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Removal of Contaminated Soil and Debris

Jet Propulsion Laboratory
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Removal of Contaminated Soil and Debris

Goldstone Deep Space Communications Complex
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ABSTRACT

The Goldstone Deep Space Communications Complex (GDSCC), located in the Mojave Desert about 40 miles north of Barstow, California, and about 160 miles northeast of Pasadena, is part of the National Aeronautics and Space Administration's (NASA's) Deep Space Network, one of the world's largest and most sensitive scientific telecommunications and radio navigation networks. The Goldstone Complex is managed, technically directed, and operated for NASA by the Jet Propulsion Laboratory (JPL) of the California Institute of Technology in Pasadena, California.

Numerous diverse activities at the GDSCC are carried out in support of six parabolic dish antennas. Some of these activities can result in possible spills or leakages of hazardous materials and wastes stored both above ground in steel drums and below ground in underground storage tanks (USTs). These possible leaks or spills, along with the past practice of burial of solid debris and waste in trenches and pits, could cause local subsurface contamination of the soil.

In 1987, JPL retained Engineering-Science, Inc. (E-S), Pasadena, California, to identify the specific local areas within the GDSCC with subsurface soil contamination. The E-S study determined that some of the soils at the Apollo Site and the Mars Site were contaminated with hydrocarbons, while soil at a nonhazardous waste dumpsite at the Mojave Base Site was contaminated with copper. The findings of these subsurface soil contaminations at the GDSCC are discussed in JPL Publication 87-4. Environmental Projects: Volume 5. Part One. Study of Subsurface Contamination. April 15, 1988.

In April 1991, E-S submitted a report (PE 209) to JPL that described the excavation, analyses, and removal of the above-described contaminated soils from the GDSCC. This present volume is a JPL-expanded version of the PE 209 E-S report.

This present volume reports that all subsurface contaminated soils at the GDSCC now have been excavated, removed, and disposed of in an environmentally acceptable way, and the excavations have been backfilled and covered in accordance with accepted Federal, State, and local environmental rules and regulations.
GLOSSARY

BLM  U.S. Bureau of Land Management
Cu   Copper
deg  degree(s)
dia  diameter
DSCC Deep Space Communications Complex
DSN  Deep Space Network
DSS  Deep Space Station
EO   Electro-optical
EPA  U.S. Environmental Protection Agency (also U.S. EPA)
E-S  Engineering-Science, Inc., Pasadena, California
ft   foot (feet)
GCF  Ground Communications Facility
GDSCC Goldstone DSCC
HEF  High-Efficiency (Antenna)
in.  inch(es)
JPL  Jet Propulsion Laboratory
kg   kilogram(s)
km   kilometer(s)
m   meter(s)
MBGA M. B. Gilbert Associates, Long Beach, California
MBS  Mojave Base Site (Goldstone)
mg   milligram(s)
mi   mile(s)
MTF  Microwave Test Facility
NASA National Aeronautics and Space Administration
NOAA National Oceanic and Atmospheric Administration
NOCC Network Operations Control Center
NTC  National Training Center (U.S. Army)
ppm parts per million
R&D Research and Development
SBC/DEHS San Bernardino County/Department of Environmental Health Services
SCANN Sensor for Control of Arterials and Networks
SETI Search for Extraterrestrial Intelligence
SPC  Signal Processing Center
STS  Space Transportation System (Space Shuttle)
TDA  Office of Telecommunications and Data Acquisition (JPL)
TDS  Total Dissolved Solids
TRPH Total Recoverable Petroleum Hydrocarbons
U.S. EPA see EPA
UST  Underground Storage Tank
VLBI Very Long Baseline Interferometry
CONTENTS

I. INTRODUCTION ..................................................... 1-1
   A. BACKGROUND OF SUBSURFACE SOIL CONTAMINATION AT THE GDSCC ......... 1-1
   B. IDENTIFICATION AND ANALYSES OF SUBSURFACE CONTAMINATED SOILS AT THE GDSCC ............................................... 1-1

II. EXCAVATION AND DISPOSAL OF SUBSURFACE CONTAMINATED SOILS AT THE GDSCC ........................................ 2-1
   A. INTRODUCTION ............................................... 2-1
   B. GENERAL EXCAVATION AND DISPOSAL PROCEDURES .......................... 2-1
   C. SPECIFIC LOCATIONS OF EXCAVATIONS AND ANALYSES OF THE EXCAVATED SOILS ..................................... 2-4

III. THE GOLDSTONE DEEP SPACE COMMUNICATIONS COMPLEX (GDSCC) .......... 3-1
   A. LOCATION OF THE GDSCC ...................................... 3-1
   B. FUNCTIONS OF THE GDSCC ..................................... 3-1
   C. FACILITIES AT THE GDSCC .................................... 3-3
   D. ANTENNA STATIONS AT THE GDSCC .............................. 3-3
   E. SUPPORT FACILITIES AT THE GDSCC ................................ 3-8
   F. NONSTRUCTURAL SUPPORT FACILITIES AT THE GDSCC .............. 3-9
   G. SOLID-WASTE MANAGEMENT FACILITIES AT THE GDSCC ............. 3-9
   H. WASTEWATER MANAGEMENT FACILITIES AT THE GDSCC .............. 3-11
   I. UNDERGROUND STORAGE TANKS AT THE GDSCC .......................... 3-11
   J. OPERATIONAL RELATIONSHIPS BETWEEN THE GDSCC AND FORT IRWIN ......... 3-11
   K. NATURAL ENVIRONMENTAL ASPECTS OF THE GDSCC ........................ 3-12

IV. CERTIFICATION .................................................... 4-1
APPENDIXES

A. CHAIN OF CUSTODY RECORDS AND RESULTS OF ANALYSES FOR HYDROCARBONS AND METALS IN GDSCC SOIL SAMPLES ................. A-1

B. CORRESPONDENCE WITH SAN BERNARDINO COUNTY DEPARTMENT OF ENVIRONMENTAL HEALTH CONCERNING REMOVAL OF CONTAMINATED SOIL FROM THE GDSCC .................. B-1

C. HAZARDOUS-WASTE MANIFESTS FOR REMOVAL OF COPPER-CONTAMINATED SOIL FROM THE GDSCC ...................... C-1

Figures

1. Typical Drilling Operation for Soil Samples with CME-75 Hollow-Stem Auger Drill ...................................................... 1-3

2. HNu Photoionization Meter "Sniffing" for Volatile Organic Materials at the Hazardous-Materials Storage Area at the Mars Site ................................................................. 1-4

3. Cleaning and Decontamination of Soil-Sample Tubes Prior to Use .......................................................... 1-5

4. Cleaning and Decontamination of Backhoe Bucket and California Brass-Ring Soil Sample Tubes Prior to Use ............................................. 1-6

5. Cleaned and Decontaminated Soil-Sample Tubes Stored and Ready for Use .................................................. 1-7

6. Packing Soil Sample into a Brass Sleeve from a Backhoe Bucket .......................................................... 2-2

7. Typical Soil Sample Ready to be Placed on Ice for Transport to a State-Certified Analytical Laboratory .... 2-3

8. Apollo Site: Plot Plan Showing Location of Hazardous-Materials Storage Area .................................................. 2-5

9. Apollo Site: Borehole Locations in both Existing Hazardous-Materials Storage Area and in Possible Former Dumpsite .......................................................... 2-6

10. Apollo Site: Diagram of Excavations of Petroleum-Contaminated Soil ...................................................... 2-7

11. Apollo Site: View Looking North of A-EX-1 Excavation .... 2-8

12. Apollo Site: View Looking South of A-EX-1 Excavation .... 2-9

13. Apollo Site: View Looking West of A-EX-2 Excavation .... 2-10

Figures (Continued)

15. Mars Site: Generalized Partial Plot Plan Showing Locations of Five New USTs, SCANN Unit Buildings, and Locations of Five Old USTs that had been Removed..............2-13


17. Mars Site: Diagram of Excavations of Petroleum-Contaminated Soil.........................................................2-15

18. Mars Site: Collection of Soil Sample Number 1 from Larger Excavation Area...........................................2-16

19. Mars Site: Collection of Soil Sample Number 9 from Smaller Excavation Area. Seventy-Meter Antenna in Background.................................................................2-17

20. Mojave Base Site: Plot Plan and Location of Abandoned Dumpsite and Abandoned Sewage Plant and Sewage Evaporation Pond.................................................................2-18

21. Mojave Base Site: Overview of Abandoned Dumpsite Before Cleanup........................................................2-19

22. Mojave Base Site: Location of Open and Covered Trash-Trenches and Seven Excavated Sampling Pits at the Abandoned Dumpsite .................................................................2-21

23. Mojave Base Site: Backhoe Excavation of a Pit Adjacent to a Covered Trash-Trench at Abandoned Dumpsite.......2-22

24. Mojave Base Site: HNu Photoionization Meter "Sniffing" for Volatile Organic Materials from an Excavated Pit Adjacent to an Open Trash-Trench at Abandoned Dumpsite.....2-23

25. Mojave Base Site: Excavations of Copper-Contaminated Soil.................................................................2-24

26. Geographic Relationship of the Goldstone Deep Space Communications Complex to JPL in Pasadena..............3-2

27. The Three-Continent NASA Deep Space Network as It Exists in 1992.........................................................3-4

28. Schematic Map of the GDSCC Showing Locations of the Five NASA Deep Space Stations (DSSs) and the Mojave Base Station Operated by NOAA ..............................................3-5

29. Major Roads Leading to and at the GDSCC.........................3-10

Table

1. Major Facilities at the GDSCC.................................3-6
SECTION I
INTRODUCTION

A. BACKGROUND OF SUBSURFACE SOIL CONTAMINATION AT THE GDSCC

The Goldstone Deep Space Communications Complex (GDSCC), located in the Mojave Desert about 40 miles north of Barstow, California, and about 160 miles northeast of Pasadena, is part of the National Aeronautics and Space Administration's (NASA's) Deep Space Network (DSN), one of the world's larger and most sensitive scientific telecommunications and radio navigation networks. The GDSCC is managed, technically directed, and operated for NASA by the Jet Propulsion Laboratory (JPL) of the California Institute of Technology in Pasadena, California. A detailed description of the GDSCC is presented in Section III of this report.

The GDSCC includes five distinct operational areas named Echo Site, Venus Site, Mars Site, Apollo Site, and Mojave Base Site. Within each of the first four sites is a Deep Space Station (DSS) that consists of at least one parabolic dish antenna and support facilities. Although there are four DSN operational sites at the GDSCC, there now are six operational parabolic dish antennas because two antennas are located at the Mars Site and two are at the Apollo Site. The Mojave Base Site, while it is part of the GDSCC, is not part of the DSN but is operated by the National Oceanic and Atmospheric Administration (NOAA).

Numerous diverse activities at the GDSCC are carried out in support of the six parabolic dish antennas. Some of these activities can result in possible spills or leakages of hazardous materials and wastes that are stored either above ground in steel drums or below ground in underground storage tanks (USTs). In addition, the past practice of burial of solid debris and wastes in trenches and pits possibly could lead to leaching out of hazardous chemicals into the surrounding soil. Both of these storage techniques, therefore, could cause possible subsurface contamination of the soil of local areas within the GDSCC.

B. IDENTIFICATION AND ANALYSES OF SUBSURFACE CONTAMINATED SOILS AT THE GDSCC

In 1987, Engineering-Science, Inc. (E-S), Pasadena, California, was retained by JPL to conduct a survey at the GDSCC to determine the specific local areas that exhibited subsurface soil contamination. The results of this survey were reported in JPL Publication 87-4, Environmental Projects: Volume 5, Part One, Study of Subsurface Contamination, April 15, 1988.

Because of previously observed spills, or because of past solid-waste disposal practices, areas at three sites at the GDSCC were suspected of having subsurface contamination of the soil.

A hand auger, or a CME-75 hollow-stem auger drill rig (Figure 1), was used to drill to various depths down to 15 ft to obtain samples from the suspected
soil. The presence of any organic vapors released during the boring operation was monitored by an HNu photoionization meter (Figure 2).\(^1\)

All equipment used in the collection of soil samples was decontaminated prior to use. The sampling equipment, including a backhoe, was washed with biodegradeable soap and water and rinsed with tap water, methanol, and distilled water, followed by air drying (Figures 3, 4, and 5).

Soil samples were collected in California brass-ring samplers. Each sample was wrapped tightly in aluminum foil and the ends were capped with plastic caps. The samples then were placed into plastic bags, the bags sealed to prevent cross-contamination, and finally placed onto ice in coolers. E-S personnel then hand delivered the coolers, containing the soil samples, to the Brown and Caldwell Laboratory, Pasadena, California, for chemical analysis.

