SUNRISE MOUNTAIN LANDFILL
EXPANSION
CLARK COUNTY, NEVADA

Prepared for
DUMPCO, INC.

December 1986

EMCON Associates
1921 Ringwood Avenue
San Jose, California 95131

Project 833-01.01
OVERSIZE DOCUMENT

Document # 2094885

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U.S. EPA Region 9
Superfund Records Center
95 Hawthorne Street, Suite 403S
San Francisco, California 94105
(415) 536-2000
Approximate boring location and designation

Line of geologic cross section
(See Figure G-3)
OVERSIZE DOCUMENT

Document # 2094885

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Superfund Records Center
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(415) 536-2000
Appendix A

LOGS OF EXPLORATORY BORINGS
Appendix A

LOGS OF EXPLORATORY BORINGS

The subsurface character of site soil and bedrock was investigated by a number of methods including borings at 10 locations (Plate G-2). Borings were drilled with both flight auger and rotary air procedures. The shallowest borings, B-1 through B-4, were drilled with augers. Drilling procedures were altered to rotary air to advance the deeper borings through cemented zones that could not be penetrated with flight augers. Soils were classified in accordance with the Unified Soil Classification System (USCS). Logs of the borings are presented on Plates G-4 through G-13. Intervals of highly cemented soils have been clearly noted on each log.

Bulk samples were drawn from auger and rotary air returns and are designated with the prefix "X" on the boring logs. Relatively undisturbed samples were obtained using a 2.0-inch I.D. modified California split-spoon sampler, advanced with a 140-pound hammer for auger drill (B-1 through B-4) drillings. For the deeper rotary air borings (B-5 through B-10), a 2.75-inch I.D. Nevada sampler was used, advanced by a 350-pound hammer. Hammer drop height was 30 inches for both sampling procedures.

Because of the presence of gravel and extensive, but variable, cemented deposits, drilling gauge pressures were recorded during drilling to estimate relative degree of hardness, indicated on the boring logs.
LOG OF EXPLORATORY BORING

PROJECT NUMBER 833-01.01  BORING NO. B-1
PROJECT NAME SILVER STATE DISPOSAL  PAGE 1 OF 2
BY PFD  SURFACE ELEV. 1905'
DATE 9/24/86

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/Fl.)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH IN FT.</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GRAVELLY SAND; variegated fine sand matrix; 30-35% hard subangular clasts of limestone, sandstone and siltstone varying from fine gravels to cobbles; dense; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SANDY SILT; gravelly; pink (5YR, 8/4); 10-20% very fine grained sand; 30-35% medium gravels; very stiff; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@9': difficult drilling; 40-45% gravel; larger clast size.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@12': clayey.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>SANDY SILT to SILTY SAND; pinkish white (5YR, 8/2); 10-20% very fine grained sand; 5-10% fine grained sand; trace trace to 15% gravel; becomes powdery when drilling; weak gypsum and carbonate cementation; dry.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>@17': easier drilling.</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>@19': hard (difficult drilling).</td>
</tr>
</tbody>
</table>

REMARKS
Exploratory boring was drilled by flight auger drilling to a diameter of 6 inches. Bag samples, denoted by an X in the sample column, were collected from auger returns. Undisturbed samples were collected by a California split spoon sampler, 2 inches outside diameter. (continued on next page)
SANDY SILT to SILTY SAND (continued).

@21': very difficult drilling; low hardness; poorly cemented; dry.
@22': less gravel.

@25.2 to 25.8': pure crystalline gypsum.

@30': 15-25% very fine grained sand with gypsum; gravel absent; poorly cemented.
BORING TERMINATED AT 30.5 FEET.

REMARKS
Boring was backfilled with drill cuttings.
**LOG OF EXPLORATORY BORING**

**PROJECT NUMBER** 833-01.01

**PROJECT NAME** SILVER STATE DISPOSAL

**BORING NO.** B-2

**DATE** 9/24/86

**SURFACE ELEV.** 1910'

---

<p>| PHOTO- | POCKET | PENETRATION | GROUND | DEPTH IN FT. | LITHOGRAPHIC COLUMN |</p>
<table>
<thead>
<tr>
<th>VAC (ppm)</th>
<th>PENETRUMETER (TSF)</th>
<th>(Blows/ Ft.)</th>
<th>LEVELS</th>
<th>SAMPLES</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GP</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>ML</td>
</tr>
<tr>
<td>84 for 9&quot;</td>
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<tr>
<td>74 for 7&quot;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@12': crystalline gypsum; gravels absent.</td>
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<td></td>
<td></td>
<td>SM</td>
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<tr>
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<td></td>
<td></td>
<td>SILTY SAND; pinkish white (5YR, 8/2); very fine grained; 45% gypsum fines; 10% fine sand; weak cementation; friable; dry.</td>
</tr>
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<td></td>
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</tr>
</tbody>
</table>

**REMARKS**

Exploratory boring was drilled by flight auger drilling to a diameter of 6 inches. Bag samples, denoted by an X in the sample column, were collected from auger returns. Undisturbed samples were collected by a California split spoon sampler, 2 inches outside diameter. (continued on next page)
### LOG OF EXPLORATORY BORING

**PROJECT NUMBER** 833-01.01

**PROJECT NAME** SILVER STATE DISPOSAL

**BORING NO.** B-2

**BORE DATE** 09/24/86

**SURFACE ELEV.** 1910’s

---

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/FT.)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH IN FT.</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
|                 |                           |                         |                     |             | SM                   | SILTY SAND (continued); coarser grained.  
|                 |                           |                         |                     |             | ML                   | @21’: becoming gravelly. |
|                 |                           |                         |                     |             | SC                   | SANDY SILT; pinkish white (5YR, 8/2);  
|                 |                           |                         |                     |             |                      | 20-30% fine to medium gravel; angular clasts of sandstone and siltstone; low hardness; dry. |
|                 |                           |                         |                     |             |                      | CLAYEY SAND; gravelly; pale red (10R, 6/4); very fine to fine grained; 30% fines; 20% coarse sand to fine gravels; low hardness; dry. |

**BORING TERMINATED AT 31 FEET.**

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**REMARKS**

Boring was backfilled with drill cuttings.
## LOG OF EXPLORATORY BORING

**PROJECT NUMBER** 833-01.01  
**BORING NO.** B-3  
**PROJECT NAME** SILVER STATE DISPOSAL  
**BY PFD** DATE 9/25/86  
**SURFACE ELEV.** 1905'

### PHOTO-VAC  

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/ft)</th>
<th>GROUND LEVELS</th>
<th>DEPTH IN FT.</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GP</td>
<td>GRAVEL; variegated; clasts composed of sandstone and siltstone in a gypsum matrix; 1&quot;-7&quot; in diameter; subangular; 15% powdery fines; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ML</td>
<td>SANDY SILT, gravelly; pinkish white (5YR, 8/2); 10-20% very fine sand; 15-30% coarse sand to gravel sized fragments composed of hard sandstones; poorly cemented with gypsum and carbonate; low hardness; dry.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>@7.5': Gravels.</td>
</tr>
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<td></td>
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<td></td>
<td>@12': decrease in gravel content.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>@15': weak red (10R, 4/4); 10-15% gravels; poorly cemented; dry.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>@18': decrease in gravel content.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### REMARKS

Exploratory boring was drilled by flight auger drilling to a diameter of 6 inches. Bag samples, denoted by an X in the sample column, were collected from auger returns. Undisturbed samples were collected by a California split spoon sampler, 2 inch outside diameter. (continued on next page)
SANDY SILT, gravelly (continued).

