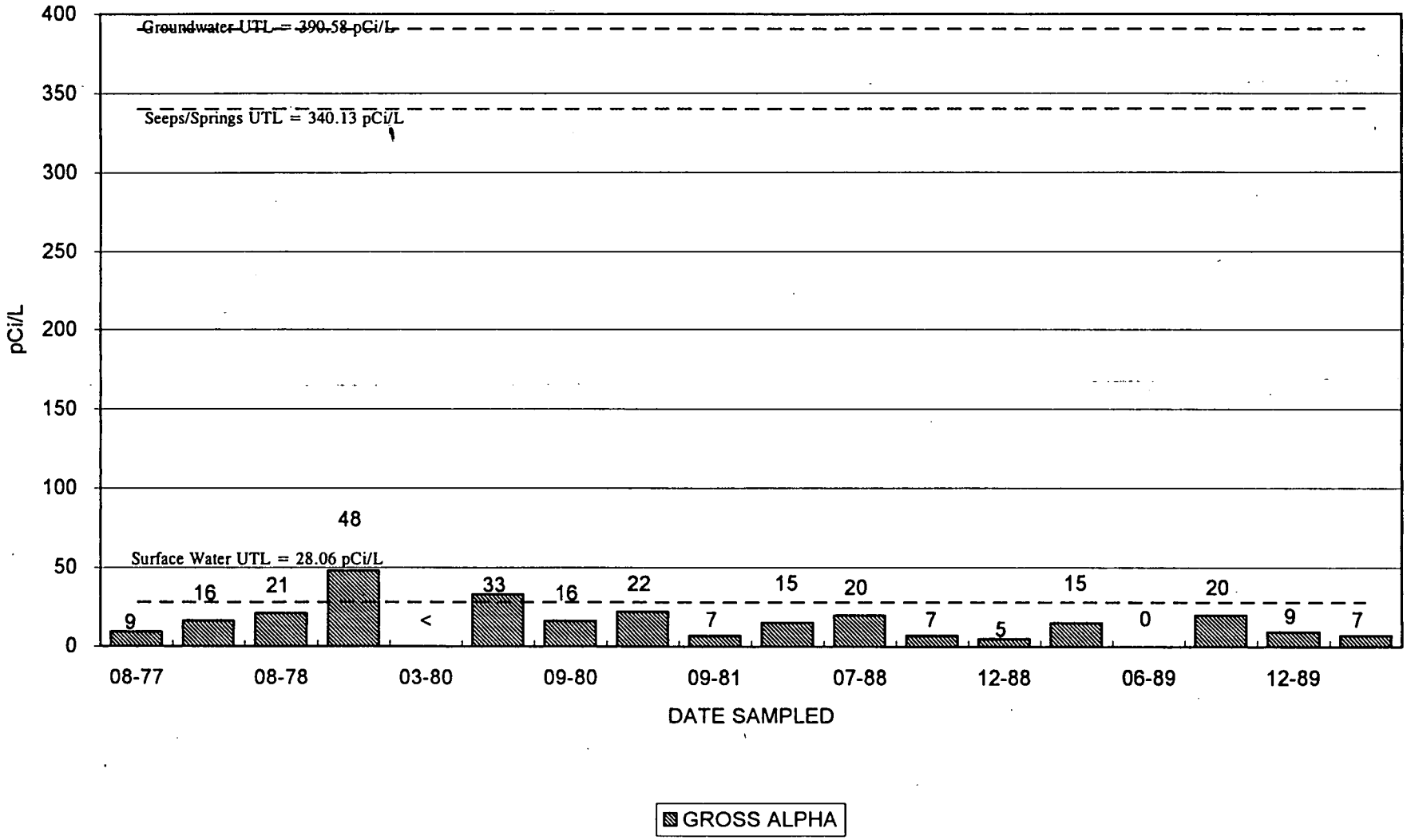
SAMPLE STATION FD881-1
Metals by ICP - Manganese



A:\METGRPH.XLS\ICPFD881-1.MN

FIGURE G-83

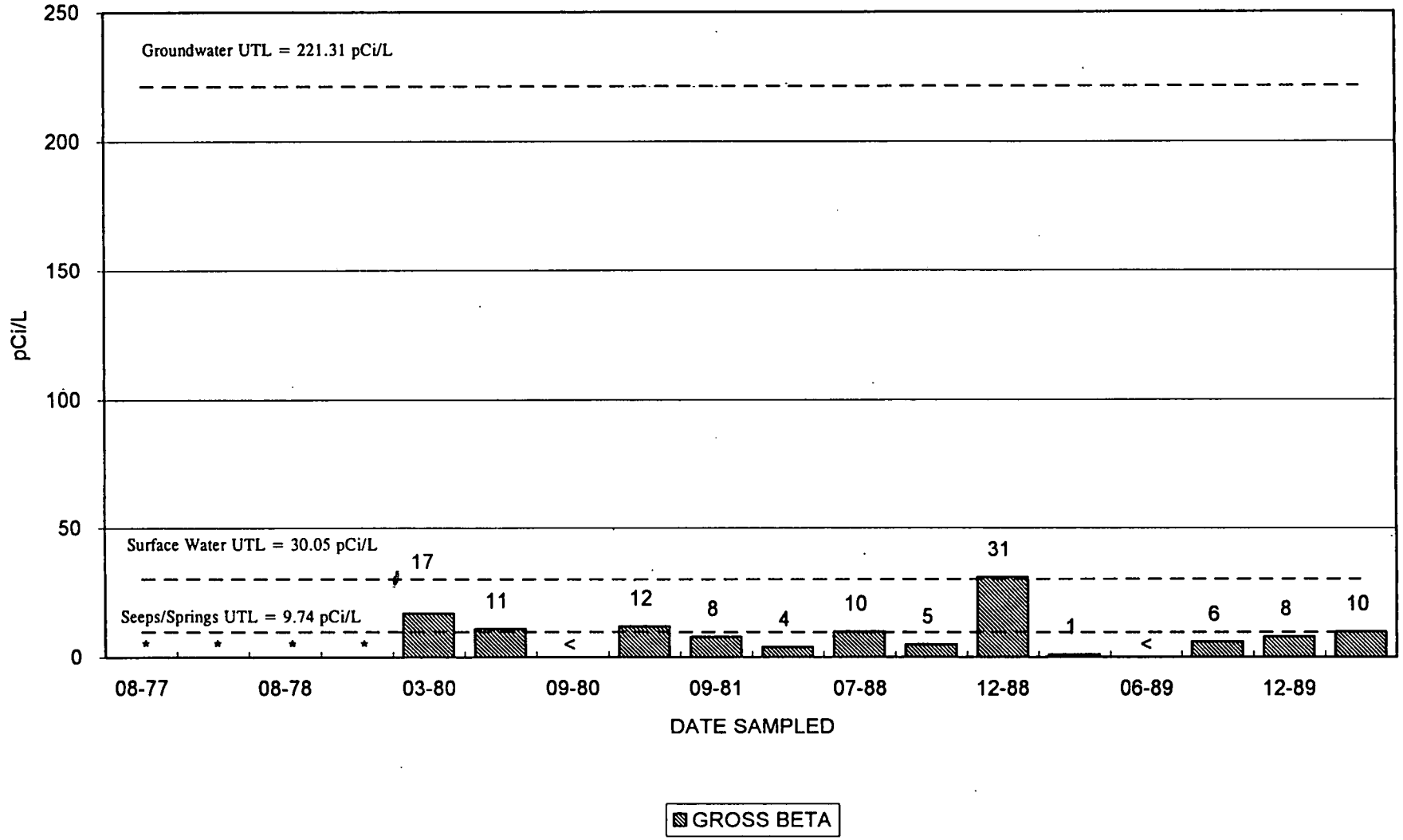
SAMPLE STATION BS881-3
GROSS ALPHA



A:\METGRPH2.XLS\ABBS881-3.A

FIGURE G-84

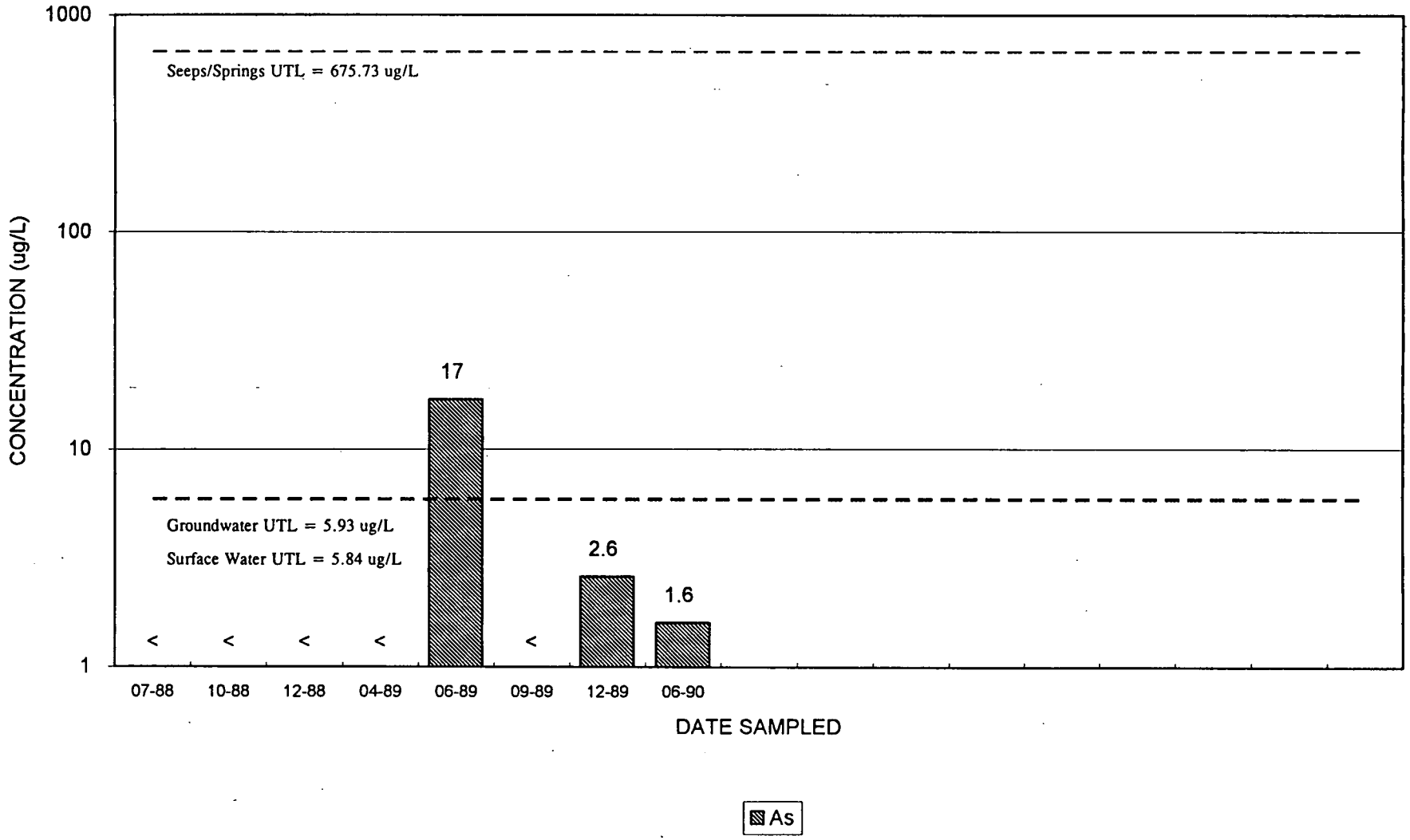
SAMPLE STATION BS881-3
GROSS BETA



A:\METGRPH.XLS\ABBS881-3.B

FIGURE G-85

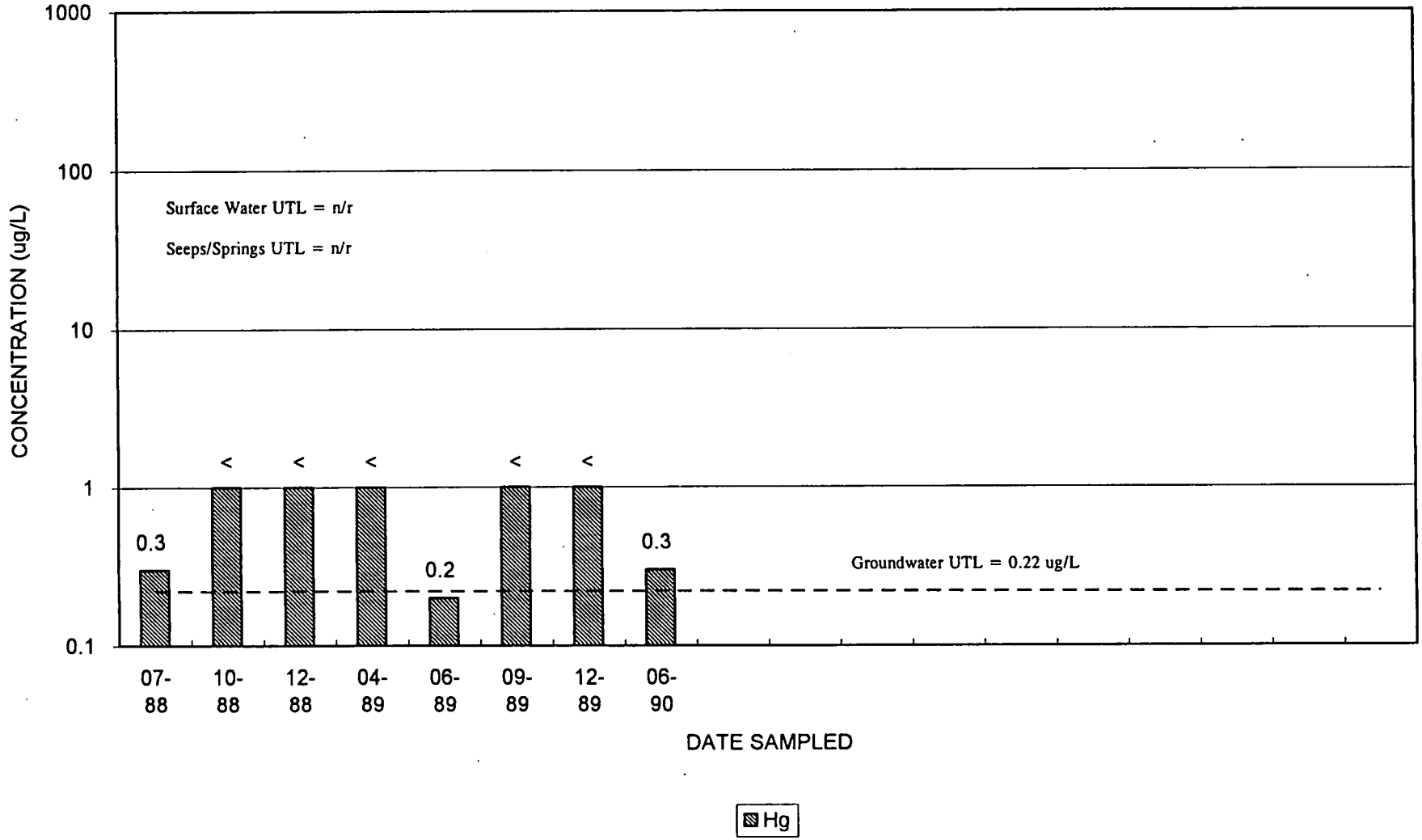
SAMPLE STATION BS881-3
Metals by Atomic Absorption - Arsenic



A:\METGRPH2.XLS\AABS881-3.AS

FIGURE G-86

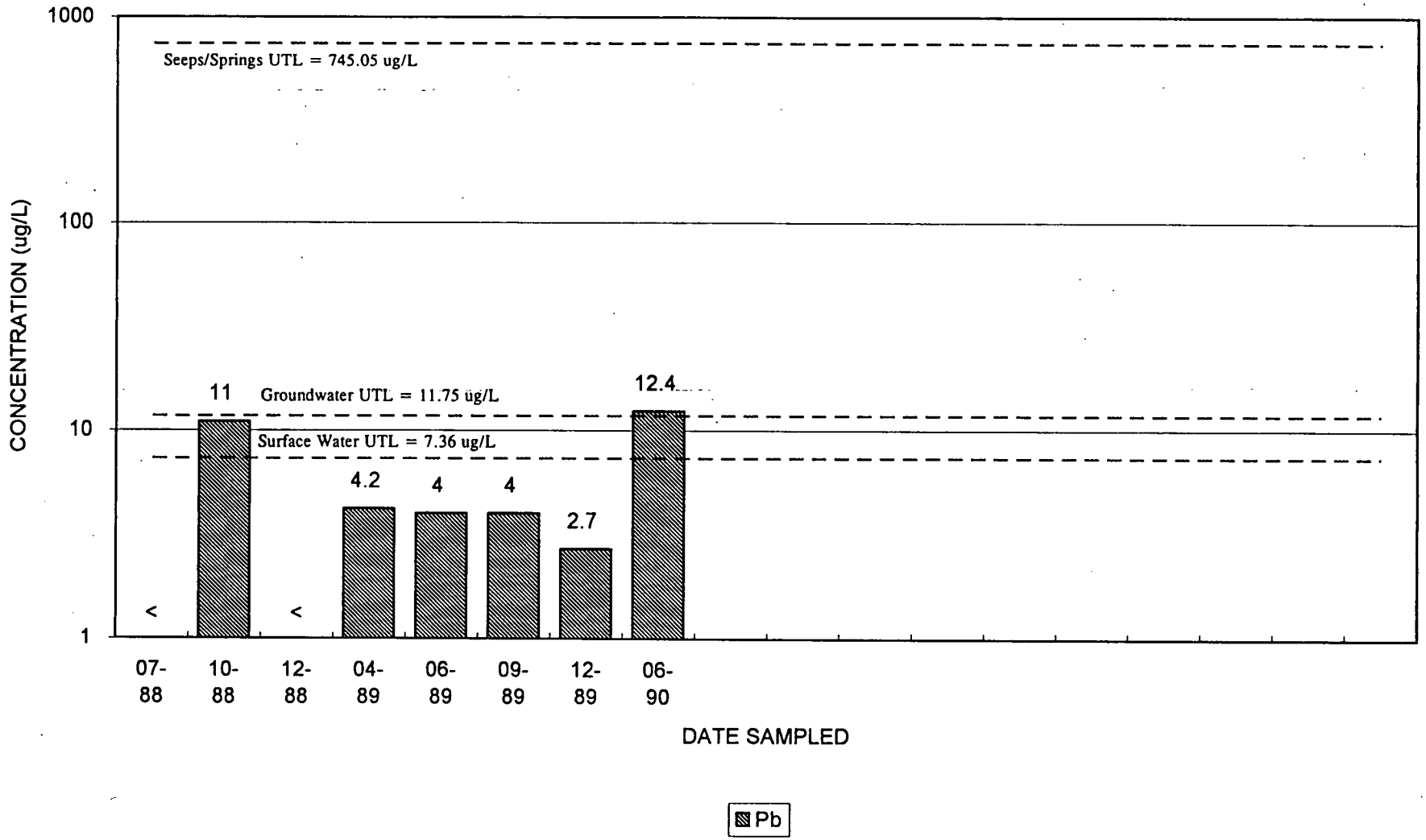
SAMPLE STATION BS881-3
Metals by Atomic Absorption - Mercury



A:\METGRPH2.XLS\AABS881-3.HG

FIGURE G-87

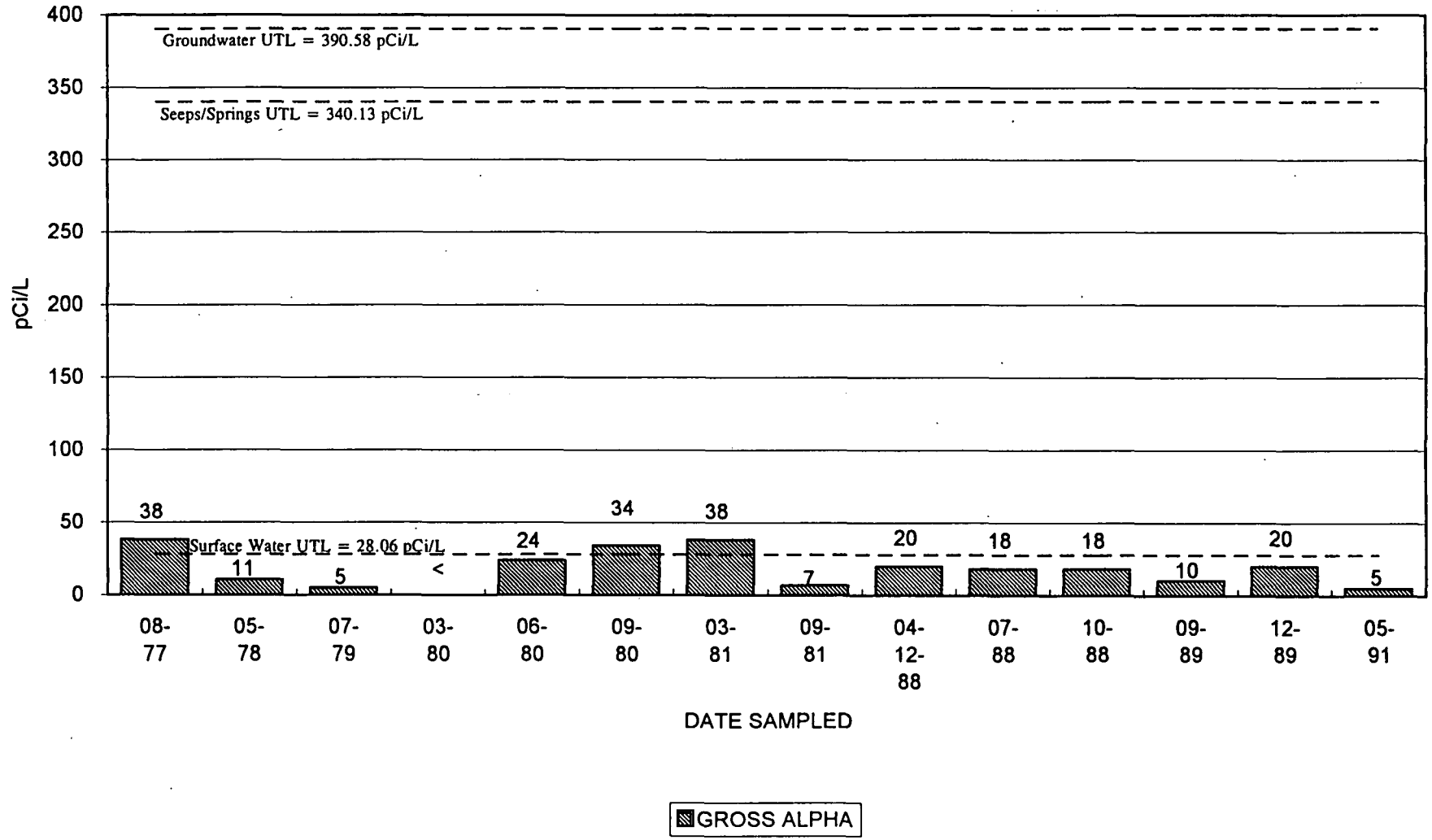
SAMPLE STATION BS881-3
Metals by Atomic Absorption - Lead