The results of this 1987 survey revealed three areas with subsurface contamination at the GDSCC: hydrocarbon-contaminated soils at specific local areas at the Apollo and Mars Sites, and copper-contaminated soil at a specific local area at the Mojave Base Site.

Based upon this survey, JPL decided to excavate and dispose of these contaminated soils in an environmentally approved manner. The excavation and disposal of these contaminated soils were carried out in May and June 1990 and are the subjects of this present report.

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\(^1\) The HNu photoionization meter is a device to detect both the presence and amount of volatile organic materials including petroleum hydrocarbons. It is equipped with a small air pump to draw vapors past the sensor. It is useful both as a screening device (to see whether petroleum hydrocarbons are present) and as a measuring device (to indicate how much of the organic volatiles are present). The latter value can indicate to the HNu operator whether protective measures should be taken by personnel in the area.
SECTION II
EXCAVATION AND DISPOSAL OF SUBSURFACE CONTAMINATED SOILS AT THE GDSCC

A. INTRODUCTION

During May and June 1990, subsurface contaminated soil was excavated from the specific local areas at the Apollo, Mars, and Mojave Base Sites that previously had been determined to be contaminated (see Section I). The Contractor, who performed the excavation work, is Jenkin Construction Co., Long Beach, California, while the work was overseen by Engineering-Science, Inc. (E-S), Pasadena, California. All soil-sampling procedures were conducted under the supervision of Carol J. Craiglow, employed by E-S as a registered geologist for the State of California.

B. GENERAL EXCAVATION AND DISPOSAL PROCEDURES

Because of the conglomeratic nature of the soil at the contaminated sites, a manual-drive soil sampler could not be used. Thus, soil samples were obtained from a backhoe bucket and placed into clean, stainless-steel sleeves (2-in. dia. 3-in. length. Figure 6). The samples were packed firmly to prevent headspaces. The sleeve ends then were covered with Teflon tape and capped with plastic endcaps.

During the excavations, a Gastech Model 1314 Hydrocarbon Surveyor was used to determine both the lateral and vertical extents of the excavations. Excavations were deemed complete when soil sample analyses showed hydrocarbon levels to be below 1000 mg/kg.

For copper-contaminated soils, excavations were deemed complete when the soil sample analyses revealed copper levels to be below 150 mg/kg.

After being labeled with pertinent sample identification information, the sample sleeves were placed into reclosable plastic bags and placed on ice for shipment for analyses to Edward S. Babcock & Sons, Inc., Riverside, California, a California state-certified laboratory (Figure 7). Analyses were carried out in accordance with laboratory methods prescribed by the U.S. Environmental Protection Agency (EPA).

The chain-of-custody records and the results of the analyses for both hydrocarbons and metals in the GDSCC samples are presented in Appendix A.

With approval from Ronald A. Ripley, Inspector for the San Bernardino County Department of Environmental Health Services (SBC/DEHS), the excavated hydrocarbon-contaminated soils from both the Apollo and Mars Sites were transported to a designated storage area at the Echo Site.

On March 8, 1991, these soils were incorporated into a desert-mix base material that was used in the asphalt paving of an 1800-ft paved road that leads to the entrance of the GDSCC landfill. Correspondence with Mr. Ripley, concerning the removal and disposal of the hydrocarbon-contaminated soils excavated from the Apollo and Mars Sites, is presented in Appendix B.
Figure 7. Typical Soil Sample Ready to be Placed on Ice for Transport to a State-Certified Analytical Laboratory.
The copper-contaminated soil from the Mojave Base Project physically was
removed from the GDSCC and trucked to the U.S. Ecology hazardous-material
disposal site at Beatty, Nevada. The hazardous-waste manifests for the removal
of the copper-contaminated soils from the GDSCC are presented in Appendix C.

C. SPECIFIC LOCATIONS OF EXCAVATIONS AND ANALYSES OF THE EXCAVATED
SOILS

The following is a detailed report about the excavations of contaminated
soils at the Apollo, Mars, and Mojave Base Sites.

1. Apollo Site

Figure 8 is a plot plan of the Apollo Site showing the location of
the Hazardous-Materials Storage Area.

During the 1987 survey, seven borehole samples were removed from
specific locations around the Hazardous-Materials Storage Area (Figure 9). In
May and June 1990, these areas were excavated around the concrete storage pad
that lies about 120 ft east of DSS 16, the 26-m (85-ft) antenna (Figure 10).

The first excavation area, named A-EX-1, lies along the western edge
of the concrete pad. The excavation was 60 x 14 ft in size and had an average
depth of 5 ft below grade (Figures 11 and 12).

On May 8, 1990, under the direction of Ronald A. Ripley, Inspector
for the SBC/DEHS, six samples were obtained, as indicated in Figure 10. The
locations of the six soil samples are as follows: Samples 2, 3, 5, and 6 were
taken at the intersection of the concrete sidewall and the bottom of the
excavation, while samples 1 and 4 were obtained from the bottom of the
excavation.

The second excavation area, named A-EX-2 (see Figure 10), was
adjacent to the northeast section of the concrete pad. The excavation was about
30 x 27 ft in size and had an average depth of 5 to 6 ft below grade (Figures 13
and 14).

On May 8, 1990, also under the direction of Mr. Ripley, three soil
samples were taken: two from the intersection of the concrete sidewall with the
bottom of the excavation and one from the bottom of the excavation.

The third and final excavation, named AP-EX-1, lies about 25 ft
south of the concrete pad and measures 94 x 32 ft in size with an average depth
of 7 ft below grade. On May 23, 1990, as depicted in Figure 10, nine soil
samples were taken from this excavation.

EPA Method 418.1 for Total Recoverable Petroleum Hydrocarbons (TRPH)
was the laboratory method used to analyze the 18 soil samples obtained from the
Apollo Site. The TRPH level of each of the 18 Apollo soil samples is shown in
Figure 10. Of the 18 samples analyzed, 17 had TRPH levels below 41 mg/kg. One
sample, number 9 of the AP-EX-1 excavation, had a much higher level of 700
mg/kg. But even this very high TRPH value is still below the 1000 mg/kg TRPH
level at which further action must be taken according to the SBC/DEHS.

The chain-of-custody records and analytical results of the TRPH
levels for the Apollo Site soil samples are presented in Appendix A.

2-4
Figure 8. Apollo Site: Plot Plan Showing Location of Hazardous-Materials Storage Area
Figure 9. Apollo Site: Borehole Locations in both Existing Hazardous-Materials Storage Area and in Possible Former Dumpsite
ANALYTICAL RESULTS
TRPH* BY EPA METHOD 418.1

<table>
<thead>
<tr>
<th>A-EX-1</th>
<th>AP-EX-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 30 mg/kg</td>
<td>1-ND**</td>
</tr>
<tr>
<td>2 - 20</td>
<td>2-ND</td>
</tr>
<tr>
<td>3 - 10</td>
<td>3-ND</td>
</tr>
<tr>
<td>4 - 10</td>
<td>4-ND</td>
</tr>
<tr>
<td>5 - 20</td>
<td>5-ND</td>
</tr>
<tr>
<td>6 - 20</td>
<td>6-ND</td>
</tr>
<tr>
<td>7-ND</td>
<td>8-ND</td>
</tr>
</tbody>
</table>

A-EX-2
1 - 10 mg/kg
2 - 40
3 - 20

* TRPH: Total Recoverable Petroleum Hydrocarbons
** ND: Not Detected

Figure 10. Apollo Site: Diagram of Excavations of Petroleum-Contaminated Soil
After these benign analytical results were reported to Mr. Ripley, Inspector for the SBC/DEHS, he gave verbal approval for the three excavation pits at the Apollo Site to be backfilled to grade with clean, native soil material made up of decomposed granite.

2. Mars Site

Figure 15 is a generalized partial plot plan of the Mars Site showing some details of the areas near Buildings G81 and G90. During the 1987 survey, four borehole samples were removed from areas near to these two buildings (Figure 16).

On May 23, 1990, two areas were excavated: a larger excavation located north of the asphalt driveway (45 x 30 ft in size with an average depth of 3 ft below grade), and a smaller excavation located about 17 ft northeast from the larger excavation (9 x 17 ft in size with an average depth of 1 ft below grade). Eight soil samples were originally taken from the bottom of the larger excavation, while only one sample was obtained from the bottom of the smaller excavation (Figure 17).

Collection of soil Sample Number 1 from the larger excavation is depicted in Figure 18, while collection of soil Sample Number 9 from the smaller excavation is shown in Figure 19.

EPA Method 418.1 for TRPH was the laboratory method used to analyze the nine soil samples taken from the Mars Site. The TRPH level of each of the nine Mars Site soil samples is shown in Figure 17. Although eight of the nine soil samples revealed no detectable levels of TRPH, Sample Number 8 taken from the southeast corner of the larger excavation showed a TRPH content of 2000 mg/kg. Because this level is far above the environmentally acceptable TRPH value of 1000 mg/kg, further excavation had to be carried out in this area.

On June 5, 1990, the southeast corner of the larger excavation was further excavated to a depth of 5 ft below grade. Three additional soil samples were obtained from the bottom of this extended excavation and all three samples showed no detectable levels of TRPH (see Figure 17). This indicated that whatever contaminated soil had been present was removed in the secondary excavation and the area now was free of subsurface contaminated soil.

After receiving these benign results from the 11 Mars Site soil samples at the larger excavation (all with no detectable TRPH), both the larger and smaller Mars Site excavations were backfilled to grade with clean native soil. The area to the north of the asphalt driveway was returned to its original condition and paved with asphalt. A clean soil cover was used to top the smaller excavation site.

The chain-of-custody records and analytical results of the TRPH levels for the Mars Site soil samples are presented in Appendix A.

3. Mojave Base Site

Figure 20 is a plot plan of the Mojave Base Site showing the location of an abandoned dump area. An overview of what the abandoned dumpsite looked like before it was cleaned up is shown in Figure 21.
Figure 17. Mars Site: Diagram of Excavations of Petroleum-Contaminated Soil
Figure 18. Mars Site: Collection of Soil Sample Number 1 from Larger Excavation Area
Figure 20. Mojave Base Site: Plot Plan and Location of Abandoned Dumpsite and Abandoned Sewage Plant and Sewage Evaporation Pond
During the 1987 survey, seven soil samples were removed from the several open and covered trenches that made up the dumpsite (Figure 22). Photographs of a typical backhoe excavation and the testing for volatile organic materials with an HNu photoionization are depicted, respectively, in Figures 23 and 24.

On June 13, 1990, ten soil samples were obtained from the bottom of an excavation near the southeast corner of the Mojave Base Site. The excavation was 25 x 50 ft in size and had an average depth of 3 ft below grade (Figure 25).

EPA Method 7210 was the laboratory method for the detection of copper that was used to analyze the ten soil samples obtained from the Mojave Base Site. Interestingly, all ten samples contained the metal, with copper concentrations ranging from a low of 10 mg/kg (Samples 9 and 10) to a high of 140 mg/kg (Sample 6). Because all the copper levels were below 150 mg/kg, no further action was necessary according to the SBC/DEHS.

The chain-of-custody records and analytical results of the copper levels for the Mojave Base Site soil samples are presented in Appendix A.

All of the copper-contaminated soil excavated from the Mojave Base Site physically was removed from the GDSCC and trucked to the U.S. Ecology hazardous-waste landfill located in Beatty, Nevada. Manifests for this environmentally acceptable disposal of the copper-contaminated soils are presented in Appendix C.

Because the levels of copper in the Mojave Base Site soil samples were environmentally benign, the excavation at the site was backfilled to grade with clean native soil made up of decomposed granite.
Figure 22. Mojave Base Site: Location of Open and Covered Trash-Trenches and Seven Excavated Sampling Pits at the Abandoned Dumpsite (see Figure 20 for Location of Area within Mojave Base Site)
Figure 23. Mojave Base Site: Backhoe Excavation of a Pit Adjacent to a Covered Trash-Trench at Abandoned Dumpsite
Figure 24. Mojave Base Site: HNu Photolization Meter "Sniffing" for Volatile Organic Materials from an Excavated Pit Adjacent to an Open Trash-Trench at Abandoned Dumpsite (Note Plastic Sheet to Avoid Cross-Contamination between Trench and Pit)
Figure 25. Mojave Base Site: Excavations of Copper-Contaminated Soil
SECTION III
THE GOLDSTONE DEEP SPACE COMMUNICATIONS COMPLEX (GDSCC)

A. LOCATION OF THE GDSCC

The GDSCC is located in southern California, in a natural, bowl-shaped depression area in the Mojave Desert, in San Bernardino County about 40 miles north of Barstow, California, and about 160 miles northeast of Pasadena, California, where JPL is located.

As indicated in Section I, the GDSCC is part of the NASA's Deep Space Network (DSN), one of the world's largest and most sensitive scientific telecommunications and radio navigation networks. The Goldstone Complex is managed, technically directed, and operated for NASA by JPL.