@21': mostly silt and sand; slightly damp.
@22': sandy, 30% very fine sand; 10% coarse sand to fine gravels; less gypsum; slightly damp.
@23': more gravels and cobbles; difficult drilling.

SILTY SAND, GRAVELLY; weak red (10R, 4/4); 25% fines; 10% gravel; 30% very fine sand; 20% fine to medium sand; poorly cemented; very dense; dry.

BORING TERMINATED AT 28.5 FEET.
Auger Refusal.

REMARKS
Boring was backfilled with drill cuttings.
<table>
<thead>
<tr>
<th>PHOTO-VAC</th>
<th>POCKET PENETRATION</th>
<th>PENETRATION (Blows/Ft.)</th>
<th>GROUND LEVELS</th>
<th>SAMPLES</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| 50 for 5" |                   |                        |               |         | GW                  | GRAVEL; varigated; hard clasts of sandstone and limestone; subangular.
|           |                   |                        |               |         | ML                  | stone; subangular.  
|           |                   |                        |               |         |                     | SANDY SILT, pale red (10R, 4);20-25% very fine gypsum sand; trace to 5% coarse sand and gravel; very stiff; dry.  
|           |                   |                        |               |         |                     | @3": pinkish white (5YR, 8/2).  
|           |                   |                        |               |         |                     | @4": increase in gypsum content.  
|           |                   |                        |               |         |                     | @5": 5-15% very fine sand; 5-10% fine sand; 5-15% medium sand; very stiff to low hardness; dry.  
|           |                   |                        |               |         |                     | @10.5": gravelly; well cemented clasts of angular calcarenite.  
|           |                   |                        |               |         |                     | SANDY CLAY; red (2.5YR, 4/6); trace to 20% very fine sand; stiff; dry.  
|           |                   |                        |               |         |                     | @12.5": 1 foot sand and caliche bed.  
|           |                   |                        |               |         |                     | @15": 6" sand and caliche bed.  
|           |                   |                        |               |         |                     | @18": silty; 5-10% fine sand; trace-5% coarse sand; stiff; dry.  
|           |                   |                        |               |         |                     | SANDY SILT to SANDY CLAY; red (2.5YR, 4/6); 15-20% fine to coarse sand; 5% gravel; stiff; dry.  

REMARKS
Exploratory boring was drilled by flight auger drilling to a diameter of 6 inches. Bag samples, denoted by an X in the sample column, were collected from auger returns. Undisturbed samples were collected by a California split spoon sampler, 2 inches outside diameter. (continued on next page)
LOG OF EXPLORATORY BORING

PROJECT NUMBER 833-01.01
BORING NO. B-4
PROJECT NAME SILVER STATE DISPOSAL
BY PFD DATE 9/25/86
SURFACE ELEV. 1890'

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/Ft.)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH IN FT.</th>
<th>SAMPLES</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SANDY SILT to SANDY CLAY, (continued).</td>
</tr>
<tr>
<td>50 for 0''</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SANDY SILT, gravelly; red (2.5YR, 4/6); 30% very fine to fine gypsum sand; 15% fine gravel; hard; dry.</td>
</tr>
</tbody>
</table>

BORING TERMINATED AT 26 FEET.

REMARKS
Boring was backfilled with drill cuttings.
**LOG OF EXPLORATORY BORING**

**PROJECT NUMBER** 833-01.01

**PROJECT NAME** SILVER STATE DISPOSAL

**Boring No. B-5**

**Date** 9/26/86

**Surface Elevation** 1963'

### PHOTO- VAC

<table>
<thead>
<tr>
<th>PHOTO- VAC</th>
<th>POCKET PENETROMETER</th>
<th>PENETRATION (Blows/Ft.)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH IN FT.</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>SW</td>
<td></td>
<td></td>
<td>GRAVELLY SAND; variegated; very fine grained; medium to calcareous gravels; subangular; poorly cemented with gypsum and carbonate; dry.</td>
</tr>
<tr>
<td>44</td>
<td></td>
<td></td>
<td>SP</td>
<td></td>
<td></td>
<td>SAND; light brown (7.5YR, 6/4); very fine grained; poorly cemented with; gypsum and carbonate; dry.</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>SP</td>
<td></td>
<td></td>
<td>@11': pale red (10R, 6/4); 10-35% silt; 15-35% gravel; poorly cemented; moderate hardness; dry.</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>SP</td>
<td></td>
<td></td>
<td>@15': decreased gravel; crystalline gypsum.</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td>SW</td>
<td></td>
<td></td>
<td>@18': coarse gravel.</td>
</tr>
</tbody>
</table>

**REMARKS**

Exploratory boring was drilled by air rotary to a diameter of 5-1/8 inches. Bag samples, denoted by an X in the sample column, were collected from air returns. Undisturbed samples were collected by a Nevada sampler, 2.75 inches outside diameter. (continued on next page)
**LOG OF EXPLORATORY BORING**

**PROJECT NUMBER** 833-01.01

**PROJECT NAME** SILVER STATE DISPOSAL

**BY PFD** DATE 9/26/86

**SURFACE ELEV. 1963'**

<table>
<thead>
<tr>
<th>PHOTO-VAC</th>
<th>POCKET PENETRATION</th>
<th>PENETRATION</th>
<th>WATER LEVELS</th>
<th>DEPTH</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>(oo-)</td>
<td>(TSF)</td>
<td>(Blows/Fl.)</td>
<td></td>
<td>(ft.)</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>20</td>
<td></td>
<td>SP</td>
<td></td>
<td>SAND (continued).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td></td>
<td>020': light red (10R, 6/8); 15-35% clay and silt; 20-30% fine sand; 20% coarse sand; poorly cemented; dense; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ML</td>
<td></td>
<td>SILTY SAND; light red (10R, 6/8); 15-40% clay and silt; dense; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SW</td>
<td></td>
<td>SANDY SILT; red (10R, 4/8); 5-20% fine to medium sand; soft; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ML</td>
<td></td>
<td>SILT; light gray (N7); well cemented; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SW</td>
<td></td>
<td>GRAVELLY SAND; light gray (N7); 5-20% clay and silt; 15-40% very fine sand; 10-25% gravel; medium dense; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ML</td>
<td></td>
<td>SILT; light gray (N7); poorly cemented; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SW</td>
<td></td>
<td>039': gypsum crystals.</td>
</tr>
</tbody>
</table>

**REMARKS**

Boring was backfilled with drill cuttings.
<table>
<thead>
<tr>
<th>PHC (VAC)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/FT.)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH/FT.</th>
<th>SAMPLES</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 for 1&quot;</td>
<td></td>
<td></td>
<td></td>
<td>40</td>
<td>ML</td>
<td></td>
<td>SILT (continued).</td>
</tr>
</tbody>
</table>

40-43': sand and gravel interbeds.