A:\METGRPH2.XLS\AABS881-3.PB

FIGURE G-88

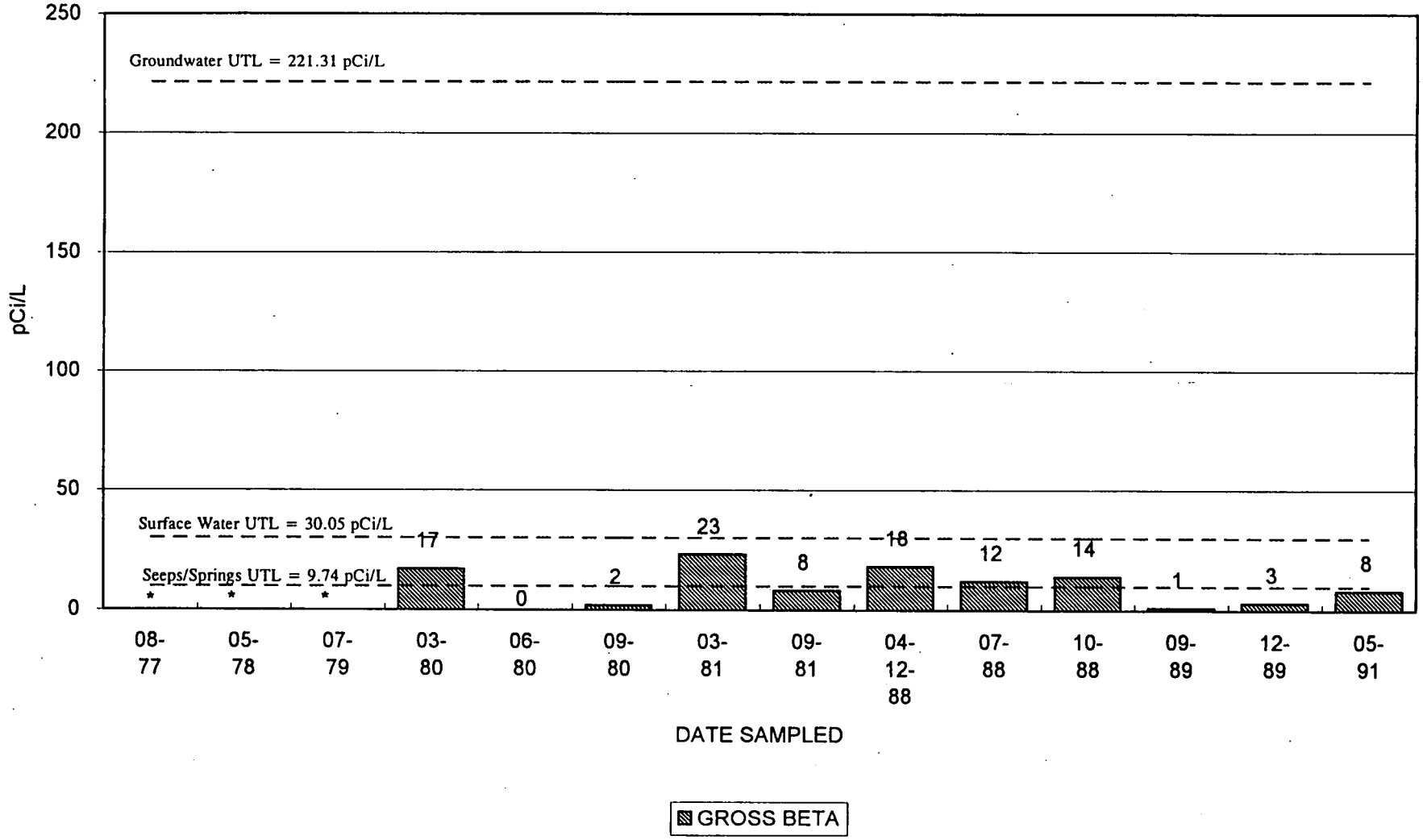
SAMPLE STATION FD883-1
GROSS ALPHA



A:\METGRPH.XLS\ABBS883-1.A

FIGURE G-89

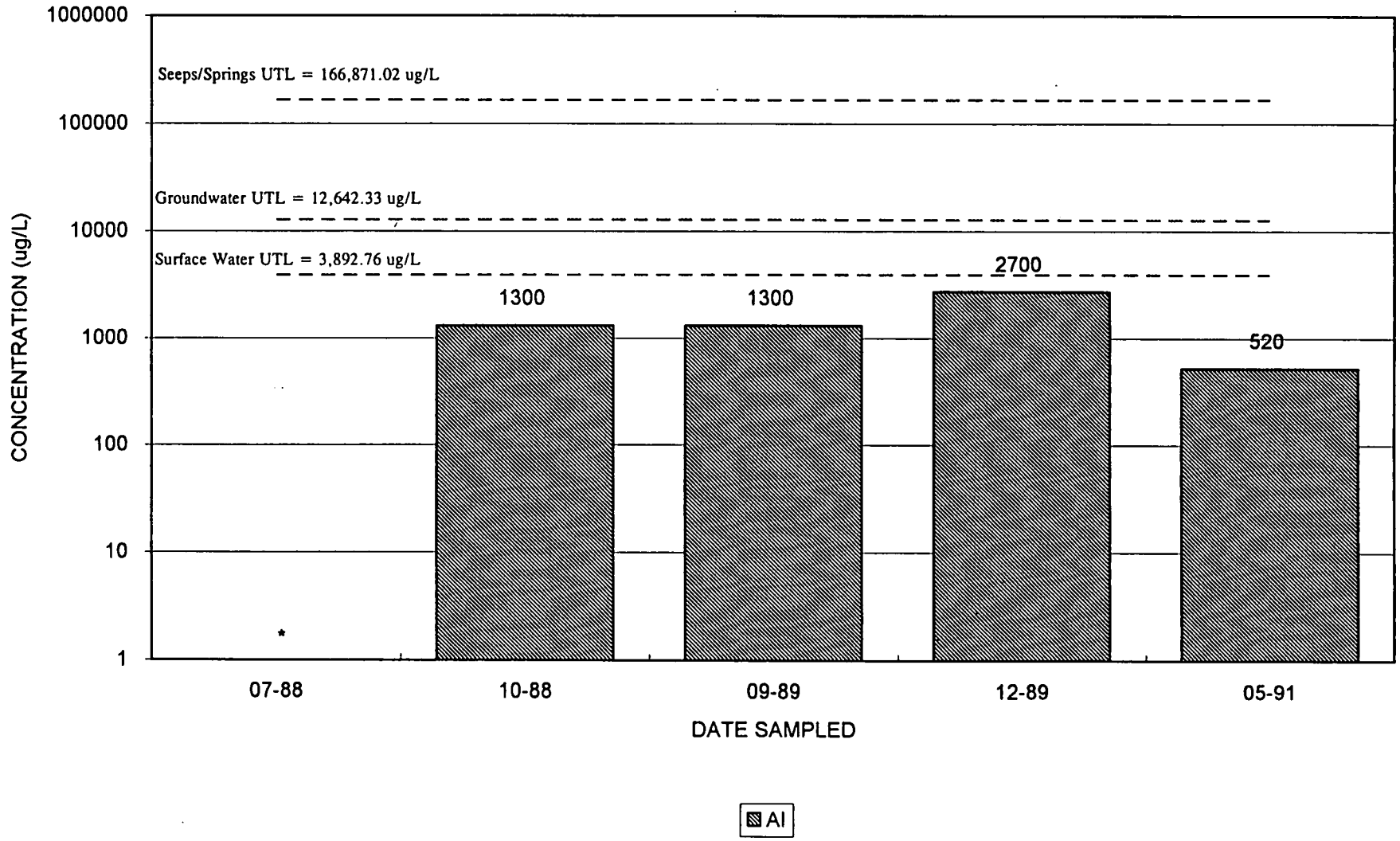
SAMPLE STATION FD883-1
GROSS BETA



A:\METGRPH.XLS\ABBS883-1.B

FIGURE G-90

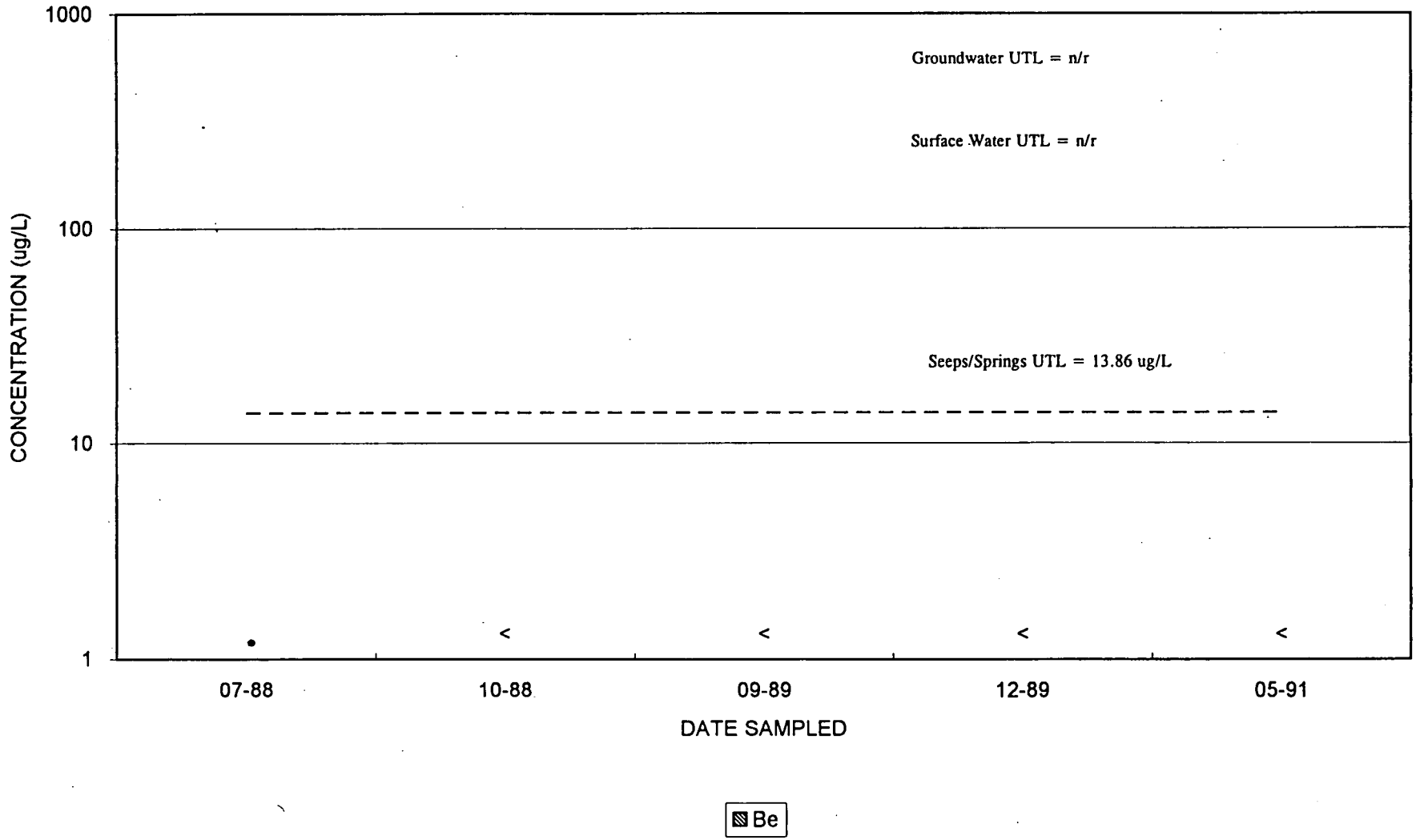
SAMPLE STATION FD883-1
Metals by ICP - Aluminum



A:\METGRPH.XLS\ICPFD883-1.AL

FIGURE G-91

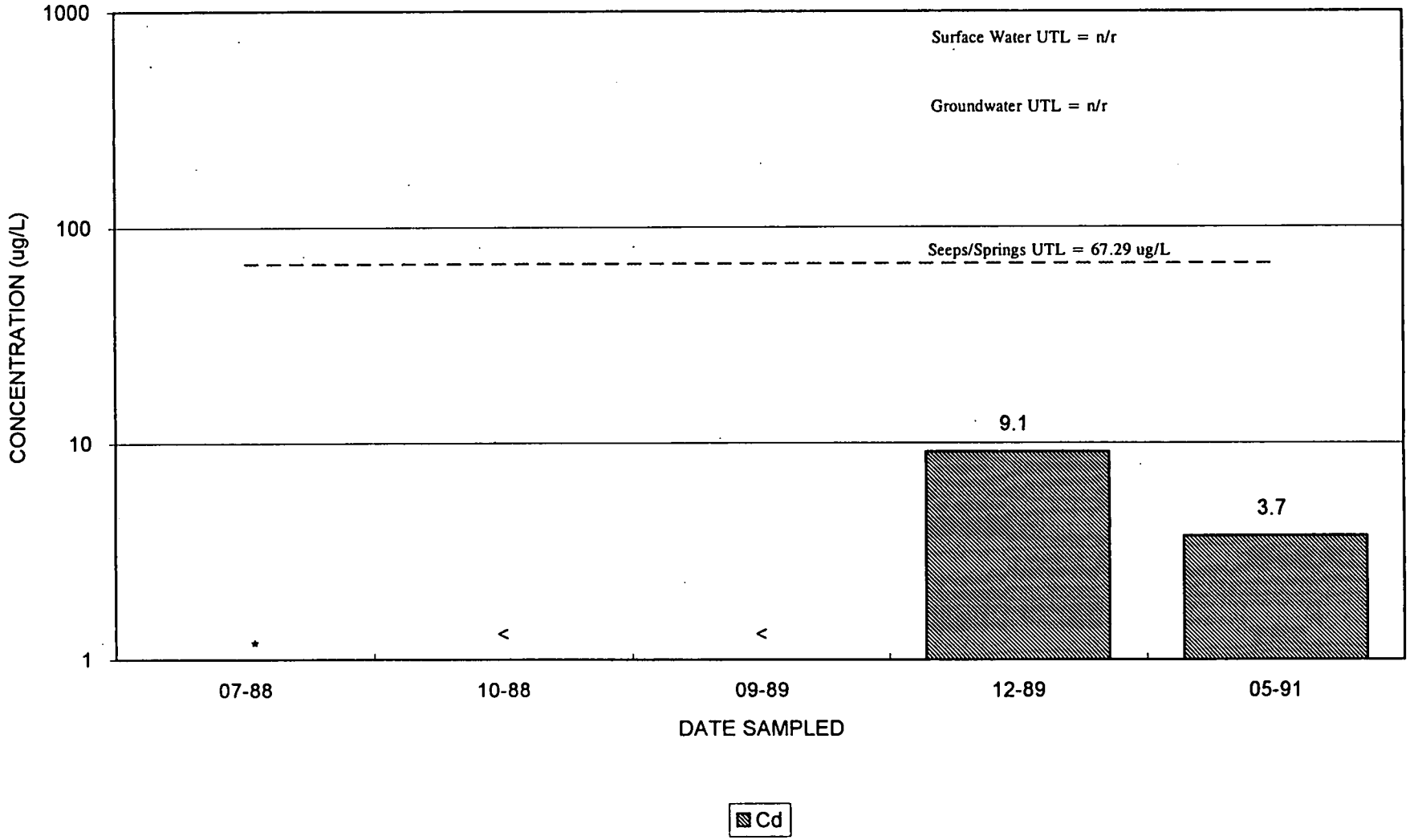
SAMPLE STATION FD883-1
Metals by ICP - Beryllium



A:\METGRPH.XLS\ICPFD883-1.BE

FIGURE G-92

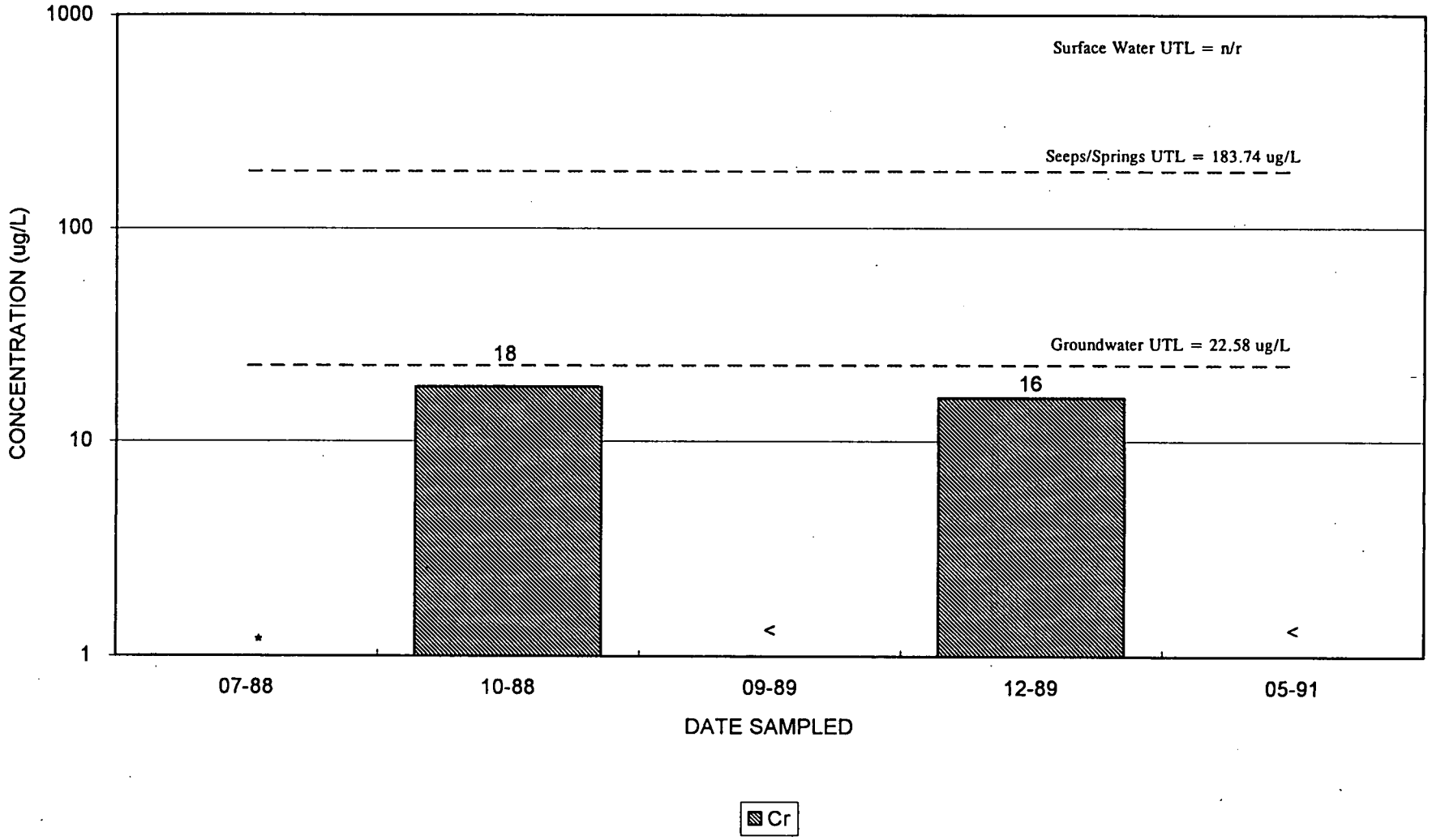
SAMPLE STATION FD883-1
Metals by ICP - Cadmium



A:\METGRPH.XLS\ICPFD883-1.CD

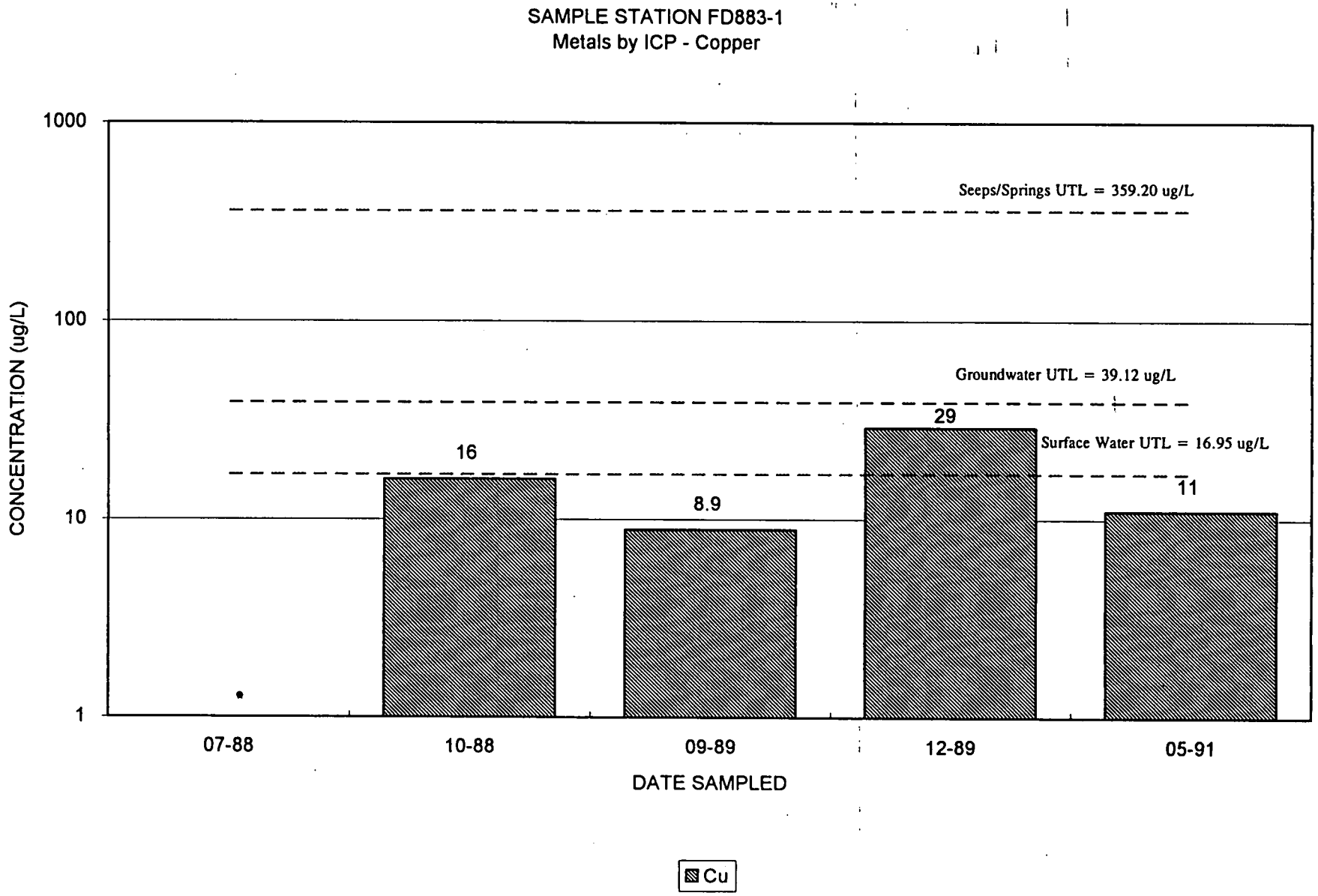
FIGURE G-93

SAMPLE STATION FD883-1
Metals by ICP - Chromium



A:\METGRPH.XLS\ICPFD883-1.CR

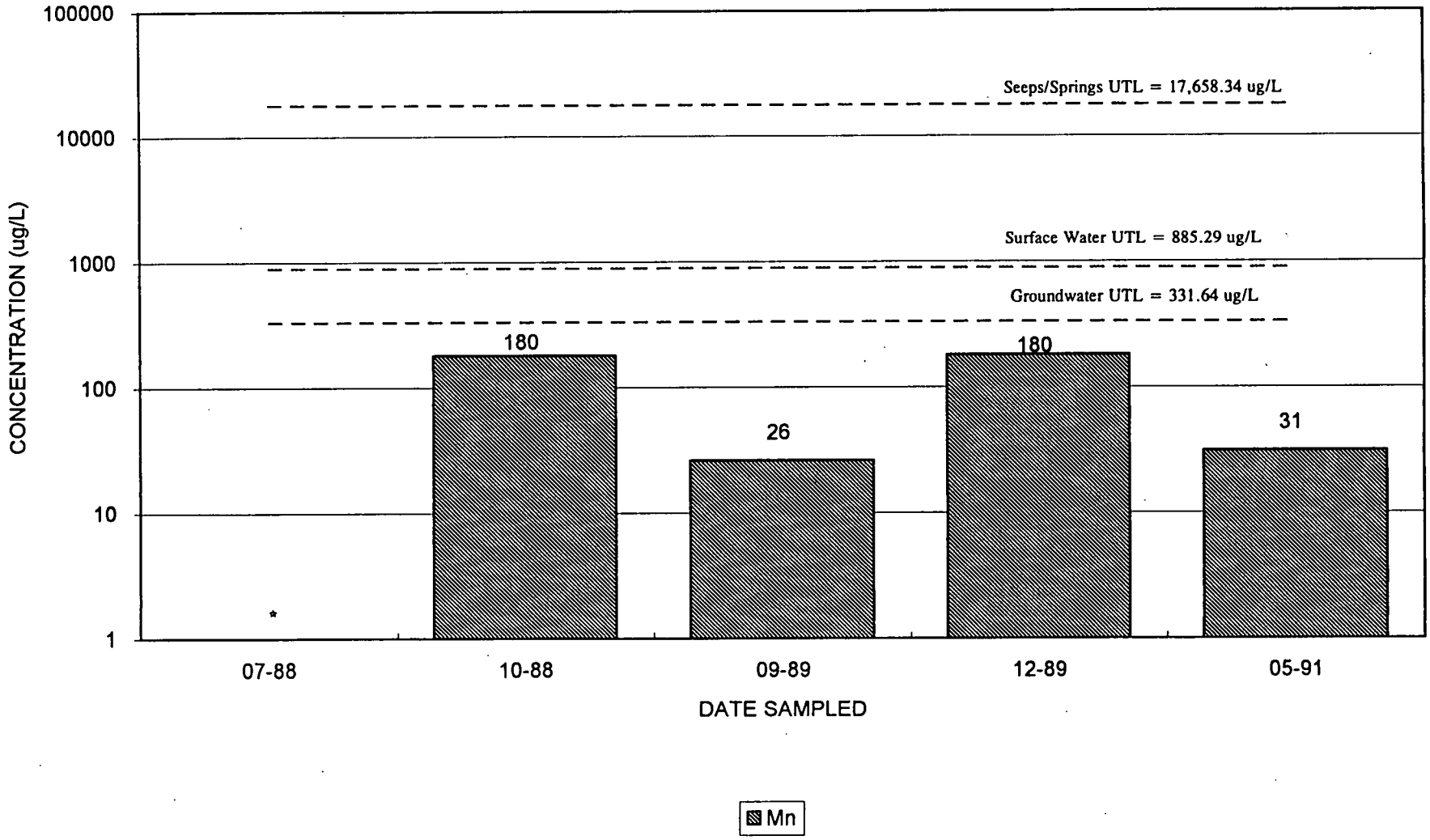
FIGURE G-94



A:\METGRPH.XLS\ICPFD883-1.CU

FIGURE G-95

SAMPLE STATION FD883-1
Metals by ICP - Manganese



A:\METGRPH.XLS\CPFD883-1.MN

APPENDIX H

List of Engineering Drawings Reviewed for IHSS Data Compilation

Appendix H
Rocky Flats Environmental Technology Site
Operable Unit 8, Data Compilation
IHSS 150.6, 150.8 and 184, Stage 1

IHSSs 150.6 150.8

Drawing No.	Original Date	Latest Rev. Date	Title
RF-W/79-C	1-25-64	No revision	Plot and Grading Plan, Building 79
RF-W/79-C-3	1-25-64	No revision	Site and Paving Details, Building 79
RF-W/79-C-8	1-25-64	N/L	Miscellaneous Detail, Building 79
RF-BS-20111-01	7-3-67	12-14-67	Site Plan, Building 79-A
RF-BS-20112-01	7-3-67	12-14-67	Grading and Drainage Plan, Building 79-A
RF-BS-20112-02	7-3-67	9-12-68*	Miscellaneous Sections and Details, Building 79-A
25682 XC2	6-17-76	No revision	Roads and Paving Replacement, Area Plot Plan
27673-X02	4-14-71	N/L	Surface Drainage Improvements, Area Plot Plant
27673-X03	4-24-79	No revision	Surface Drainage Improvement, 776/779
27673-X04A	4-24-79	No revision	Surface Drainage Improvement Plan 776/779
D27673-X05A	4-20-79	N/L	Surface Drainage, 776/779
D27673-2	6-16-79	N/L	Surface Drainage Improvements, 776/779, Plan and Elevation

Notes:

N/L = Not Legible
* = As Built Date

IHSS 184

Drawing No.	Original Date	Latest Rev. Date	Title
RF-91-98-Y-1	8-15-51	N/L	Plot Plan
1-6516-91	4-5-60	No revision	"D" Plant Loading Dock Addition, Steel Details (Bldg 91)
1-6517-91	4-5-60	6-30-60	"D" Plant Loading Dock Additions, Concrete Details (Bldg 91)
RF-BY-15928-2	8-21-67	3-6-68*	Grading and Location Plan Buildings 86 and 91
15928-8	10-31-67	3-6-69*	Construction Group 703 Repave Dock Area, Bldg 91, Subdrainage System
28738-X03	4-27-84	2-21-86*	Site Removal Plan, Building 991
28738-X04	4-27-84	2-21-86*	Utilities Removal Plan, Building 991
28738-X05	4-27-84	2-21-86*	Mechanical Removal Plan, Building 991
28738-103	4-27-84	2-21-86*	Site Details

Notes:

N/L = Not Legible
* = As Built Date

APPENDIX I

Water Table Measurements in Industrial Area Monitoring Wells, Spring and Fall 1992

APPENDIX I – Water Level Measurements in Industrial Area Monitoring Wells, Spring and Fall 1992

WELL	DTW	DATE	STATE NORTH	STATE EAST	COMPLETION UNIT/LITH	SURFACE ELEV.	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	WLE
1386	4.38	02-APR-92	751857	2086051	Qc	5840.47	5842.59	9.50	3.09	9.50	9.00	5838.2
1486	11.69	02-APR-92	751856	2085838	Kss & Ksclst	5844.71	5846.71	55.36	39.42	55.36	11.00	5835.0
1586	5.62	02-APR-92	751852	2085812	Qc	5848.43	5850.63	14.44	4.09	14.44	12.50	5845.0
1686	5.46	02-APR-92	751747	2085260	Ksltss	5867.92	5869.55	45.06	39.06	45.06	7.00	5864.1
1786	5.37	02-APR-92	751740	2085242	Qc	5868.43	5869.57	13.98	3.73	13.98	12.50	5864.2
1886	8.83	02-APR-92	751522	2085831	Qc	5885.75	5887.97	7.50	3.74	7.50	8.00	5879.1
1986	2.34	02-APR-92	750894	2083296	Kclst	5943.08	5943.86	12.25	3.00	12.25	11.50	5941.5
2186	32.67	02-APR-92	750855	2082501	Kss & Ksltclst	6004.76	6005.96	67.25	35.00	67.24	15.00	5973.3
2286	7.12	02-APR-92	750718	2084411	Qrf	5978.77	5979.55	11.20	3.20	11.20	11.00	5972.4
2386	83.93	02-APR-92	750338	2084259	Kslt & Ksltclst	5982.46	5982.46	117.25	113.00	117.25	8.20	5898.5
2486	7.55	02-APR-92	750338	2084277	Qrf	5982.45	5983.56	7.45	2.95	7.45	7.20	5976.0
2586	30.43	03-APR-92	750412	2084831	Ksltclst & Kclst	5975.24	5977.14	82.00	59.90	82.00	8.00	5946.7
2686	9.96	03-APR-92	750411	2084841	Qrf	5975.42	5977.17	11.00	3.75	11.00	10.50	5967.2
2786	80.62	02-APR-92	750781	2085238	Kslts & Ksclst	5962.89	5963.88	133.00	128.50	133.00	11.00	5883.3
2986	7.43	02-APR-92	750599	2085687	Qrf	5959.58	5960.68	8.77	2.83	8.77	8.50	5953.3
3086	3.93	02-APR-92	751078	2084921	Kclst	5957.42	5958.39	14.93	2.48	14.93	2.50	5954.5
3186	DRY	02-APR-92	751051	2084764	Kss & Kslt	5964.98	5967.05	17.32	2.46	17.32	0.50	5967.1
3286	59.09	02-APR-92	751050	2084743	Kss & Ksltss	5966.08	5967.92	125.50	114.90	125.50	1.00	5908.8
3386	5.97	02-APR-92	749950	2085003	Qrf	5951.40	5952.42	7.34	2.99	7.34	6.80	5946.5
4486	6.25	06-APR-92	749254	2082234	Qrf	6019.93	6021.96	26.25	3.23	26.25	25.50	6015.7
6186	8.88	06-APR-92	749198	2083717	Qrf	5999.47	6000.60	12.25	5.00	12.00	11.50	5991.7
0187	7.92	03-APR-92	748127	2083653	fill	5992.49	5994.08	12.08	3.38	11.83	11.80	5986.2
0587	43.62	01-APR-92	748081	2084849	Kss & Ksltss	5927.85	5929.99	51.50	42.00	51.25	11.00	5886.4
1287	5.58	03-APR-92	748581	2086066	Kcslt	5934.81	5936.30	10.24	4.91	10.01	3.50	5930.7
2187	10.24	02-APR-92	749969	2085799	Qc	5928.43	5929.69	10.56	3.26	10.41	8.00	5919.5
2287	80.46	02-APR-92	749924	2085822	Kss & Kslt	5931.18	5932.80	88.70	81.41	88.46	12.80	5852.3
3787	5.92	02-APR-92	750494	2085224	Qrf	5967.52	5968.99	9.00	3.50	8.77	8.00	5963.1
3887	8.47	03-APR-92	750396	2085094	Qrf	5972.15	5973.90	9.50	3.50	9.27	7.80	5965.4
3987	84.88	02-APR-92	751081	2085268	Kslt & Kclst	5946.95	5948.42	117.39	109.99	117.14	3.50	5863.5
4387	7.9	01-APR-92	748030	2084788	Qc	5925.06	5926.41	12.50	3.50	12.25	12.00	5918.5
4487	3.92	03-APR-92	748306	2085435	Qc	5949.63	5951.10	3.70	1.50	3.50	3.20	5947.2
4587	91.15	03-APR-92	748313	2085451	Kss & Kslt & Kclst	5949.32	5950.91	101.30	89.50	97.05	4.00	5859.8
5687	7.08	02-APR-92	750638	2084423	Qrf	5978.39	5979.77	9.92	3.52	9.67	9.40	5972.7
1587	12.97	06-APR-92	749011	2086249	Qrf	5971.27	5972.79	22.53	5.80	22.06	21.90	5959.8
1687	86.46	06-APR-92	749130	2086249	Kslt	5969.49	5970.79	125.24	100.00	125.00	22.20	5884.3
1787	7.66	06-APR-92	749415	2086308	Qrf	5968.01	5969.56	25.75	3.50	25.50	25.00	5961.9
1887	129.46	06-APR-92	749404	2086339	Kss & Kslt	5967.99	5969.49	133.70	127.00	133.45	25.20	5840.0
1987	6.94	06-APR-92	749623	2086171	Qrf	5968.44	5969.91	11.89	3.50	11.65	10.80	5963.0
2087	110.49	06-APR-92	749634	2086155	Ksltclst	5968.66	5970.14	116.36	107.26	116.11	11.80	5859.7
2387	11.25	06-APR-92	749404	2085910	Ksltss & Kclst	5972.79	5974.49	37.85	17.19	37.61	15.20	5963.2
5087	DRY	03-APR-92	748123	2085334	Qc	5933.14	5934.78	13.70	3.50	13.50	12.50	5934.8
5187	15.47	06-APR-92	748103	2083850	fill?	5963.27	5965.22	14.00	3.58	13.84	12.50	5949.8

APPENDIX I – Water Level Measurements in Industrial Area Monitoring Wells, Spring and Fall 1992