The 52-mi² Goldstone Complex lies within the western part of the Fort Irwin Military Reservation (Figure 26). A Use Permit for the land was granted to NASA by the U.S. Army. The Complex is bordered by the Fort Irwin Military Reservation on the north, east, and southeast; the China Lake Naval Weapons Center on the northwest; and the state and Federal lands managed by the U.S. Bureau of Land Management (BLM) on the south.

B. FUNCTIONS OF THE GDSCC

After the Space Act of 1958 had accelerated U.S. plans and programs for space exploration, JPL initiated construction work at Goldstone to build the first tracking station of what is now known as the DSN. Thus, for more than three decades, the primary purpose of the DSN has been and continues today to be the support for the tracking of both manned and unmanned spacecraft missions and to provide instrumentation for radio and radar astronomy in the exploration of the solar system and the universe.

Over the years, the DSN has become a world leader in the development of low-noise receivers; tracking, telemetry, and command systems; digital signal processing; and deep space radio navigation.

The basic responsibilities of the DSN are to receive telemetry signals from spacecraft, to transmit commands that control the various spacecraft operations, and to generate the radio navigation data to locate and guide the spacecraft to its destination.

Because of its advanced technical ability to perform the above services, the DSN also is able to carry out the following functions: flight radio-science, radio and radar astronomy, very long baseline interferometry (VLBI), precise measurement of minute earth movements (geodynamics), and participation in the NASA Search for Extraterrestrial Intelligence (SETI).

Goldstone also is a research and development (R&D) center both to extend the communication range and to increase the data acquisition capabilities of the DSN. It serves as a proving ground for new operational techniques. Prototypes of all new equipment are thoroughly tested at Goldstone before they are duplicated for installation at overseas stations (see Section III.C below).
Figure 26. Geographic Relationship of the Goldstone Deep Space Communications Complex to JPL in Pasadena
C. FACILITIES AT THE GDSCC

The GDSCC is a self-sufficient, working community with its own roads, airstrip, cafeteria, electrical power, and telephone systems, and it is equipped to conduct all necessary maintenance, repairs, and domestic support services. Facilities at the GDSCC include about 100 buildings and structures that were constructed during a 30-year period from the 1950s through the 1980s. The construction of additional buildings and structures continues today as the GDSCC increases its activities and operations.

Goldstone is one of three Deep Space Communications Complexes (DSCCs) operated by NASA. The three DSCCs are located on three continents: at Goldstone in southern California's Mojave Desert; in Spain, about 60 km (37 miles) west of Madrid at Robledo de Chavela; and in Australia, near the Tidbinbilla Nature Reserve, about 40 km (25 miles) southwest of Canberra. Because these three DSCCs are approximately 120 deg apart in longitude, a spacecraft is nearly always in view of one of the DSCCs as the Earth rotates on its axis (Figure 27).

Activities at the GDSCC support six parabolic dish antennas at five sites called Deep Space Stations (DSSs): Four sites are operational for space missions, while one is devoted to R&D activities. There are also four, similar, operational DSSs in Spain and in Australia. Thus, the NASA DSN consists of a worldwide network of 12 operational DSSs.

The GDSCC also includes three antennas at the Venus Site (for R&D), while another parabolic dish antenna at the Mojave Base Site is operated by the National Oceanic and Atmospheric Administration (NOAA).

A Network Operations Control Center (NOCC), located at JPL in Pasadena, controls and monitors the DSN. A Ground Communications Facility (GCF) of the DSN operates to link together the NOCC at JPL with the three DSCCs at Goldstone, Spain, and Australia.

A 26-m (85-ft) antenna, located at the Pioneer Site, was deactivated in 1981. In 1985, the Pioneer antenna (DSS 11) was designated a National Historic Landmark by the U.S. Department of Interior, and the Pioneer Site was returned to the U.S. Army. Each of the Goldstone sites is briefly described below.

Total NASA/JPL facilities at the GDSCC (Figure 28) include the six DSN parabolic dish antennas, an airport, a microwave test facility, miscellaneous support buildings, and a remote support facility in Barstow, California, located about 40 miles south of the GDSCC. The GDSCC support staff consists of about 260 personnel on-site and at the Barstow facility. Table 1 summarizes the major facilities, buildings (number and square footage), and antennas (construction date and size). Three sites within the GDSCC have antennas (referred to as stations) devoted to NASA DSN operations: Echo Station, Mars Station, Uranus Station, and two antennas at the Apollo Station. Two other sites have antennas devoted to R&D: Venus, operated by the GDSCC, and Mojave, operated by NOAA.

D. ANTENNA STATIONS AT THE GDSCC

1. Echo Site (DSS 12)

The Echo Site, as the administration center and operations headquarters of the GDSCC, is the most extensively developed site on the complex. It has one 34-m (111.5-ft) antenna and 24 support buildings, with a combined area of 79,208 ft². Support buildings include administration and
### Table 1. Major Facilities at the GDSCC

<table>
<thead>
<tr>
<th>Site</th>
<th>Station Number</th>
<th>Buildings</th>
<th>Antennas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echo Site</td>
<td>DSS 12</td>
<td>25</td>
<td>1961(^a)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>79,208</td>
<td>34(^b)</td>
</tr>
<tr>
<td>Venus Site</td>
<td>DSS 13 (old)</td>
<td>15</td>
<td>1962(^d)</td>
</tr>
<tr>
<td></td>
<td>DSS 13 (new)</td>
<td>1990</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Existing antenna (no number assigned)</td>
<td>9</td>
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<tr>
<td>Mars Site</td>
<td>DSS 14</td>
<td>14</td>
<td>1966</td>
</tr>
<tr>
<td></td>
<td>DSS 15</td>
<td>1984</td>
<td>70(^e)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41,754</td>
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<tr>
<td>Apollo Site</td>
<td>DSS 16</td>
<td>21</td>
<td>1965(^f)</td>
</tr>
<tr>
<td></td>
<td>DSS 17</td>
<td>1990</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>DSS 24(^g) (planned)</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Mojave Site</td>
<td></td>
<td>5</td>
<td>1964</td>
</tr>
<tr>
<td></td>
<td>11,850</td>
<td>12(^h)</td>
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<tr>
<td>Airport(^i)</td>
<td>3</td>
<td>1963/1970</td>
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<tr>
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<td>4,848</td>
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<tr>
<td>Test Facility</td>
<td>MTF</td>
<td>1</td>
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<tr>
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<tr>
<td>Barstow Facility(^j)</td>
<td>1</td>
<td>28,343</td>
<td>--</td>
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</tbody>
</table>

**Notes:**

- \(^a\)The original antenna, built in 1959, was moved to the Venus Site in 1962. A 26-m antenna, built in 1961, was extended to 34 m in 1978.
- \(^b\)This antenna is to be dismantled and removed after the planned DSS 24 antenna at the Apollo Site becomes operational in 1993.
- \(^c\)This square footage does not include the two newly constructed facilities for Hazardous Materials Storage and for Acid Wash.
- \(^d\)This antenna was constructed at the Echo Site in 1959 and moved to the Venus Site in 1962.
- \(^e\)Originally constructed as a 64-m antenna in 1966, this antenna was enlarged to 70 m in 1988.
- \(^f\)This antenna originally was constructed for the NASA Goddard Space Tracking and Data Network. JPL/GDSCC/DSN operation of the antenna began in October 1984.
- \(^g\)This planned DSS 24 antenna previously was designated as DSS 18.
- \(^h\)This antenna is operated by the National Oceanic and Atmospheric Administration (NOAA).
- \(^i\)The airport is located at the Goldstone Dry Lake.
- \(^j\)This site, a leased facility, is located in Barstow, California, about 40 miles southwest of the GDSCC.

engineering offices, cafeteria, dormitory, transportation and maintenance facilities, storage areas, and warehouses. The Echo Station originally was built in 1959 as a 26-m (85-ft) antenna. The antenna was first used in 1960 to support the Echo Project, an experiment to transmit voice communications coast-to-coast by bouncing radio signals off the reflective Mylar surface of a passive balloon-type satellite. In 1962, this original 26-m antenna was moved to the Venus Site. In anticipation of this move, a newer 26-m antenna had been built at the Echo Site in 1961. In 1978, this antenna was enlarged to 34 m (111.5 ft). The present antenna is approximately 35 m (113 ft) high and weighs about 270,000 kg (300 tons). In 1993, it is to be replaced by the new DSS 24 34-m antenna that is planned to be constructed at the Apollo Site.

2. Venus Site (DSS 13)

The Venus Site consists of three antennas: a new 34-m (111.5-ft) antenna, a 26-m (85-ft) antenna, and a 9-m (29.5-ft) antenna. The smaller antenna is no longer used. There are 15 buildings with a combined area of 12,589 ft². The support buildings provide space for operations control, laboratories, offices, security, workshops, warehouses, and mechanical equipment. The 26-m antenna, which was originally located at the Echo Site, was moved to the Venus Site in 1962. The antenna was used for a radar astronomy study of the planet Venus. Currently, its primary functions are R&D and performance- and reliability-testing of high-power radio-frequency transmitters and new systems and equipment prior to their introduction into the DSN.

The newly constructed DSS 13 antenna, a 34-m (111.5-ft) antenna similar in size and structure to DSS 15 (see below), began operation with research and development activities in 1991. It is to replace the older 26-m antenna. An Environmental Assessment concerning this new DSS 13 antenna is the subject of JPL Publication 87-4, Volume 6, Environmental Assessment: New 34-Meter Antenna at Venus Site, June 15, 1988.

3. Mars Site (DSS 14 and DSS 15)

The Mars Site consists of two antennas at two stations (the Mars and Uranus stations) and 14 buildings, with a combined area of 41,754 ft². The support buildings provide facilities for operations control, offices, training, mechanical equipment, storage, and security. In May 1989, M. B. Gilbert Associates (MBGA), Long Beach, California, submitted an Environmental Assessment to JPL concerning the construction work needed for a proposed building extension to the Operations Building (Bldg. G-86) at the Mars Site.


The Mars Station Antenna (DSS 14), at 70 m (230 ft) in diameter, is one of the larger antennas of its kind in the world (see front cover). In 1991, the antenna celebrated its 25th anniversary of operation. The antenna, which was originally constructed as a 64-m antenna in 1966 and enlarged to a 70-m antenna in 1988, is 7.25 times more powerful and sensitive than a 26-m antenna, extending the range of deep space communications by 2.7 times. It can maintain communications with spacecraft to the edge of the solar system. Standing more than 235 ft high, this antenna is one of the more striking features to be seen in the GDSCC geographic area. The 70-m antenna was used in August 1989 for the Voyager 2 spacecraft's encounter with the planet Neptune. The latter is located at a distance of 4.5 billion km (2.8 billion miles) from Earth.
The Uranus Station Antenna (DSS 15) is a 34-m high-efficiency (HEF), precision-shaped antenna, located approximately 1,600 ft southeast of the Mars Station Antenna. Built in 1984, this antenna at the GDSCC first was used in January 1986 to support the encounter of the Voyager 2 spacecraft with the planet Uranus. The latter is located at a distance of more than 3 billion km (1.8 billion miles) from Earth. The new, proposed 34-m, precision-shaped antennas, newly constructed at the Venus Site (see above) and planned for the Apollo Site (see below), are similar in size and structure to this Uranus Station antenna.

4. **Apollo Site (DSS 16, DSS 17, and DSS 24)**

The Apollo Site has a 26-m (85-ft) antenna (DSS 16), a 9-m (29.5-ft) antenna (DSS 17), and 21 buildings, with a combined total area of 43,978 ft². The buildings provide space for operations, equipment, storage, and warehousing. The 26-m antenna originally was constructed in 1965 by NASA's Goddard Space Tracking and Data Network to support the manned Apollo missions to the moon. Operation of this antenna under JPL management began in October 1984. Both the 26-m and the 9-m antennas are used to support the missions of the Space Shuttle [Space Transportation System (STS)] and satellites in both low and high Earth orbits. In May 1989, M. B. Gilbert Associates, Long Beach, California, submitted an Environmental Assessment to JPL concerning the construction work needed for a planned new 34-m (111.5-ft) antenna (DSS 24) at the Apollo Site. The details of this Environmental Assessment are described in JPL Publication 87-4, Volume 10, *Environmental Assessment: New 34-Meter Antenna at Apollo Site*, January 15, 1990.

5. **Mojave Base Site (NOAA Antenna)**

The Mojave Base Site has one antenna and five buildings, with a combined area of 11,850 ft². At one time, these buildings provided support facilities for operations, equipment, and maintenance. Except for the NOAA operations buildings, however, these buildings are not in use.