42-43': sand and gravel interbeds.

SILTY SAND; light red (10R, 6/8);
10-25% clay and silt; very fine grained; trace to 10% gravels; loose; dry.

SANDY SILT, gravelly; medium gray (N5); 15-30% very fine sand; 10-20% fine gravel; very hard; dry.
LOG OF EXPLORATORY BORING

PROJECT NUMBER 833-01.01
BORING NO. B-5
PROJECT NAME SILVER STATE DISPOSAL
BY PFD DATE 9/26/86
PAGE 4 OF 4
SURFACE ELEV. 1963'

<table>
<thead>
<tr>
<th>PHOTOVAC (ppr)</th>
<th>POCKET PENETRATION (TSF)</th>
<th>PENETRATION (Bows/Fl.)</th>
<th>GROUND WATERS</th>
<th>DEPTH IN FT.</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ML</td>
<td>SANDY SILT, GRAVELLY (continued); very hard; well cemented.</td>
</tr>
<tr>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BOTTOM OF BORING AT 64 FEET. Drilling refusal.</td>
</tr>
<tr>
<td>70</td>
<td></td>
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<tr>
<td>75</td>
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<tr>
<td>80</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

REMARKS

PLATE
## LOG OF EXPLORATORY BORING

**PROJECT NUMBER**: 833-01.01  
**BORING NO.**: B-6  
**PROJECT NAME**: SILVER STATE DISPOSAL  
**BY**: PFD  
**DATE**: 9/26/86  
**SURFACE ELEV.**: 1930±

### PHOTO-VAC (ppm), POCKET PENUMETER (TST), PENETRATION (Blows/Ft), GROUND WATER LEVELS, DEPTH IN FT, SAMPLES, LITHOGRAPHIC COLUMN

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENUMETER (TST)</th>
<th>PENETRATION (Blows/Ft)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH IN FT</th>
<th>SAMPLES</th>
<th>LITHOGRAPHIC COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>GW</td>
<td></td>
<td>ML</td>
<td>GRAVEL; variegated; composed of clasts of quartz sandstone and siltstones. SANDY SILT, pale red (10YR, 6/4); 30-35% very fine sand; trace to 5% fine gravels; stiff; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ML</td>
<td></td>
<td></td>
<td>@8': gravelly; medium-dense to dense.</td>
</tr>
<tr>
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<td></td>
<td>@9-10': very hard; well cemented.</td>
</tr>
<tr>
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<td></td>
<td>@11-14': interbedded gravelly silt; poorly cemented with gypsum and carbonate.</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>@14': interbedded sands; 15-30% fines; medium dense.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>SANDY SILT; weak red (10R, 5/4); 5-15% clay; 30% very fine sand; trace to 15% medium sand; moderate hardness; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@18.5'-19': easy drilling.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@19'-20': moderate hardness; gravels.</td>
</tr>
</tbody>
</table>

### REMARKS

Exploratory boring was drilled by air rotary to a diameter of 5-1/8 inches. Bag samples, denoted by an X in the sample column, were collected from air returns. Undisturbed samples were collected by a Nevada sampler, 2.75 inches outside diameter. (continued on next page)
<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TF)</th>
<th>PENETRATION (Blows/Ft.)</th>
<th>GROUND WATER LEVELS</th>
<th>SAMPLES</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SANDY SILT (continued), poorly cemented; 20-30% fine to coarse sand. @21.5': soft. @22': dense to friable. @23': very hard.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SANDY SILT, gravelly; pink (5YR, 8/4); 15-30% very fine sand; hard; dry. @27': moderate hardness. @28': trace of gravel; very hard</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@31': light red (10R, 6/8); 20-30% very fine sand; trace to 10% medium sands; poorly cemented; low hardness; dry. @32.5': gravelly; pink (5YR, 8/4); 20-30% coarse sand to fine gravel; poorly cemented; moderate hardness; dry. @36': variable hardness due to varied cementation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@38': low hardness. @39': gravel bed; difficult drilling.</td>
</tr>
</tbody>
</table>

REMARKS
Boring was backfilled with drill cuttings.
LOG OF EXPLORATORY BORING

PROJECT NUMBER 833-01.01
BORING NO. B-6
PROJECT NAME SILVER STATE DISPOSAL
PAGE 3 OF 4
BY PFD DATE 9/26/86
SURFACE ELEV. 1930'

<table>
<thead>
<tr>
<th>PHOTOVAC</th>
<th>ROCKET PENETRATION</th>
<th>PENETRATION (B/FL)</th>
<th>GROUND LEVELS</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>(in)</td>
<td>(blows/ft)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>ML</td>
<td></td>
<td></td>
<td></td>
<td>SANDY SILT, gravelly (continued).</td>
</tr>
<tr>
<td>75</td>
<td>CL</td>
<td></td>
<td></td>
<td></td>
<td>CLAYEY SAND; light red (10R, 6/8); very fine grained; 20-30% fines; low hardness; slightly damp.</td>
</tr>
<tr>
<td>84 for 10.5&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SANDY CLAY; pinkish gray (5YR, 7/2); 15-40% very fine sand; trace to 15% medium to coarse sand; moderate hardness; slightly damp.</td>
</tr>
<tr>
<td>100 for 11.5&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@45': decreasing sand content.</td>
</tr>
<tr>
<td>50 for 3&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@47': red (2.5YR, 4/8); trace to 10% very fine sand; poorly cemented; moderate hardness; slightly damp.</td>
</tr>
<tr>
<td>60</td>
<td>NR</td>
<td></td>
<td></td>
<td></td>
<td>@48': gravelly, sandy, soft.</td>
</tr>
<tr>
<td>65</td>
<td>NR</td>
<td></td>
<td></td>
<td></td>
<td>@49': moderate hardness.</td>
</tr>
<tr>
<td>50</td>
<td>NR</td>
<td></td>
<td></td>
<td></td>
<td>@50': red (2.5YR, 4/8); loose; dry.</td>
</tr>
<tr>
<td>60</td>
<td>NR</td>
<td></td>
<td></td>
<td></td>
<td>@57': interbedded sand; very fine grained; low hardness; dry.</td>
</tr>
<tr>
<td>62</td>
<td>NR</td>
<td></td>
<td></td>
<td></td>
<td>@59-62': clay becomes gravelly and sandy (see next page).</td>
</tr>
</tbody>
</table>

REMARKS

PLATE
**LOG OF EXPLORATORY BORING**

**PROJECT NUMBER** 833-01.01  
**BORING NO.** 8-6  
**PROJECT NAME** SILVER STATE DISPOSAL  
**DATE** 9/26/86  
**SURFACE ELEV.** 1930'±

<table>
<thead>
<tr>
<th>Photo- Vac (ppm)</th>
<th>Pocket Penetrometer (TSF)</th>
<th>Penetration (Blows/ Ft.)</th>
<th>Ground Levels</th>
<th>Depth in Ft.</th>
<th>Samples</th>
<th>Lithographic Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>60</td>
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<td></td>
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<td>70</td>
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<td></td>
<td></td>
<td>75</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>80</td>
</tr>
</tbody>
</table>

**DESCRIPTION**

SANDY CLAYSTONE, gravelly; pale red (10R, 6/2); 15-25% very fine sand; 10-25% medium to coarse sand; 5-15% fine gravels composed of limestones and calcareous sandstones; poorly cemented; moderate hardness; dry.