WELL	DTW	DATE	STATE NORTH	STATE EAST	COMPLETION UNIT/UTH	SURFACE ELEV.	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	WLE
5287	9.47	06-APR-92	748145	2084067	fill?	5967.85	5969.57	20.50	3.50	20.25	20.00	5960.1
5387	4.61	06-APR-92	747985	2083912	Qc	5959.99	5961.81	9.30	3.50	9.05	10.00	5957.2
5487	3.2	06-APR-92	747985	2084032	Qc	5955.85	5957.62	4.68	1.33	4.53	4.00	5954.4
5687	6.93	06-APR-92	750638	2084423	Qrf	5978.39	5979.77	9.92	3.52	9.67	9.40	5972.8
B208089	11.57	02-APR-92	751143	2085876	Qc	5935.40	5937.07	14.16	3.40	12.90	12.20	5925.5
B208189	4.02	02-APR-92	751138	2085885	Kclst	5935.40	5937.46	27.58	16.90	26.34	11.00	5933.4
B208289	17.14	02-APR-92	751739	2086289	Ksltclst & Kclst	5850.70	5852.95	16.16	5.95	15.42	0.20	5835.8
B208389	DRY	02-APR-92	751687	2085584	Ksclst & Kclst	5876.80	5878.66	9.05	3.37	7.80	0.20	5878.7
B208489	DRY	02-APR-92	751683	2085636	Kclst	5876.30	5878.34	30.49	19.76	29.22	15.50	5878.3
B208589	3.39	02-APR-92	751804	2085477	Qc	5856.50	5858.35	5.07	3.23	3.99	3.60	5855.0
B208689	19.14	02-APR-92	751728	2085250	Ksltclst	5867.60	5869.60	23.07	12.32	21.80	7.30	5850.5
B208789	3.83	02-APR-92	751755	2084450	Qc	5907.10	5909.03	12.32	2.88	10.93	8.40	5905.2
B210489	3.37	02-APR-92	751802	2085513	Qc	5856.40	5858.71	8.67	2.98	7.41	7.00	5855.3
P114389	7.56	01-APR-92	750337	2081246	Qrf	6033.40	6035.43	50.10	44.40	48.80	48.30	6027.9
P114489	9.23	01-APR-92	750337	2081246	Qrf	6033.40	6035.43	50.10	44.40	48.80	48.30	6026.2
P114589	3.58	01-APR-92	750396	2081731	Qrf	6024.10	6025.90	37.60	32.54	36.50	27.50	6022.3
P114689	8.28	01-APR-92	749943	2083044	Qrf	6004.00	6005.76	23.50	17.83	22.24	22.00	5997.5
P114789	7.35	01-APR-92	749940	2082610	Qrf	6010.70	6012.40	27.60	21.81	26.23	26.00	6005.1
P114889	6.62	01-APR-92	749926	2082127	Qrf	6016.60	6018.26	15.55	9.89	14.30	13.80	6011.6
P114989	14.48	01-APR-92	749959	2081661	Qrf	6029.80	6031.84	39.30	33.59	38.00	37.50	6017.4
P115089	10.74	01-APR-92	749930	2081258	Qrf	6038.10	6040.10	42.01	36.27	40.70	40.20	6029.4
P115489	8.47	01-APR-92	749507	2082135	Qrf	6023.40	6025.10	27.75	22.09	26.50	26.00	6016.6
P115589	4.35	01-APR-92	749551	2082658	Qrf	6014.10	6015.77	30.70	25.05	29.48	29.00	6011.4
P115689	7.53	01-APR-92	749532	2083019	Qrf	6006.90	6008.71	21.31	16.23	20.20	19.70	6001.2
P119389	5.38	02-APR-92	750280	2081921	Qrf	6011.70	6013.18	18.21	12.50	16.90	16.40	6007.8
P207389	6.48	03-APR-92	750195	2084468	Kss & Kclst	5981.02	5982.77	16.22	10.53	15.18	7.00	5976.3
P207489	6.3	03-APR-92	750197	2084481	Qrf	5980.71	5982.64	8.23	2.39	7.00	6.50	5976.3
P207589	25.77	03-APR-92	750395	2084843	Ksltclst	5974.06	5975.96	25.10	14.40	23.86	9.40	5950.2
P207689	6.85	02-APR-92	750398	2085318	Qrf	5966.32	5967.88	14.36	3.64	13.10	12.60	5961.0
P207789	29.36	02-APR-92	750392	2085343	Ksltclst	5965.88	5967.75	28.63	17.90	27.34	12.90	5938.4
P207889	4.25	02-APR-92	750671	2085343	Qrf	5962.82	5964.90	8.95	3.26	7.70	8.50	5960.7
P207989	21.03	02-APR-92	750671	2085330	Kclst	5963.09	5965.17	21.73	11.00	20.48	5.80	5944.1
P208889	86.13	02-APR-92	751086	2085249	Ksltclst	5947.30	5949.25	99.16	87.76	96.94	5.50	5863.1
P208989	12.16	02-APR-92	751044	2084839	Ksltss & Ksltclst	5962.53	5964.56	26.12	15.40	24.84	3.50	5952.4
P209089	28.03	03-APR-92	750566	2084910	Ksltclst	5972.16	5974.25	27.21	16.50	25.96	11.50	5946.2
P209189	10.18	02-APR-92	750762	2084309	Kss & Ksltclst	5980.66	5982.21	36.08	13.30	35.01	10.30	5972.0
P209289	13.73	02-APR-92	750863	2084139	Qrf	5981.59	5983.42	13.40	8.20	12.66	12.20	5969.7
P209389	17.15	02-APR-92	750864	2084130	Kss & Ksltss & Kcss	5981.47	5983.39	30.05	16.82	28.80	13.80	5966.2
P209489	26.5	02-APR-92	750991	2084634	Kss & Ksltss	5977.98	5980.10	36.25	15.48	35.00	9.00	5953.6
P209589	18.36	02-APR-92	751071	2085286	Ksltclst & Ksclst	5948.17	5950.04	19.77	9.07	18.52	4.10	5931.7
P209689	28.45	02-APR-92	750533	2085514	Ksltclst	5962.63	5964.43	27.93	17.20	26.67	12.20	5936.0
P209789	4.7	02-APR-92	750579	2085481	Qrf	5962.82	5964.94	13.75	3.00	12.50	12.00	5960.2

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WELL	DTW	DATE	STATE NORTH	STATE EAST	COMPLETION UNIT/UTH	SURFACE ELEV.	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	WLE
P209889	4.49	02-APR-92	751194	2084984	Ksltclst	5940.28	5942.40	19.63	8.89	18.33	3.90	5937.9
P209989	10.29	02-APR-92	751565	2084649	Qc	5898.10	5900.40	9.58	3.81	8.18	7.70	5890.1
P210089	19.21	02-APR-92	751564	2084639	Ksltclst	5898.40	5900.40	22.93	12.20	21.50	7.20	5881.2
P213689	8.54	01-APR-92	749460	2083736	Qrf	5994.30	5996.04	14.80	9.08	13.50	13.00	5987.5
P213889	DRY	02-APR-92	750466	2086109	Kss & Kcss	5954.10	5955.94	22.03	11.30	20.83	8.00	5955.9
P213989	DRY	02-APR-92	750468	2086102	Qrf	5954.30	5956.38	7.20	3.29	6.92	6.70	5956.4
P215789	13.87	01-APR-92	749470	2083430	Qrf	6002.00	6003.66	19.59	14.53	18.50	18.00	5989.8
P218089	5.16	02-APR-92	749941	2084020	Qrf	5985.80	5987.55	8.69	3.00	7.43	6.00	5982.4
P218389	8.83	02-APR-92	750831	2085648	Qrf	5956.20	5958.45	13.77	8.06	12.50	12.00	5949.6
P219189	9.77	02-APR-92	751222	2084010	Qc	5941.20	5943.15	12.77	7.08	11.50	11.00	5933.4
P219489	14.48	02-APR-92	750415	2085651	Qrf	5959.50	5961.15	24.20	18.48	22.90	22.50	5946.7
P219589	23.94	02-APR-92	750268	2085536	Kclst & Ksclst	5963.80	5965.70	26.99	21.27	25.70	17.20	5941.8
P313489	9.36	01-APR-92	748913	2083062	Qrf	6011.70	6013.58	22.37	16.71	21.10	20.60	6004.2
P313589	7.19	01-APR-92	748510	2083547	Qrf	6008.50	6010.11	13.76	8.08	12.50	11.00	6002.9
P314089	8.18	01-APR-92	749461	2083653	Qrf	5996.70	5998.49	11.06	5.37	9.79	9.30	5990.3
P314289	13.82	01-APR-92	748216	2083280	Qrf	6010.10	6011.77	14.80	9.11	13.51	13.00	5998.0
P414189	4.88	01-APR-92	749059	2082986	Qrf	6010.60	6012.18	19.78	14.09	18.50	18.00	6007.3
P415889	11.22	01-APR-92	749125	2080718	Qrf	6050.40	6052.60	44.50	38.75	43.20	49.50	6041.4
P415989	3.46	01-APR-92	749025	2081011	Qrf	6044.90	6046.71	28.00	22.30	26.73	34.00	6043.3
P416089	4.04	01-APR-92	748605	2080720	Qrf	6051.70	6053.95	35.39	29.24	34.00	33.50	6049.9
P416189	5.52	01-APR-92	748606	2081120	Qrf	6045.60	6047.95	30.94	25.23	29.66	29.20	6042.4
P416289	10.94	01-APR-92	748598	2081555	Qrf	6038.60	6040.22	24.77	19.07	23.50	23.00	6029.3
P416389	5.52	01-APR-92	748313	2080631	Qrf	6055.40	6057.14	31.40	25.69	30.10	30.00	6051.6
P416489	9.37	01-APR-92	748210	2081113	Qrf	6048.50	6050.15	26.98	21.27	25.70	25.20	6040.8
P416589	23.66	01-APR-92	748211	2081546	Qrf	6041.20	6042.81	32.10	27.04	31.00	30.50	6019.2
P416689	27.97	01-APR-92	748147	2081941	Qrf	6035.00	6036.55	33.76	28.09	32.50	32.00	6008.6
P416789	22.85	01-APR-92	748206	2082382	Qrf	6027.80	6029.27	28.20	22.48	26.90	26.40	6006.4
P416889	14.03	01-APR-92	748206	2082815	Qrf	6017.40	6018.79	21.52	15.86	20.27	20.20	6004.8
P207989	20.71	06-APR-92	750671	2085330	Kclst	5963.09	5965.17	21.73	11.00	20.48	5.80	5944.5
P317989	3.88	06-APR-92	748891	2084272	Qrf	5990.90	5992.84	8.73	3.00	7.49	6.40	5989.0
P320089	10.19	06-APR-92	748799	2083280	Qrf	6009.90	6011.87	20.08	14.38	18.81	18.80	6001.7
P418289	6.31	06-APR-92	748952	2082653	Qrf	6016.90	6018.20	26.70	9.60	23.50	23.00	6011.9
2391	DRY	03-APR-92	749853	2086600	Qrf	5956.82	5958.43	8.00	3.00	6.00	6.90	5958.4
07391	5.06	03-APR-92	748547	2085827	Qrf & Kclst	5949.14	5950.61	13.40	5.40	11.40	8.10	5945.6
09691	5.99	03-APR-92	748572	2086038	Ksltss & Kclst	5935.64	5937.05	16.00	6.00	14.00	3.10	5931.1
33491	10.76	03-APR-92	748080	2084883	Qc & Ksclst	5926.06	5928.59	11.10	6.68	8.69	8.00	5917.8
33691	10.93	03-APR-92	748112	2084994	Qc	5926.99	5929.24	10.60	6.19	8.11	7.80	5918.3
34591	12.8	03-APR-92	748462	2085621	Qc & Kclst	5952.19	5954.63	11.30	6.90	8.90	8.20	5941.8
34791	1.92	03-APR-92	748377	2085521	Qc	5951.39	5953.91	10.42	6.00	8.00	8.00	5952.0
36191	5.72	03-APR-92	748091	2084198	Qc	5962.89	5965.17	17.00	9.52	14.60	14.00	5959.5
36391	22.54	03-APR-92	748042	2084294	Qrf	5964.57	5967.01	29.80	17.43	27.41	26.40	5944.5
36691	26.68	03-APR-92	748027	2084421	Qc	5949.76	5951.52	27.83	15.83	25.83	25.00	5924.8

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WELL	DTW	DATE	STATE NORTH	STATE EAST	COMPLETION UNIT/LITH	SURFACE ELEV.	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	WLE
37191	5.61	03-APR-92	748036	2084533	Qc	5945.91	5948.29	23.07	11.12	21.07	20.50	5942.7
37591	5.73	03-APR-92	748580	2084610	Qrf	5991.42	5993.45	14.60	7.60	12.60	12.00	5987.7
37691	13.28	03-APR-92	748692	2085217	Qrf	5984.46	5985.24	18.50	6.51	16.50	16.20	5972.0
37891	38.94	03-APR-92	748075	2084915	Kcsltst & Ksltst	5925.22	5926.29	55.20	43.20	53.20	4.70	5887.4
37991	47.76	03-APR-92	748063	2084731	Kcsltst & Kssltst	5931.45	5933.55	57.20	45.20	55.20	6.90	5885.8
38191	7.68	03-APR-92	748014	2084765	Qc	5924.47	5926.40	17.00	10.00	15.00	14.70	5918.7
38291	DRY	03-APR-92	748032	2084801	Qc	5924.49	5926.71	10.70	6.70	8.70	8.40	5926.7
39691	8.25	03-APR-92	748357	2083634	Qrf & Kclst	6006.26	6008.37	11.00	7.00	9.00	8.00	6000.1
06591	10.32	06-APR-92	749064	2085535	Ksclst & Ksltclst	5978.28	5979.78	50.00	33.00	48.00	15.40	5969.5
06891	6.24	06-APR-92	749258	2085883	Qrf	5974.14	5975.62	16.00	6.00	14.00	14.00	5969.4
06991	8.91	06-APR-92	749168	2085990	Qrf	5972.91	5974.57	31.00	14.00	29.00	28.60	5965.7
07191	14.57	06-APR-92	748850	2085908	Qrf	5974.79	5976.34	23.10	11.10	21.10	20.00	5961.8
07291	16.06	06-APR-92	748748	2085766	Qrf	5977.27	5978.80	22.60	10.60	20.60	20.00	5962.7
08891	12.77	06-APR-92	749128	2085866	Qrf	5976.36	5978.06	27.30	15.30	25.30	23.00	5965.3
09091	14.86	06-APR-92	748918	2085943	Qrf	5975.16	5976.79	26.70	14.70	24.70	24.00	5961.9
13191	11.6	06-APR-92	749071	2085530	Ksclst	5978.25	5979.90	27.70	15.70	25.70	15.40	5968.3
13291	9.21	06-APR-92	749060	2085523	Qrf	5978.48	5979.97	17.70	5.70	15.70	15.40	5970.8
35391	11.09	06-APR-92	748011	2083907	Kclst	5960.73	5963.03	10.50	6.10	8.11	6.00	5951.9
37791	19.54	06-APR-92	748592	2083753	Qrf	6002.16	6004.18	22.60	10.60	20.60	20.00	5984.6
SUPPLEMENTAL SPRING 1992 DATA:												
0987	14.83	07-APR-92	749068	2085348	Kss	5980.22	5981.70	32.40	14.50	32.15	12.50	5966.9
1087	13.05	07-APR-92	748946	2085290	Qrf	5981.95	5983.52	12.00	3.50	12.00	11.30	5970.5
3486	20.9	07-APR-92	750162	2086193	Kcss & Kcslt	5912.00	5913.95	56.25	44.24	56.25	16.00	5893.1
3586	6.15	07-APR-92	750167	2086219	Qc	5910.75	5912.76	11.60	4.86	11.60	10.50	5906.6
P207889	4.74	07-APR-92	750671	2085343	Qrf	5962.82	5964.90	8.95	3.26	7.70	8.50	5960.2
P210089	19.09	07-APR-92	751564	2084639	Ksltclst	5898.40	5900.40	22.93	12.20	21.50	7.20	5881.3
01791	8.89	08-APR-92	749504	2086018	Ksltss & Ksclst	5965.78	5967.41	20.00	10.00	18.00	8.00	5958.5
01891	9.1	08-APR-92	749438	2086023	Ksltss & Ksltclst	5971.76	5973.37	32.00	20.00	30.00	12.40	5964.3
02091	8.21	08-APR-92	749617	2086428	Ksclst, Kssit, Ksltclst	5965.19	5966.65	32.60	15.60	30.60	16.10	5958.4
02291	8.08	08-APR-92	749880	2086139	Ksclst & Kcss	5936.66	5938.26	18.50	11.50	16.50	8.80	5930.2
02491	9.41	08-APR-92	749949	2086432	Ksltss, Kssit	5944.54	5946.21	18.80	11.80	16.80	8.50	5936.8
02691	5.34	08-APR-92	750385	2086043	Ksltss & Ksltclst	5934.78	5936.38	18.00	6.00	16.00	1.10	5931.0
12091	9.77	08-APR-92	749436	2086009	Ksltss	5971.59	5973.27	24.00	14.00	22.00	13.20	5963.5
12291	14.29	08-APR-92	749429	2085441	Kcss & Kss	5970.98	5972.73	16.10	7.10	14.10	2.00	5958.4
1986	2.53	08-APR-92	750894	2083296	Kclst	5943.08	5943.86	12.25	3.00	12.25	11.50	5941.3
33891	11.38	08-APR-92	747961	2084641	Qc & Kclst	5927.54	5929.94	11.10	6.70	8.70	8.10	5918.6
35991	18.03	08-APR-92	748057	2083756	Qc	5973.25	5976.45	16.10	8.68	13.70	12.20	5958.4
4386	12.9	08-APR-92	749404	2085869	Qrf	5972.91	5974.46	16.75	3.99	16.75	17.00	5961.6
2486	8.3	09-APR-92	750338	2084277	Qrf	5982.45	5983.56	7.45	2.95	7.45	7.20	5975.3

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3987	83.23	09-APR-92	751081	2085268	Kssit & Kcist	5946.95	5948.42	117.39	109.99	117.14	3.50	5865.2
B208089	11.83	09-APR-92	751143	2085876	Qc	5935.40	5937.07	14.16	3.40	12.90	12.20	5925.2
B208189	5.03	09-APR-92	751138	2085885	Kcist	5935.40	5937.46	27.58	16.90	26.34	11.00	5932.4
P208889	84.81	09-APR-92	751086	2085249	Ksitcist	5947.30	5949.25	99.16	87.76	96.94	5.50	5864.4
P209189	10.57	09-APR-92	750762	2084309	Kss & Ksitcist	5980.66	5982.21	36.08	13.30	35.01	10.30	5971.6
P209589	18.06	09-APR-92	751071	2085286	Ksitcist & Ksscist	5948.17	5950.04	19.77	9.07	18.52	4.10	5932.0
P416989	16.37	09-APR-92	748780	2081034	Kssit & Ksit	6045.20	6047.55	157.95	151.16	155.61	30.00	6031.2
00191	9.32	13-APR-92	749237	2086244	Qrf	5968.86	5970.44	27.00	15.00	25.00	24.20	5961.1
01391	12.3	13-APR-92	749402	2085226	Qrf	5973.70	5975.30	16.00	6.00	14.00	14.50	5963.0
01491	14.34	13-APR-92	749430	2085474	Kss & Kcs	5970.37	5972.03	26.00	14.00	24.00	1.60	5957.7
02191	DRY	13-APR-92	749708	2086166	Qrf	5965.81	5967.51	15.00	8.00	13.00	13.50	5967.5
2286	7.72	13-APR-92	750718	2084411	Qrf	5978.77	5979.55	11.20	3.20	11.20	11.00	5971.8
2786	75.98	13-APR-92	750781	2085238	Kssits & Ksscist	5962.89	5963.88	133.00	128.50	133.00	11.00	5887.9
3386	6.4	13-APR-92	749950	2085003	Qrf	5951.40	5952.42	7.34	2.99	7.34	6.80	5946.0
3787	6.29	13-APR-92	750494	2085224	Qrf	5967.52	5968.99	9.00	3.50	8.77	8.00	5962.7
2686	10.47	14-APR-92	750411	2084841	Qrf	5975.42	5977.17	11.00	3.75	11.00	10.50	5966.7
P207589	25.62	14-APR-92	750395	2084843	Ksitcist	5974.06	5975.96	25.10	14.40	23.86	9.40	5950.3
2187	9.57	15-APR-92	749969	2085799	Qc	5928.43	5929.69	10.56	3.26	10.41	8.00	5920.1
2287	80.44	15-APR-92	749924	2085822	Kss & Ksit	5931.18	5932.80	88.70	81.41	88.46	12.80	5852.4
P207689	7.15	15-APR-92	750398	2085318	Qrf	5966.32	5967.88	14.36	3.64	13.10	12.60	5960.7
P207789	29.23	15-APR-92	750392	2085343	Ksitcist	5965.88	5967.75	28.63	17.90	27.34	12.90	5938.5
2186	32.62	16-APR-92	750855	2082501	Kss & Ksitcist	6004.76	6005.96	67.25	35.00	67.24	15.00	5973.3
3186	DRY	20-APR-92	751051	2084764	Kss & Ksit	5964.98	5967.05	17.32	2.46	17.32	0.50	5967.1
3887	9.03	20-APR-92	750396	2085094	Qrf	5972.15	5973.90	9.50	3.50	9.27	7.80	5964.9
P208989	13.83	20-APR-92	751044	2084839	Ksitss & Ksitcist	5962.53	5964.56	26.12	15.40	24.84	3.50	5950.7
P209889	4.62	20-APR-92	751194	2084984	Ksitcist	5940.28	5942.40	19.63	8.89	18.33	3.90	5937.8
P218089	5.44	20-APR-92	749941	2084020	Qrf	5985.80	5987.55	8.69	3.00	7.43	6.00	5982.1
5287	9.59	22-APR-92	748145	2084067	fill?	5967.85	5969.57	20.50	3.50	20.25	20.00	5960.0
6186	9.79	22-APR-92	749198	2083717	Qrf	5999.47	6000.60	12.25	5.00	12.00	11.50	5990.8
P209289	14.68	22-APR-92	750863	2084139	Qrf	5981.59	5983.42	13.40	8.20	12.66	12.20	5968.7
P317989	4.95	22-APR-92	748891	2084272	Qrf	5990.90	5992.84	8.73	3.00	7.49	6.40	5987.9
4486	6.9	23-APR-92	749254	2082234	Qrf	6019.93	6021.96	26.25	3.23	26.25	25.50	6015.1
P209389	18.53	23-APR-92	750864	2084130	Kss & Ksitss & Kcss	5981.47	5983.39	30.05	16.82	28.80	13.80	5964.9
P209489	27.97	23-APR-92	750991	2084634	Kss & Ksitss	5977.98	5980.10	36.25	15.48	35.00	9.00	5952.1
P209789	6.37	24-APR-92	750579	2085481	Qrf	5962.82	5964.94	13.75	3.00	12.50	12.00	5958.6
P418289	7.72	24-APR-92	748952	2082653	Qrf	6016.90	6018.20	26.70	9.60	23.50	23.00	6010.5
P209089	27.09	27-APR-92	750566	2084910	Ksitcist	5972.16	5974.25	27.21	16.50	25.96	11.50	5947.2
P209689	28.14	27-APR-92	750533	2085514	Ksitcist	5962.63	5964.43	27.93	17.20	26.67	12.20	5936.3
P320089	11.81	27-APR-92	748799	2083280	Qrf	6009.90	6011.87	20.08	14.38	18.81	18.80	6000.1
P207389	6.66	28-APR-92	750195	2084468	Kss & Kcist	5981.02	5982.77	16.22	10.53	15.18	7.00	5976.1
P207489	6.73	28-APR-92	750197	2084481	Qrf	5980.71	5982.64	8.23	2.39	7.00	6.50	5975.9
5387	6.12	29-APR-92	747985	2083912	Qc	5959.99	5961.81	9.30	3.50	9.05	10.00	5955.7

APPENDIX I – Water Level Measurements in Industrial Area Monitoring Wells, Spring and Fall 1992

WELL	DTW	DATE	STATE NORTH	STATE EAST	COMPLETION UNIT/UTH	SURFACE ELEV.	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	WLE
5487	4.28	29-APR-92	747985	2084032	Qc	5955.85	5957.62	4.68	1.33	4.53	4.00	5953.3
1787	10.86	30-APR-92	749415	2086308	Qrf	5968.01	5969.56	25.75	3.50	25.50	25.00	5958.7
2986	9.06	30-APR-92	750599	2085687	Qrf	5959.58	5960.68	8.77	2.83	8.77	8.50	5951.6
3086	5.02	30-APR-92	751078	2084921	Kclst	5957.42	5958.39	14.93	2.48	14.93	2.50	5953.4
P209989	10.43	30-APR-92	751565	2084649	Qc	5898.10	5900.40	9.58	3.81	8.18	7.70	5890.0
1386	5.02	14-APR-92	751857	2086051	Qc	5840.47	5842.59	9.50	3.09	9.50	9.00	5837.6
1486	11.52	14-APR-92	751856	2085838	Kss & Ksclst	5844.71	5846.71	55.36	39.42	55.36	11.00	5835.2
1586	6.32	13-APR-92	751852	2085812	Qc	5848.43	5850.63	14.44	4.09	14.44	12.50	5844.3
1686	5.5	07-APR-92	751747	2085260	Ksltss	5867.92	5869.55	45.06	39.06	45.06	7.00	5864.1
1786	6.02	07-APR-92	751740	2085242	Qc	5868.43	5869.57	13.98	3.73	13.98	12.50	5863.6
1886	9	09-APR-92	751522	2085831	Qc	5885.75	5887.97	7.50	3.74	7.50	8.00	5879.0
37791	19.54	06-APR-92	748592	2083753	Qrf	6002.16	6004.18	22.60	10.60	20.60	20.00	5984.6
B208289	17.09	09-APR-92	751739	2086289	Ksltclst & Kclst	5850.70	5852.95	16.16	5.95	15.42	0.20	5835.9
B208589	3.95	09-APR-92	751804	2085477	Qc	5856.50	5858.35	5.07	3.23	3.99	3.60	5854.4
B208689	18.59	07-APR-92	751728	2085250	Ksltclst	5867.60	5869.60	23.07	12.32	21.80	7.30	5851.0
B208789	3.97	08-APR-92	751755	2084450	Qc	5907.10	5909.03	12.32	2.88	10.93	8.40	5905.1
B210489	4.16	10-APR-92	751802	2085513	Qc	5856.40	5858.71	8.67	2.98	7.41	7.00	5854.6
FALL 1992 WATER LEVEL DATA:												
1386	8.11	02-OCT-92	751857	2086051	Qc	5840.47	5842.59	9.50	3.09	9.50	9.00	5834.5
1486	10.91	02-OCT-92	751856	2085838	Kss & Ksclst	5844.71	5846.71	55.36	39.42	55.36	11.00	5835.8
1586	7.16	02-OCT-92	751852	2085812	Qc	5848.43	5850.63	14.44	4.09	14.44	12.50	5843.5
1686	6.66	02-OCT-92	751747	2085260	Ksltss	5867.92	5869.55	45.06	39.06	45.06	7.00	5862.9
1786	6.61	02-OCT-92	751740	2085242	Qc	5868.43	5869.57	13.98	3.73	13.98	12.50	5863.0
1886	DRY	02-OCT-92	751522	2085831	Qc	5885.75	5887.97	7.50	3.74	7.50	8.00	5888.0
1986	3.07	05-OCT-92	750894	2083296	Kclst	5943.08	5943.86	12.25	3.00	12.25	11.50	5940.8
2186	33.86	05-OCT-92	750855	2082501	Kss & Ksltclst	6004.76	6005.96	67.25	35.00	67.24	15.00	5972.1
2286	10.03	05-OCT-92	750718	2084411	Qrf	5978.77	5979.55	11.20	3.20	11.20	11.00	5969.5
2386	88.05	05-OCT-92	750338	2084259	Kslt & Ksltclst	5982.46	5982.46	117.25	113.00	117.25	8.20	5894.4
2486	DRY	05-OCT-92	750338	2084277	Qrf	5982.45	5983.56	7.45	2.95	7.45	7.20	5983.6
2586	30.16	05-OCT-92	750412	2084831	Ksltclst & Kclst	5975.24	5977.14	82.00	59.90	82.00	8.00	5947.0
2686	12	05-OCT-92	750411	2084841	Qrf	5975.42	5977.17	11.00	3.75	11.00	10.50	5965.2
2786	77	05-OCT-92	750781	2085238	Kssslts & Ksclst	5962.89	5963.88	133.00	128.50	133.00	11.00	5886.9
2986	DRY	05-OCT-92	750599	2085687	Qrf	5959.58	5960.68	8.77	2.83	8.77	8.50	5960.7
3086	7.36	05-OCT-92	751078	2084921	Kclst	5957.42	5958.39	14.93	2.48	14.93	2.50	5951.0
3186	19.56	05-OCT-92	751051	2084764	Kss & Kslt	5964.98	5967.05	17.32	2.46	17.32	0.50	5947.5
3286	53.91	05-OCT-92	751050	2084743	Kss & Ksltss	5966.08	5967.92	125.50	114.90	125.50	1.00	5914.0
3386	8.68	05-OCT-92	749950	2085003	Qrf	5951.40	5952.42	7.34	2.99	7.34	6.80	5943.7
3486	21.5	01-OCT-92	750162	2086193	Kcss & Kcslt	5912.00	5913.95	56.25	44.24	56.25	16.00	5892.5
3586	9.87	01-OCT-92	750167	2086219	Qc	5910.75	5912.76	11.60	4.86	11.60	10.50	5902.9

APPENDIX I – Water Level Measurements in Industrial Area Monitoring Wells, Spring and Fall 1992