The Mojave Base Site has a 12-m (40-ft) antenna operated by NOAA. The antenna is involved in several programs, including monitoring of shifts in the Earth's tectonic plates, monitoring weather changes, and retrieving information from very low-orbiting Earth satellites.

**E. SUPPORT FACILITIES AT THE GDSCC**

1. **Goldstone Dry Lake Airport**

The airport consists of an approximately 6,000- by 100-ft paved runway. There are two buildings at the airport site neither of which is presently in use. An open hanger is used to provide shelter for a single aircraft. For its personnel, NASA operates three scheduled shuttle flights per week to the GDSCC that originate from the Burbank-Glendale-Pasadena Airport. In addition, the Goldstone airport is used infrequently by administrative Army flights. Both NASA and the U.S. Army use propeller-driven aircraft.

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2 This planned DSS 24 antenna previously was designated as DSS 18.
2. Microwave Test Facility and Fire-Training Area

The Microwave Test Facility (MTF) and Fire-Training Area consist of a single building of 2,880 ft² along with areas identified for fire fighting. The MTF is used for research and development testing of antenna microwave equipment. Fire training includes procedures for the quenching of fires.

3. Miscellaneous Buildings in the GDSCC Area

Three buildings and structures at the GDSCC that fall into this category include the main gate house, pump house, and radio spectrum monitor. The total area of these three buildings/structures is 1,430 ft².

4. Off-Site Facility at Barstow, California

In addition to the above-mentioned on-site facilities, the GDSCC leases an office and warehouse support facility in the nearby city of Barstow. The facility is a single-story, 28,343-ft² structure located at 850 Main Street.

F. NONSTRUCTURAL SUPPORT FACILITIES AT THE GDSCC

1. Transportation Network

The major roadways in the area are shown in Figure 29. The only surface public transportation route to the GDSCC is by the Fort Irwin Road that leads to Fort Irwin. The NASA Road cutoff from Fort Irwin Road leads into the GDSCC. The NASA Road merges with Goldstone Road, which is the only north-south paved access road within the complex. Both of the NASA and Goldstone Roads are paved two-lane roads and are maintained by the Fort Irwin Post Engineer. Two-lane paved access roads also lead to each of the sites and major facilities.

2. Utilities and Services

The Southern California Edison Company provides electricity for the Goldstone Complex. The GDSCC provides its own backup diesel-engine generators to ensure operations during emergencies and continuity of electrical service for prescheduled periods of time. Gasoline, diesel oil, and hydraulic oil are stored in double-walled underground storage tanks fitted with sensors between the walls to detect leaks. Water is supplied by Fort Irwin from groundwater basin wells. Sanitary sewage is discharged through septic tank systems to leaching fields. The Echo and Mars Sites discharge wastewater to evaporation ponds (see JPL Publication 87-4, Environmental Projects: Volume 8, Modifications of Wastewater Evaporation Ponds, October 15, 1989).

G. SOLID-WASTE MANAGEMENT FACILITIES AT THE GDSCC

At the Echo Site, the GDSCC operates its own 10-acre, Class III solid-waste landfill. This facility accepts only nonhazardous, solid wastes.

Most of a small quantity of hazardous waste, generated at the GDSCC each year, is sent to off-site commercial facilities for reclamation and eventual reuse. The remainder is transported to off-site commercial treatment of disposal facilities within 90 days of generation. The GDSCC now has four new, properly managed storage facilities for hazardous materials and wastes: one is located at the Echo Site, one at the Venus Site, and two at the Mars Site. The GDSCC does not operate any facilities that require a hazardous waste permit.
Figure 29. Major Roads Leading to and at the GDSCC
Details concerning the construction of these two new storage facilities for hazardous materials and wastes at the Echo and Venus Sites are described in JPL Publication 87-4, *Environmental Projects: Volume 9, Construction of Hazardous Materials Storage Facilities*, November 14, 1989. Two more storage facilities for hazardous materials and wastes, one at the Mars Site and the other at the Apollo Site, were completed in 1990. In accordance with its environmental management program, the GDSCC conducts all of its waste-management operations in strict compliance with environmental regulations, in a manner consistent with protection of human health and the environment.

H. WASTEWATER MANAGEMENT FACILITIES AT THE GDSCC

Four functioning sewage evaporation ponds, one pair at the Echo Site and another pair at the Mars Site, are designed to receive effluent from an upstream septic tank system. Extensive work was completed in the spring of 1989 to repair and reshape the previously eroded embankments of the wastewater evaporation ponds. Details of this construction work are recorded in JPL Publication 87-4, *Environmental Projects: Volume 8, Modifications of Wastewater Evaporation Ponds*, October 15, 1989.

I. UNDERGROUND STORAGE TANKS (USTs) AT THE GDSCC

As a large-scale facility located in a remote, isolated desert region, the GDSCC operations to support the various DSS antennas require numerous on-site storage facilities for gasoline, diesel oil, hydraulic oil, and waste oil. The most environmentally safe and economical way to store large quantities of these liquids is in double-walled, steel shells with outer fiberglass coating for corrosion protection, and a monitoring system in the annular space between the inner and outer shells to detect any leaks in either shell.

The installation of 13 new USTs with the above-described, environmentally safe properties (7 at the Echo Site, 5 at the Mars Site, and 1 at the Mojave Base Site) is discussed in detail in JPL Publication 87-4, *Environmental Projects: Volume 13, Underground Storage Tanks: Removal and Replacement*, February 15, 1991.

J. OPERATIONAL RELATIONSHIPS BETWEEN THE GDSCC AND FORT IRWIN

Because the GDSCC is located within the Fort Irwin property, the two installations potentially can affect each other’s roles and missions. Fort Irwin is a U.S. Army installation serving at the U.S. Army National Training Center (NTC). The remote desert environment allows military task forces to practice large-scale training maneuvers that could affect natural, historic, and cultural resources at the GDSCC. This especially is true when the maneuvers involve the movement of heavy equipment (tanks, large trucks) within the GDSCC. Most maneuvers occur at the eastern border of the GDSCC, and every effort is made by both the GDSCC and Fort Irwin personnel to avoid the use of sensitive areas for such maneuvers.
K. NATURAL ENVIRONMENTAL ASPECTS OF THE GDSCC

1. Geology

The GDSCC is located in the North Central section of the Mojave Desert Province. Typically, the Mojave Desert Province consists of broad, flat plains separated by low mountains (1,000 to 2,000 ft of topographic relief). The GDSCC is situated within one of these low mountain areas.

The GDSCC is located in a naturally occurring bowl-shaped depression area bounded on three sides by geological faults. The Garlock Fault lies to the north, while the Blackwater and Calico Faults lie, respectively, to the west and south. The GDSCC is bounded on the east by the Tiefort Mountains. Each antenna site at the GDSCC is located on natural alluvial material, ranging in thickness from 15 ft at the Venus Site to more than 70 ft at the Echo Site. The alluvium is derived from the surrounding hills.

2. Hydrology

Groundwater in the Goldstone area is generally confined and is found at depths ranging from 170 ft near the Minitrack Site to approximately 1,000 ft below the Echo Site. Chemical analyses of the groundwater have yielded total dissolved solids (TDS) values in excess of 1,000 ppm, indicating that the groundwater is brackish. The Goldstone Complex currently obtains potable water from a group of wells located at Fort Irwin, approximately 10 miles to the southeast.

3. Climatic Conditions

The GDSCC lies within the U.S. Naval Weather Service's Southwest Desert, Climatic Area A. Mean annual temperatures for the area range from 50°F to 80°F. Temperatures can climb as high as 114°F during the summer months, and drop as low as 11°F during the winter months. Mean annual precipitation for the area is approximately 2.5 in.; most precipitation falls between November and February.
SECTION IV
CERTIFICATION

I hereby certify that all work performed by Engineering-Science, Inc., Pasadena, California, and the Jenkin Construction Company, Long Beach, California, in their work pertaining to the excavation, removal, and disposal of hydrocarbon-contaminated soils from the Apollo and Mars Sites, and the excavation, removal, and disposal of copper-contaminated soils at the Mojave Base Site in the Goldstone Deep Space Communications Complex of the Ft. Irwin Military Preservation, San Bernardino County, California, as described in this report, was performed in compliance with Federal, State, and local regulations, and in accordance with good engineering practice.

Leonard H. Kushner
Registered Professional Engineer

Signature  _____________________________
Date Signed:  March 15, 1992
Registration No.  E9003, Electrical  State: California
SF186, Safety  California
EA 0078 Environmental Assessor  California
APPENDIX A

CHAIN OF CUSTODY RECORDS AND RESULTS OF ANALYSES FOR HYDROCARBONS AND METALS IN GDSCC SOIL SAMPLES
# GOLDSTONE DEEP SPACE COMMUNICATIONS COMPLEX

## CHAIN OF CUSTODY

850 East Main Street, Barstow, California 92311 619-386-8330

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<th>Number of Containers</th>
<th>Analysis Requested</th>
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**Samplers:** (Signature)

Carol J. Craig 
Paul A. Pederson

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**Special Requirements**

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Shipped by: (signature) | Courier (signature) | Received for Lab by (sig) | Date/Time |
|-----------------------|---------------------|---------------------------|-----------|

Address: ESB Labs | Date/Time |
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
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Apollo
soil

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Date analysis completed: 05/09/90

Notes:

cc: Edward S. Babcock & Sons, Inc.

Edward S. Babcock & Sons, Inc.

A-3
To: Jenkin Construction Co.  
P. O. Box 1427  
Long Beach, CA 90801  
Attn: L. L. Thomas  

Sample Marked:  
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Apollo soil  

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Date analysis completed: 05/09/90

Notes:  

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Edward S. Babcock & Sons, Inc.
To: Jenkin Construction Co.  
P. O. Box 1427  
Long Beach, CA 90801  
Attn: L. L. Thomas

Sample Marked:  
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Apollo  
soil

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Date analysis completed: 05/09/90

Notes:

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Edward S. Babcock & Sons, Inc.
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
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Apollo soil

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Date analysis completed: 05/09/90

Notes:

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Chain of Custody on file: Y
To: Jenkin Construction Co.
P. O. Box 1427
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Attn: L. L. Thomas

Sample Marked:
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Apollo
soil

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Date analysis completed: 05/09/90

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To: Jenkin Construction Co.
   P. O. Box 1427
   Long Beach, CA 90801
   Attn: L. L. Thomas

Sample Marked:
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Edward S. Babcock & Sons, Inc.

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To: Jenkin Construction Co.  
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Long Beach, CA 90801  
Attn: L. L. Thomas

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A-9
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P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL-A-EX2-2
Apollo
soil

Date analysis completed: 05/09/90

Notes:

cc:

Edward S. Babcock & Sons, Inc.

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td></td>
</tr>
<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>40 mg/kg</td>
</tr>
<tr>
<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
</tr>
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</table>

Lab No. 900508-761
Invoice No. 60328

<table>
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<tr>
<th>Submitted</th>
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</thead>
<tbody>
<tr>
<td>Jim K.</td>
<td>CJC/PAF</td>
</tr>
<tr>
<td>05/08/90</td>
<td>05/08/90</td>
</tr>
<tr>
<td>16:58</td>
<td>13:25</td>
</tr>
</tbody>
</table>

Chain of Custody on file: Y
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL-A-EX2-3
Apollo
soil

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Results</th>
<th>Parameter Name</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td></td>
<td>Total Petroleum Hydrocarbons</td>
<td>20 mg/kg</td>
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<tr>
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<td></td>
<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
</tr>
</tbody>
</table>

Date analysis completed: 05/09/90

Notes:

cc: Edward S. Babcock & Sons, Inc.

Edward S. Babcock & Sons, Inc.
To: Jenkin Construction Co.  
P. O. Box 1427  
Long Beach, CA 90801  
Attn: L. L. Thomas

Sample Marked:  
JPL Goldstone, Apollo  
Site soil AP-EX2-1

<table>
<thead>
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<th>Results</th>
<th>Parameter Name</th>
<th>Results</th>
</tr>
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<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td>ND mg/kg</td>
<td></td>
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<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
<td>Practical Quantitation Limit</td>
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</tr>
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</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

Edward S. Babcock & Sons, Inc.

A-13
To: Jenkin Construction Co.  
P. O. Box 1427  
Long Beach, CA 90801  
Attn: L. L. Thomas

Sample Marked:  
JPL Goldstone, Apollo  
Site soil AP-EX2-2

<table>
<thead>
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<th>Parameter Name</th>
<th>Results</th>
</tr>
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<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td>NU mg/kg</td>
<td>Total Petroleum Hydrocarbons</td>
<td>NU mg/kg</td>
</tr>
<tr>
<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date analysis completed: 05/24/90

Notes: NU = None Detected at Practical Quantitation Limit

CC: Edward S. Babcock & Sons, Inc.