@62': gravelly; light brown (5YR, 6/4); loose.

Silty Sand; pink (5YR, 8/3); 10-15% fines; very fine grained; 10-20% medium sand; trace to 5% fine to coarse gravels; moderate hardness; dry.

@68': moderately cemented.

BORING TERMINATED AT 70 FEET.
### LOG OF EXPLORATORY BORING

**PROJECT NUMBER:** 833-01.01  
**BORING NO.:** B-7  
**PROJECT NAME:** SILVER STATE DISPOSAL  
**DATE:** 9/29/86  
**SURFACE ELEV.:** 1985'"  
**PAGE:** 1 OF 6

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETRATION (TSF)</th>
<th>PENETRATION (Blows/FT.)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH IN FT.</th>
<th>SAMPLES</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GRAVEL; variegated; 25% fine sand; clasts range from sands to gravels to cobbles and boulders; composed of well cemented subangular to rounded grains.</td>
</tr>
</tbody>
</table>

GRAVELLY SILT; light red (10R, 6/8); firm; gravel interbeds.

- @10': gravel bed; very coarse grained; gypsiferous; loose.
- @11-15': sand interbeds; pinkish white (5YR, 6/2); low hardness.

@18': gravels; moderate hard.

**REMARKS:**

Exploratory boring was drilled by air rotary to a diameter of 5-1/8 inches. Bag samples, denoted by an X in the sample column, were collected from air return. Undisturbed samples were collected by a Nevada sampler, 2.75 inches outside diameter. (continued on next page)
### LOG OF EXPLORATORY BORING

**PROJECT NUMBER** 833-01.01  
**BORING NO.**  B-7  
**PROJECT NAME**  SILVER STATE DISPOSAL  
**PAGE 2 OF 6**  
**BY PFD**  
**DATE 9/29/86**  
**SURFACE ELEV. 1985'**

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/Fl.)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH IN FT.</th>
<th>SAMPLES</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>24</td>
<td></td>
<td>20</td>
<td>GP</td>
<td></td>
<td>GP</td>
<td>GP</td>
<td>SILTY GRAVELS; pink (5YR, 8/4); gypsum prominent; loose.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>@22-24': interbedded silt; soft.</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>@23': 40% gypsum and carbonate.</td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td>@25.5-26': gravel bed; moderate hardness.</td>
</tr>
<tr>
<td></td>
<td>50 for 5.5&quot;</td>
<td></td>
<td></td>
<td>30</td>
<td>ML</td>
<td></td>
<td>@28-30': silty sand bed; coarse sands composed of limestone and sandstones; low hardness.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>SANDY SILT; pink (5YR, 8/4); white crystalline gypsum; 40% very fine sand; low hardness; dry.</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>@32-37': gravel interbed; low hardness.</td>
</tr>
<tr>
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<td></td>
<td>@37-40': gravel interbed; trace to 10% fines; loose.</td>
</tr>
</tbody>
</table>

### REMARKS
Boring was backfilled with drill cuttings.
LOG OF EXPLORATORY BORING

PROJECT NUMBER 833-01.01
PROJECT NAME SILVER STATE DISPOSAL
BY PFD DATE 9/29/86
BORING NO. B-7
SURFACE ELEV. 1985'

PHOTO-VAC (ppm) POCKET PENETROMETER (TSI) PENETRATION (Blows/Ft.) GROUND WATER LEVELS DEPTH IN FT. SAMPLES LITHOGRAPHIC COLUMN DESCRIPTION

SILT (continued).

GRAVELLY SAND; clayey, pale red (10R, 6/2); 25-30% clay; very fine grained; 30% fine sand; 15-20% medium sand; trace to 5% gravels; low hardness; dry.

@47-47.5': caliche lense; hard.

@50': moderate hard.

SANDY SILT; pink (5YR, 8/4); 15-20% very fine sand; 10% medium sand; trace to 5% gravels composed of yellow and red sandstones; low to moderate hardness. Moderate hardness.

@54': gypsiferous; moderate hard.
LOG OF EXPLORATORY BORING

PROJECT NUMBER 833-01.01
PROJECT NAME SILVER STATE DISPOSAL
BY PFD DATE 9/29/86
BORING NO. 8-7
SURFACE ELEV. 1985±

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blow/ft.)</th>
<th>GROUND WATERS</th>
<th>DEPTH IN FT.</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 for 4.5&quot;</td>
<td></td>
<td></td>
<td></td>
<td>ML</td>
<td>SANDY SILT (continued).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td>SILTY SAND; pink (5YR, 8/4); 20-25% fines; 30-45% fine sand; poorly cemented; low hardness; dry.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>@67': 20-30% very fine sand; 10-15% medium sand; trace to 10% coarse sands to fine gravels; 30% gypsum silt; low hardness; dry.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>@71-80': gravel.</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>@72-80': moderate hardness.</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>@75.5': 30% fines; 20-35% very fine sand; 20% medium sands; 10-15% coarse sand to fine gravels; moderate hard; dry.</td>
</tr>
</tbody>
</table>

REMARKS

PLATE
## LOG OF EXPLORATORY BORING

**PROJECT NUMBER** 833-01.01  
**BORING NO.** B-7  
**PROJECT NAME** SILVER STATE DISPOSAL  
**BY PFD** DATE 9/29/86  
**SURFACE ELEV.** 1985'

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blow/ft.)</th>
<th>WATER LEVELS</th>
<th>DEPTH IN FT.</th>
<th>SAMPLES</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SAND (continued).</td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@80': caliche bed; moderate hard.</td>
</tr>
<tr>
<td>GP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@81': very fine grained;</td>
</tr>
<tr>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20% medium sands; trace gravels.</td>
</tr>
<tr>
<td>SM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GRAVEL; variegated; coarse grained supported; composed of sandstones, caliche and limestone clasts; loose.</td>
</tr>
<tr>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SILTY SAND, gravelly; red (3.5YR, 4/8); silty sand; 20-30% silts; very fine grained; 10-30% fine to medium sand; 15% coarse sand; 10% gravels; poorly cemented; low hardness; dry.</td>
</tr>
<tr>
<td>95</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>@91': clayey; decreasing in size and amount of sand.</td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@100': moderate red (5R, 4/6).</td>
</tr>
</tbody>
</table>

**REMARKS**
**DESCRIPTION**

CLAYEY SAND; weak red (10R, 5/4); 30-40% fines; 45-60% very fine sand; trace of medium to fine gravels; low hardness; dry.