WELL	DTW	DATE	STATE NORTH	STATE EAST	COMPLETION UNIT/UTH	SURFACE ELEV.	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	WLE
4386	DRY	01-OCT-92	749404	2085869	Qrf	5972.91	5974.46	16.75	3.99	16.75	17.00	5974.5
4486	8.14	01-OCT-92	749254	2082234	Qrf	6019.93	6021.96	26.25	3.23	26.25	25.50	6013.8
0187	10.41	01-OCT-92	748127	2083653	fill	5992.49	5994.08	12.08	3.38	11.83	11.80	5983.7
0587	44.59	01-OCT-92	748081	2084849	Kss & Ksltss	5927.85	5929.99	51.50	42.00	51.25	11.00	5885.4
0987	19.39	02-OCT-92	749068	2085348	Kss	5980.22	5981.70	32.40	14.50	32.15	12.50	5962.3
1087	DRY	01-OCT-92	748946	2085290	Qrf	5981.95	5983.52	12.00	3.50	12.00	11.30	5983.5
1087	13.77	02-OCT-92	748946	2085290	Qrf	5981.95	5983.52	12.00	3.50	12.00	11.30	5969.8
1287	10.87	02-OCT-92	748581	2086066	Kcslt	5934.81	5936.30	10.24	4.91	10.01	3.50	5925.4
1587	21.77	02-OCT-92	749011	2086249	Qrf	5971.27	5972.79	22.53	5.80	22.06	21.90	5951.0
1687	90.53	02-OCT-92	749130	2086249	Kslt	5969.49	5970.79	125.24	100.00	125.00	22.20	5880.3
1787	21.2	01-OCT-92	749415	2086308	Qrf	5968.01	5969.56	25.75	3.50	25.50	25.00	5948.4
1887	127.09	01-OCT-92	749404	2086339	Kss & Ksslt	5967.99	5969.49	133.70	127.00	133.45	25.20	5842.4
1987	13.72	01-OCT-92	749623	2086171	Qrf	5968.44	5969.91	11.89	3.50	11.65	10.80	5956.2
2087	108.8	01-OCT-92	749634	2086155	Kslt/clst	5968.66	5970.14	116.36	107.26	116.11	11.80	5861.3
2187	7.84	05-OCT-92	749969	2085799	Qc	5928.43	5929.69	10.56	3.26	10.41	8.00	5921.9
2287	80.57	05-OCT-92	749924	2085822	Kss & Kslt	5931.18	5932.80	88.70	81.41	88.46	12.80	5852.2
2387	18.87	01-OCT-92	749404	2085910	Kslt/ss & Kclst	5972.79	5974.49	37.85	17.19	37.61	15.20	5955.6
3787	9.49	05-OCT-92	750494	2085224	Qrf	5967.52	5968.99	9.00	3.50	8.77	8.00	5959.5
3887	11.15	05-OCT-92	750396	2085094	Qrf	5972.15	5973.90	9.50	3.50	9.27	7.80	5962.8
3987	89.54	05-OCT-92	751081	2085268	Kslt & Kclst	5946.95	5948.42	117.39	109.99	117.14	3.50	5858.9
4387	9.73	01-OCT-92	748030	2084788	Qc	5925.06	5926.41	12.50	3.50	12.25	12.00	5916.7
4487	DRY	01-OCT-92	748306	2085435	Qc	5949.63	5951.10	3.70	1.50	3.50	3.20	5951.1
4587	90.74	01-OCT-92	748313	2085451	Kss & Kslt & Kclst	5949.32	5950.91	101.30	89.50	97.05	4.00	5860.2
5087	DRY	01-OCT-92	748123	2085334	Qc	5933.14	5934.78	13.70	3.50	13.50	12.50	5934.8
5387	10.94	01-OCT-92	747985	2083912	Qc	5959.99	5961.81	9.30	3.50	9.05	10.00	5950.9
5487	6	01-OCT-92	747985	2084032	Qc	5955.85	5957.62	4.68	1.33	4.53	4.00	5951.6
5687	8.48	05-OCT-92	750638	2084423	Qrf	5978.39	5979.77	9.92	3.52	9.67	9.40	5971.3
B208089	13.22	02-OCT-92	751143	2085876	Qc	5935.40	5937.07	14.16	3.40	12.90	12.20	5923.9
B208089	13.27	05-OCT-92	751143	2085876	Qc	5935.40	5937.07	14.16	3.40	12.90	12.20	5923.8
B208189	22.88	02-OCT-92	751138	2085885	Kclst	5935.40	5937.46	27.58	16.90	26.34	11.00	5914.6
B208189	22.72	05-OCT-92	751138	2085885	Kclst	5935.40	5937.46	27.58	16.90	26.34	11.00	5914.7
B208289	17.33	02-OCT-92	751739	2086289	Kslt/clst & Kclst	5850.70	5852.95	16.16	5.95	15.42	0.20	5835.6
B208389	DRY	02-OCT-92	751687	2085584	Kscl/st & Kclst	5876.80	5878.66	9.05	3.37	7.80	0.20	5878.7
B208489	DRY	02-OCT-92	751683	2085636	Kclst	5876.30	5878.34	30.49	19.76	29.22	15.50	5878.3
B208589	DRY	02-OCT-92	751804	2085477	Qc	5856.50	5858.35	5.07	3.23	3.99	3.60	5858.4
B208689	14.8	02-OCT-92	751728	2085250	Kslt/clst	5867.60	5869.60	23.07	12.32	21.80	7.30	5854.8
B208789	9.77	02-OCT-92	751755	2084450	Qc	5907.10	5909.03	12.32	2.88	10.93	8.40	5899.3
B210489	6.42	02-OCT-92	751802	2085513	Qc	5856.40	5858.71	8.67	2.98	7.41	7.00	5852.3
P114389	8.17	01-OCT-92	750337	2081246	Qrf	6033.40	6035.43	50.10	44.40	48.80	48.30	6027.3
P114489	14.58	01-OCT-92	750337	2081246	Qrf	6033.40	6035.43	50.10	44.40	48.80	48.30	6020.9
P114589	7.64	01-OCT-92	750396	2081731	Qrf	6024.10	6025.90	37.60	32.54	36.50	27.50	6018.3
P114689	12.24	01-OCT-92	749943	2083044	Qrf	6004.00	6005.76	23.50	17.83	22.24	22.00	5993.5

APPENDIX I – Water Level Measurements in Industrial Area Monitoring Wells, Spring and Fall 1992

WELL	DTW	DATE	STATE NORTH	STATE EAST	COMPLETION UNIT/LITH	SURFACE ELEV.	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	WLE
P114789	8.04	01-OCT-92	749940	2082610	Qrf	6010.70	6012.40	27.60	21.81	26.23	26.00	6004.4
P114889	5.52	01-OCT-92	749926	2082127	Qrf	6016.60	6018.26	15.55	9.89	14.30	13.80	6012.7
P114989	12.77	01-OCT-92	749959	2081661	Qrf	6029.80	6031.84	39.30	33.59	38.00	37.50	6019.1
P115089	15.89	01-OCT-92	749930	2081258	Qrf	6038.10	6040.10	42.01	36.27	40.70	40.20	6024.2
P115489	11.28	01-OCT-92	749507	2082135	Qrf	6023.40	6025.10	27.75	22.09	26.50	26.00	6013.8
P115589	8.17	01-OCT-92	749551	2082658	Qrf	6014.10	6015.77	30.70	25.05	29.48	29.00	6007.6
P115689	13.02	01-OCT-92	749532	2083019	Qrf	6006.90	6008.71	21.31	16.23	20.20	19.70	5995.7
P119389	5.73	05-OCT-92	750280	2081921	Qrf	6011.70	6013.18	18.21	12.50	16.90	16.40	6007.5
P207389	8.69	05-OCT-92	750195	2084468	Kss & Kclst	5981.02	5982.77	16.22	10.53	15.18	7.00	5974.1
P207489	8.53	05-OCT-92	750197	2084481	Qrf	5980.71	5982.64	8.23	2.39	7.00	6.50	5974.1
P207589	25.58	05-OCT-92	750395	2084843	Ksltclst	5974.06	5975.96	25.10	14.40	23.86	9.40	5950.4
P207689	8.74	05-OCT-92	750398	2085318	Qrf	5966.32	5967.88	14.36	3.64	13.10	12.60	5959.1
P207789	29.17	05-OCT-92	750392	2085343	Ksltclst	5965.88	5967.75	28.63	17.90	27.34	12.90	5938.6
P207889	10.08	05-OCT-92	750671	2085343	Qrf	5962.82	5964.90	8.95	3.26	7.70	8.50	5954.8
P207989	18.45	05-OCT-92	750671	2085330	Kclst	5963.09	5965.17	21.73	11.00	20.48	5.80	5946.7
P208889	86.22	05-OCT-92	751086	2085249	Ksltclst	5947.30	5949.25	99.16	87.76	96.94	5.50	5863.0
P208989	17.55	05-OCT-92	751044	2084839	Ksltss & Ksltclst	5962.53	5964.56	26.12	15.40	24.84	3.50	5947.0
P209089	25.13	05-OCT-92	750566	2084910	Ksltclst	5972.16	5974.25	27.21	16.50	25.96	11.50	5949.1
P209189	13.5	05-OCT-92	750762	2084309	Kss & Ksltclst	5980.66	5982.21	36.08	13.30	35.01	10.30	5968.7
P209289	14.62	05-OCT-92	750863	2084139	Qrf	5981.59	5983.42	13.40	8.20	12.66	12.20	5968.8
P209389	18.42	05-OCT-92	750864	2084130	Kss & Ksltss & Kcss	5981.47	5983.39	30.05	16.82	28.80	13.80	5965.0
P209489	29.37	05-OCT-92	750991	2084634	Kss & Ksltss	5977.98	5980.10	36.25	15.48	35.00	9.00	5950.7
P209589	18.75	05-OCT-92	751071	2085286	Ksltclst & Ksclst	5948.17	5950.04	19.77	9.07	18.52	4.10	5931.3
P209689	28.37	05-OCT-92	750533	2085514	Ksltclst	5962.63	5964.43	27.93	17.20	26.67	12.20	5936.1
P209789	10.05	05-OCT-92	750579	2085481	Qrf	5962.82	5964.94	13.75	3.00	12.50	12.00	5954.9
P209889	5.34	05-OCT-92	751194	2084984	Ksltclst	5940.28	5942.40	19.63	8.89	18.33	3.90	5937.1
P209989	DRY	02-OCT-92	751565	2084649	Qc	5898.10	5900.40	9.58	3.81	8.18	7.70	5900.4
P210089	18.6	05-OCT-92	751564	2084639	Ksltclst	5898.40	5900.40	22.93	12.20	21.50	7.20	5881.8
P210089	18.72	02-OCT-92	751564	2084639	Ksltclst	5898.40	5900.40	22.93	12.20	21.50	7.20	5881.7
P213689	9.47	01-OCT-92	749460	2083736	Qrf	5994.30	5996.04	14.80	9.08	13.50	13.00	5986.6
P213889	DRY	01-OCT-92	750466	2086109	Kss & Kcss	5954.10	5955.94	22.03	11.30	20.83	8.00	5955.9
P213989	DRY	01-OCT-92	750468	2086102	Qrf	5954.30	5956.38	7.20	3.29	6.92	6.70	5956.4
P215789	15.79	01-OCT-92	749470	2083430	Qrf	6002.00	6003.66	19.59	14.53	18.50	18.00	5987.9
P218089	9.49	05-OCT-92	749941	2084020	Qrf	5985.80	5987.55	8.69	3.00	7.43	6.00	5978.1
P218389	14.53	05-OCT-92	750831	2085648	Qrf	5956.20	5958.45	13.77	8.06	12.50	12.00	5943.9
P219189	9.8	05-OCT-92	751222	2084010	Qc	5941.20	5943.15	12.77	7.08	11.50	11.00	5933.4
P219489	13.46	05-OCT-92	750415	2085651	Qrf	5959.50	5961.15	24.20	18.48	22.90	22.50	5947.7
P219589	22.52	05-OCT-92	750268	2085536	Kclst & Ksclst	5963.80	5965.70	26.99	21.27	25.70	17.20	5943.2
P313589	9.32	01-OCT-92	748510	2083547	Qrf	6008.50	6010.11	13.76	8.08	12.50	11.00	6000.8
P314089	10.05	01-OCT-92	749461	2083653	Qrf	5996.70	5998.49	11.06	5.37	9.79	9.30	5988.4
P314289	13.33	01-OCT-92	748216	2083280	Qrf	6010.10	6011.77	14.80	9.11	13.51	13.00	5998.4
P320089	15.23	02-OCT-92	748799	2083280	Qrf	6009.90	6011.87	20.08	14.38	18.81	18.80	5996.6

APPENDIX I – Water Level Measurements in Industrial Area Monitoring Wells, Spring and Fall 1992

WELL	DTW	DATE	STATE NORTH	STATE EAST	COMPLETION UNIT/LITH	SURFACE ELEV.	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	WLE
P414189	10.87	01-OCT-92	749059	2082986	Qrf	6010.60	6012.18	19.78	14.09	18.50	18.00	6001.3
P415889	16.53	01-OCT-92	749125	2080718	Qrf	6050.40	6052.60	44.50	38.75	43.20	49.50	6036.1
P415989	9.05	01-OCT-92	749025	2081011	Qrf	6044.90	6046.71	28.00	22.30	26.73	34.00	6037.7
P416089	11.36	01-OCT-92	748605	2080720	Qrf	6051.70	6053.95	35.39	29.24	34.00	33.50	6042.6
P416189	11.54	01-OCT-92	748606	2081120	Qrf	6045.60	6047.95	30.94	25.23	29.66	29.20	6036.4
P416289	14.08	01-OCT-92	748598	2081555	Qrf	6038.60	6040.22	24.77	19.07	23.50	23.00	6026.1
P416389	16.48	01-OCT-92	748313	2080631	Qrf	6055.40	6057.14	31.40	25.69	30.10	30.00	6040.7
P416489	19.28	01-OCT-92	748210	2081113	Qrf	6048.50	6050.15	26.98	21.27	25.70	25.20	6030.9
P416589	27.73	01-OCT-92	748211	2081546	Qrf	6041.20	6042.81	32.10	27.04	31.00	30.50	6015.1
P416689	29.73	01-OCT-92	748147	2081941	Qrf	6035.00	6036.55	33.76	28.09	32.50	32.00	6006.8
P416789	27.53	01-OCT-92	748206	2082382	Qrf	6027.80	6029.27	28.20	22.48	26.90	26.40	6001.7
P416889	18.37	01-OCT-92	748206	2082815	Qrf	6017.40	6018.79	21.52	15.86	20.27	20.20	6000.4
P418289	10.42	02-OCT-92	748952	2082653	Qrf	6016.90	6018.20	26.70	9.60	23.50	23.00	6007.8
00191	20.25	02-OCT-92	749237	2086244	Qrf	5968.86	5970.44	0.00	15.00	25.00	24.20	5950.2
01391	12.99	01-OCT-92	749402	2085226	Qrf	5973.70	5975.30	16.00	6.00	14.00	14.50	5962.3
01491	16.21	01-OCT-92	749430	2085474	Kss & Kcs	5970.37	5972.03	26.00	14.00	24.00	1.60	5955.8
01791	15.21	01-OCT-92	749504	2086018	Ksltss & Ksclst	5965.78	5967.41	20.00	10.00	18.00	8.00	5952.2
01891	19.42	01-OCT-92	749438	2086023	Ksltss & Ksltclst	5971.76	5973.37	32.00	20.00	30.00	12.40	5954.0
02091	22.11	01-OCT-92	749617	2086428	Ksclst, Kssit, Ksltclst	5965.19	5966.65	32.60	15.60	30.60	16.10	5944.5
02191	DRY	01-OCT-92	749708	2086166	Qrf	5965.81	5967.51	15.00	8.00	13.00	13.50	5967.5
02291	13.51	01-OCT-92	749880	2086139	Ksclst & Kcss	5936.66	5938.26	18.50	11.50	16.50	8.80	5924.8
2391	DRY	02-OCT-92	749853	2086600	Qrf	5956.82	5958.43	8.00	3.00	6.00	6.90	5958.4
02491	16.9	01-OCT-92	749949	2086432	Ksltss, Kssit	5944.54	5946.21	18.80	11.80	16.80	8.50	5929.3
02691	8.81	01-OCT-92	750385	2086043	Ksltss & Ksltclst	5934.78	5936.38	18.00	6.00	16.00	1.10	5927.6
06591	20.01	02-OCT-92	749064	2085535	Ksclst & Ksltclst	5978.28	5979.78	50.00	33.00	48.00	15.40	5959.8
06691	22.02	02-OCT-92	749068	2085714	Qrf	5978.34	5979.94	25.10	13.10	23.10	22.00	5957.9
06791	22.85	02-OCT-92	748855	2085646	Qrf	5978.87	5980.38	23.20	11.20	21.20	21.20	5957.5
06891	16.18	02-OCT-92	749258	2085883	Qrf	5974.14	5975.62	16.00	6.00	14.00	14.00	5959.4
06991	20.99	02-OCT-92	749168	2085990	Qrf	5972.91	5974.57	31.00	14.00	29.00	28.60	5953.6
07191	21.21	02-OCT-92	748850	2085908	Qrf	5974.79	5976.34	23.10	11.10	21.10	20.00	5955.1
07291	22.12	02-OCT-92	748748	2085766	Qrf	5977.27	5978.80	22.60	10.60	20.60	20.00	5956.7
07391	7.88	02-OCT-92	748547	2085827	Qrf & Kclst	5949.14	5950.61	13.40	5.40	11.40	8.10	5942.7
08891	23.55	02-OCT-92	749128	2085866	Qrf	5976.36	5978.06	27.30	15.30	25.30	23.00	5954.5
09091	23.4	02-OCT-92	748918	2085943	Qrf	5975.16	5976.79	26.70	14.70	24.70	24.00	5953.4
09691	11.3	02-OCT-92	748572	2086038	Ksltss & Kclst	5935.64	5937.05	16.00	6.00	14.00	3.10	5925.8
12091	19.48	01-OCT-92	749436	2086009	Ksltss	5971.59	5973.27	24.00	14.00	22.00	13.20	5953.8
12291	16.3	01-OCT-92	749429	2085441	Kcss & Kss	5970.98	5972.73	16.10	7.10	14.10	2.00	5956.4
13091	21.68	02-OCT-92	748960	2085992	Qrf	5973.68	5975.20	23.30	11.30	21.30	19.50	5953.5
13191	19.48	02-OCT-92	749071	2085530	Ksclst	5978.25	5979.90	27.70	15.70	25.70	15.40	5960.4
13291	DRY	02-OCT-92	749060	2085523	Qrf	5978.48	5979.97	17.70	5.70	15.70	15.40	5980.0
13291	DRY	01-OCT-92	749060	2085523	Qrf	5978.48	5979.97	17.70	5.70	15.70	15.40	5980.0
33491	10.91	01-OCT-92	748080	2084883	Qc & Ksclst	5926.06	5928.59	11.10	6.68	8.69	8.00	5917.7

APPENDIX I – Water Level Measurements in Industrial Area Monitoring Wells, Spring and Fall 1992

WELL	DTW	DATE	STATE NORTH	STATE EAST	COMPLETION UNIT/UTH	SURFACE ELEV.	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	WLE
33691	10.31	01-OCT-92	748112	2084994	Qc	5926.99	5929.24	10.60	6.19	8.11	7.80	5918.9
33891	10.6	01-OCT-92	747961	2084641	Qc & Kclst	5927.54	5929.94	11.10	6.70	8.70	8.10	5919.3
34591	13.61	02-OCT-92	748462	2085621	Qc & Kclst	5952.19	5954.63	11.30	6.90	8.90	8.20	5941.0
34791	6.41	02-OCT-92	748377	2085521	Qc	5951.39	5953.91	10.42	6.00	8.00	8.00	5947.5
35391	12.49	01-OCT-92	748011	2083907	Kclst	5960.73	5963.03	10.50	6.10	8.11	6.00	5950.5
35991	17.24	01-OCT-92	748057	2083756	Qc	5973.25	5976.45	16.10	8.68	13.70	12.20	5959.2
36191	10.37	01-OCT-92	748091	2084198	Qc	5962.89	5965.17	17.00	9.52	14.60	14.00	5954.8
36391	26.09	01-OCT-92	748042	2084294	Qrf	5964.57	5967.01	29.80	17.43	27.41	26.40	5940.9
36691	25.83	01-OCT-92	748027	2084421	Qc	5949.76	5951.52	27.83	15.83	25.83	25.00	5925.7
37191	9.59	01-OCT-92	748036	2084533	Qc	5945.91	5948.29	23.07	11.12	21.07	20.50	5938.7
37591	9.73	01-OCT-92	748580	2084610	Qrf	5991.42	5993.45	14.60	7.60	12.60	12.00	5983.7
37691	DRY	01-OCT-92	748692	2085217	Qrf	5984.46	5985.24	18.50	6.51	16.50	16.20	5985.2
37891	40.8	01-OCT-92	748075	2084915	Kcsltst & Ksltst	5925.22	5926.29	55.20	43.20	53.20	4.70	5885.5
37991	47.77	01-OCT-92	748063	2084731	Kcsltst & Kssltst	5931.45	5933.55	57.20	45.20	55.20	6.90	5885.8
38191	11.19	01-OCT-92	748014	2084765	Qc	5924.47	5926.40	17.00	10.00	15.00	14.70	5915.2
38291	12.71	01-OCT-92	748032	2084801	Qc	5924.49	5926.71	10.70	6.70	8.70	8.40	5914.0
39691	12.88	01-OCT-92	748357	2083634	Qrf & Kclst	6006.26	6008.37	11.00	7.00	9.00	8.00	5995.5
SUPPLEMENTAL FALL 1992 DATA:												
2186	33.86	06-OCT-92	750855	2082501	Kss & Ksltclst	6004.76	6005.96	67.25	35.00	67.24	15.00	5972.1
2286	10.03	06-OCT-92	750718	2084411	Qrf	5978.77	5979.55	11.20	3.20	11.20	11.00	5969.5
2386	87.75	06-OCT-92	750338	2084259	Kslt & Ksltclst	5982.46	5982.46	117.25	113.00	117.25	8.20	5894.7
5687	8.5	06-OCT-92	750638	2084423	Qrf	5978.39	5979.77	9.92	3.52	9.67	9.40	5971.3
B208189	22.72	06-OCT-92	751138	2085885	Kclst	5935.40	5937.46	27.58	16.90	26.34	11.00	5914.7
P218089	9.49	06-OCT-92	749941	2084020	Qrf	5985.80	5987.55	8.69	3.00	7.43	6.00	5978.1
P419689	20.04	06-OCT-92	748522	2082513	Qrf & Kss	6022.40	6023.42	24.77	19.08	23.50	22.00	6003.4
1986	3.07	07-OCT-92	750894	2083296	Kclst	5943.08	5943.86	12.25	3.00	12.25	11.50	5940.8
2486	DRY	07-OCT-92	750338	2084277	Qrf	5982.45	5983.56	7.45	2.95	7.45	7.20	5983.6
2986	DRY	07-OCT-92	750599	2085687	Qrf	5959.58	5960.68	8.77	2.83	8.77	8.50	5960.7
P207989	18.35	07-OCT-92	750671	2085330	Kclst	5963.09	5965.17	21.73	11.00	20.48	5.80	5946.8
P209289	14.58	07-OCT-92	750863	2084139	Qrf	5981.59	5983.42	13.40	8.20	12.66	12.20	5968.8
P209389	18.4	07-OCT-92	750864	2084130	Kss & Ksltss & Kcss	5981.47	5983.39	30.05	16.82	28.80	13.80	5965.0
3086	7.36	08-OCT-92	751078	2084921	Kclst	5957.42	5958.39	14.93	2.48	14.93	2.50	5951.0
3286	53.91	08-OCT-92	751050	2084743	Kss & Ksltss	5966.08	5967.92	125.50	114.90	125.50	1.00	5914.0
P207789	29.14	08-OCT-92	750392	2085343	Ksltclst	5965.88	5967.75	28.63	17.90	27.34	12.90	5938.6
P208989	17.55	08-OCT-92	751044	2084839	Ksltss & Ksltclst	5962.53	5964.56	26.12	15.40	24.84	3.50	5947.0
P209089	25	08-OCT-92	750566	2084910	Ksltclst	5972.16	5974.25	27.21	16.50	25.96	11.50	5949.3
P209889	5.34	08-OCT-92	751194	2084984	Ksltclst	5940.28	5942.40	19.63	8.89	18.33	3.90	5937.1
36991	DRY	09-OCT-92	748180	2084177	Qrf & Kclst	5969.48	5972.31	10.62	6.62	8.62	8.00	5972.3
37791	18.86	09-OCT-92	748592	2083753	Qrf	6002.16	6004.18	22.60	10.60	20.60	20.00	5985.3

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WELL	DTW	DATE	STATE NORTH	STATE EAST	COMPLETION UNIT/LITH	SURFACE ELEV.	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	WLE
5187	15.57	09-OCT-92	748103	2083850	fill?	5963.27	5965.22	14.00	3.58	13.84	12.50	5949.7
5287	10.42	09-OCT-92	748145	2084067	fill?	5967.85	5969.57	20.50	3.50	20.25	20.00	5959.2
6186	10.74	09-OCT-92	749198	2083717	Qrf	5999.47	6000.60	12.25	5.00	12.00	11.50	5989.9
P207689	8.77	09-OCT-92	750398	2085318	Qrf	5966.32	5967.88	14.36	3.64	13.10	12.60	5959.1
P317989	9.68	09-OCT-92	748891	2084272	Qrf	5990.90	5992.84	8.73	3.00	7.49	6.40	5983.2
2187	7.84	12-OCT-92	749969	2085799	Qc	5928.43	5929.69	10.56	3.26	10.41	8.00	5921.9
2287	80.57	12-OCT-92	749924	2085822	Kss & Kslt	5931.18	5932.80	88.70	81.41	88.46	12.80	5852.2
2586	28.66	12-OCT-92	750412	2084831	Ksltclst & Kclst	5975.24	5977.14	82.00	59.90	82.00	8.00	5948.5
2686	12.08	12-OCT-92	750411	2084841	Qrf	5975.42	5977.17	11.00	3.75	11.00	10.50	5965.1
37791	18.86	12-OCT-92	748592	2083753	Qrf	6002.16	6004.18	22.60	10.60	20.60	20.00	5985.3
5187	15.57	12-OCT-92	748103	2083850	fill?	5963.27	5965.22	14.00	3.58	13.84	12.50	5949.7
6186	10.74	12-OCT-92	749198	2083717	Qrf	5999.47	6000.60	12.25	5.00	12.00	11.50	5989.9
P207589	25.49	12-OCT-92	750395	2084843	Ksltclst	5974.06	5975.96	25.10	14.40	23.86	9.40	5950.5
P207889	10.09	12-OCT-92	750671	2085343	Qrf	5962.82	5964.90	8.95	3.26	7.70	8.50	5954.8
P209689	28.29	12-OCT-92	750533	2085514	Ksltclst	5962.63	5964.43	27.93	17.20	26.67	12.20	5936.1
P209189	13.78	13-OCT-92	750762	2084309	Kss & Ksltclst	5980.66	5982.21	36.08	13.30	35.01	10.30	5968.4
P317989	9.68	13-OCT-92	748891	2084272	Qrf	5990.90	5992.84	8.73	3.00	7.49	6.40	5983.2
5287	10.42	14-OCT-92	748145	2084067	fill?	5967.85	5969.57	20.50	3.50	20.25	20.00	5959.2
P209489	29.44	14-OCT-92	750991	2084634	Kss & Ksltss	5977.98	5980.10	36.25	15.48	35.00	9.00	5950.7
2786	73.33	15-OCT-92	750781	2085238	Kssits & Ksclst	5962.89	5963.88	133.00	128.50	133.00	11.00	5890.6
P209789	10.27	16-OCT-92	750579	2085481	Qrf	5962.82	5964.94	13.75	3.00	12.50	12.00	5954.7
3787	9.8	19-OCT-92	750494	2085224	Qrf	5967.52	5968.99	9.00	3.50	8.77	8.00	5959.2
3887	11.37	19-OCT-92	750396	2085094	Qrf	5972.15	5973.90	9.50	3.50	9.27	7.80	5962.5
P416289	15.37	19-OCT-92	748598	2081555	Qrf	6038.60	6040.22	24.77	19.07	23.50	23.00	6024.9
P418289	11.23	19-OCT-92	748952	2082653	Qrf	6016.90	6018.20	26.70	9.60	23.50	23.00	6007.0
P419689	20.3	19-OCT-92	748522	2082513	Qrf & Kss	6022.40	6023.42	24.77	19.08	23.50	22.00	6003.1
0587	45.11	21-OCT-92	748081	2084849	Kss & Ksltss	5927.85	5929.99	51.50	42.00	51.25	11.00	5884.9
4486	8.68	21-OCT-92	749254	2082234	Qrf	6019.93	6021.96	26.25	3.23	26.25	25.50	6013.3
36391	26.17	23-OCT-92	748042	2084294	Qrf	5964.57	5967.01	29.80	17.43	27.41	26.40	5940.8
33491	10.75	26-OCT-92	748080	2084883	Qc & Ksclst	5926.06	5928.59	11.10	6.68	8.69	8.00	5917.8
33891	10.79	26-OCT-92	747961	2084641	Qc & Kclst	5927.54	5929.94	11.10	6.70	8.70	8.10	5919.2
35391	12.36	26-OCT-92	748011	2083907	Kclst	5960.73	5963.03	10.50	6.10	8.11	6.00	5950.7
36191	8.3	26-OCT-92	748091	2084198	Qc	5962.89	5965.17	17.00	9.52	14.60	14.00	5956.9
36691	25.04	26-OCT-92	748027	2084421	Qc	5949.76	5951.52	27.83	15.83	25.83	25.00	5926.5
37991	48.26	26-OCT-92	748063	2084731	Kcsltst & Kssltst	5931.45	5933.55	57.20	45.20	55.20	6.90	5885.3
0187	10.27	27-OCT-92	748127	2083653	fill	5992.49	5994.08	12.08	3.38	11.83	11.80	5983.8
4387	9.31	27-OCT-92	748030	2084788	Qc	5925.06	5926.41	12.50	3.50	12.25	12.00	5917.1
37591	10.47	28-OCT-92	748580	2084610	Qrf	5991.42	5993.45	14.60	7.60	12.60	12.00	5983.0
P320089	15.71	28-OCT-92	748799	2083280	Qrf	6009.90	6011.87	20.08	14.38	18.81	18.80	5996.2
02291	14.15	29-OCT-92	749880	2086139	Ksclst & Kcss	5936.66	5938.26	18.50	11.50	16.50	8.80	5924.1
37891	41.61	29-OCT-92	748075	2084915	Kcsltst & Ksltst	5925.22	5926.29	55.20	43.20	53.20	4.70	5884.7
4587	90.68	29-OCT-92	748313	2085451	Kss & Kslt & Kclst	5949.32	5950.91	101.30	89.50	97.05	4.00	5860.2