A-14
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Apollo
Site soil AP-EX2-3

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Results</th>
<th>Parameter Name</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td></td>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
</tr>
</tbody>
</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

cc: Edward S. Babcock & Sons, Inc.

Edward S. Babcock & Sons, Inc.

Lab No. 900523-216
Invoice No. 60716

Submitted | Sampled
----------|---------
HTH        | HTH     
05/23/90  | 5/23/90 |
16:30     | 12:59   

Chain of Custody on file: Y
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Apollo
Site soil AP-EX2-4

<table>
<thead>
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<th>Results</th>
<th>Parameter Name</th>
<th>Results</th>
</tr>
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<tbody>
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<td>EPA 418.1 - soil extension</td>
<td></td>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
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<tr>
<td></td>
<td></td>
<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
</tr>
</tbody>
</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

CC: Edward S. Babcock & Sons, Inc.

A-16
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Apollo
Site soil AP-EX2-5

<table>
<thead>
<tr>
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<tr>
<td>EPA 418.1 - soil extension</td>
<td></td>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
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<tr>
<td></td>
<td></td>
<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
</tr>
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</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

Edward S. Babcock & Sons, Inc.
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Apollo
Site soil AP-EA2-6

---

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Results</th>
<th>Parameter Name</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EPA 418.1 - soil extension</strong></td>
<td></td>
<td><strong>Total Petroleum Hydrocarbons</strong></td>
<td>ND mg/kg</td>
</tr>
<tr>
<td><strong>Practical Quantitation Limit</strong></td>
<td>10 mg/kg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

Edward S. Babcock & Sons, Inc.

---

A-18
To: Jenkin Construction Co.  
P. O. Box 1427  
Long Beach, CA 90801  
Attn: L. L. Thomas

Sample Marked:  
JPL Goldstone, Apollo  
Site soil AP-EX2-7

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Results</th>
<th>Parameter Name</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td>ND mg/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical Quantitation Limit</td>
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<td></td>
<td></td>
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</tbody>
</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

cc: Edward S. Babcock & Sons, Inc.

A-19
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Apollo Site soil AP-EX2-8

---

**Parameter Name** | **Results** | **Parameter Name** | **Results**
--- | --- | --- | ---
EPA 418.1 - soil extension | ND mg/kg | Total Petroleum Hydrocarbons | ND mg/kg
Practical Quantitation Limit | 10 mg/kg |  |

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

Edward S. Babcock & Sons, Inc.

A-20
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Apollo
Site soil AP-EXZ-9

Lab No. 900523-222
Invoice No. 60716

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Results</th>
<th>Parameter Name</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
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<td>Total Petroleum Hydrocarbons</td>
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<tr>
<td>Practical Quantitation Limit</td>
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Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

Edward S. Babcock & Sons, Inc.

A-21
<table>
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<th>Time</th>
<th>Description</th>
<th>CN</th>
<th>C</th>
<th>SP</th>
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<tbody>
<tr>
<td>JPL-MA-5x1-1</td>
<td>2/14/90</td>
<td>09:51</td>
<td>4 (18,1)</td>
<td>1</td>
<td>✓</td>
<td></td>
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<tr>
<td>-2</td>
<td></td>
<td>10:06</td>
<td></td>
<td>1</td>
<td>✓</td>
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<tr>
<td>-3</td>
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<td>10:20</td>
<td></td>
<td>1</td>
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<tr>
<td>-4</td>
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<td>10:30</td>
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<td>1</td>
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<tr>
<td>-5</td>
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<td>1</td>
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<tr>
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<tr>
<td>-7</td>
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<td>11:00</td>
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<td>1</td>
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<tr>
<td>-8</td>
<td></td>
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<td>1</td>
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<td>-9</td>
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<td>11:20</td>
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<td>1</td>
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</table>

Remarks:
- 24 HR Rush
- Tru Fry
- Try for 24 HR Rush

Relinquished By: [Signature]
Date/Time: 2/14/90 11:30

Received For Lab By: [Signature]
Date/Time: 5/23/90 11:30
To: Jenkin Construction Co.  
P. O. Box 1427  
Long Beach, CA 90801  
Attn: L. L. Thomas

Sample Marked:  
JPL Goldstone, Mars Site  
soil NA-EX1-1

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Results</th>
<th>Parameter Name</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td></td>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
</tr>
</tbody>
</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Mars Site
soil MA-EX1-2

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Results</th>
<th>Parameter Name</th>
<th>Results</th>
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</thead>
<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td></td>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
</tr>
</tbody>
</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

cc: Edward S. Babcock & Sons, Inc.

A-24
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Mars Site
soil MA-EX1-3

Parameter Name | Results | Parameter Name | Results
--- | --- | --- | ---
EPA 418.1 - soil extension | | | 
Total Petroleum Hydrocarbons | ND mg/kg | Practical Quantitation Limit | 10 mg/kg

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

cc: Edward S. Babcock & Sons, Inc.

A-25
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Mars Site
soil MA-EX1-4

<table>
<thead>
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<th>Results</th>
<th>Date analysis completed: 05/24/90</th>
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<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td>ND mg/kg</td>
<td></td>
</tr>
<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
<td></td>
</tr>
<tr>
<td>Practical Quantitation Limit</td>
<td>ND mg/kg</td>
<td></td>
</tr>
</tbody>
</table>

Notes: ND = None Detected at Practical Quantitation Limit

CC: Edward S. Babcock & Sons, Inc.
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Mars Site
soil MA-EX1-5

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Results</th>
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<th>Results</th>
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</thead>
<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td></td>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
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<tr>
<td></td>
<td></td>
<td>Practical Quantitation Limit</td>
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</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

Edward S. Babcock & Sons, Inc.

A-27
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Mars Site
soil MA-EX1-6

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Results</th>
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<th>Results</th>
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<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
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</tr>
<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
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<td></td>
</tr>
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Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

Edward S. Babcock & Sons, Inc.

A-28
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Mars Site
Soil MA-EX1-7

Lab No. 900523-229
Invoice No. 60716

<table>
<thead>
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<td>5/23/90</td>
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<tr>
<td>16:30</td>
<td>11:00</td>
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Chain of Custody on file: Y

<table>
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<tbody>
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<td>EPA 418.1 - soil extension</td>
<td>ND mg/kg</td>
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<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
</tr>
<tr>
<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
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</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

Edward S. Babcock & Sons, Inc.

A-29
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Mars Site
soil MA-EX1-8

---

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Results</th>
<th>Parameter Name</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
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<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
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</tbody>
</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

cc: Edward S. Babcock & Sons, Inc. A-30
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
JPL Goldstone, Mars Site
soil MA-EX1-9

<table>
<thead>
<tr>
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<th>Results</th>
<th>Parameter Name</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td></td>
<td>Total Petroleum Hydrocarbons</td>
<td>ND mg/kg</td>
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<tr>
<td>Total Petroleum Hydrocarbons</td>
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<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
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</table>

Date analysis completed: 05/24/90

Notes: ND = None Detected at Practical Quantitation Limit

Edward S. Babcock & Sons, Inc.

A-31
<table>
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<th>Description</th>
<th>Date</th>
<th>Time</th>
<th>Determination Requested</th>
<th>Condition of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>JPL- MA - EX 3 - 1</td>
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<td>10:30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td>June 90</td>
<td>10:40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-3</td>
<td>June 90</td>
<td>10:50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks

Received By: 

Relinquished By: 

Date/Time: 5/10 10:00
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
Goldstone-JPL
MA-EX3-1
Soil

Parameters Name | Results | Parameters Name | Results
--- | --- | --- | ---
EPA 418.1 - soil extension | | | 
Total Petroleum Hydrocarbons | 10 mg/kg | Practical Quantitation Limit | 10 mg/kg

Date analysis completed: 06/12/90

Notes:

cc: Edward S. Babcock & Sons, Inc.

A-33
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
Goldstone-JPL
MA-EX3-2
Soil

---

<table>
<thead>
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<th>Parameter Name</th>
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</thead>
<tbody>
<tr>
<td>EPA 418.1 - soil extension</td>
<td>ND mg/kg</td>
<td>Practical Quantitation Limit</td>
<td>10 mg/kg</td>
</tr>
</tbody>
</table>

ND = None Detected at PQL.

---

Date analysis completed: 06/12/90

Notes:

cc:

Edward S. Babcock & Sons, Inc.

A-34
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked:
Goldstone-JPL
MA-EX3-3
Soil

Lab No. 900605-244
Invoice No. 61012

Submitted | Sampled
---------|--------
HTH       | HTH
06/05/90  | 06/05/90
14:15     | 10:50

Chain of Custody on file: Y

<table>
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<th>Parameter Name</th>
<th>Results</th>
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<tbody>
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<td></td>
<td></td>
<td>Practical Quantitation Limit</td>
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<td>ND = None Detected at PQL.</td>
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<tr>
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Edward S. Babcock & Sons, Inc.

A-35
<table>
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<th>Chilled</th>
<th>Preserved</th>
<th>Remarks</th>
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<td>7210</td>
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To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked: JPL Goldstone Mojave
#JPL-MOJ-EX4-1

Lab No. 900613-930
Invoice No. 61265
Customer No. J2156

Submitted By HTH
Date 06/13/90
Time 16:15

Sample Matrix

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<td>Chromium (Cr)</td>
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<td>Chromium +6 (hex)</td>
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<td>Copper (Cu)</td>
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<td>7470/7471</td>
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Date analysis completed: 06/14/90
ND = Not Detected at Practical Quantitation Limit (PQL).
NA = Not Analyzed or Not Applicable.
Notes: Edward S. Babcock & Sons, Inc.

cc:
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked: JPL Goldstone Mojave
#JPL-MOJ-EX4-2

Sample Matrix

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<td>EPA 3005</td>
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<td>Non-aqueous liquid</td>
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Percent Solids (%) 98.6

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<td>Barium (Ba)</td>
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<tr>
<td>Cadmium (Cd)</td>
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<tr>
<td>Chromium (Cr)</td>
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<td>Lead (Pb)</td>
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Date analysis completed: 06/14/90
ND = Not Detected at Practical Quantitation Limit (PQL).
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Notes:
To: Jenkin Construction Co.
P.O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked: JPL Goldstone Mojave
#JPL-MOJ-EX4-3

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Percent Solids (%) 98.1

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Date analysis completed: 06/14/90

ND = Not Detected at Practical Quantitation Limit (PQL).
NA = Not Analyzed or Not Applicable.
Notes: Edward S. Babcock & Sons, Inc.

cc:
To: Jenkin Construction Co.  
P. O. Box 1427  
Long Beach, CA 90801  
Attn: L. L. Thomas

Sample Marked: JPL Goldstone Mojave  
#JPL-MOJ-EX4-4

Sample Matrix:  
- Water
- XX Soil
- Sludge
- Oil
- Non-aqueous liquid

Sample Preparation:  
- XX Total
- CAM WET
- EP Toxicity
- TCLP

Digestion Method:  
- EPA 3005
- EPA 3010
- EPA 3020
- EPA 3040
- XX EPA 3050

Percent Solids (%) 98.3

Parameter Name | EPA Method | Result mg/kg As Received | PQL |
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Date analysis completed: 06/14/90

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Notes:

cc:
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked: JPL Goldstone Mojave
#JPL-MOJ-EX4-5

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<td>XX Soil</td>
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<td>Sludge</td>
<td>EP Toxicity</td>
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Percent Solids (%) 99.0

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</table>

Date analysis completed: 06/14/90
ND = Not Detected at Practical Quantitation Limit (PQL).
NA = Not Analyzed or Not Applicable.

Notes:

cc:

Edward S. Babcock & Sons, Inc.
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked: JPL Goldstone Mojave
#JPL-MOJ-EX4-6

Sample Matrix
- Water
- Soil
- Sludge
- Oil
- Non-aqueous liquid

Sample Preparation
- XX Total
- CAM WET
- EP Toxicity
- TCLP

Digestion Method
- EPA 3005
- EPA 3010
- EPA 3020
- EPA 3040
- XX EPA 3050

Percent Solids (%) 98.7

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<tr>
<td>Copper (Cu)</td>
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<td>Lead (Pb)</td>
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<tr>
<td>Mercury (Hg)</td>
<td>7470/7471</td>
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<tr>
<td>Molybdenum (Mo)</td>
<td>7480/7481</td>
<td>NA</td>
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<tr>
<td>Nickel (Ni)</td>
<td>7520</td>
<td>NA</td>
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<tr>
<td>Selenium (Se)</td>
<td>7740</td>
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<tr>
<td>Silver (Ag)</td>
<td>7760</td>
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<tr>
<td>Thallium (Tl)</td>
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<tr>
<td>Vanadium (V)</td>
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<tr>
<td>Zinc (Zn)</td>
<td>7950</td>
<td>NA</td>
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</table>

Date analysis completed: 06/14/90
ND = Not Detected at Practical Quantitation Limit (PQL).
NA = Not Analyzed or Not Applicable.
Notes: Edward S. Babcock & Sons, Inc.
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked: JPL Goldstone Mojave
#JPL-MOJ-EX4-7

Sample Matrix
- Water
- XX Soil
- Sludge
- Oil
- Non-aqueous liquid

Sample Preparation
- XX Total
- CAM WET
- EP Toxicity
- TCLP

Digestion Method
- EPA 3005
- EPA 3010
- EPA 3020
- EPA 3040
- XX EPA 3050

Percent Solids (%): 98.1

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<th>EPA Method</th>
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<td>Beryllium (Be)</td>
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Date analysis completed: 06/14/90
ND = Not Detected at Practical Quantitation Limit (PQL).
NA = Not Analyzed or Not Applicable.
Notes: cc:

Edward S. Babcock & Sons, Inc.