**BORING TERMINATED AT 110 FEET.**
## LOG OF EXPLORATORY BORING

**PROJECT NUMBER** 833-01.01  
**PROJECT NAME** SILVER STATE DISPOSAL  
**BY PFD**  
**DATE** 9/29/86  
**SURFACE ELEV.** 1952’

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/Fl.)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH IN FT.</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>GW-SW</td>
<td></td>
<td></td>
<td>GRAVEL TO GRAVELLY SAND; variegated fine sand matrix; 40-50% 1&quot; to 2&quot; clasts of subangular to rounded sandstone and limestone; poorly cemented with gypsum and carbonate; loose; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GW-SW</td>
<td></td>
<td></td>
<td>08': decrease in size of gravels; gypsum sand matrix; sand supported.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GW-SW</td>
<td></td>
<td></td>
<td>GRAVELLY SAND; pink (5YR, 8/4); 15-20% very fine sand; 15% medium sand; 30-35% coarse sand to fine gravels; poorly cemented; low hardness; dry.</td>
</tr>
</tbody>
</table>

**REMARKS**  
Exploratory boring was drilled by air rotary to a diameter of 5-1/8 inches. Bag samples, denoted by an X in the sample column, were collected from air returns. Undisturbed samples were collected by a Nevada sampler, 2.75 inches outside diameter. (continued on next page)
LOG OF EXPLORATORY BORING

PROJECT NUMBER 833-01.01
PROJECT NAME SILVER STATE DISPOSAL

BY PFD DATE 9/29/86 SURFACE ELEV. 1952'

BORING NO. B-8

PHOTO- VAC (ppm) POCKET PENETROMETER (TSF) PENETRATION (Blows/Ft) GROUND WATER LEVELS DEPTH IN FT. SAMPLES LITHOGRAPHIC COLUMN DESCRIPTION

20 SW GRAVELLY SAND (continued).

ML SANDY SILT; grayish orange pink (10R, 8/2); 10-15% very fine sand; friable; dry.

@25.5': gravel content; moderate hard.

@27.5': (10R, 6/6); decreased gypsum content increased gravel content.

50 for 5' GRAVELLY SAND; variegated; fine grained; clasts composed of yellow and red calc-sandstones, limestones and chert, well cemented; very hard; dry.

REMARKS
Boring was backfilled with drill cuttings.
## LOG OF EXPLORATORY BORING

**PROJECT NUMBER** 833-01.01  
**BORING NO.** B-8  
**PROJECT NAME** SILVER STATE DISPOSAL  
**BY PFD** DATE 9/29/86  
**SURFACE ELEV.** 1952'±

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/Ft.)</th>
<th>GROUND LEVELS</th>
<th>DEPTH IN FT.</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
|                 |                             |                         |                |              | SM                  | SILTY SAND; pale red (10R, 6/2)  
15-20% fines; 25-30% very fine sand;  
20% medium sand; 15-20% coarse sand;  
well cemented with gypsum and carbonate; very hard; dry. |
|                 |                             |                         |                |              |                     | @46-50': red (10R, 5/6); 20-30%  
fines; 15-25% very fine sand; 20-25%  
medium sand; trace to 15% coarse sand  
to fine gravel; low hardness; dry. |
|                 |                             |                         |                |              |                     | @51': gravelly; pale red (10R, 5/6);  
15-20% fines; 20-25% very fine sand;  
25-30% medium sand; trace to 20%  
fine to medium gravels; friable. |
|                 |                             |                         |                |              |                     | @55': gravel; loose (easier drilling) |
|                 |                             |                         |                |              |                     | @58': moderate hardness. |
|                 |                             |                         |                |              |                     | @59': clayey. |

**REMARKS**

PLATE
LOG OF EXPLORATORY BORING

PROJECT NUMBER 833-01.01
PROJECT NAME SILVER STATE DISPOSAL
BY PFD DATE 9/29/86
SURFACE ELEV. 1952'

BORING NO. B-8
PAGE 4 OF 4

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/Fl.)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH IN FT.</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td>SAND (continued); red (10R, 4/6); trace to 10% fines; very fine grained; trace medium sand; friable; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@64-65': gravel bed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@67': increase in clay content; low hardness.</td>
</tr>
</tbody>
</table>

BORING TERMINATED AT 70 FEET.

REMARKS

PLATE
LOG OF EXPLORATORY BORING

PROJECT NUMBER 833-01.01  BORING NO. B-9
PROJECT NAME SILVER STATE DISPOSAL  PAGE 1 OF 5
BY PFD  DATE 9/30/86  SURFACE ELEV. 1990' ±

PHOTO - VAC (ppm) POCKET PENETROMETER (TSP) PENETRATION (Blows/FL) GROUND WATER LEVELS DEPTH IN FT. SAMPLES LITHOGRAPHIC COLUMN DESCRIPTION

GW
ML

GRAVELS: variegated; well indurated clasts of yellow and red calcareous sandstones; subangular to rounded.
SANDY SILT: pale red (10R, 6/2); 20-25% very fine sand; trace to 5% medium sand; stiff; dry.

@6-8': gravelly; very stiff, hard.

@10': pinkish white (5YR, 8/2); 20-30% very fine grained sand; low hardness; dry.

@14': very friable (easier drilling).

@17-20': gravel interbed; poorly cemented gravels of subangular clasts; calcareous mudstone.

REMARKS
Exploratory boring was drilled by air rotary to a diameter of 5-1/8 inches. Bag samples, denoted by an X in the sample column, were collected from air returns. Undisturbed samples were collected by a Nevada Sampler, 2.75 inches outside diameter. (continued on next page)
<table>
<thead>
<tr>
<th>PHOTO-VAC</th>
<th>POCKET PENETROMETER</th>
<th>PENETRATION (Blows/</th>
<th>GROUND WATER</th>
<th>DEPTH IN FT.</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(bpm)</td>
<td>(TSF)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>for 3&quot;</td>
<td></td>
<td></td>
<td>20</td>
<td>ML</td>
<td>SANDY SILT; 15-20% very fine grained sand; trace to 15% medium sand; gypsiferous; low hardness; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>for 4.5&quot;</td>
<td></td>
<td></td>
<td>30</td>
<td>SM</td>
<td>@26-27': gravel stringer; moderate hardness. SILTY SAND; pink (5YR, 8/4); 25% fines; very fine grained; trace medium sand; poorly cemented with gypsum and carbonate; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@32': 15% fines; 30-40% very fine sand; 15-20% medium sand; 15-20% coarse sand to fine gravel, subangular; low hardness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@36-38': gravel bed; moderate hardness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@38': decrease in grain size; low hardness; easy drilling.</td>
</tr>
</tbody>
</table>