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WELL	DTW	DATE	STATE NORTH	STATE EAST	COMPLETION UNIT/LITH	SURFACE ELEV.	TOP OF CASING	TD CSG	TOP SCRN	BOT SCRN	TOP BEDROCK	WLE
13591	DRY	02-OCT-92	749204	2086612	Qrf	5965.92	5967.55	18.00	6.00	16.00	16.00	5967.6
1386	8.67	12-OCT-92	751857	2086051	Qc	5840.47	5842.59	9.50	3.09	9.50	9.00	5833.9
1486	10.8	12-OCT-92	751856	2085838	Kss & Ksclst	5844.71	5846.71	55.36	39.42	55.36	11.00	5835.9
1586	7.08	07-OCT-92	751852	2085812	Qc	5848.43	5850.63	14.44	4.09	14.44	12.50	5843.6
1686	6.54	12-OCT-92	751747	2085260	Ksltss	5867.92	5869.55	45.06	39.06	45.06	7.00	5863.0
1786	8.54	07-OCT-92	751740	2085242	Qc	5868.43	5869.57	13.98	3.73	13.98	12.50	5861.0
37791	18.86	09-OCT-92	748592	2083753	Qrf	6002.16	6004.18	22.60	10.60	20.60	20.00	5985.3
37791	18.86	12-OCT-92	748592	2083753	Qrf	6002.16	6004.18	22.60	10.60	20.60	20.00	5985.3
B208689	13.74	12-OCT-92	751728	2085250	Ksltclst	5867.60	5869.60	23.07	12.32	21.80	7.30	5855.9
B208789	9.79	05-OCT-92	751755	2084450	Qc	5907.10	5909.03	12.32	2.88	10.93	8.40	5899.2
B208289	17.32	05-OCT-92	751739	2086289	Ksltclst & Kclst	5850.70	5852.95	16.16	5.95	15.42	0.20	5835.6
B210489	8.23	08-OCT-92	751802	2085513	Qc	5856.40	5858.71	8.67	2.98	7.41	7.00	5850.5

INDEX:

SURFACE ELEV. = elevation of land surface at well head, in feet above mean sea level

STATE NORTH = State plane coordinates, northing

STATE EAST = State plane coordinates, easting

COMPLETION UNIT/LITH = rock type in which well is screened:
- Kss = Cretaceous sandstone
- Kclst = Cretaceous claystone
- Kcslt = Cretaceous clayey siltstone
- Kcss = Cretaceous clayey sandstone
- Ksclst = Cretaceous sandy claystone
- Kslt = Cretaceous siltstone
- Ksltclst = Cretaceous silty claystone
- Ksltss = Cretaceous silty sandstone
- Kssslt = Cretaceous sandy siltstone
- Qa = Quaternary alluvium
- Qc = Quaternary colluvium
- Qrf = Quaternary Rocky Flats Alluvium

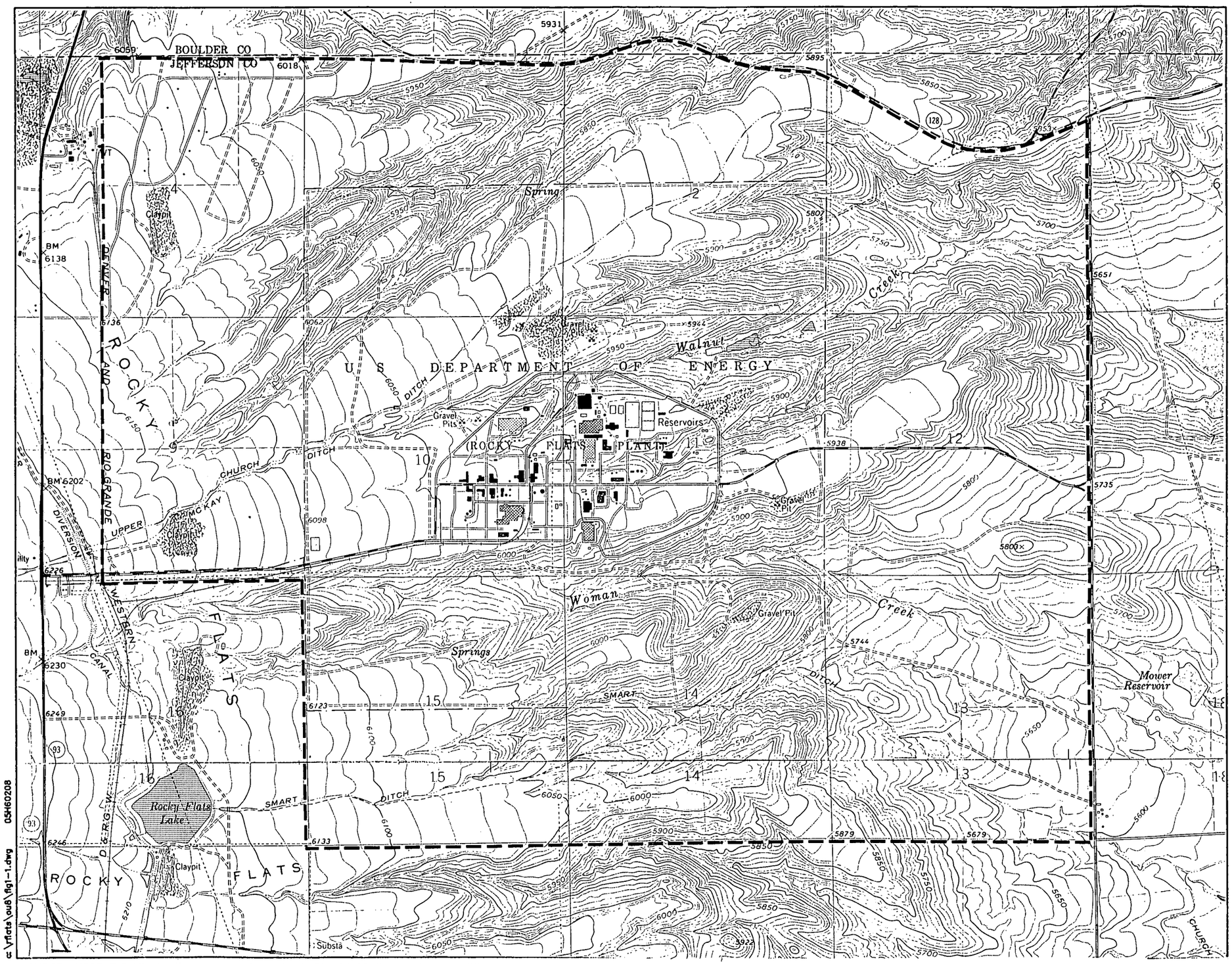
DTW = depth to water, measured in feet from top of casing

TD CSG = total depth of casing, in feet below top of casing

TOP SCRN = depth to top of well screen, in feet below top of casing

BOT SCRN = depth to bottom of well screen, in feet below top of casing

WLE = water-level elevation, in feet above mean sea level



SOURCE: USGS 7.5 Minute Topography Maps, Louisville PR 1979 and Golden 1980

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Rocky Flats Environmental
Technology Site

DRAFT FINAL

EXPLANATION

Rocky Flats Environmental Technology Site Boundary

COLORADO

GN MN
0°07' 2 MILS
12½° 222 MILS

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

N

0 1000 2000 4000

SCALE IN FEET

FIGURE 1-1
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Site Location and
Local Topography

EG&G ROCKY FLATS

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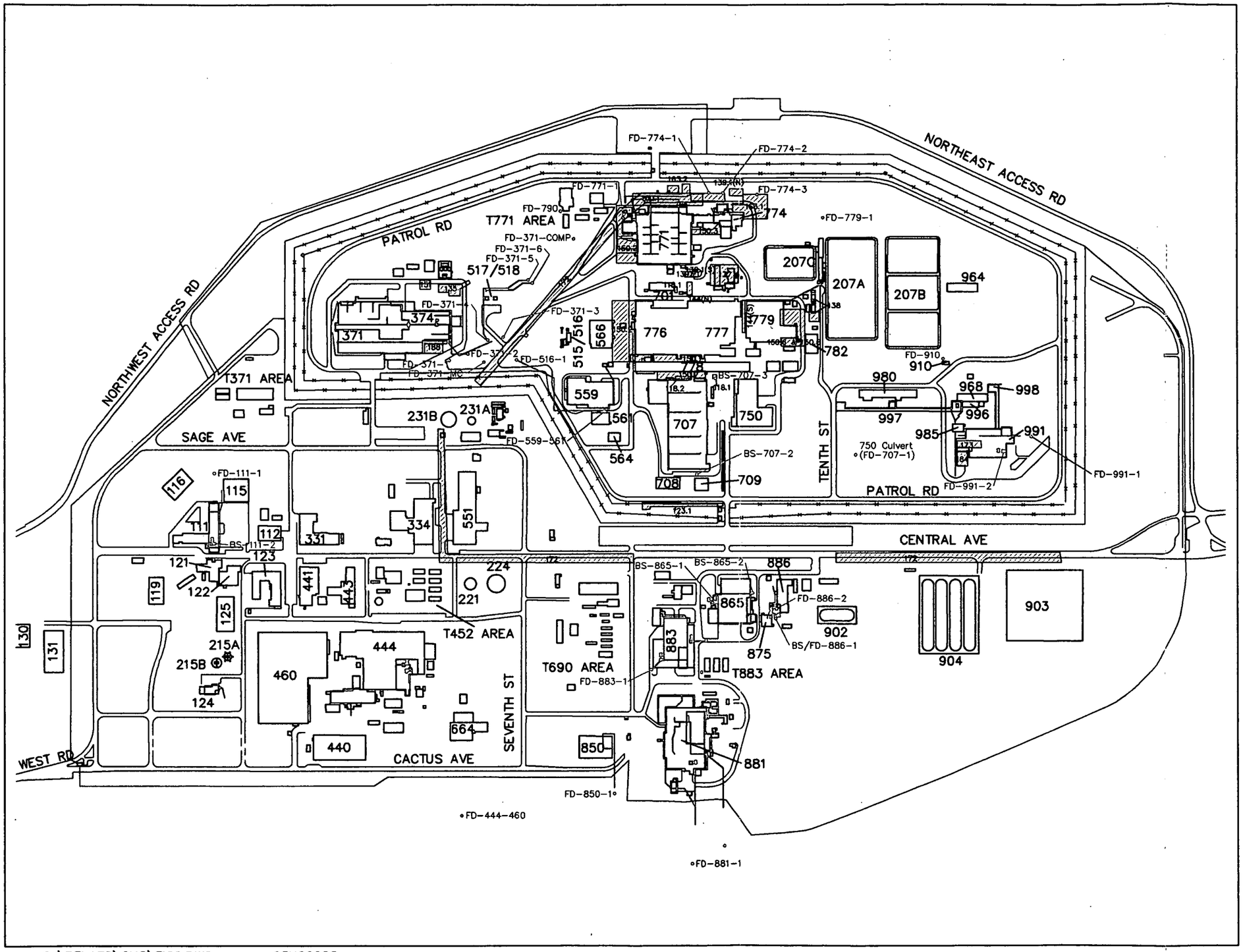

- Sample Station (Current)
- Sample Station (Historical)
- Foundation Drain
- Road
- Fence
- Structure/Building and Number
- Sump/Pit
- OU8 IHSS
- FD Foundation Drain
- BS Building Sump

N

100 300 500
0 200 400 FEET

FIGURE 1-2
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Current and Historical
Foundation Drain and Building Sump
Sampling Stations
and OU8 IHSSs

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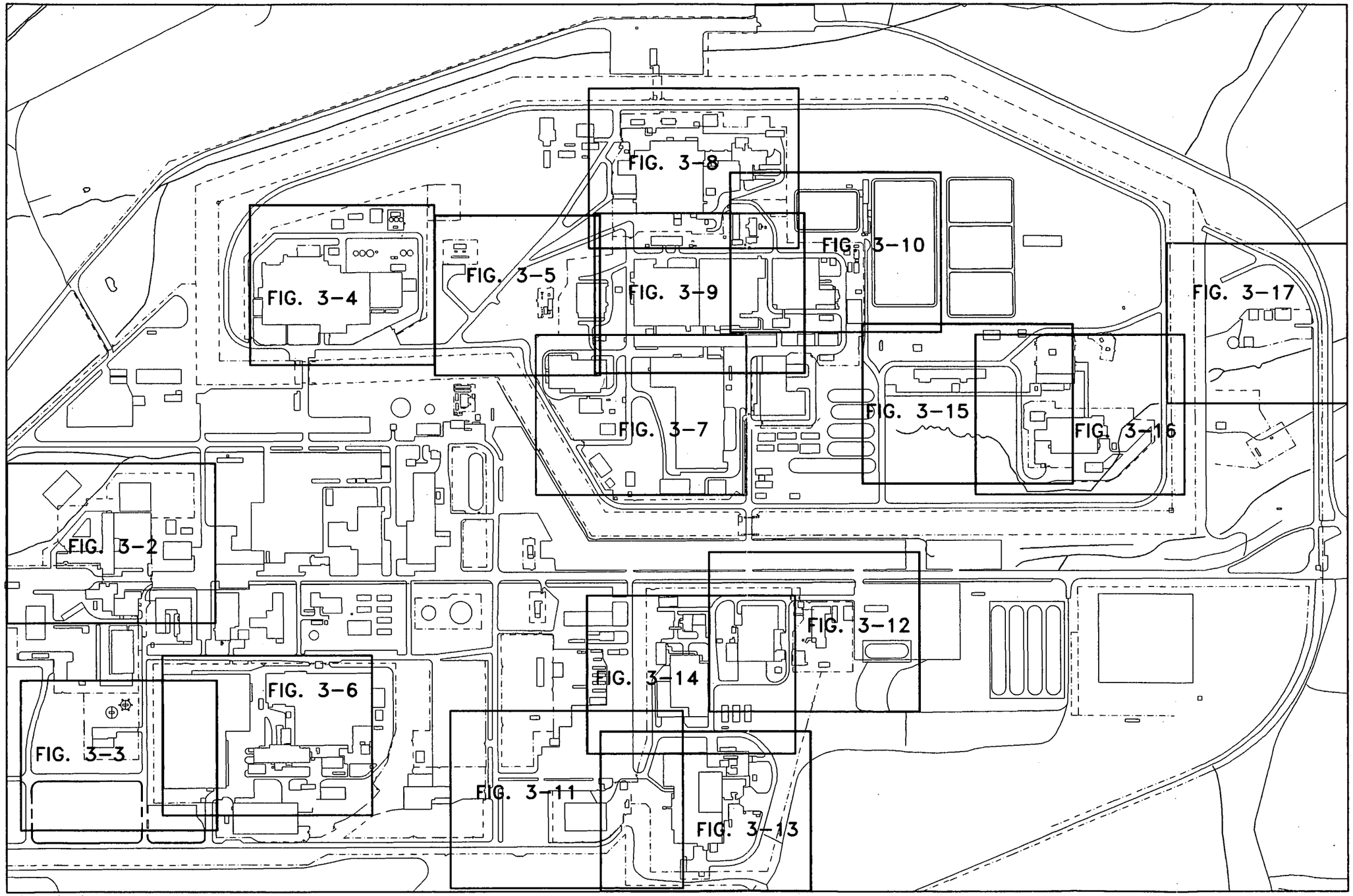
C:\RFLATS\OU8\FIG2.DWG 05H60208



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DRAFT FINAL

EXPLANATION

- FIG. 3-2 — Location Map Index
- Building
- Fence
- Paved Road
- Dirt Road
- Stream or Drainage

200 100 0 200 400 feet

FIGURE 3-1
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Index Map

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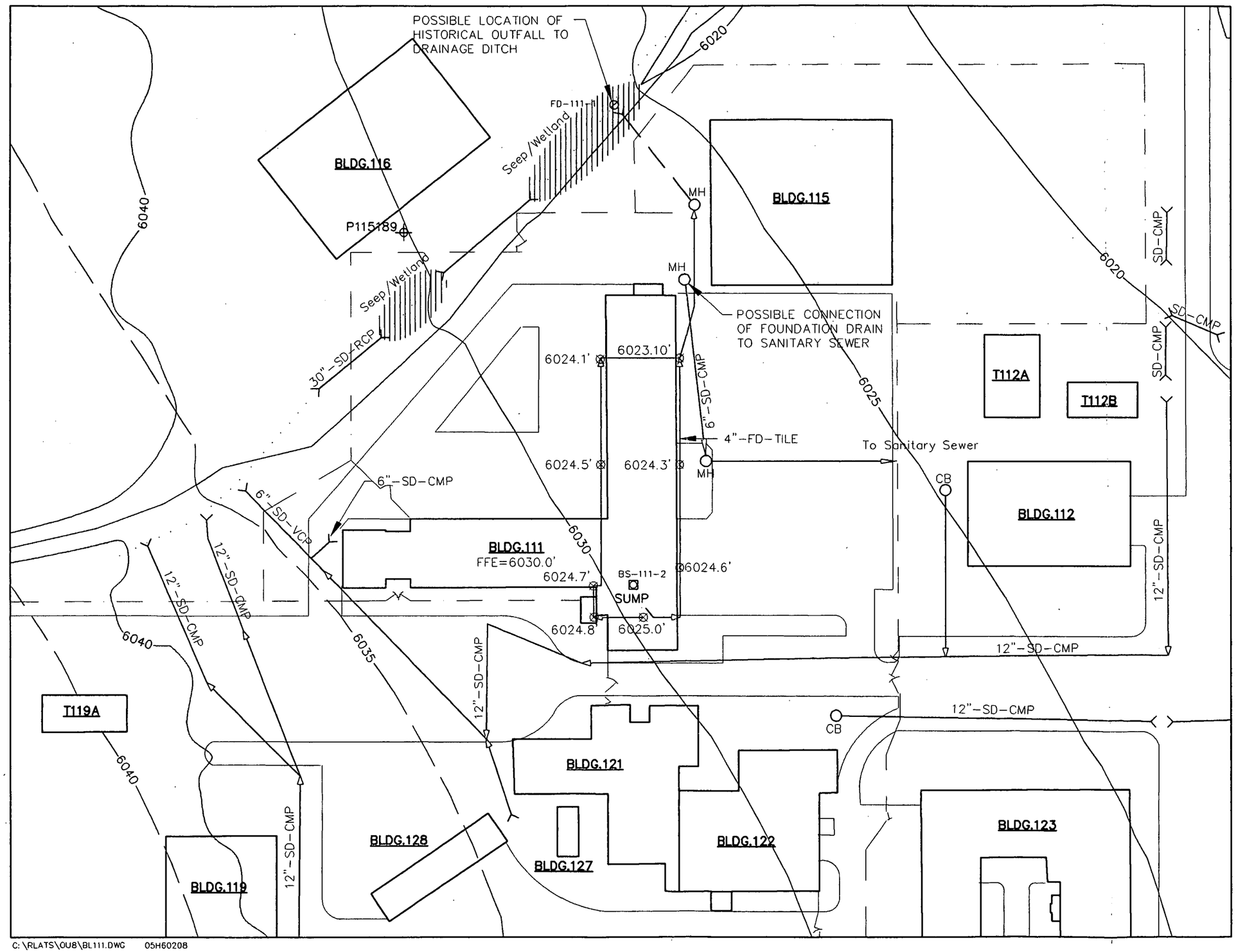

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EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- Suspected Storm Drain
- Sump
- FFE Finished Floor Elevation
- FD Foundation Drain
- SD Storm Drain
- BS Building Sump
- VCP Vitrified Clay Pipe
- CMP Corrugated Metal Pipe
- RCP Reinforced Concrete Pipe
- CB Catch Basin
- MH Manhole
- Fences
- Roads
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- Seep/Wetland
- Inferred Water Level

0 FEET 50 100 150

FIGURE 3-2
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Building 111
Foundation Drains, Building Sumps, and Outfalls

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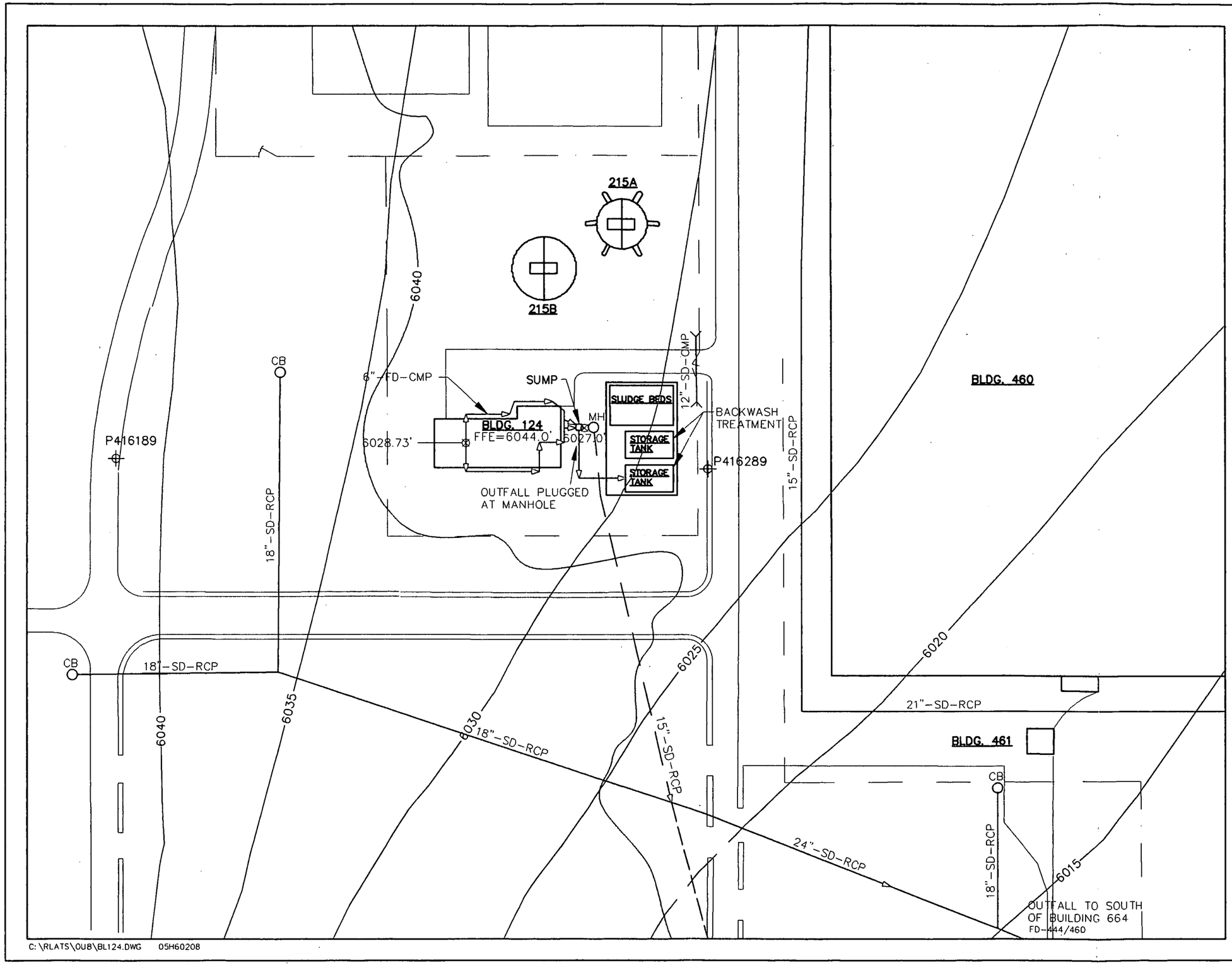

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EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- Original Drain Location
- Sump
- FFE Finished Floor Elevation
- FD Foundation Drain
- SD Storm Drain
- CMP Corrugated Metal Pipe
- MH Manhole
- RCP Reinforced Concrete Pipe
- CB Catch Basin
- Fences
- Roads
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992

0 FEET 50 100 150

FIGURE 3-3
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Building 124
Foundation Drains, Building Sumps, and Outfalls

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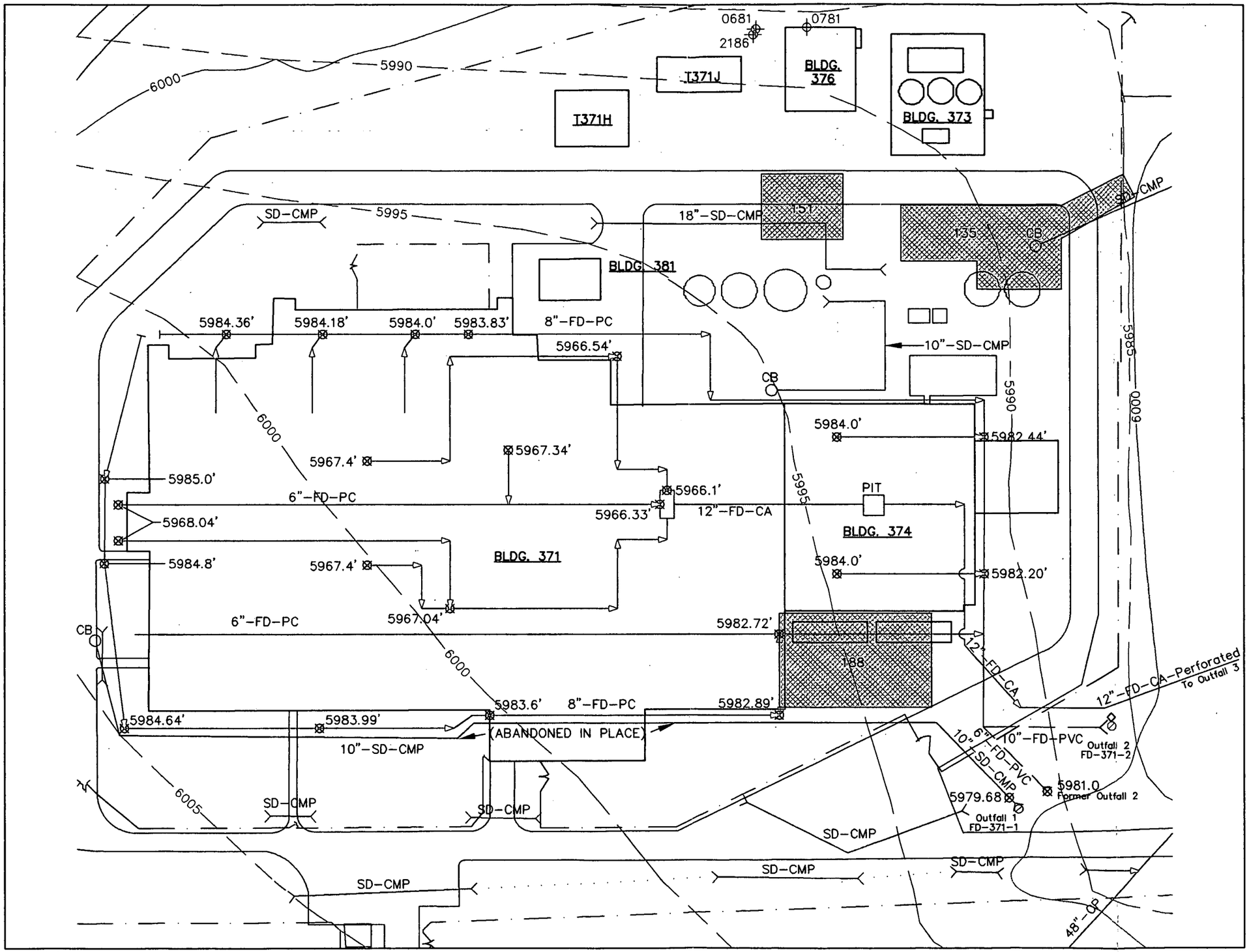

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DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- Possible Foundation Drain
- FD Foundation Drain
- SD Storm Drain
- CMP Corrugated Metal Pipe
- PVC PVC Pipe
- PC Porous Concrete
- CA Concrete Asbestos
- CB Catch Basin
- MH Manhole
- Fences
- Roads
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- Inferred Water Level
- 188 OU8 IHSS

0 FEET 50 100 150

FIGURE 3-4
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Buildings 371 and 374
Foundation Drains, Building
Sumps, and Outfalls