A-43
To: Jenkin Construction Co.  
P. O. Box 1427  
Long Beach, CA 90801  
Attn: L. L. Thomas  

Sample Marked: JPL Goldstone Mojave  
#JPL-MOJ-EX4-8  

Sample Matrix  

<table>
<thead>
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<th>Parameter Name</th>
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<th>Result</th>
<th>PQL</th>
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<td>Chromium (Cr)</td>
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<tr>
<td>Chromium +6 (hex)</td>
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Date analysis completed: 06/14/90  
ND = Not Detected at Practical Quantitation Limit (PQL).  
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Notes:  

Edward S. Babcock & Sons, Inc.  

cc:
To: Jenkin Construction Co.
P. O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked: JPL Goldstone Mojave
#JPL-MOJ-EX4-9

Sample Matrix
Water
XX Soil
Sludge
Oil
Non-aqueous liquid

Sample Preparation
XX Total
CAM WET
EP Toxicity
TCLP

Percent Solids (%) 98.0

Parameter Name     | EPA Method      | Result
---                | ---             | ---
Antimony (Sb)      | 7040/7041       | NA
Arsenic (As)       | 7060            | NA
Barium (Ba)        | 7080            | NA
Beryllium (Be)     | 7090/7091       | NA
Cadmium (Cd)       | 7130/7131       | NA
Chromium (Cr)      | 7190/7191       | NA
Chromium +6 (hex)  | 7196            | NA
Cobalt (Co)        | 7200/7201       | NA
Copper (Cu)        | 7210            | 10
Lead (Pb)          | 7420/7421       | NA
Mercury (Hg)       | 7470/7471       | NA
Molybdenum (Mo)    | 7480/7481       | NA
Nickel (Ni)        | 7520            | NA
Selenium (Se)      | 7740            | NA
Silver (Ag)        | 7760            | NA
Thallium (Tl)      | 7840/7841       | NA
Vanadium (V)       | 7910/7911       | NA
Zinc (Zn)          | 7950            | NA

Date analysis completed: 06/14/90
ND = Not Detected at Practical Quantitation Limit (PQL).
NA = Not Analyzed or Not Applicable.

Notes: Edward S. Babcock & Sons, Inc.

cc:
To: Jenkin Construction Co.
P.O. Box 1427
Long Beach, CA 90801
Attn: L. L. Thomas

Sample Marked: JPL Goldstone Mojave
#JPL-MOJ-EX4-10

Sample Matrix

<table>
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<td>Chromium +6 (hex)</td>
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<td>Cobalt (Co)</td>
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<td>Copper (Cu)</td>
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<td>Lead (Pb)</td>
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<td>Mercury (Hg)</td>
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<td>Zinc (Zn)</td>
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Date analysis completed: 06/14/90
ND = Not Detected at Practical Quantitation Limit (PQL).
NA = Not Analyzed or Not Applicable.

Notes:
APPENDIX B

CORRESPONDENCE WITH
SAN BERNARDINO COUNTY DEPARTMENT OF ENVIRONMENTAL HEALTH
CONCERNING REMOVAL OF CONTAMINATED SOIL FROM THE GDSCC
12 March 1991

Mr. Ronald Ripley
San Bernardino County
Department of Environmental Health
385 North Arrowhead Avenue
San Bernardino, California

Dear Mr. Ripley:

The purpose of this letter is to document the final disposition of oil and/or diesel contaminated soil at Goldstone Deep Space Communications Complex (GDSCC).

All soils excavated from the Apollo, Mars, Mojave and Echo Sites contaminated with oil and/or diesel fuel has been recycled into an 1800 foot paved road leading to the entrance of the GDSCC landfill. The road was completed Friday, March 8, 1991.

Your concurrence that this recycling project using the contaminated soil in constructing this road was performed properly, as defined by the rules and regulations of San Bernardino County, would be appreciated.

Please sign, date and return this letter to the undersigned. If you have any questions, please do not hesitate to call me at (619) 255-8388.

Sincerely,

David C. Roberts

Concurrence, Mr. Ronald Ripley
San Bernardino County Department of Environmental Health

cc: E. Abrahamy
L. Kushner
ENVIRONMENTAL HEALTH SERVICES
385 North Arrowhead Avenue, San Bernardino, CA 92415-0160 • (714) 687-4648
320 East "D" Street, Ontario, CA 91761 • (714) 591-7570
16508 Civic Drive, Victorville, CA 92392 • (804) 243-0141
17830 Arrow Highway, Fontana, CA 92338 • (714) 829-6244
67407 Twenty Nine Palms Highway, Yucca Valley, CA 92284
San Bernardino County Vector Control Program
2366 East Fifth Street, San Bernardino, CA 92410 • (714) 583-3200
Environmental Enforcement and Housing
172 West Third Street, San Bernardino, CA 92415-0318 • (714) 387-6612/6616
Air Pollution Control District
15428 Civic Drive, Suite 200, Victorville, CA 92392 • (818) 243-0200

OCTOBER 31, 1990

GDSCC Environmental

BENDIX FIELD ENGINEERING CORPORATION
850 EAST MAIN STREET
BARSTOW, CA 92311

ATTENTION: MR. HAROLD ALDERSON

SUBJECT: CORRESPONDENCE DATED OCTOBER 10, 1990 REGARDING CLEANUP ACTIVITIES AT THE GOLDSSTONE DEEP SPACE COMMUNICATIONS COMPLEX, FORT IRWIN, CA.

The Department concurs with the subject correspondence regarding excavation and removal of contaminated soil at the Apollo, Mars and Mojave sites with the exception that the Department gave Ms. Craiglow of Engineering Science full authority in deeming an excavation complete. The Department established minimum requirements that Ms. Craiglow was to supervise and document their compliance. The Department will require the receipt of this documentation before it may conclude investigations regarding this matter.

Additionally, prior to terminating these investigations, the Department will require notification of the completion of the recycling project. This is necessary because the Department not only must assure the removal of the contamination, but it must also document the contaminated soil's final disposition.

Please submit the required documentation and notification upon completion of the recycling project, so that the Department may issue complete concurrence with regard to the clean up activities at these sites. If you have any questions, please call me at (714) 387-4631.

RONALD A. RIPLEY, R.E.H.
ENVIRONMENTAL HEALTH SPECIALIST III
EMERGENCY RESPONSE/ENFORCEMENT

RAR/blm
15 October 1990

Mr. Ronald Ripley  
San Bernardino County  
Department of Environmental Health  
385 North Arrowhead Avenue  
San Bernardino, California 92415

Dear Mr. Ripley:

The purpose of this letter is to document your approval of the excavation and removal of contaminated soil conducted at the Goldstone Deep Space Communications Complex (GDSCC). Subsurface borings identified hydrocarbon contaminated soil at the Apollo and Mars site and copper-contaminated soil at the Mojave site at GDSCC. Contaminated soil was excavated from these three sites in May and June 1990 by Jenkin Construction Company. All excavations and soil sampling was conducted under the supervision of Carol J. Craiglow, Registered Geologist for the State of California. Ms. Craiglow is employed by Engineering-Science.

The initial soil sampling and excavation was conducted at the Apollo site on May 8, 1990. You were present on that day and provided on-site guidance for acceptable and proper sampling and excavation procedures to Ms. Craiglow. It was agreed that Ms. Craiglow supervised all remaining sampling and excavations, your on-site supervision would not be required. No excavation was deemed complete until all soil sample analysis were below the action level (1000 mg/kg for hydrocarbons and 150 mg/kg for copper). Ms. Craiglow had full authority in deeming an excavation complete. All records of the soil analysis and excavation are on file at the offices of Jet Propulsion Laboratory and Engineering Science.
Your concurrence that all sampling, excavations and removal of contaminated soil conducted at GDSCC as described above was performed properly as defined by the rules and regulations of San Bernardino County would be appreciated. Please sign, date and return this letter to the undersigned. If you have any questions, please do not hesitate to call me (619-255-8330) or Paul Farmanian (818-440-6148), Engineering Science Project Manager.

Sincerely,

Harold Alderson

Concurrence, Mr. Ronald Ripley
San Bernardino County Department of Environmental Health

cc: E. Abrahamy
    L. Kushner
APPENDIX C

HAZARDOUS-WASTE MANIFESTS FOR REMOVAL OF COPPER-CONTAMINATED SOIL FROM THE GDSGC
August 16, 1990

Engineering-Science, Inc.
P. O. Box 7107
Pasadena, California 91109

Attention: Mr. P. A. Farmanian

Subject: Goldstone Environmental Projects
Phase II

Gentlemen:

Enclosed are copies of the documents generated by the Copper-contaminated soil disposal as you requested. Harold Alderson, the environmental officer at Goldstone has a copy of this material.

Please call if we can be of further assistance in this matter.

Very truly yours,

JENKIN CONSTRUCTION CO.

L. L. Thomas
Project Manager

LLT: mn
RECEIVED FROM YOUR FACILITY 6-13-90

MANIFEST NO. 90272977
24.30 tons of Chemical waste @ $110.00/ton
24.30 tons @ $20.00/ton for taxes

432.0 cu. ft. $2,673.00
$ 486.00 $ 3,159.00

MANIFEST NO. 90272976
23.46 tons of Chemical waste @ $110.00/ton
23.46 tons @ $20.00/ton for taxes

432.0 cu. ft. $2,580.60
$ 469.20 $ 3,049.80

RECEIVED FROM YOUR FACILITY 6-14-90

MANIFEST NO. 90272980
22.14 tons of Chemical waste @ $110.00/ton
22.14 tons @ $20.00/ton for taxes

432.0 cu. ft. $2,435.40
$ 442.80 $ 2,878.20

MANIFEST NO. 90272979
23.12 tons of Chemical waste @ $110.00/ton
23.12 tons @ $20.00/ton for taxes

432.0 cu. ft. $2,543.20
$ 462.40 $ 3,005.60

RECEIVED FROM YOUR FACILITY 6-15-90

MANIFEST NO. 90272964
23.07 tons of Chemical waste @ $110.00/ton
23.07 tons @ $20.00/ton for taxes

432.0 cu. ft. $2,537.70
$ 461.40 $ 2,999.10

MANIFEST NO. 90138909
18.88 tons of Chemical waste @ $110.00/ton
18.88 tons @ $20.00/ton for taxes

432.0 cu. ft. $2,076.80
$ 377.60 $ 2,454.40

$17,546.10

TOTAL

$17,546.10
### PERSONNEL REPORT

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<th>DATE</th>
<th>DEPART TERMINAL</th>
<th>JOB ARRIVAL</th>
<th>JOB DEPARTURE</th>
<th>ARRIVE-DEPART TSDF-FACILITY</th>
<th>ARRIVE TERMINAL</th>
<th>NET HOURS</th>
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<td>AM:5:30 PM:</td>
<td>AM:1:30 PM:</td>
<td>IN:</td>
<td>AM:8:00 PM:</td>
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### DRIVERS COMMENTS:

- Job Schedule 2 loads. Had to go to Long Beach yard for more manifest and attend to Long Beach yard. Wrapped back to Barstow.

### TRASH

- PVT. Waste
- Bin #25501
- Manifest # 1
- Receipt # 1

### CHARGES

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<th>Quantity</th>
<th>Rate</th>
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<td>Demurrage Hrs @ PER HR.</td>
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<td>Scale Charge</td>
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### CUSTOMER SIGNATURE

**C-4**
## Bill Details

**Bill No:** NO 11 J1

**Date:** 6-13 1990

**Debtor:** Duane's

**Truck #:** 1

**Trailer #:** 3

**Rate @:**

**Address:**

**Customer/Shipper:** Pacific

**OVERLYING CARRIER:** Duane's Equipment Rental

**UNDERLYING CARRIER:** Duane's Equipment Rental

**MATERIAL POINT OF ORIGIN:** Foot Down - Barstow

**POINT OF DESTINATION:** US Ecology - Battle New

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<th>JOB NO.</th>
<th>P.O. NO.</th>
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<th>UNLOADING</th>
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**Type of Dump Truck Equipment - Trailer(s):**

- **EPA #:** CAD981983158
- **HAULER #:** 2286
- **CAL T 151-145**

- **Truck:**
  - 2 Axle
  - 3 Axle

- **Tractor:**
  - 2 Axle
  - 3 Axle

**Terms:**

- All accounts due and payable 15th of month following receipt. Paying after 30 days. A service charge of 1.25% per month which is an ANNUAL PERCENTAGE RATE 15.01% - will be charged on the unpaid balance of past due accounts.