REMARKS
Boring was backfilled with drill cuttings.
<table>
<thead>
<tr>
<th>PHOTO- VAC</th>
<th>POCKET PENETRATION</th>
<th>PENETRATION GROUND WATER LEVELS</th>
<th>DEPTH IN FT</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ppm)</td>
<td>(TSF)</td>
<td>(Blows/ Ft.)</td>
<td>ML</td>
<td></td>
<td>SILT; pinkish white (5YR, 8/2) to white (N9); 80% gypsum and carbonate. gypsum. @41': moderate hardness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@45': gravels; loose.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@48': coarse grained layer; moderate hardness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SILTY SAND; pinkish white; fines; 40-60% very fine sand; 5-10% medium sand; trace gravels; gypsiferous; low hardness; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@58-60': moderate hard.</td>
</tr>
</tbody>
</table>

REMARKS
<table>
<thead>
<tr>
<th>Photo-Vac (ppm)</th>
<th>Pocket Penetration (TSF)</th>
<th>Penetration (Blows/ft)</th>
<th>Ground Water Levels</th>
<th>Depth in ft</th>
<th>Lithographic Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>60</td>
<td></td>
<td></td>
<td>60</td>
<td>SM/GP</td>
<td>SILTY SAND (continued).</td>
</tr>
<tr>
<td>SM/SM</td>
<td>65</td>
<td></td>
<td></td>
<td>65</td>
<td></td>
<td>SILTY SAND WITH INTERBEDDED GRAVELS; pinkish white (5YR, 8/2); very fine grained; 25-35% fines; 5-15% medium sands; stiff; dry. Fine to medium gravels; gypsiferous; interbeds; loose; dry.</td>
</tr>
<tr>
<td></td>
<td>73for 10.5&quot;</td>
<td></td>
<td></td>
<td>73</td>
<td></td>
<td>@70': pale reddish brown (2.5YR, 5/4); slightly damp.</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td></td>
<td></td>
<td>75</td>
<td></td>
<td>@75-77': 30% fines; very fine grained; trace medium sands and gravels; medium dense; dry. @77-80': interbedded gravels.</td>
</tr>
</tbody>
</table>

REMARKS

PLATE
## LOG OF EXPLORATORY BORING

**PROJECT NUMBER** 833-01.01  
**BORING NO.** B-9  
**PROJECT NAME** SILVER STATE DISPOSAL  
**DATE** 9/30/86  
**SURFACE ELEV.** 1990' ±

### Table

<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/ft)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH IN FT. SAMPLES</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>92 for 4&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SILTY SAND (continued); gypsiferous.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>084-86': gravel bed; clasts of red and white calc-arenites; moderate hardness.</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SILTY SAND; pink (5YR, 8/4); 10-15% fines; very fine grained; 5-10% medium sands; trace coarse sands and gravels; moderate hard; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>092.5-100': 10-20% fines; very fine grained; 5% medium sands; 5% coarse sand; 10-15% gravels; dense; dry.</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BORING TERMINATED AT 100 FEET.</td>
</tr>
</tbody>
</table>

### Remarks

**PLATE**
# LOG OF EXPLORATORY BORING

**PROJECT NUMBER** 833-01.01  
**BORING NO.** B-10  
**PROJECT NAME** SILVER STATE DISPOSAL  
**PAGE 1 OF 3**  
**BY** PFD  
**DATE** 10/01/86  
**SURFACE ELEV.** 1960'±

<table>
<thead>
<tr>
<th>PHOTOVAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/ft.)</th>
<th>GROUND WATER LEVELS</th>
<th>DEPTH IN FT.</th>
<th>SAMPLES</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>GW</td>
<td></td>
<td>SM</td>
<td></td>
<td>GRAVEL; gray (N6); coarse gravel to cobbles; composed of fine to medium grained sandstone clasts; very loose; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td></td>
<td>SILTY SAND; pale red to white (10R, 6/3) to (10YR, 8/2); fine grained; 10-15% fines; gypsiferrous; medium dense; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SW</td>
<td></td>
<td>@5-8': gravelly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SW</td>
<td></td>
<td>@10': coarse gravels; subangular.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SW</td>
<td></td>
<td>SAND; pinkish white (5YR, 8/2); very fine to fine grained; 15-20% medium sand; 10-15% coarse sand; 5% gravel; gypsiferrous; moderate hardness; dry.</td>
</tr>
</tbody>
</table>

**REMARKS**

Exploratory boring was drilled by air rotary to a diameter of 5-1/8 inches. Bag samples, denoted by an X in the sample column, were collected from air returns. Undisturbed samples were collected by a Nevada sampler. (continued on next page).
<table>
<thead>
<tr>
<th>PHOTO-VAC (ppm)</th>
<th>POCKET PENETROMETER (TSF)</th>
<th>PENETRATION (Blows/FT)</th>
<th>WATER LEVELS</th>
<th>DEPTH IN FT.</th>
<th>LITHOGRAPHIC COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SW</td>
<td>SAND (continued); gravelly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@23-25': increase in gypsum content; low hardness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@25-27': gravel bed; loose (easy drilling).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@31-40': medium grained; 10-20% coarse sand to fine gravel; very hard; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@34': gravel; clasts composed of gypsiferous sandstone and yellow limestone; very hard; dry.</td>
</tr>
</tbody>
</table>

**REMARKS**
Boring was backfilled with drill cuttings.
# LOG OF EXPLORATORY BORING

**PROJECT NUMBER** 833-01.01  
**PROJECT NAME** SILVER STATE DISPOSAL  
**BORING NO.** B-10  
**DATE** 10/01/86  
**SURFACE ELEV.** 1960'

## Lithographic Column

<table>
<thead>
<tr>
<th>Photo-Vac (ppm)</th>
<th>Pocket Penetrometer (TSF)</th>
<th>Penetration (Blows/ft)</th>
<th>Ground Levels</th>
<th>Depth in ft.</th>
<th>Samples</th>
<th>Lithographic Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td>SILTY SAND; pinkish white (5YR, 8/2); very fine grained; 10-20% fines; 10-15% medium sand; 10-20% coarse sand to fine gravel; moderate hardness; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@5': pale red (10R, 6/2); 10-15% fines; 5-15% medium sand; trace coarse sand to fine gravel; moderate hardness; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@47': gravelly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@49': gravelly; pinkish white (5YR, 8/2); very fine to fine grained; 10% fines; 10-20% medium sand 10-20% coarse sand to fine gravel; moderate hardness; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@51': coarse grained; very hard.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@55': silty; very fine grained; 10-20% silt; 15-25% fine sand; 15% medium sand; very hard; dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@59': gravelly.</td>
</tr>
</tbody>
</table>

**BORING TERMINATED AT 60 FEET.**

## Remarks

PLATE
Appendix C

SOILS LABORATORY TEST DATA
A soil testing program was conducted to confirm the classification (USCS) and the physical and mechanical properties of representative site soil and rock materials. American Society for Testing and Materials (ASTM) standard test methods were used.