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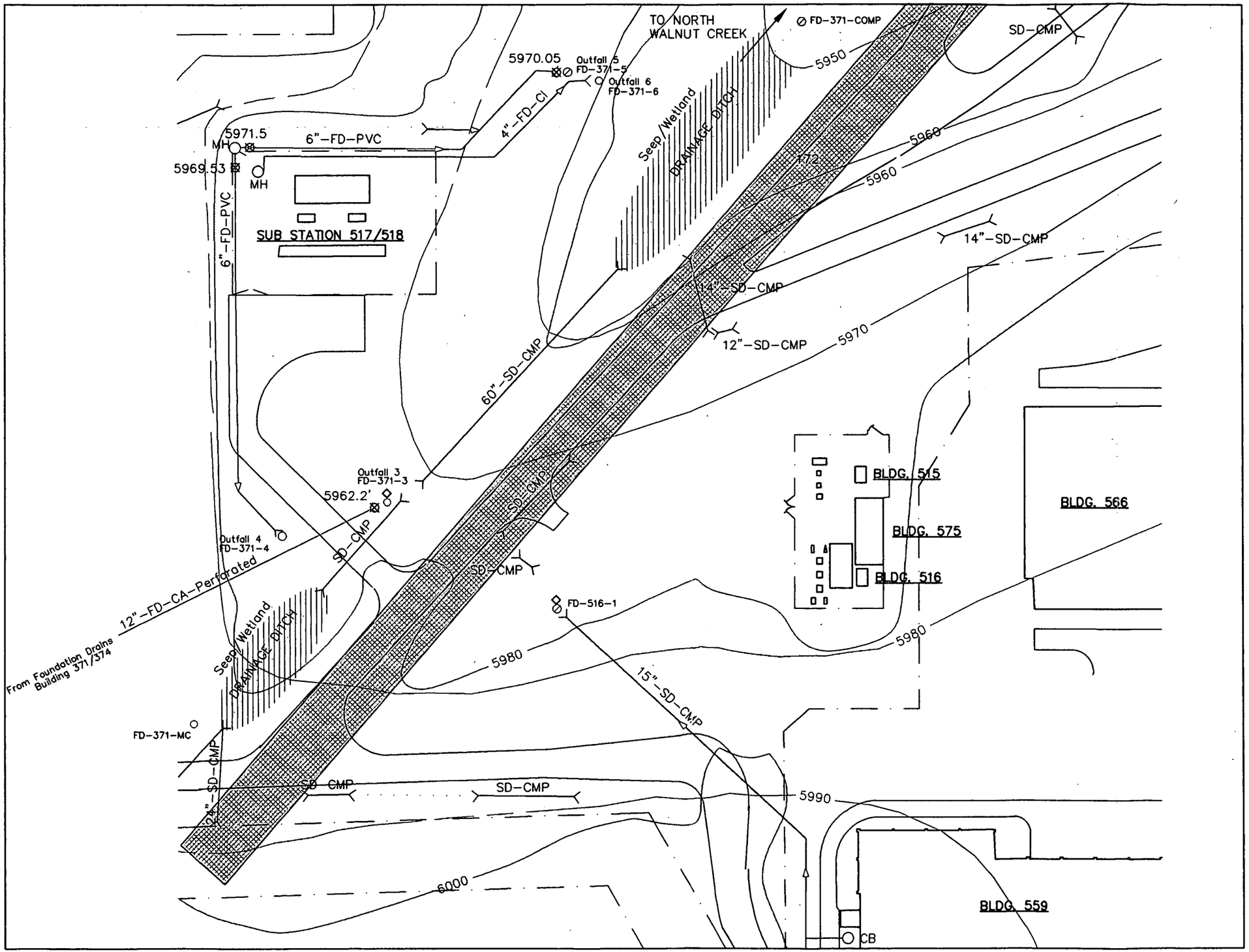

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DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- Possible Foundation Drain
- FD Foundation Drain
- SD Storm Drain
- CMP Corrugated Metal Pipe
- PVC PVC Pipe
- CA Concrete Asbestos
- CI Cast Iron
- CP Concrete Pipe
- CB Catch Basin
- Fences
- Roads
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- 172 OU8 IHSS
- Seep/Wetland

0 FEET 50 100 150

FIGURE 3-5
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Buildings Substation 517/518 Foundation Drains, Building Sumps, and Outfalls

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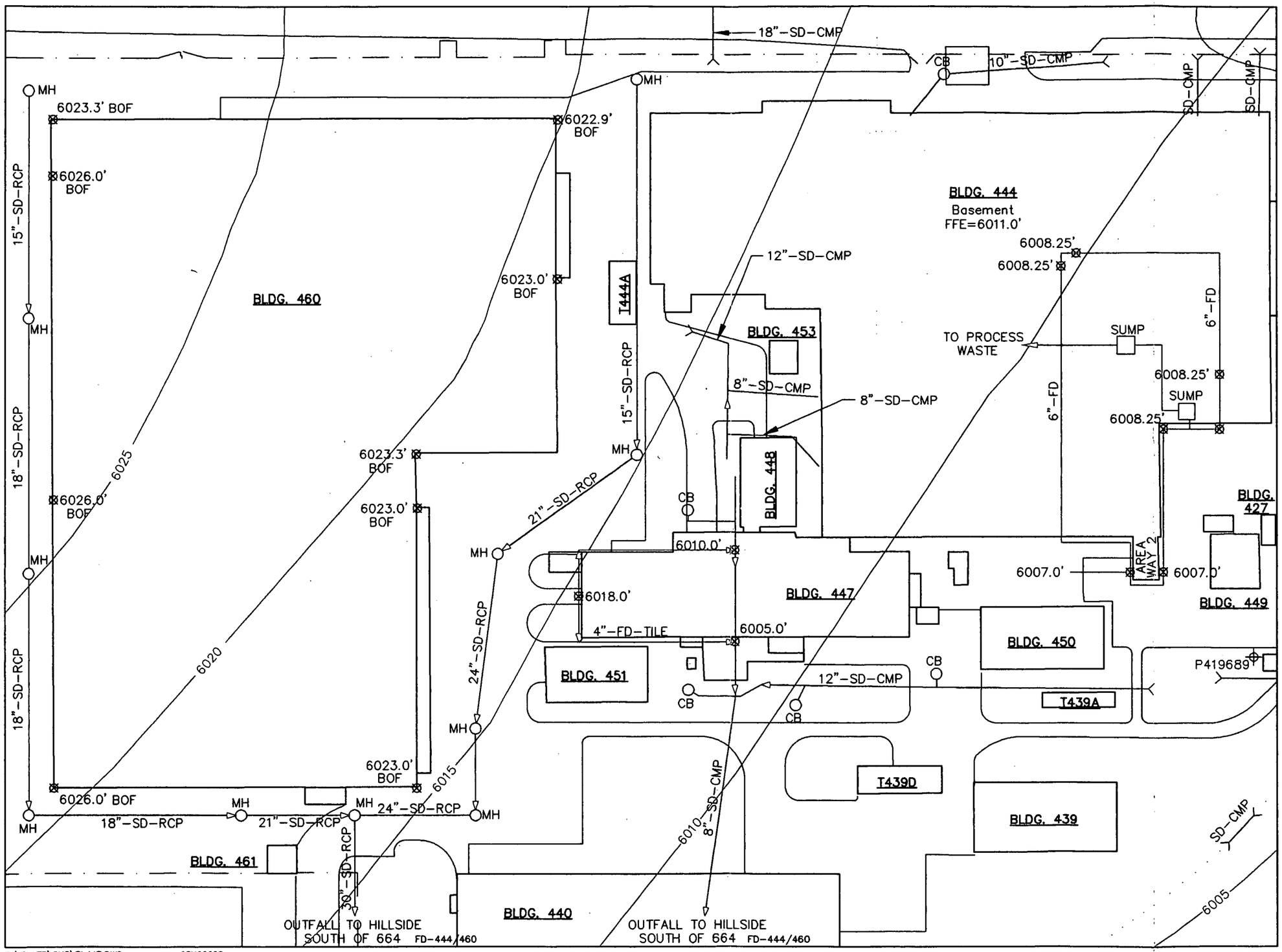

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DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- Sump
- FFE Finished Floor Elevation
- FD Foundation Drain
- SD Storm Drain
- BOF Bottom of Footing
- CMP Corrugated Metal Pipe
- DIP Ductile Iron Pipe
- PVC PVC Pipe
- CB Catch Basin
- MH Manhole
- RCP Reinforced Concrete Pipe
- Fences
- Roads
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992

0 FEET 50 100 150

FIGURE 3-6
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Buildings 444, 447, and 460 Foundation Drains, Building Sumps, and Outfalls

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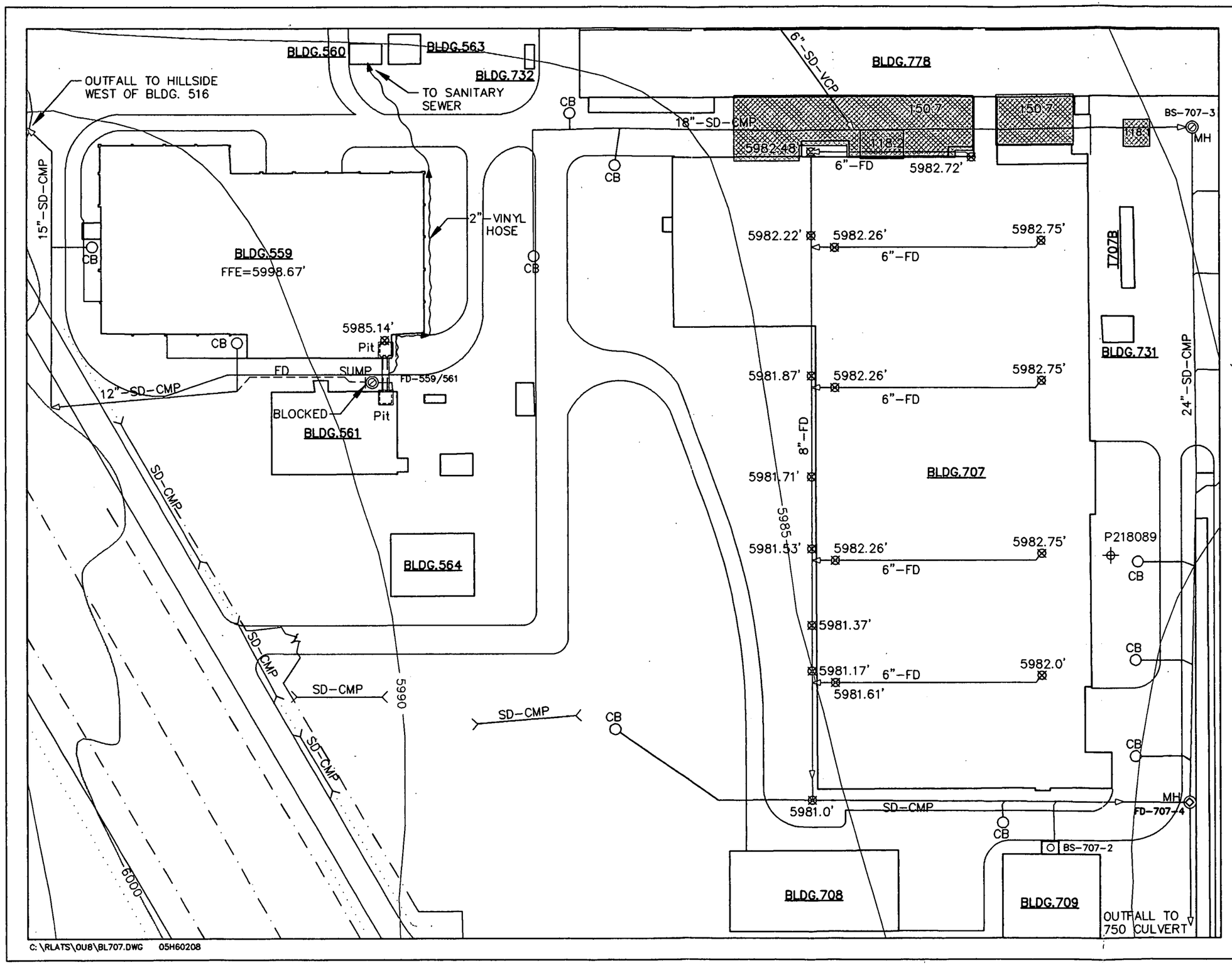

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DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- Abandoned Discharge Line
- FFE Finished Floor Elevation
- FD Foundation Drain
- SD Storm Drain
- BS Building Sump
- VCP Vitrified Clay Pipe
- CMP Corrugated Metal Pipe
- CB Catch Basin
- MH Manhole
- Fences
- Roads
- Tunnel
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- 150.7 OU8 IHSS

0 FEET 50 100 150

FIGURE 3-7
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Buildings 559, 561, and 707 Foundation Drains, Building Sumps, and Outfalls

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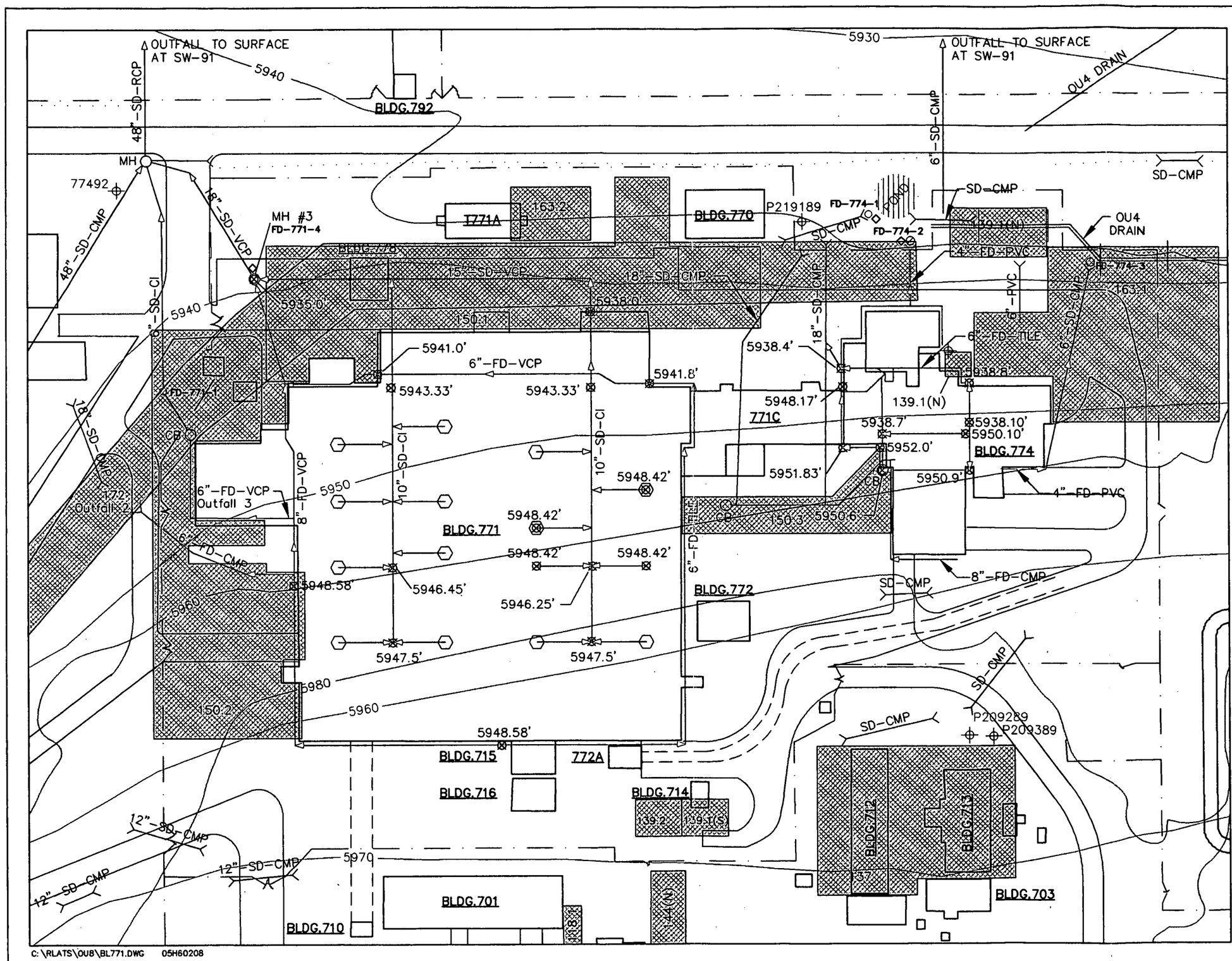

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Technology Site

DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- OU4 Drain
- FD Foundation Drain
- SD Storm Drain
- VCP Vitrified Clay Pipe
- CMP Corrugated Metal Pipe
- PVC PVC Pipe
- RCP Reinforced Concrete Pipe
- SW Surface Water Sample Point
- CI Cast Iron
- CB Catch Basin
- MH Manhole
- Fences
- Tunnels
- Roads
- Ditch
- Elevation Point
- Roof Downspout
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- 137 OU8 IHSS
- Pond

0 FEET 50 100 150

FIGURE 3-8
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Buildings 771 and 774
Foundation Drains, Building
Sumps, and Outfalls

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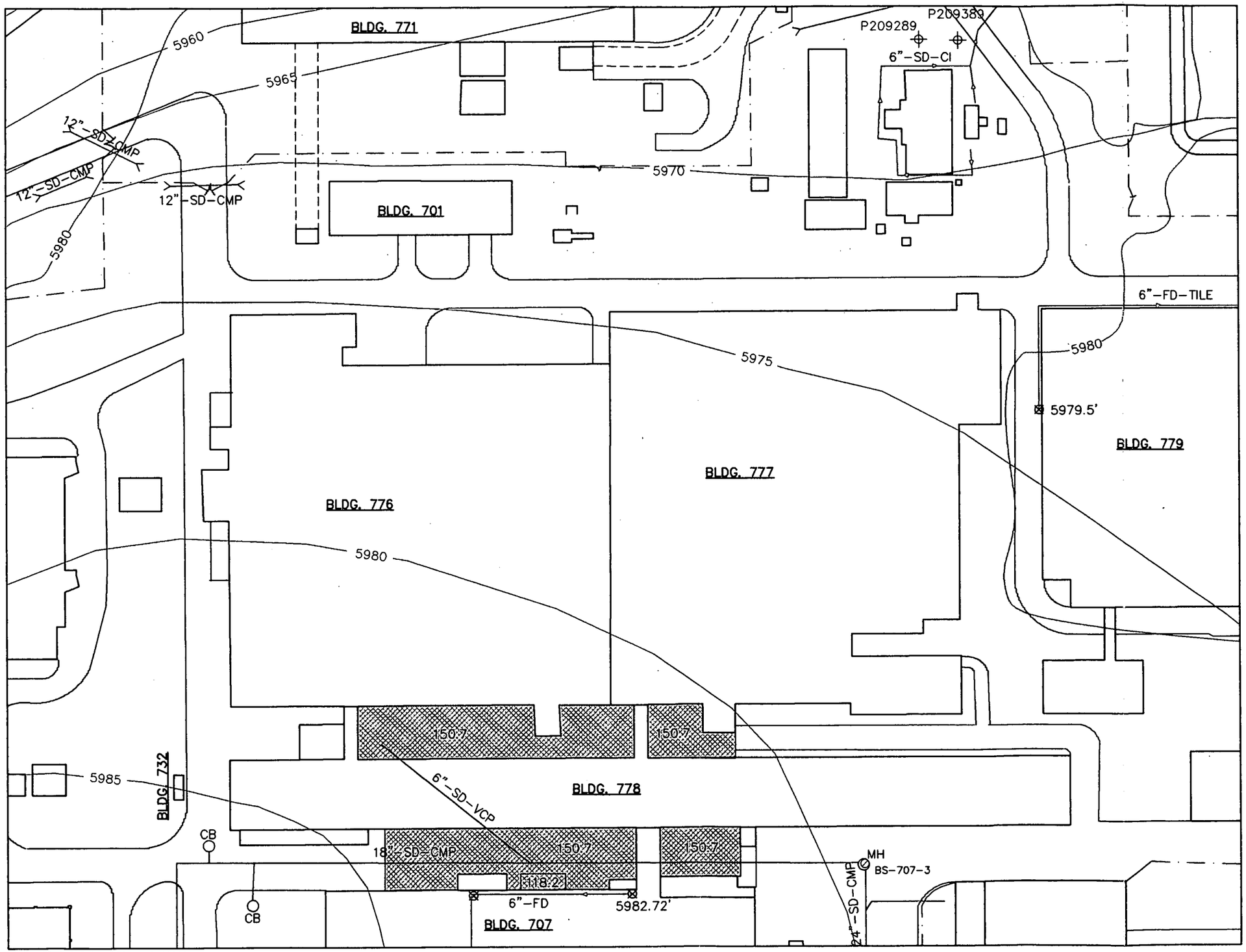

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DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- Suspected Storm Drain
- Sump
- FD Foundation Drain
- SD Storm Drain
- BS Building Sump
- VCP Vitrified Clay Pipe
- CMP Corrugated Metal Pipe
- CI Cast Iron Pipe
- CB Catch Basin
- MH Manhole
- Fences
- Tunnels
- Roads
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station never Sampled
- Alluvial Monitoring Well
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- 150.7 OU8 IHSS

0 FEET 50 100 150

FIGURE 3-9
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Buildings 776, 777, and 778
Foundation Drains, Building
Sumps, and Outfalls

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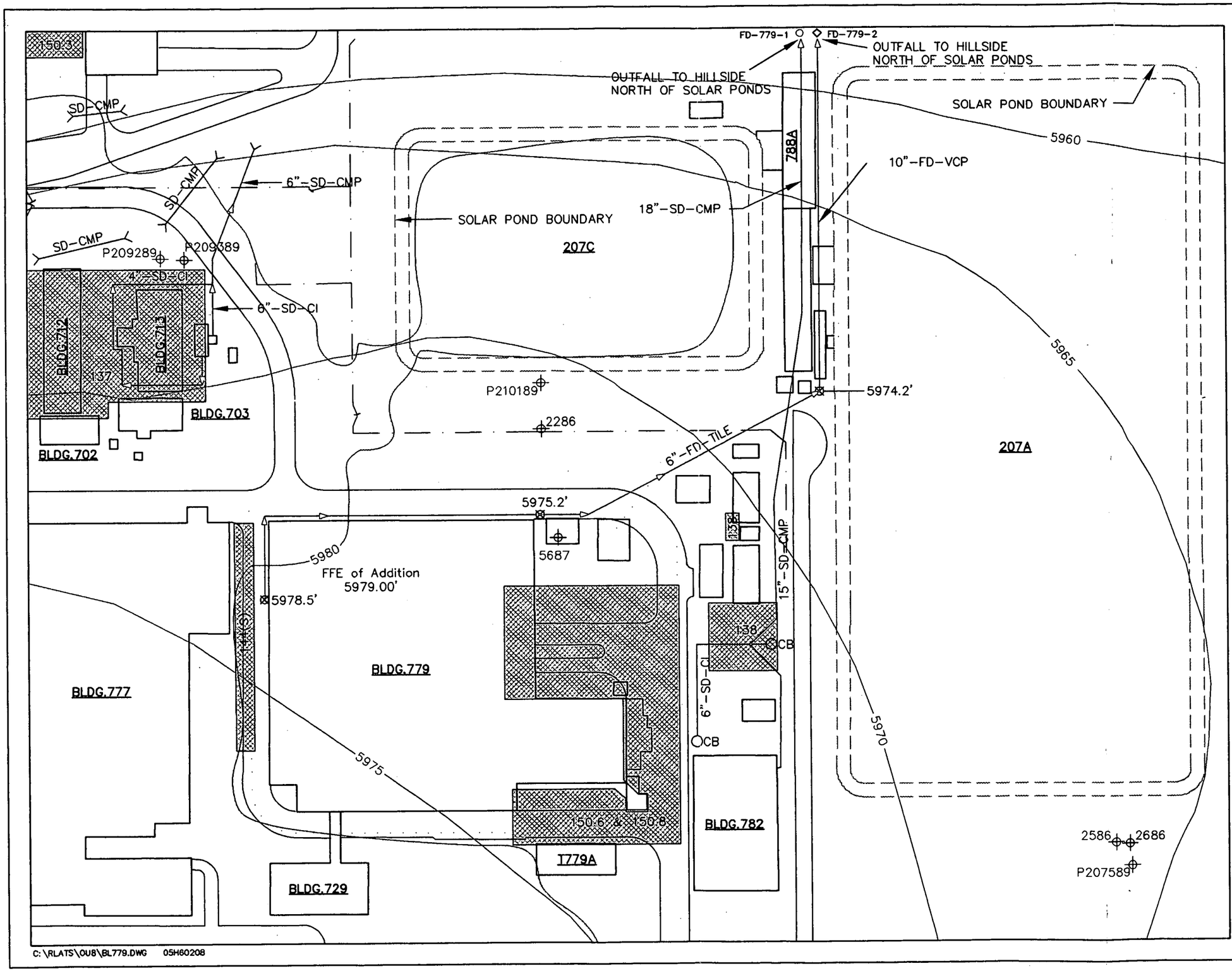

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DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- FFE Finished Floor Elevation
- FD Foundation Drain
- SD Storm Drain
- VCP Vitrified Clay Pipe
- CMP Corrugated Metal Pipe
- CI Cast Iron
- CB Catch Basin
- Fences
- Roads
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- 137 OU8 IHSS

0 FEET 50 100 150

FIGURE 3-10
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Building 779
Foundation Drains, Building
Sumps, and Outfalls

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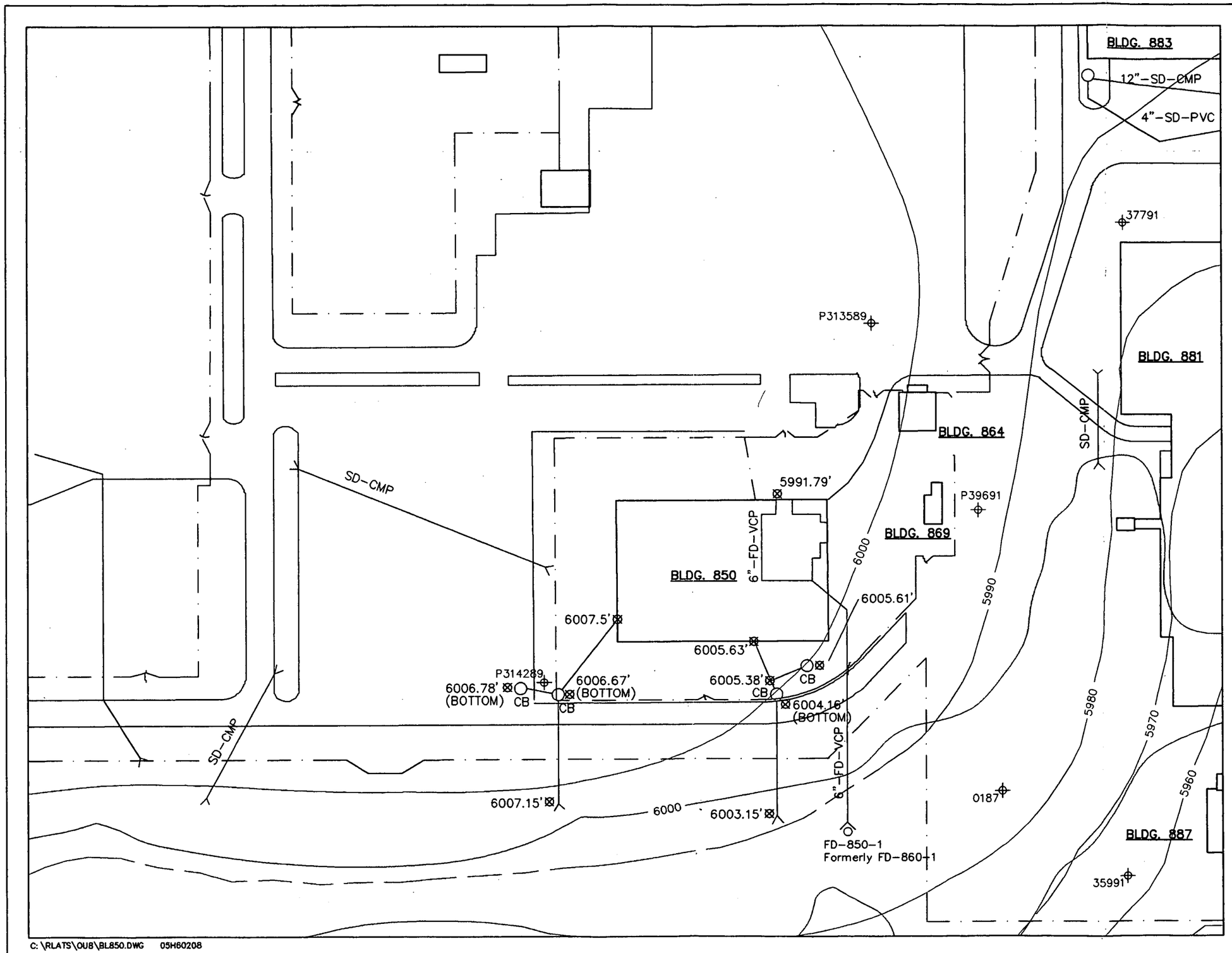

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EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- FD Foundation Drain
- SD Storm Drain
- VCP Vitrified Clay Pipe
- CMP Corrugated Metal Pipe
- PVC PVC Pipe
- CB Catch Basin
- Fences
- Roads
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- Inferred Water Level

0 FEET 50 100 150

FIGURE 3-11
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Building 850
Foundation Drains, Building Sumps, and Outfalls