**Driver:**

**Terms:**

- All accounts due and payable 15th of month following receipt. Paying after 30 days. A service charge of 1.25% per month which is an ANNUAL PERCENTAGE RATE 15.01% - will be charged on the unpaid balance of past due accounts.

C-5
**UNIFORM HAZARDOUS WASTE MANIFEST**

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<th>Item</th>
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<tr>
<td>2.</td>
<td>Document Number</td>
</tr>
<tr>
<td>3.</td>
<td>Generator's Name and Mailing Address</td>
</tr>
<tr>
<td>4.</td>
<td>Transporter 1 Company Name</td>
</tr>
<tr>
<td>5.</td>
<td>US EPA ID Number</td>
</tr>
<tr>
<td>6.</td>
<td>US EPA ID Number</td>
</tr>
<tr>
<td>7.</td>
<td>Designated Facility Name and Site Address</td>
</tr>
<tr>
<td>8.</td>
<td>Voluntary Reporting of Hazardous Materials Generated in the Current Reporting Year</td>
</tr>
<tr>
<td>9.</td>
<td>US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)</td>
</tr>
<tr>
<td>10.</td>
<td>Additional Descriptions for Materials Listed Above</td>
</tr>
<tr>
<td>11.</td>
<td>Additional Handling Information (such as special handling instructions)</td>
</tr>
<tr>
<td>12.</td>
<td>Printed/Typed Name</td>
</tr>
<tr>
<td>13.</td>
<td>Signature</td>
</tr>
<tr>
<td>14.</td>
<td>Month Day Year</td>
</tr>
</tbody>
</table>

**GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment. OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

**TRANSPORTER'S CERTIFICATION:** I, 

[Signature]

Month Day Year

**FACILITY'S CERTIFICATION:** 

[Signature]

Month Day Year

**Facility Owner or Operator Certification:** I hereby certify that I received the hazardous materials covered by this manifest except as noted in Item 18.

[Signature]

Month Day Year

**Do Not Write Below This Line**

GREEN. HAULER RETAINS

C-6
DUANE'S
Equipment Rental
769 East Kemp Place
Covina, CA 91722
Phone: (818) 331-4742

BILL NO: NO 151

DATE 6-13-90

CUSTOMER
Shipper: Samson Industrial

ADDRESS

DEBTOR: Duane's

TRUCK#: 2

TRAILER#: 4

CAL-T#: 

RATE @ 

HOURLY  TONNAGE

MATERIAL POINT OF ORIGIN

MANIFEST NO: 02329777

WEIGHT: 7452

JOB NO: 2138

P.O. #:

LOADING POINT

POINT OF DESTINATION

MANIFEST NO: 02329777

WEIGHT: 7452

JOB NO: 2138

P.O. #:

LOADING

UNLOADING

STAND TIME

BREAKDOWN REASON FOR DELAY

TOTAL TIME

TOTAL TONS

ACCESSORY OTHER CHARGES

DEDUCTIBLE TIME

NET TIME

TOTAL CHARGES

TYPE OF DUMP TRUCK EQUIPMENT TRAILER(S)

EPA# CAD981983158

HAULER# 2286

CAL T 151-145

TRUCK
1 AXLE

TRACTOR
2 AXLE

NONE

BOTTOM DUMP DBL.

TRANSFER

END DUMP SEMI

I AGREE TO COURT COSTS, ATTORNEY'S FEES AND ALL COSTS THAT ARSE FROM ANY PROCEED-
INGS FOR THE COLLECTION OF AMOUNTS DUE TO THE ABOVE CARRIER FOR WORK DONE FOR
THE ABOVE SHIPPERS WILL BE PAID BY THE ABOVE SHIPPERS. NOTE: P.U.C. requires payment for
these charges not later than 15th of following month. These charges include (1) fees to pay for regulation
of transportation companies by the California Public Utilities Commission and (2) rates paid to California cities
instead of excise or business license taxes they could otherwise impose.

TERMS: All accounts due and payable 15th of month following invoice. Pagable after 30 days. A service
charge of 1 1/2% PER MONTH which is an ANNUAL PERCENTAGE RATE OF 18% - will be charged on the
unpaid balance of past due accounts.

Duane

RECEIVED BY:

C-7
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>UNIFORM HAZARDOUS WASTE MANIFEST</strong></td>
</tr>
<tr>
<td>2.</td>
<td>Generator’s US EPA ID No.</td>
</tr>
<tr>
<td>3.</td>
<td>Generator’s Name and Mailing Address</td>
</tr>
<tr>
<td>4.</td>
<td>Transporter 1 Company Name</td>
</tr>
<tr>
<td>5.</td>
<td>Transporter 2 Company Name</td>
</tr>
<tr>
<td>6.</td>
<td>Designated Facility Name and Site Address</td>
</tr>
<tr>
<td>7.</td>
<td>US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)</td>
</tr>
<tr>
<td>8.</td>
<td>Additional Descriptions for Materials Listed Above</td>
</tr>
<tr>
<td>9.</td>
<td>Special Handling Instructions and Additional Information</td>
</tr>
<tr>
<td>10.</td>
<td>Generator’s Certification: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.</td>
</tr>
<tr>
<td>11.</td>
<td>transporter 1 Acknowledgement of Receipt of Materials</td>
</tr>
<tr>
<td>12.</td>
<td>transporter 2 Acknowledgement of Receipt of Materials</td>
</tr>
<tr>
<td>13.</td>
<td>Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.</td>
</tr>
</tbody>
</table>

**Hazardous Waste Solid, O.N.B. ORM-E MA 9189**

**Consigned Soil and Debris**

**HANDLER: 17-000-1077**

**Handling Codes for Wastes Listed Above**

- **03**
- **b.**
- **c.**
- **d.**

**Discrepancy Indication Space**

**Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.**

**In Case of an Emergency, call the National Response Center: 1-800-424-8802.**

**Do Not Write Below This Line**

**GREEN: HAULER RETAINS.**

**C-8**
# PERSONNEL REPORT

<table>
<thead>
<tr>
<th>DATE:</th>
<th>DEPART TERMINAL</th>
<th>JOB ARRIVAL</th>
<th>JOB DEPARTURE</th>
<th>ARRIVE-DEPART TSDF-FACILITY</th>
<th>ARRIVE TERMINAL</th>
<th>NET HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM 6:00 PM</td>
<td>AM 7:00 PM</td>
<td>AM</td>
<td>PM</td>
<td>IN</td>
<td>OUT</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATE:</th>
<th>DEPART TERMINAL</th>
<th>JOB ARRIVAL</th>
<th>JOB DEPARTURE</th>
<th>ARRIVE-DEPART TSDF-FACILITY</th>
<th>ARRIVE TERMINAL</th>
<th>NET HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM:</td>
<td>PM:</td>
<td>AM:</td>
<td>PM:</td>
<td>IN</td>
<td>OUT</td>
<td></td>
</tr>
</tbody>
</table>

**DRIVERS COMMENTS:**

---

**PVT.** waste: HAZ SOIL / DISPOSAL TRAILER

**BIN#**

**MANIFEST#**

**RECEIPT#**

**CONDITION**

---

<table>
<thead>
<tr>
<th>REGULAR HRS</th>
<th>PER HR.</th>
<th>SCALE CHARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTHER HRS</td>
<td>PER HR.</td>
<td>DISPOSAL CHARGE</td>
</tr>
<tr>
<td>MILAGE MLS</td>
<td>PER ML.</td>
<td>WASHOUT CHARGE</td>
</tr>
<tr>
<td>DEMURRAGE HRS</td>
<td>PER HR.</td>
<td>STORAGE CHARGE</td>
</tr>
<tr>
<td>SUBSISTENCE DAYS</td>
<td>PER DAY</td>
<td>%SURCHARGE</td>
</tr>
</tbody>
</table>

**CUSTOMER SIGNATURE**

---

**SUB TOTAL**

---

**CUSTOMER SIGNATURE**

---

**TOTAL CHARGES**

---

C-9
DUANE'S
Equipment Rental
769 East Kemp Place
Covina, CA 91722
Phone: (818) 331-4742

BILL NO: No 11 J2

CUSTOMER/SHIPPER

ADDRESS

DATE 6-14 1998

DEBTOR

TRUCK

TRAILER

OVERLYING CARRIER

UNDERLYING CARRIER

SAME

MANIFEST NO.

WEIGHT

JOB NO.

P.O. NO.

LOADING

UNLOADING

ARRIVE

DEPART

ARRIVE

DEPART

STAND BY

BREAKDOWN

TOTAL TIME

TOTAL TONS

DEDUCTIBLE TIME

OTHER CHARGES

NET TIME

SUB TOTAL

TOTAL CHARGES

TYPE OF DUMP TRUCK EQUIPMENT TRAILER(S)

TRUCK

TRACTOR

NONE

BOTTOM DUMP DBL

TRANSFER

END DUMP SEMI

EPA# CAD981983158

HAULER# 2286

CAL T 151-145

DRIVERS

RECEIVED BY:

NOTE: All invoices due and payable 15th of month following purchase. Payments due 30 days. A service charge of 1.5% PER MONTH which is an ANNUAL PERCENTAGE RATE OF 18% will be charged on the unpaid balance of past due accounts.
**UNIFORM HAZARDOUS WASTE MANIFEST**

1. **Generators Name and Mailing Address**
   - Company Name: IMPACT INC.
   - Mailing Address: HIGHWAY 95

2. **Number of Containers**
   - Number: 1
   - Type: 

3. **Hazardous Waste Description**
   - Description: B3000-1077

4. **Handling Codes**
   - Code: 1

5. **State and Facility ID**
   - State: CA
   - Facility ID: 90272980

6. **Transporter Information**
   - Company Name: IMPACT INC.
   - Mailing Address: HIGHWAY 95

7. **Manifest No.**
   - Number: 17-000-1077

8. **Additional Information**
   - GLOVES AND GOOGLES

**GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize the waste generation and select the best waste management method that is available to me and that I can afford.

**Do Not Write Below This Line**

GREEN: HAULER RETAINS
**DUANE'S Equipment Rental**
769 East Kern Place  
Covina, CA 91722  
Phone: (818) 331-4742

---

**CUSTOMER/SHIPPER**  
P. Higgins  
Industrial

**DATE** 1/24/1990

**DEBTOR**  
DUANE'S

**TRUCK#**  
6

**TRAILER#**  
1

---

**RATE @**  

**HOURLY**  

**TONNAGE**  

**OVERLAYER CARRIER**  
DUANE'S EQUIPMENT RENTAL  
DUANE'S EQUIPMENT RENTAL

---

**MATERIAL POINT OF ORIGIN**  
Mass. Hold.  
U.S. Ecology, Rechtmyer

**POINT OF DESTINATION**  
Oxner, CA

<table>
<thead>
<tr>
<th>MANIFEST NO.</th>
<th>WEIGHT</th>
<th>LOADING</th>
<th>TRUCK#</th>
<th>TRAILER#</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7452</td>
<td>2138</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

---

**TYPE OF DUMP TRUCK EQUIPMENT TRAILER(S)**

**EPA#** CAD981983158  
**HAULER#** 2286  
**CAL T** 151-145

---

**TERMS:** All accounts due and payable 15th of month following purchase. Past due after 30 days. A service charge of 1.5% PER MONTH which is an ANNUAL PERCENTAGE RATE OF 18% - will be charged on the unpaid balance of past due accounts.