Soil classification tests consisted of Atterberg Limit determination D423-72 (1972) and D424-71 (1971), and sieve analysis D422-72 (1972). The physical and mechanical tests included (1) compaction D1557-78, (2) percent of soil (dry-weight basis) passing through a U.S. No. 200 sieve D1140-54, and (3) remolded permeabilities.

The permeability of remolded soil samples was determined by the falling head test method, using back pressure to achieve a high degree of saturation. Samples were enclosed in rubber membranes and tested in triaxial chambers. The sample thickness was between 1 and 2 inches and the hydraulic gradient less than 10.
### Table C-1
**GRAIN SIZE DISTRIBUTION**

<table>
<thead>
<tr>
<th>Boring</th>
<th>Depth (Ft.)</th>
<th>3/8&quot;</th>
<th>Percent Passing No. 4</th>
<th>Percent Passing No. 16</th>
<th>Percent Passing No. 50</th>
<th>No. 200</th>
<th>Unified Soil Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-2</td>
<td>30</td>
<td>96</td>
<td>86</td>
<td>70</td>
<td>60</td>
<td>30</td>
<td>SC</td>
</tr>
<tr>
<td>B-3</td>
<td>28</td>
<td>85</td>
<td>77</td>
<td>70</td>
<td>65</td>
<td>24</td>
<td>GM-SM</td>
</tr>
<tr>
<td>B-4</td>
<td>18.5</td>
<td>99</td>
<td>96</td>
<td>86</td>
<td>81</td>
<td>65</td>
<td>CL</td>
</tr>
<tr>
<td>B-6</td>
<td>59</td>
<td>99</td>
<td>82</td>
<td>50</td>
<td>35</td>
<td>20</td>
<td>SC</td>
</tr>
<tr>
<td>B-7</td>
<td>93</td>
<td>96</td>
<td>91</td>
<td>90</td>
<td>83</td>
<td>18</td>
<td>SM</td>
</tr>
</tbody>
</table>

### Table C-2
**ATTERBERG LIMITS**

<table>
<thead>
<tr>
<th>Boring</th>
<th>Depth (Ft.)</th>
<th>Plastic Limit (%)</th>
<th>Liquid Limit (%)</th>
<th>Plasticity Index</th>
<th>Unified Soil Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-2</td>
<td>30</td>
<td>23</td>
<td>36</td>
<td>13</td>
<td>SC</td>
</tr>
<tr>
<td>B-4</td>
<td>18.5</td>
<td>12</td>
<td>27</td>
<td>15</td>
<td>CL</td>
</tr>
<tr>
<td>B-4</td>
<td>26</td>
<td>21</td>
<td>31</td>
<td>10</td>
<td>GL-SC</td>
</tr>
<tr>
<td>B-6</td>
<td>59</td>
<td>21</td>
<td>32</td>
<td>11</td>
<td>SC</td>
</tr>
</tbody>
</table>

C-2
### Table C-3

**MAXIMUM DRY DENSITY***

<table>
<thead>
<tr>
<th>Soil Description**</th>
<th>Maximum Dry Density (pcf)</th>
<th>Optimum Moisture Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reddish Brown CLAYEY SAND</td>
<td>130</td>
<td>8</td>
</tr>
<tr>
<td>Reddish Brown SILTY SAND</td>
<td>124</td>
<td>9</td>
</tr>
<tr>
<td>White to Light Brown Gypsiferous SILTY SAND</td>
<td>121</td>
<td>12</td>
</tr>
</tbody>
</table>

* ASTM D-1557

** Bulk samples were obtained by combining similar soils from several borings and at different depths.

### Table C-4

**REMOLED PERMEABILITY**

<table>
<thead>
<tr>
<th>Soil Description*</th>
<th>Dry Density (pcf)</th>
<th>Percent of Maximum Dry Density</th>
<th>Permeability (cm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAYEY SAND</td>
<td>117</td>
<td>90</td>
<td>$2 \times 10^{-5}$</td>
</tr>
<tr>
<td>SILTY SAND</td>
<td>112</td>
<td>90</td>
<td>$1 \times 10^{-4}$</td>
</tr>
<tr>
<td>Gypsiferous SILTY SAND</td>
<td>109</td>
<td>90</td>
<td>$8 \times 10^{-5}$</td>
</tr>
</tbody>
</table>

* Bulk samples were obtained by combining similar soils from several borings and at different depths.
Appendix D

WATER BALANCE
Appendix D

MOISTURE BALANCE CALCULATIONS

The selection of the final cover profile proposed for the Sunrise Mountain Landfill, Clark County, Nevada was based on a study of numerous alternative profiles. To evaluate these alternatives, the Hydrologic Evaluation of Landfill Performance (HELP) program, developed by EPA, was used to estimate the amount of the annual precipitation that would penetrate the final cover profile.

The attached HELP program provides a summary of the moisture balance parameters and results.
LAS VEGAS, NEVADA 89101
NOVEMBER 10, 1986

THE TOP LAYER IS AN UNVEGETATED SAND OR GRAVEL LAYER.

BARE GROUND

LAYER 1

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical Percolation Layer</td>
<td></td>
</tr>
<tr>
<td>Thickness</td>
<td>24.00 inches</td>
</tr>
<tr>
<td>Evaporation Coefficient</td>
<td>3.100 MM/DAY x 0.5</td>
</tr>
<tr>
<td>Porosity</td>
<td>0.2907 VOL/VOL</td>
</tr>
<tr>
<td>Field Capacity</td>
<td>0.1415 VOL/VOL</td>
</tr>
<tr>
<td>Wilting Point</td>
<td>0.0500 VOL/VOL</td>
</tr>
<tr>
<td>Effective Hydraulic Conductivity</td>
<td>0.26999998 INCHES/HF</td>
</tr>
</tbody>
</table>

LAYER 2

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrier Soil Layer</td>
<td></td>
</tr>
<tr>
<td>Thickness</td>
<td>12.00 inches</td>
</tr>
<tr>
<td>Evaporation Coefficient</td>
<td>4.500 MM/DAY x 0.5</td>
</tr>
<tr>
<td>Porosity</td>
<td>0.5210 VOL/VOL</td>
</tr>
<tr>
<td>Field Capacity</td>
<td>0.3770 VOL/VOL</td>
</tr>
<tr>
<td>Wilting Point</td>
<td>0.2210 VOL/VOL</td>
</tr>
<tr>
<td>Effective Hydraulic Conductivity</td>
<td>0.20999992 INCHES/HF</td>
</tr>
</tbody>
</table>
GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER = 100.00
TOTAL AREA OF COVER = 43560.50 FT^2
EVAPORATIVE ZONE DEPTH = 4.00 INCHES
EFFEVTIVE EVAPORATION COEFFICIENT = 3.100 MM/DAY * 0.3
UPPER LIMIT VEG. STORAGE = 1.1626 INCHES
INITIAL VEG. STORAGE = 0.3630 INCHES