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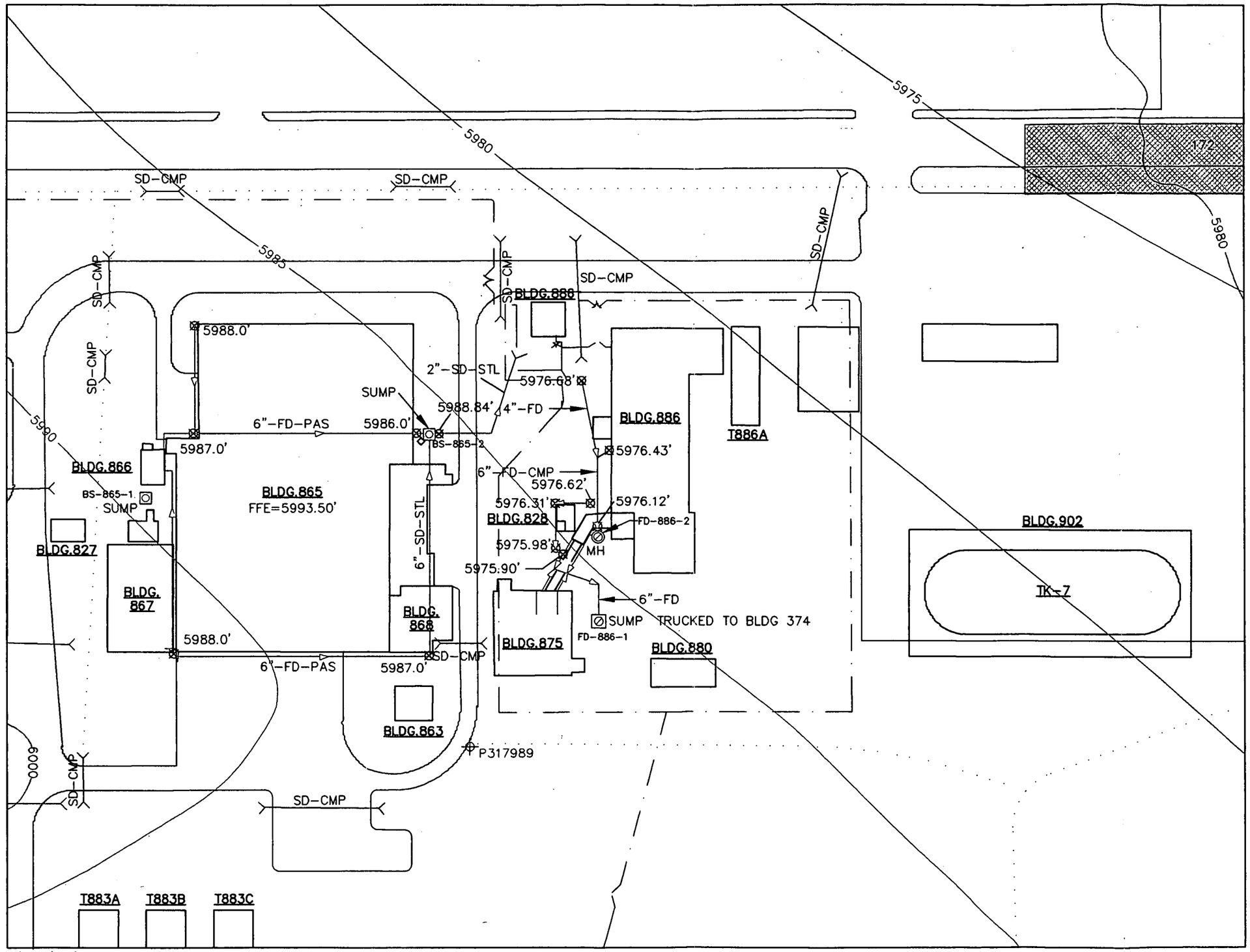

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Technology Site

DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- Sump
- FFE Finished Floor Elevation
- FD Foundation Drain
- SD Storm Drain
- BS Building Sump
- CMP Corrugated Metal Pipe
- STL Steel
- PAS Perforated Asbestos Subdrain
- MH Manhole
- Fences
- Tunnel
- Roads
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- 172 OU8 IHSS

0 FEET 50 100 150

FIGURE 3-12
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Buildings 865 and 886
Foundation Drains, Building
Sumps, and Outfalls

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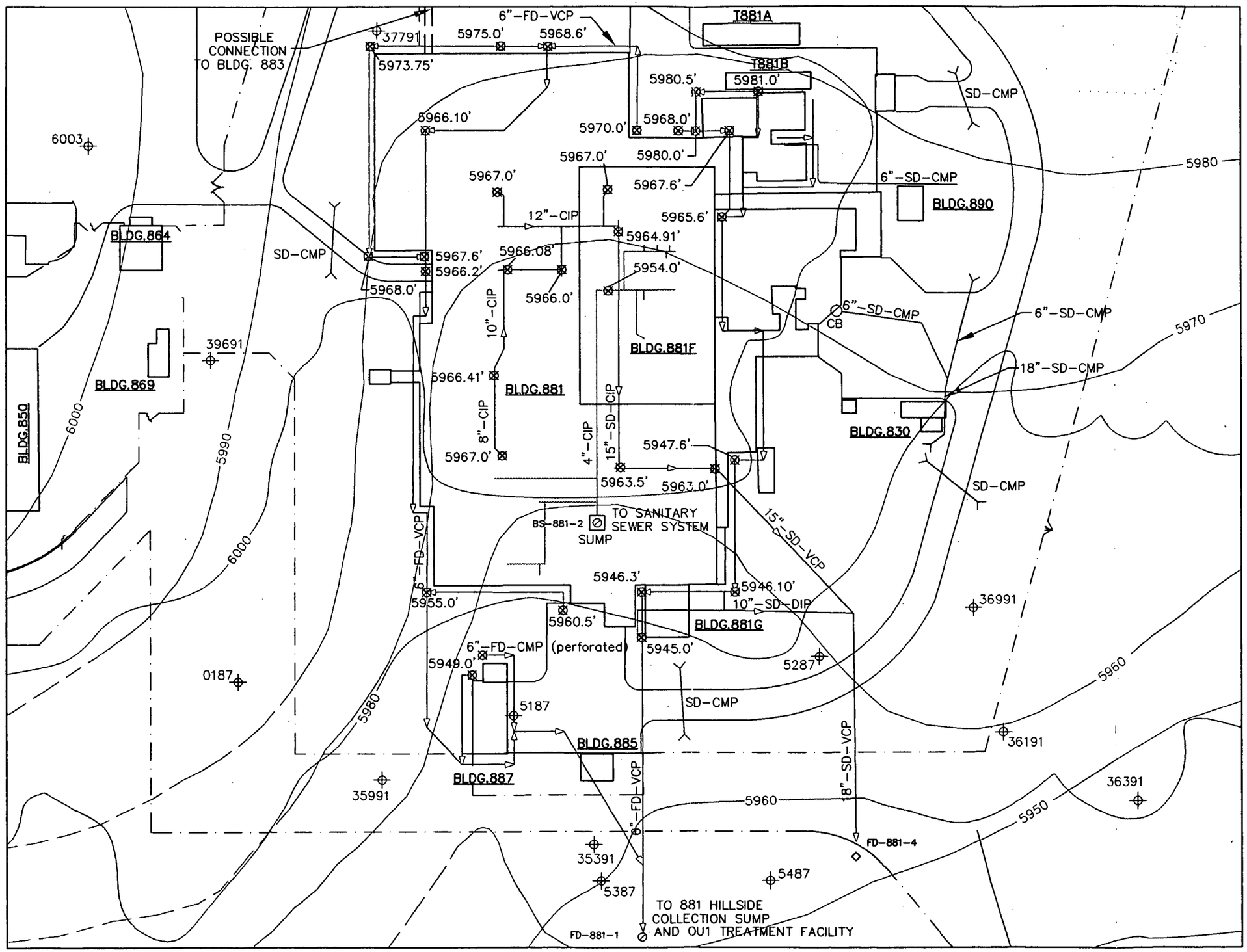

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DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- Utility Tunnel
- Sump
- FD Foundation Drain
- SD Storm Drain
- VCP Vitrified Clay Pipe
- CMP Corrugated Metal Pipe
- DIP Ductile Iron Pipe
- PVC PVC Pipe
- CIP Cast Iron Pipe
- Fences
- Roads
- Tunnel
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- Inferred Water Level

0 FEET 50 100 150

FIGURE 3-13
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Buildings 881 and 887
Foundation Drains, Building Sumps, and Outfalls

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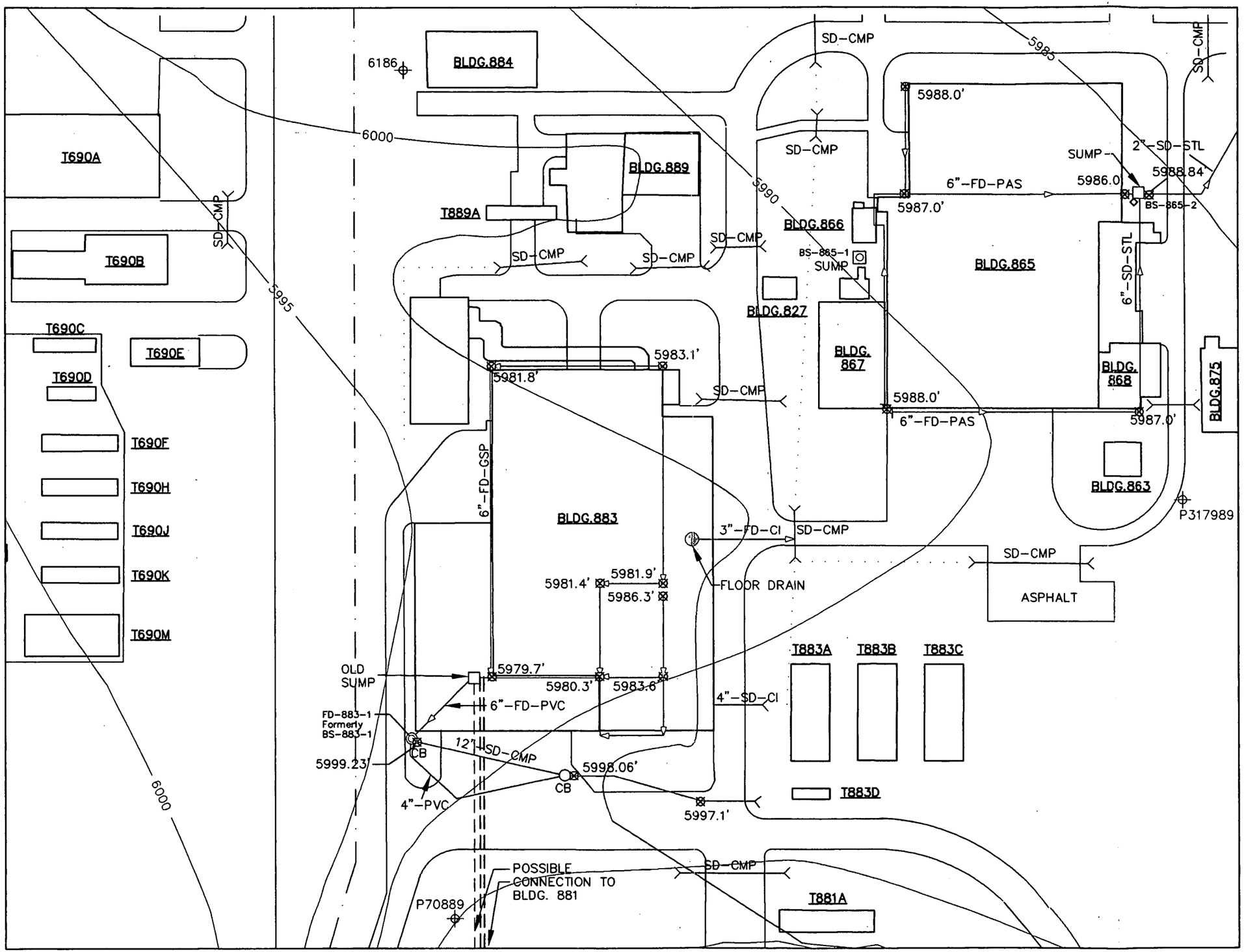

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DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- Sump
- Possible Foundation Drain
- FD Foundation Drain
- SD Storm Drain
- CMP Corrugated Metal Pipe
- PVC PVC Pipe
- PAS Perforated Asbestos Subdrain
- GSP Galvanized Steel Pipe
- CI Cast Iron
- MH Manhole
- Fences
- Roads
- Tunnel
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992

0 FEET 50 100 150

FIGURE 3-14
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Building 883
Foundation Drains, Building Sumps, and Outfalls

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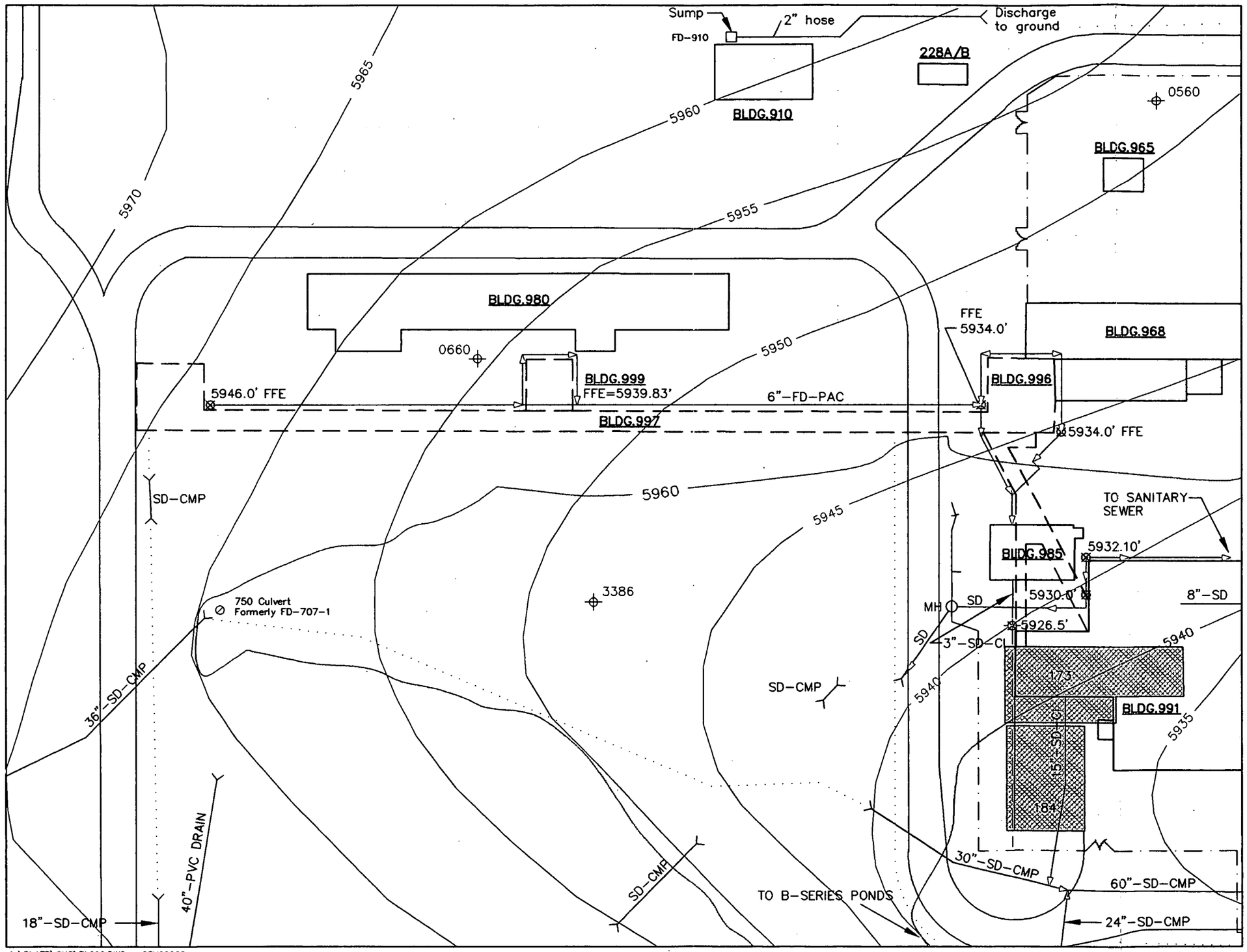

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Rocky Flats Environmental Technology Site

DRAFT FINAL

EXPLANATION

- Buildings
- Underground Structures
- Foundation Drain
- Storm Drain
- Old Foundation Drain
- Sump
- FD Foundation Drain
- SD Storm Drain
- CMP Corrugated Metal Pipe
- PVC PVC Pipe
- FFE Finished Floor Elevation
- CI Cast Iron
- MH Manhole
- PAC Perforated, Asphalt Coated
- Fences
- Roads
- Tunnel
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- 173 OU8 IHSS

N

0 FEET 50 100 150

FIGURE 3-15
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Buildings 910, 996, 997, and 999 Foundation Drains, Building Sumps, and Outfalls

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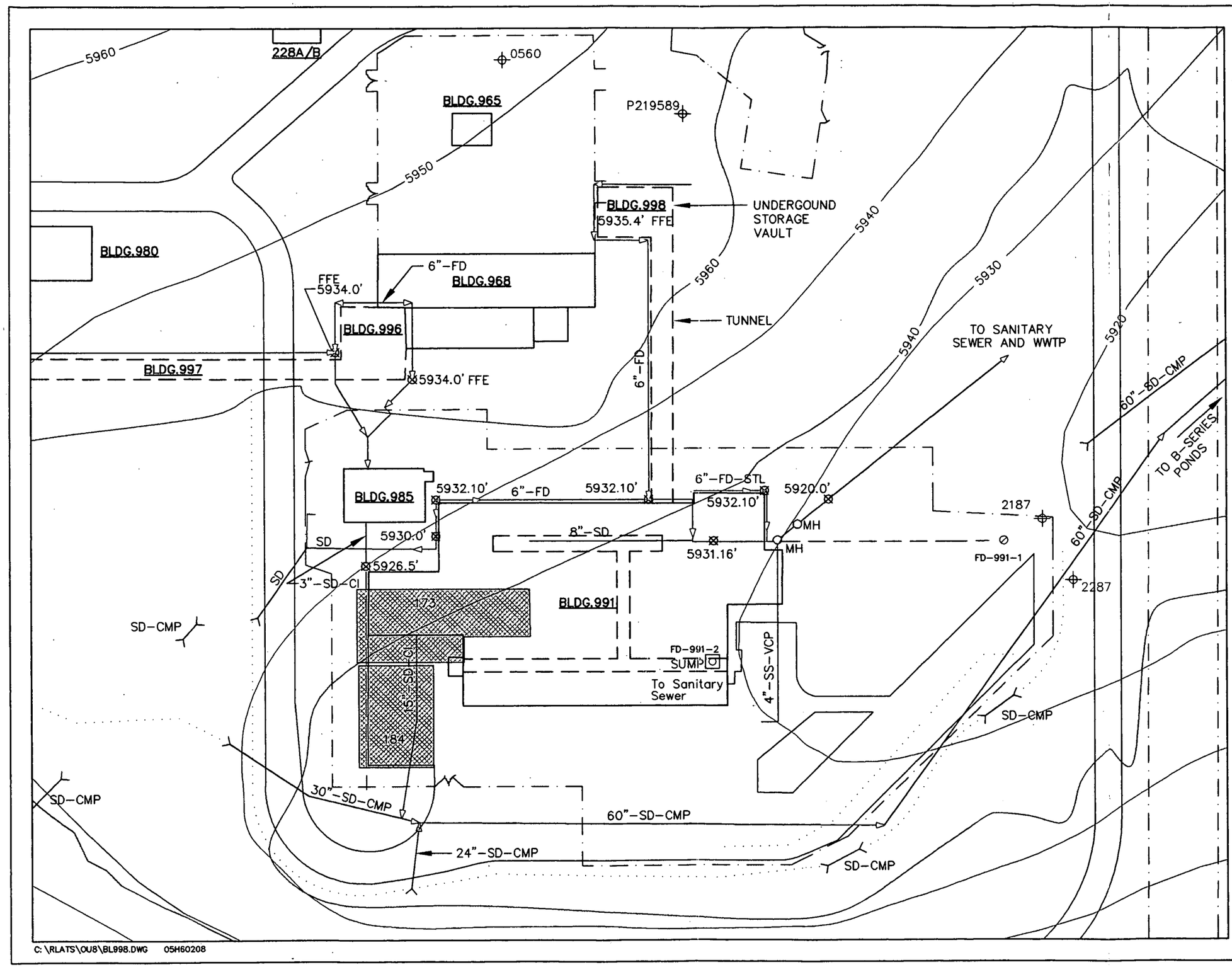

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DRAFT FINAL

EXPLANATION

- Buildings
- Underground Structures
- Foundation Drain
- Storm Drain
- Old Foundation Drain
- Sump
- FD Foundation Drain
- SD Storm Drain
- VCP Vitrified Clay Pipe
- CMP Corrugated Metal Pipe
- PVC PVC Pipe
- CI Cast Iron
- STL Steel
- FFE Finished Floor Elevation
- MH Manhole
- Fences
- Roads
- Tunnel
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station Never Sampled
- Alluvial Monitoring Well
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992
- 173 OU8 IHSS

N

0 FEET 50 100 150

FIGURE 3-16
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1
Buildings 991 and 998
Foundation Drains, Building Sumps, and Outfalls

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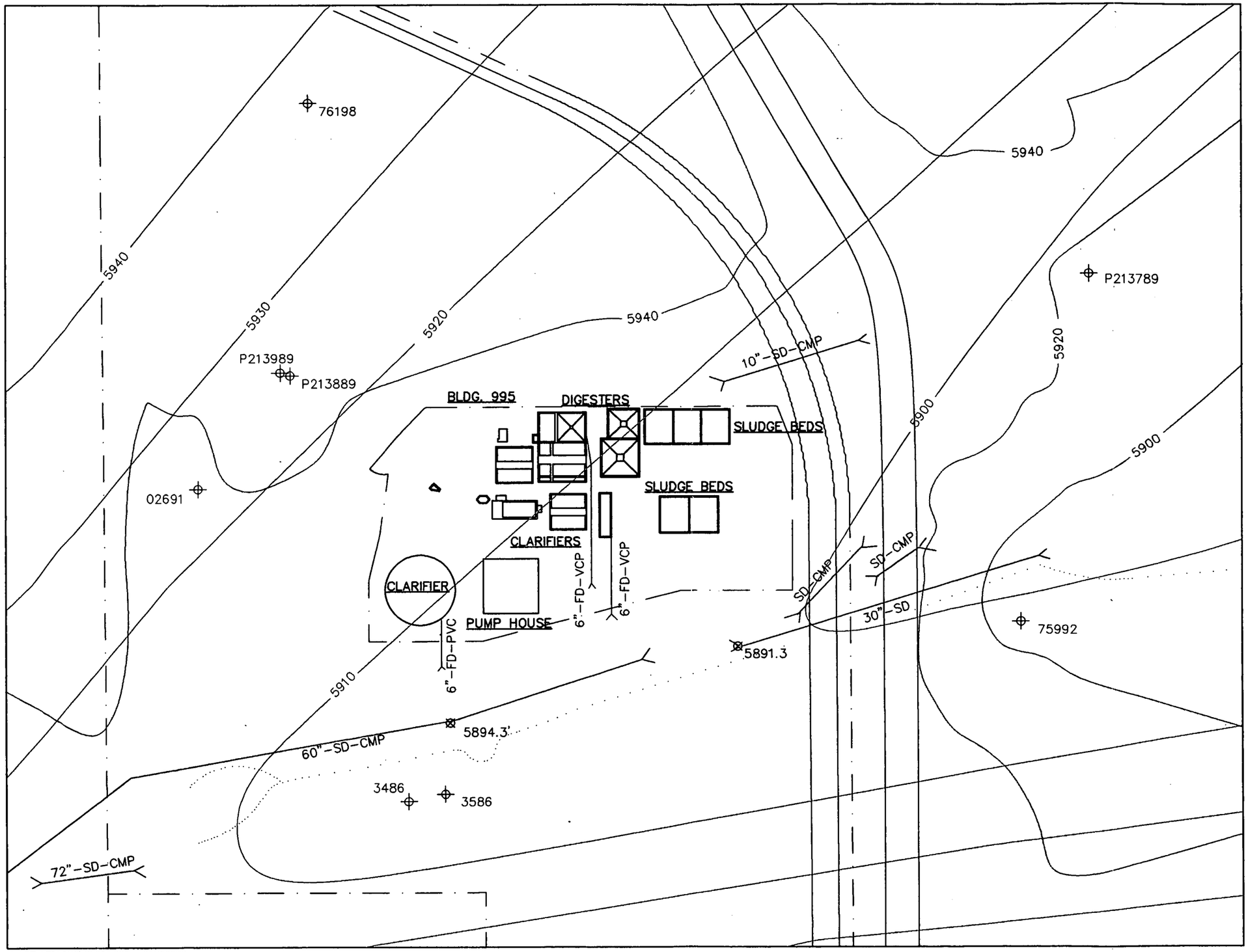

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EXPLANATION

- Buildings
- Foundation Drain
- Storm Drain
- FD Foundation Drain
- SD Storm Drain
- VCP Vitrified Clay Pipe
- CMP Corrugated Metal Pipe
- PVC PVC Pipe
- Fences
- Roads
- Ditch
- Elevation Point
- Outfall
- Sample Station (Current)
- Sample Station (Historical)
- Sample Station (Proposed)
- Station never Sampled
- Alluvial Monitoring Well
- Bedrock Monitoring Well
- 5960 Topographic Elevation (Contour Interval 20 feet)
- 5950 Water Table Elevation Spring 1992

0 FEET 50 100 150

FIGURE 3-17
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Building 995
Foundation Drains, Building Sumps, and Outfalls

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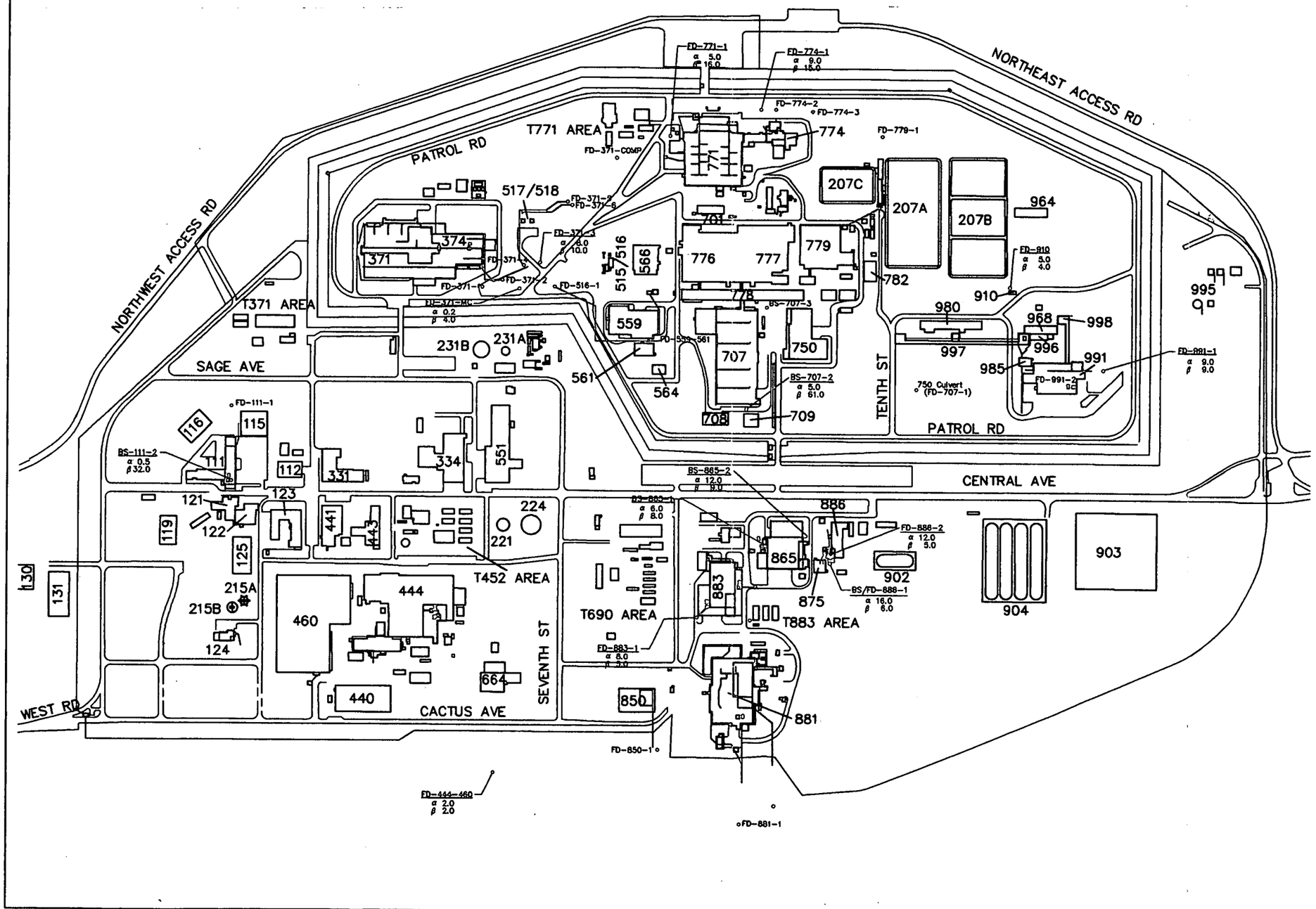

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DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Sump
- FD Foundation Drain
- BS Building Sump
- Fences
- Roads
- Outfall/Sample Location

All units in picocuries per liter.