---

**C-12**
# UNIFORM HAZARDOUS WASTE MANIFEST

   
2. Page 1 of 1  
   Information in the shaded areas is not required by Federal law.

<table>
<thead>
<tr>
<th>Description</th>
<th>No.</th>
<th>Type</th>
<th>Quantity</th>
<th>Unit Width/Height</th>
<th>Waste No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZARDOUS WASTE SOLID, n.o.s. ORM-E SH 9169: CONTAMINATED SOIL AND DERRIS</td>
<td>001</td>
<td>D</td>
<td>16</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

### GENERATOR'S CERTIFICATION

I hereby declare that the contents of this container are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: __________________________  
Signature: __________________________  
Month Day Year: __________________________

Do Not Write Below This Line

GREEN HAULER RETAINS

C-13
# PACIFIC INDUSTRIAL SERVICE CORPORATION
## TRANSPORTATION ORDER

<table>
<thead>
<tr>
<th>SERVICE ORDER NO.</th>
<th>No. 9349</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Customer Name</th>
<th>Jenkins Co.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Billing Address</th>
<th>20 Box 1427 Long Beach</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>Zip</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Job Time</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/15/90</td>
<td>14/5-2</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Service Requested</th>
<th>Loaded Soil 2 Loads Transported To Dune Site</th>
</tr>
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</table>

### PERSONNEL REPORT

<table>
<thead>
<tr>
<th>DATE: 6-15-90</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEPART TERMINAL AM: 600 PM:</td>
</tr>
<tr>
<td>JOB ARRIVAL AM: 7:00 PM:</td>
</tr>
<tr>
<td>JOB DEPARTURE AM: 1000 PM:</td>
</tr>
<tr>
<td>ARRIVE-DEPART TSDF-FACILITY IN:</td>
</tr>
<tr>
<td>OUT:</td>
</tr>
<tr>
<td>NET HOURS: 8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATE:</th>
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</thead>
<tbody>
<tr>
<td>DEPART TERMINAL AM: PM:</td>
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<td>JOB ARRIVAL AM: PM:</td>
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<tr>
<td>JOB DEPARTURE AM: PM:</td>
</tr>
<tr>
<td>ARRIVE-DEPART TSDF FACILITY IN:</td>
</tr>
<tr>
<td>OUT:</td>
</tr>
<tr>
<td>NET HOURS:</td>
</tr>
</tbody>
</table>

### DRIVERS COMMENTS:

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

### BIN # WASTE DISPOSAL US. Ecology TRAILER RECEIPT # CONDITION

<table>
<thead>
<tr>
<th>PVT.</th>
<th>WASTE</th>
<th>DISPOSAL US. Ecology TRAILER</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>BIN # MANIFEST # RECEIPT # CONDITION</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>REGULAR HRS @ PER HR.</th>
<th>OTHER HRS @ PER HR.</th>
<th>MILAGE MLS @ PER ML.</th>
<th>DEMURRAGE HRS @ PER HR.</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>SUBSISTENCE DAYS @ PER DAY</th>
<th>CUSTOMER FLAT RATE</th>
</tr>
</thead>
</table>

### SCALE CHARGE DISPOSAL CHARGE WASHOUT CHARGE STORAGE CHARGE % SURCHARGE

<table>
<thead>
<tr>
<th>SUB TOTAL</th>
<th>SUBTOTAL</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>CUSTOMER SIGNATURE</th>
<th>TOTAL CHARGES</th>
</tr>
</thead>
</table>

C-14
CUSTOMER/SHIPPER: Pacific
ADDRESS:

DUANE'S Equipment Rental
769 East Kemp Place
Covina, CA 91722
Phone: (818) 331-4742

BILL NO: NO 11/3

DATE: 6-14-90
DEBTOR: Duane's
TRUCK#: #1
TRAILER#: #3
CAL-T#

RATE @

OVERLAWING CARRIER
DUANE'S Equipment Rental

UNDERLYING CARRIER
Same

MATERIAL POINT OF ORIGIN
Point of Origin: Brea
Point of Destination: US Ecology - New

<table>
<thead>
<tr>
<th>MANIFEST NO.</th>
<th>WEIGHT</th>
<th>JOB NO.</th>
<th>P.O. NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>90278964</td>
<td>1952</td>
<td>2138</td>
<td></td>
</tr>
</tbody>
</table>

LOADING
<table>
<thead>
<tr>
<th>ARRIVE</th>
<th>DEPART</th>
</tr>
</thead>
</table>

UNLOADING
<table>
<thead>
<tr>
<th>ARRIVE</th>
<th>DEPART</th>
</tr>
</thead>
</table>

TOTAL TIME | TOTAL TONS | ACCESSIONAL OTHER CHARGES | DEDUCTIBLE TIME | SUB TOTAL | NET TIME | TOTAL CHARGES |

TYPE OF DUMP TRUCK EQUIPMENT TRAILER(S)

<table>
<thead>
<tr>
<th>TRUCK</th>
<th>TRACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-AXLE</td>
</tr>
</tbody>
</table>

EPA# CAD981983158
HAULER# 2286
CAL T 151-145

I AGREE TO COURT COSTS, ATTORNEYS FEES AND ALL COSTS THAT ARISE FROM ANY PROCEEDINGS FOR THE COLLECTION OF AMOUNTS DUE TO THE ABOVE CARRIER FOR WORK DONE FOR THE ABOVE SHIPPERS WILL BE PAID BY THE ABOVE SHIPPERS. NOTE: P.U.C. requires payment for these charges not later than 15th of following month. These charges include: 1) fees to pay for regulations of transportation companies by the California Public Utilities Commission and 2) taxes paid to California cities instead of state or business license taxes they would otherwise impose.

DRIVER

RECEIVED BY:

TERMS: All accountable and payable 15th of month following purchase. Past due after 30 days. A service charge of 1 1/2% PER MONTH which is an ANNUAL PERCENTAGE RATE OF 18% - will be charged on the unpaid balance of past due accounts.
## UNIFORM HAZARDOUS WASTE MANIFEST

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>Generator's Name and Mailing Address</td>
</tr>
<tr>
<td>4.</td>
<td>410 Oak Grove Drive, Pasadena, CA 91103</td>
</tr>
<tr>
<td>5.</td>
<td>Transporter 1 Company Name</td>
</tr>
<tr>
<td>6.</td>
<td>US EPA ID Number</td>
</tr>
<tr>
<td>7.</td>
<td>Transporter 2 Company Name</td>
</tr>
<tr>
<td>8.</td>
<td>US EPA ID Number</td>
</tr>
<tr>
<td>9.</td>
<td>Designated Facility Name and Site Address</td>
</tr>
<tr>
<td>10.</td>
<td>US EPA ID Number</td>
</tr>
<tr>
<td>11.</td>
<td>US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)</td>
</tr>
<tr>
<td>a.</td>
<td>Hazardous waste solid n.o.s. OR4-B NA 9139 contamined soil and debris</td>
</tr>
<tr>
<td>b.</td>
<td>01011 QT 1 1116 Y</td>
</tr>
<tr>
<td>c.</td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td></td>
</tr>
<tr>
<td>f.</td>
<td></td>
</tr>
<tr>
<td>g.</td>
<td></td>
</tr>
<tr>
<td>h.</td>
<td></td>
</tr>
</tbody>
</table>

### Profile # 17-007-1077

**Handling Codes for Wastes Listed Above**

| a. | State |
| b. | EPA/Other |
| c. | EPA/Other |
| d. | EPA/Other |
| e. | EPA/Other |
| f. | EPA/Other |
| g. | EPA/Other |

### Additional Descriptions for Materials Listed Above


16. **GENERATOR'S CERTIFICATION:**
I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all aspects in proper condition for transport by highway according to applicable international and national government regulations.

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### Transporter

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>Transporter 1 Acknowledgement of Receipt of Materials</td>
</tr>
<tr>
<td>18.</td>
<td>Transporter 2 Acknowledgement of Receipt of Materials</td>
</tr>
</tbody>
</table>

### Facility

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19</td>
</tr>
</tbody>
</table>

**Do Not Write Below This Line**

GREEN HAULER RETAINS

---

**Printed/Typed Name:**

David Roberts

**Signature:**

[Signature]

**Month Day Year:**

(12/1/97)

---

**Printed/Typed Name:**

[Signature]

**Month Day Year:**

(12/1/97)
**DUANE'S**
**Equipment Rental**
769 East Kemp Place
Covina, CA 91722
Phone: (818) 331-4742

**CUSTOMER/SHIPPER:** Pacific Industrial

**ADDRESS:**

**OVERRYING CARRIER:**

**DUANE'S Equipment Rental**

**DUANE'S Equipment Rental**

**DATE:** 6-15-90

**DEBTOR:** DUANE'S

**TRUCK#:** 5

**TRAILER#:** 4

**CAL-T#**

**RATE @ □ HOURLY □ TONNAGE**

<table>
<thead>
<tr>
<th>MANIFEST NO.</th>
<th>WEIGHT</th>
<th>JOB NO.</th>
<th>P.O. NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>7452</td>
<td>2138</td>
</tr>
</tbody>
</table>

**TYPE OF DUMP TRUCK EQUIPMENT TRAILER(S)**

- EPA# CAD981983158
- HAULER# 2286
- CAL T 151-145

**AGREE TO COURT COSTS, ATTORNEYS FEES AND ALL COSTS THAT ARISE FROM PROCEEDINGS FOR THE COLLECTION OF AMOUNTS DUE TO THE ABOVE CARRIER FOR WORK DONE FOR THE ABOVE SHIPPERS WILL BE PAID BY THE ABOVE SHIPPERS. NOTE: P.U.C. requires payment for these charges not later than 15th of following month. These charges include (1) fees to pay for regulation of transportation companies by the California Public Utilities Commission and (2) taxes paid to California cities instead of excise or business license taxes they could otherwise impose.

**OWNER**

**SIGNATURE**

**TERM:** All accounts due and payable 15th of month following statement. Past due after 30 days. A service charge of 1 1/2% PER MONTH will be charged on the unpaid balance of past due accounts.

C-17
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Hazardous waste solid n.o.s. ORM-F, NA 9139 contaminated solid and debris</td>
<td>0</td>
<td>0</td>
<td>1</td>
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</tbody>
</table>

K. Handling Codes for Waste Listed Above

1. a.
2. b.
3. c.
4. d.

J. Additional Descriptions for Materials Listed Above

Profile 817-000-1077

10. Special Handling Instructions and Additional Information

GLOVES AND COUPLES

18. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: David Roberts

Signature: [Signature]

Month Day Year: 05 11 99

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: [Name]

Signature: [Signature]

Month Day Year: [Month Day Year]

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name: [Name]

Signature: [Signature]

Month Day Year: [Month Day Year]

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name: [Name]

Signature: [Signature]

Month Day Year: [Month Day Year]
<table>
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<th>Date</th>
<th>Time</th>
<th>Weight</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-13-90</td>
<td>3:56PM</td>
<td>78,720 lb</td>
<td>GR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>31,800 lb</td>
<td>TA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>46,920 lb</td>
<td>NT</td>
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</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Weight</th>
<th>Description</th>
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</thead>
<tbody>
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<td>80,960 lb</td>
<td>GR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32,360 lb</td>
<td>TA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48,600 lb</td>
<td>NT</td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>GR</td>
<td>TA</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>-----</td>
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</tr>
<tr>
<td>5-14-90</td>
<td>2:15PM</td>
<td>78780 lb</td>
<td>32540 lb</td>
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<tr>
<td>6-14-90</td>
<td>2:25PM</td>
<td>75300 lb</td>
<td>31020 lb</td>
</tr>
</tbody>
</table>

**U.S. Ecology-Beatty, Nevada - (702) 553-2204**

*Original face is of poor quality*
U.S. Ecology-Beatty, Nevada-(702) 553-2204  

6-15-90  
3:43PM  
ID 901388509  

70280 lb GR  
32520 lb TA  
37760 lb NT  

---

U.S. Ecology-Beatty, Nevada-(702) 553-2204  

6-15-90  
3:51PM  
ID 90272964  

77620 lb GR  
31480 lb TA  
46140 lb NT  

ORIGINAL PAGE IS OF POOR QUALITY
Numerous diverse activities at the Goldstone Deep Space Communications Complex (GDSCC) are carried out in support of six parabolic dish antennas. Some of these activities can result in possible spills or leakages of hazardous materials and wastes stored both above ground in steel drums and below ground in underground storage tanks (USTs). These possible leaks or spills, along with the past practice of burial of solid debris and waste in trenches and pits, could cause local subsurface contamination of the soil.

In 1987, the Jet Propulsion Laboratory (JPL), retained Engineering-Science, Inc. (E-S), Pasadena, California, to identify the specific local areas within the GDSCC with subsurface soil contamination. The E-S study determined that some of the soils at the Apollo Site and the Mars Site were contaminated with hydrocarbons, while soil at a nonhazardous waste dumpsite at the Mojave Base Site was contaminated with copper.

This volume is a JPL-expanded version of the PE 209 E-S report, and also reports that all subsurface contaminated soils at the GDSCC now have been excavated, removed, and disposed of in an environmentally acceptable way, and the excavations have been backfilled and covered in accordance with accepted Federal, State, and local environmental rules and regulations.

17. Key Words (Selected by Author(s))
- Ground Support Systems/Facilities (Space)
- Civil Engineering
- Environment Pollution
- Methods & Equipment (General)
- Soil pollution
- Goldstone DSCC
- Contaminated soil disposal
- Hydrocarbon & Metal Analysis

18. Distribution Statement
Unclassified, unlimited