N

100 300 500 FEET
0 200 400

FIGURE 4-1
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Foundation Drain and Building Sump
Analytical Results
March – May 1993
Radionuclides

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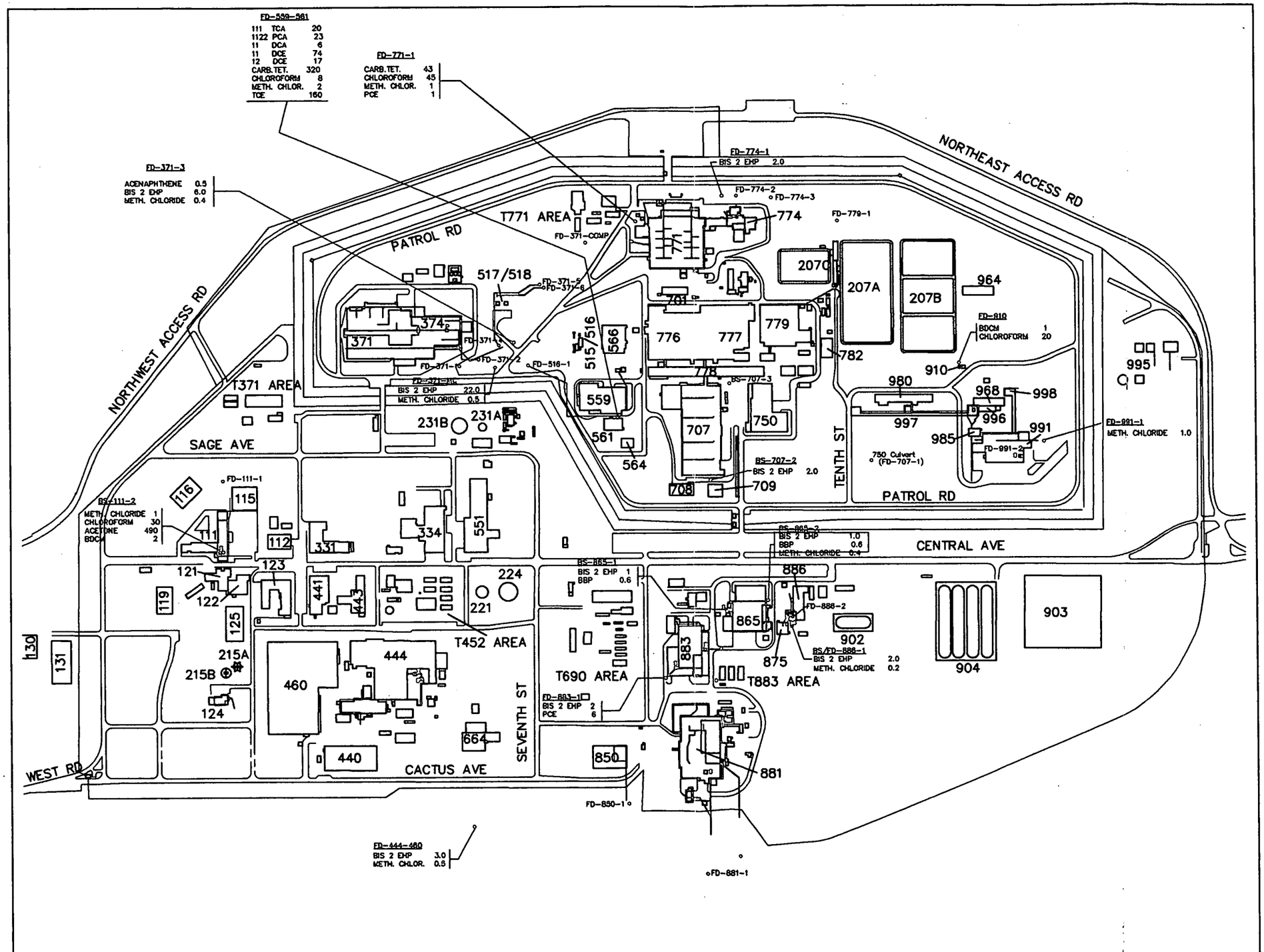

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DRAFT FINAL

EXPLANATION

- Buildings
- Foundation Drain
- Sump
- FD Foundation Drain
- BS Building Sump
- Fences
- Roads
- Outfall/Sampling Location

111TCA – 1,1,1 Trichloroethane
1122 PCA – 1,1,2,2 Tetrachloroethane
11 DCA – 1,1 Dichloroethane
11 DCE – 1,1 Dichloroethene
12 DCE – 1,2 Dichloroethene
Carb. Tet. – Carbon Tetrachloride
Meth. Chlor. – Methylene Chloride
TCE – Trichloroethene
PCE – Tetrachloroethene
BIS 2 EHP – Bis(2-Ethylhexyl) Phthalate
BDCM – Bromodichloromethane
BBP – Butyl Benzyl Phthalate

All units in micrograms per liter.

N

100 300 500 FEET
0 200 400

FIGURE 4-2
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Foundation Drain and Building Sump
Analytical Results
March – June 1993
Volatile and Semivolatile
Organic Compounds

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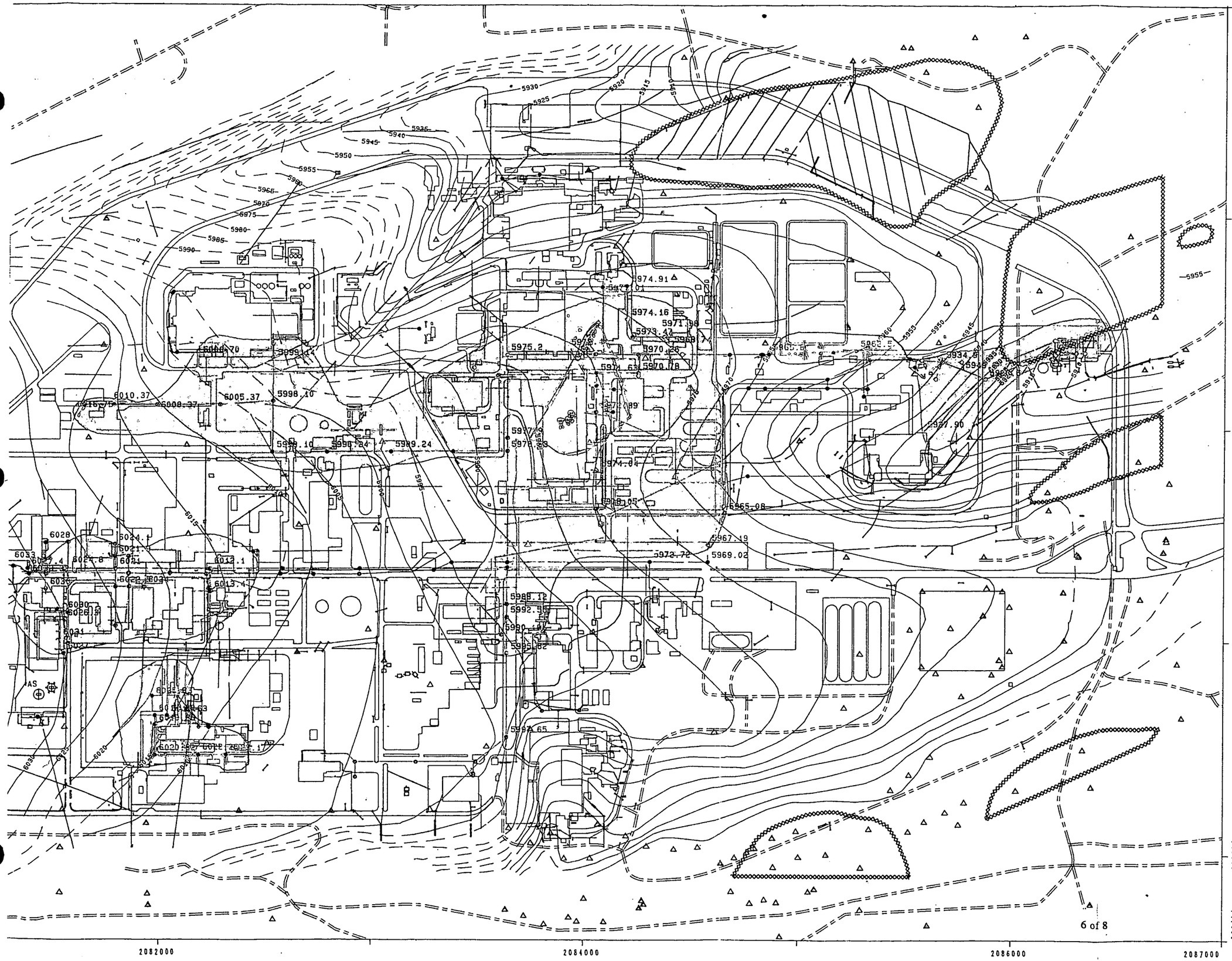

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Sanitary Sewer
Infiltration/Exfiltration
Spring 1992

Figure 5-1

- Fall Water Table Elevations Dashed where Inferred
- Unsaturated Zone (Alluvium)
- Sanitary Sewer System with Invert Manhole Elevations
- Storm Sewer System
- Zone of Potential Exfiltration from Sanitary Sewer System
- Zone of Potential Infiltration to Sanitary Sewer System
- Paved Roads
- Dirt Roads
- Alluvial Ground Water Wells

Prepared by:

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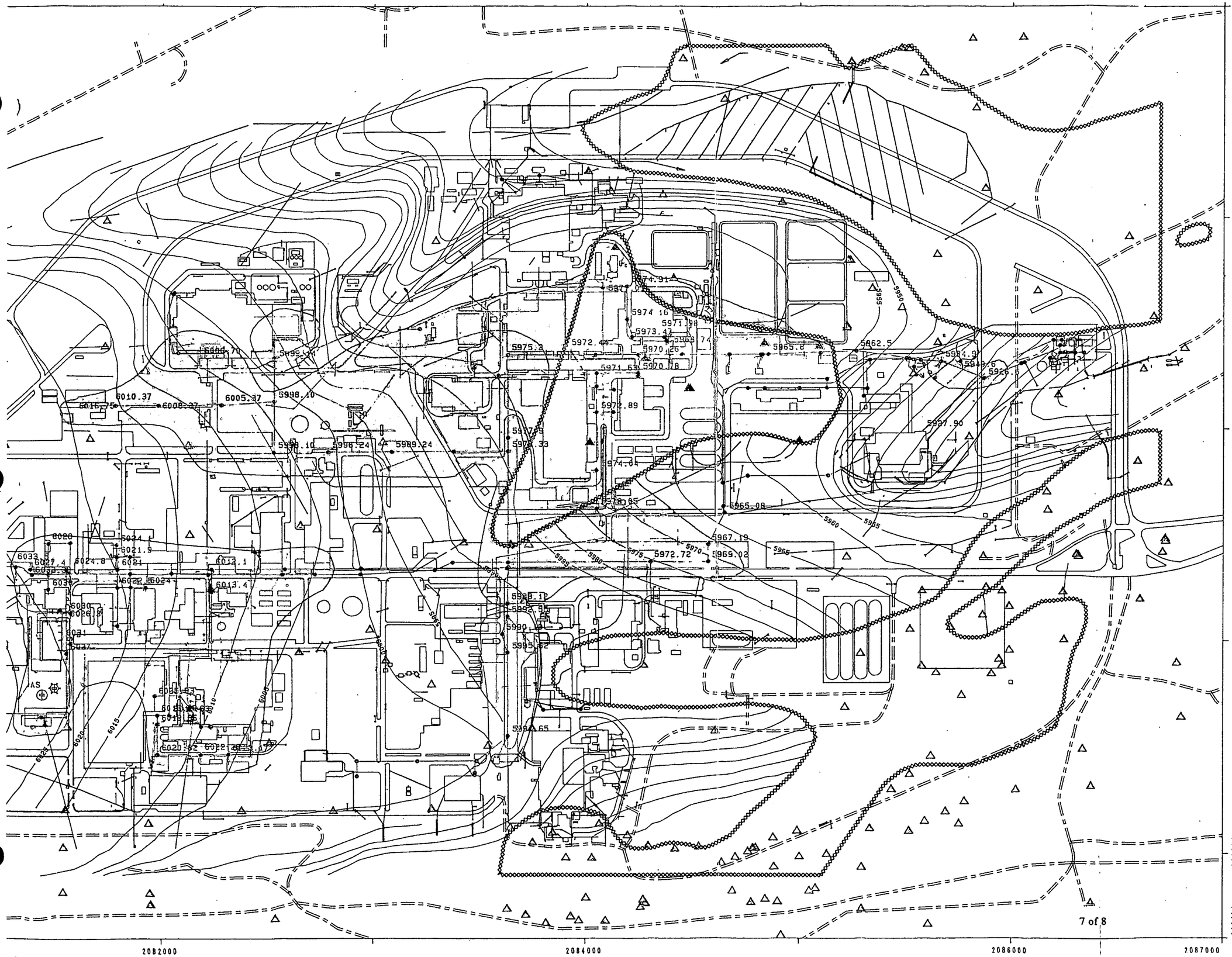

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Sanitary Sewer Infiltration/Exfiltration
Fall 1992

Figure 5-2

- Fall Water Table Elevations Dashed where Inferred
- Unsaturated Zone (Alluvium)
- Sanitary Sewer System with Invert Manhole Elevations
- Storm Sewer System
- Zone of Potential Exfiltration from Sanitary Sewer System
- Zone of Potential Infiltration to Sanitary Sewer System
- Paved Roads
- Dirt Roads
- Alluvial Ground Water Wells

N

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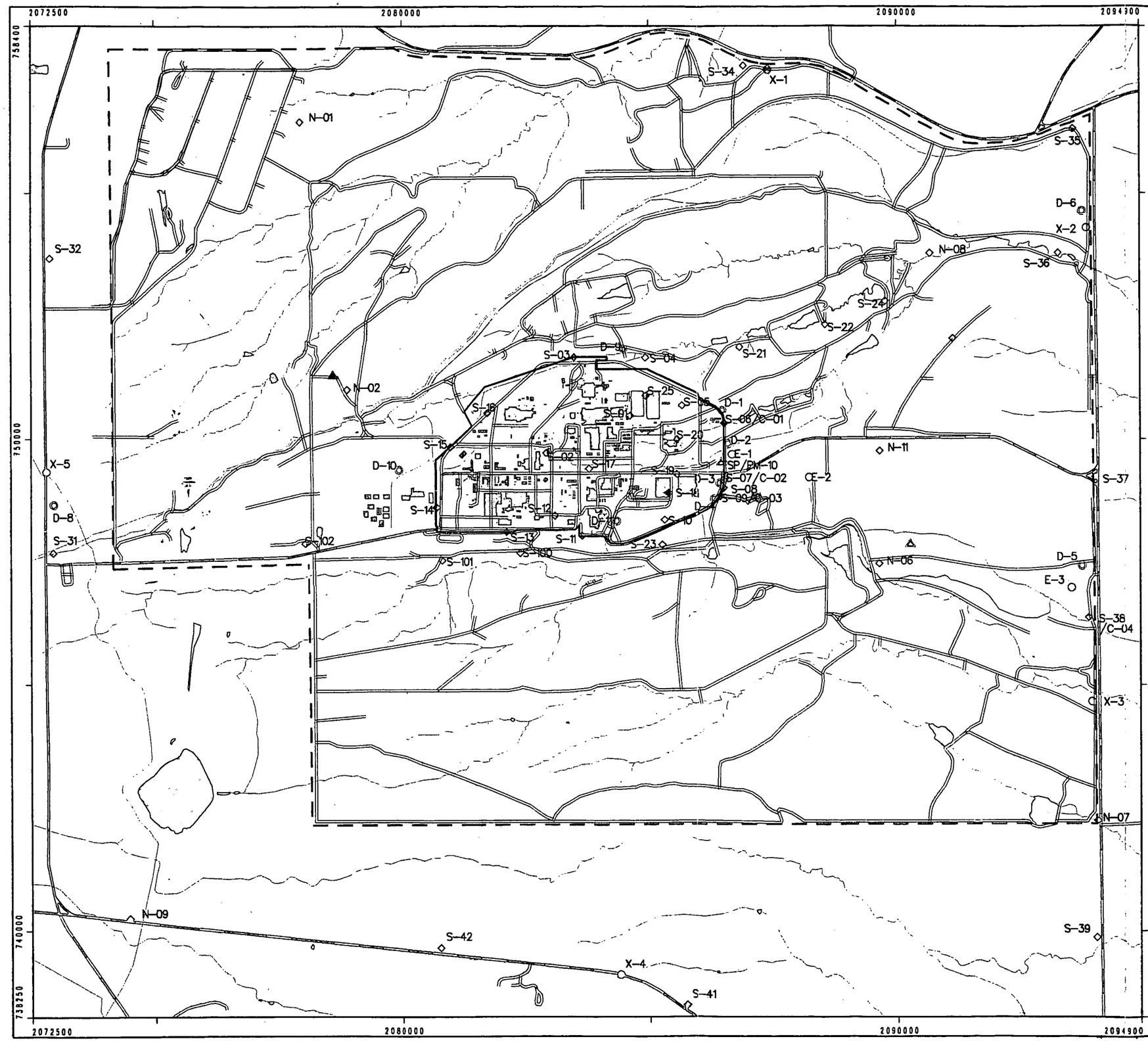

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Rocky Flats Environmental Technology Site

Figure 6-1

Operable Unit No. 8 Air Sampling Stations

- Buildings
- Lakes and Ponds
- Major roads
- Paved roads
- Dirt roads
- Fences
- Rocky Flats Plant Boundary
- ▲ 61 Meter Meteorological Tower
- △ Proposed Meteorological Tower
- △ RFP TSP/PM-10 Sampler
- ○ CDH Air Samplers D,E = Particulate and Radiological Ambient Air Sampling Stations X = VOC, NOx, particulate, radionuclide and metals sampling stations
- ◇ RFP Radiological Ambient Air Sampling Stations

Locations S-05, S-07, S-23 and S-16 are recommended for VOC monitoring.

N

Scale = 1 : 24000
1 inch = 2000 feet

0 3500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

Prepared by:

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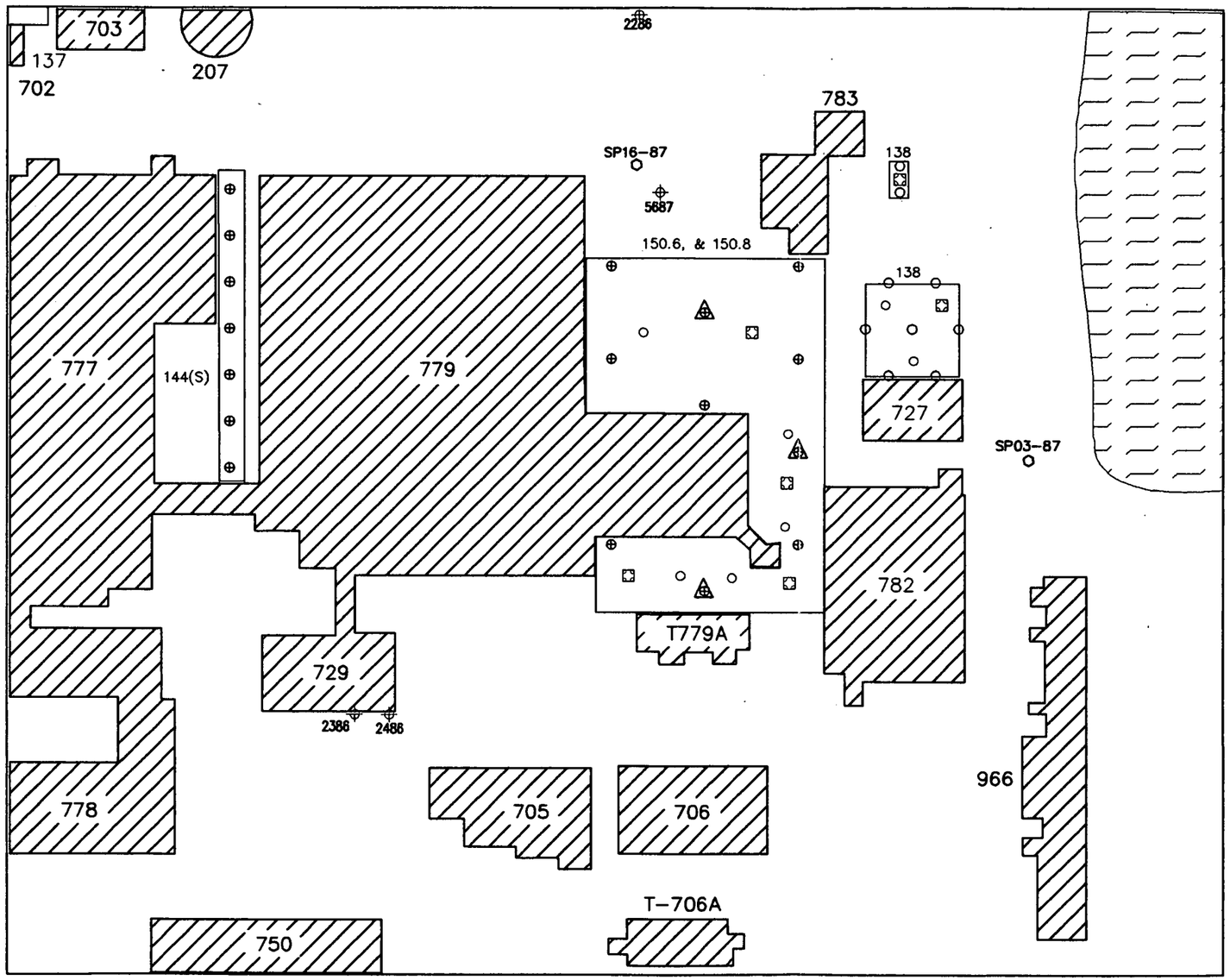
Date: August 02, 1994



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EXPLANATION

- Buildings
- Water Features
- Individual Hazardous Substance Sites
- Roads

EXISTING SAMPLE LOCATIONS

- 2386 Bedrock Well
- 5687 Alluvial Well
- SP03-87 Borehole

PROPOSED STAGE 2 SAMPLE LOCATIONS

- + Soilgas
- Surficial Soil
- HPGe
- Vertical Soil Profile (Actual location will be selected in the field.)
- Asphalt Sample (Included as of 4/94)

0 FEET 50 100 150

FIGURE 7-1
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Proposed Stage 2 Sample Locations: IHSS Nos. 138, 144(S), 150.6, and 150.8

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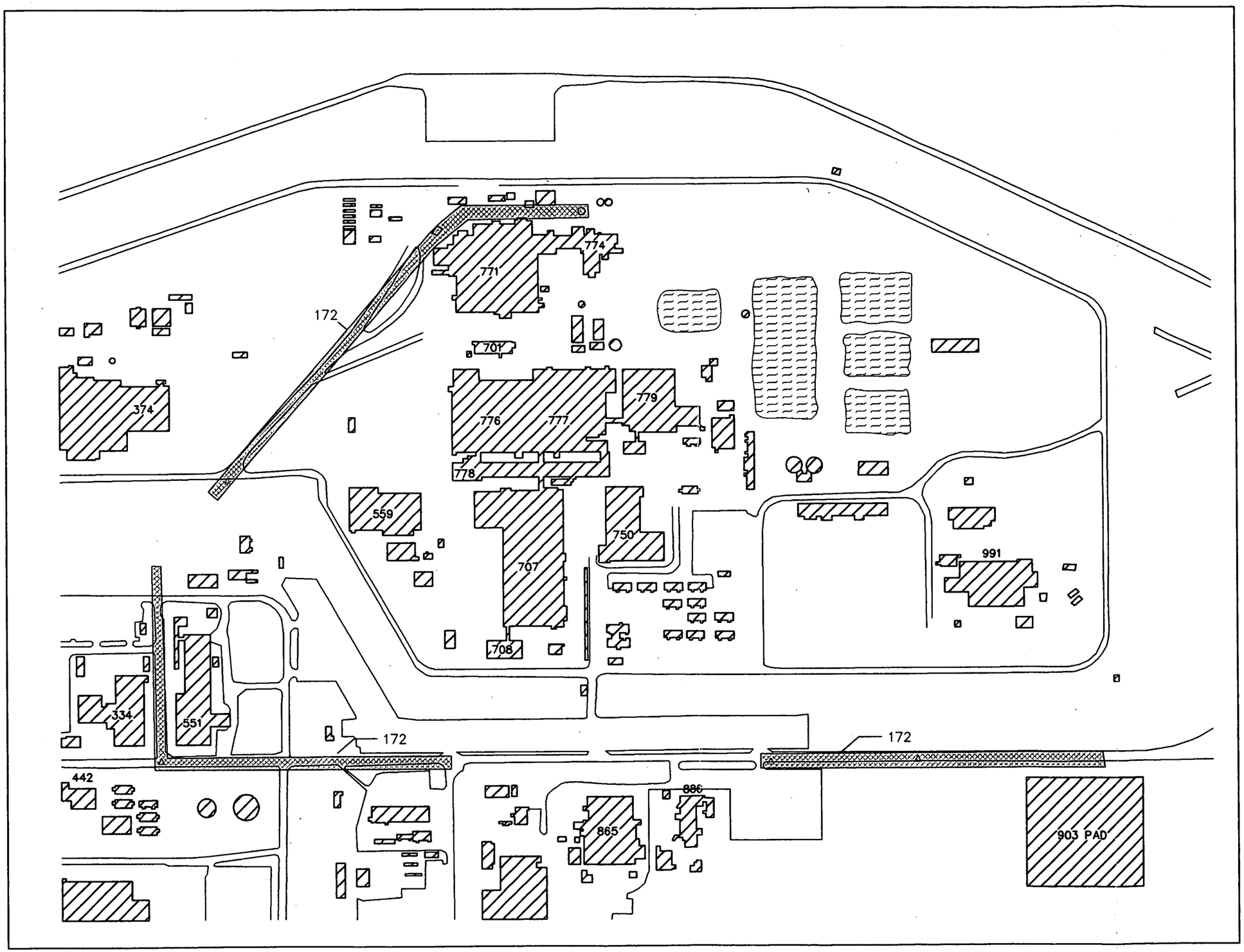

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DRAFT FINAL

EXPLANATION

- Buildings
- Individual Hazardous Substance Sites
- Evaporation Ponds
- Road
- Proposed Asphalt Sample Location
- Proposed Surface Soil Sample Location
- Proposed Vertical Soil Sample Location

N

SCALE IN FEET

0 300 600

FIGURE 7-2
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Proposed Stage 2
Sample Locations
IHSS No. 172

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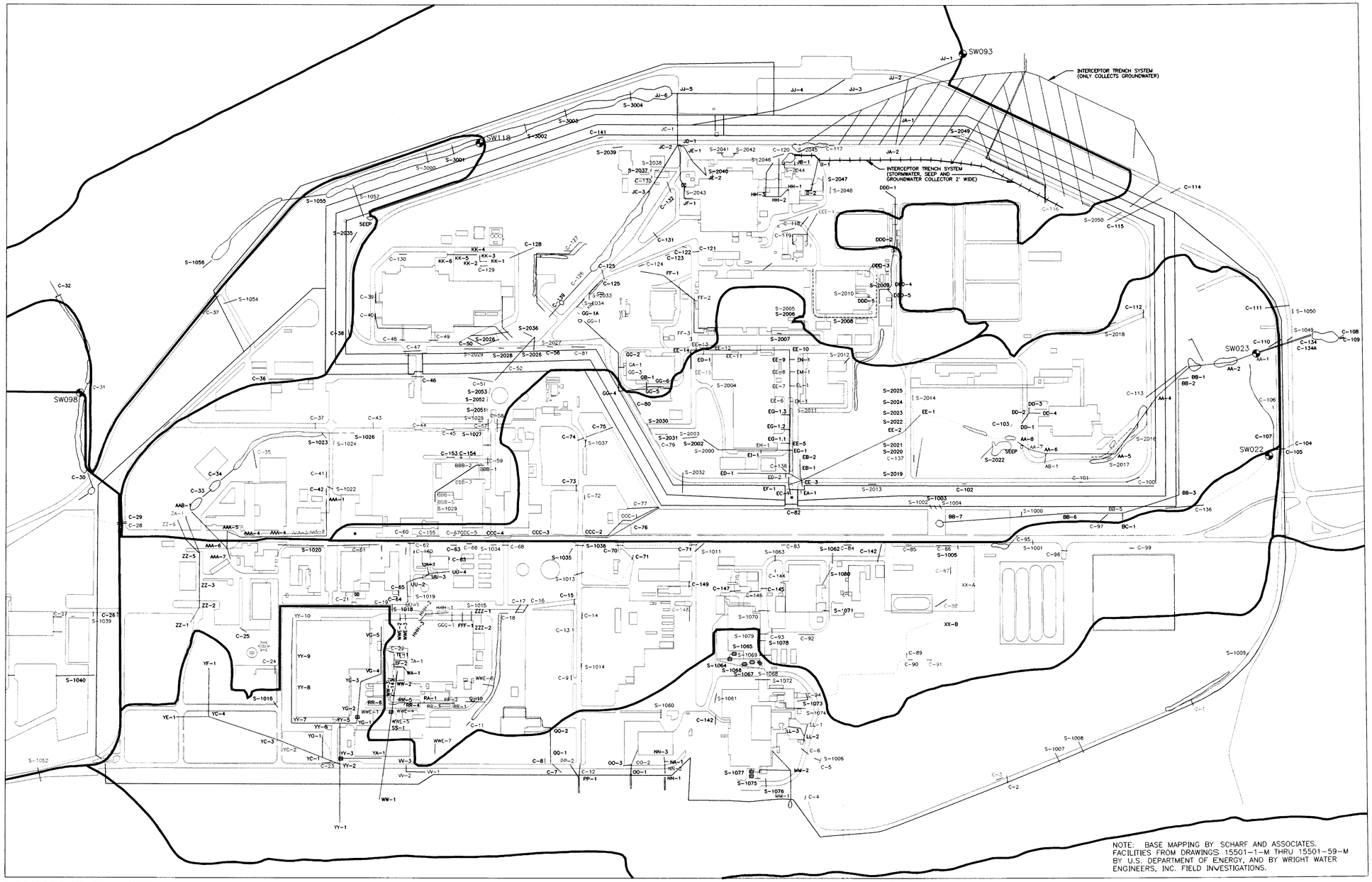

NOTE: BASE MAPPING BY SCHARF AND ASSOCIATES. FACILITIES FROM DRAWINGS 15501-1-M THRU 15501-59-M BY U.S. DEPARTMENT OF ENERGY, AND BY WRIGHT WATER ENGINEERS, INC. FIELD INVESTIGATIONS.

LEGEND

- INLET
- GRATE
- MANHOLE
- S-1000 STRUCTURES
- S-1000 STRUCTURES NOT FOUND
- APPROXIMATE BOUNDARY OF WETLAND VEGETATION
- S-1000 STRUCTURE REQUIRES IMMEDIATE MAINTENANCE
- DITCH
- CONCRETE DITCH
- S-1000 NEW STRUCTURE (1000-2000 SERIES)
- C-100 CULVERT (0-200 SERIES)
- CURB & GUTTER
- SW098 STORMWATER MONITORING LOCATION
- DRAINAGE BASIN

-N-

200 100 0 200 400
SCALE IN FEET

PLATE B-1
OPERABLE UNIT 8
TECHNICAL MEMORANDUM 1

Structural Storm Sewer Controls Inventory (Core Area)

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