CLIMATOLOGIC DATA FOR LAS VEGAS NEVADA

MONTHLY MEAN TEMPERATURES, DEGREES FAHRENHEIT

<table>
<thead>
<tr>
<th>N/JUL</th>
<th>FEB/AUG</th>
<th>MAR/SEP</th>
<th>APR/OCT</th>
<th>MAY/NOV</th>
<th>JUN/DEC</th>
</tr>
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<tbody>
<tr>
<td>6.67</td>
<td>45.90</td>
<td>53.51</td>
<td>64.43</td>
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<td>67.26</td>
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<td>47.31</td>
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</table>

MONTHLY MEANS SOLAR RADIATION, LANGLEYS PER DAY

<table>
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<th>N/JUL</th>
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<th>MAR/SEP</th>
<th>APR/OCT</th>
<th>MAY/NOV</th>
<th>JUN/DEC</th>
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<tbody>
<tr>
<td>2.28</td>
<td>381.68</td>
<td>493.22</td>
<td>612.47</td>
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<tr>
<td>5.68</td>
<td>636.48</td>
<td>522.94</td>
<td>405.69</td>
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LEAF AREA INDEX TABLE

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<tr>
<td>1</td>
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<td>366</td>
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BARE GROUND

WINTER COVER FACTOR = 0.0
<table>
<thead>
<tr>
<th></th>
<th>INCHES</th>
<th>CU. FT.</th>
<th>PERCENT</th>
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<tr>
<td>PRECIPITATION</td>
<td>4.52</td>
<td>16408.</td>
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<tr>
<td>RUNOFF</td>
<td>1.971</td>
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<td>47.50</td>
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<tr>
<td>EVAPOTRANSPIRATION</td>
<td>2.704</td>
<td>9815.</td>
<td>59.52</td>
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<tr>
<td>PERCOLATION FROM BASE OF COVER</td>
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<td>3.</td>
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<td>DRAINAGE FROM BASE OF COVER</td>
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<td>SOIL WATER AT START OF YEAR</td>
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<tr>
<td>SOIL WATER AT END OF YEAR</td>
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<td>27521.</td>
<td></td>
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<td>SNOW WATER AT END OF YEAR</td>
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<td>ANNUAL WATER BUDGET BALANCE</td>
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<td>0.00</td>
</tr>
<tr>
<td>Description</td>
<td>Inches</td>
<td>Cubic Ft.</td>
<td>Percent</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>--------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Precipitation</td>
<td>7.47</td>
<td>12576.</td>
<td>100.00</td>
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<td>Runoff</td>
<td>1.625</td>
<td>5899.</td>
<td>45.34</td>
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<td>Evapotranspiration</td>
<td>1.883</td>
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<td>54.27</td>
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<tr>
<td>Percolation from base of cover.</td>
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<td>0.</td>
<td>0.0</td>
</tr>
<tr>
<td>Drainage from base of cover</td>
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<td>0.0</td>
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<tr>
<td>Soil water at start of year</td>
<td>7.58</td>
<td>27521.</td>
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<tr>
<td>Soil water at end of year</td>
<td>7.54</td>
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<td>Snow water at start of year</td>
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<td></td>
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<tr>
<td>Snow water at end of year</td>
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</tr>
<tr>
<td>Annual water budget balance</td>
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<td>0.</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>JAN/JUL</td>
<td>FEB/AUG</td>
<td>MAR/SEP</td>
</tr>
<tr>
<td>----------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>PRECIPITATION (INCHES)</strong></td>
<td>1.00</td>
<td>0.03</td>
<td>0.61</td>
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<tr>
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<td>0.42</td>
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<td><strong>RUNOFF (INCHES)</strong></td>
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<td><strong>EVAPOTRANSPIRATION (INCHES)</strong></td>
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<tr>
<td></td>
<td>0.0</td>
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</tr>
<tr>
<td><strong>DRAINAGE FROM BASE OF COVER (INCHES)</strong></td>
<td>0.0</td>
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### Average Annual Totals for 74 Through 75

<table>
<thead>
<tr>
<th>Description</th>
<th>Inches</th>
<th>Cu. Ft.</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precipitation</td>
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<td>1450.1</td>
<td>100.00</td>
</tr>
<tr>
<td>Unoff</td>
<td>1.778</td>
<td>652.6</td>
<td>44.00</td>
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<tr>
<td>Transpiration</td>
<td>2.294</td>
<td>832.6</td>
<td>57.40</td>
</tr>
<tr>
<td>Erosion From Base of Cover</td>
<td>0.0005</td>
<td>2.0</td>
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</tr>
<tr>
<td>Infiltration From Base of Cover</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

### Peak Daily Values for 74 Through 75

<table>
<thead>
<tr>
<th>Description</th>
<th>Inches</th>
<th>Cu. Ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precipitation</td>
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<td>333.96</td>
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<tr>
<td>Unoff</td>
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<td>Erosion From Base of Cover</td>
<td>0.0009</td>
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<td>Infiltration From Base of Cover</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Erod on Base of Cover</td>
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<td>0.0</td>
</tr>
<tr>
<td>Snow Water</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Minimum Veg. Soil Water (Vol/Vol) 0.1116

Minimum Veg. Soil Water (Vol/Vol) 0.0499
Appendix E

RESPONSES TO 40 CFR PART 241
Appendix E

40 CFR PART 241
GUIDELINES FOR THE LAND DISPOSAL
OF SOLID WASTES

Subpart B - Requirements and Recommended Procedures

Section 241.200 Solid Wastes Accepted

Section 241.200-1 Requirement

Response: See Section IX-G, Special Wastes

Section 241.200-2 Recommended procedures: Design

Response: See Section IX-G, Special Wastes

Section 241.200-3 Recommended procedures: Operations

(a) Response: See Section VIII-B, Landfilling Procedures

(b) Response: See Section VIII-B, Landfilling Procedures

(c) Response: See Section VIII-B, Landfilling Procedures

(d) Response: See Section VIII-B, Landfilling Procedures

(e) Response: Only non-hazardous incinerator and air-pollution control residues will be accepted for disposal.

Section 241.201 Solid Wastes Excluded

Section 241.201-1 Requirement

E-1
Response: See Section IX-H, Hazardous Waste Exclusion
Pesticides and non-rinsed pesticide containers
will not be accepted for disposal.

Section 241.201-2 Recommended procedures: Design

Response: The site will not accept any hazardous waste
for disposal.

Section 241.201-3 Recommended procedures: Operations

Response: See Section IX-H, Hazardous Waste Exclusion

Section 241.202 Site Selection

Section 241.202-2 Requirement

(a) Response: See Section V, Site Geologic and Hydrogeologic
Conditions

(b) Response: See Section VI, Engineering Properties of
Soil/Rock

(c) Response: See Section II, Site Description

(d) Response: See Section VII-G, Access Roads

(e) Response: See Section II, Site Description
Section 241.204-2 Recommended procedures: Design

(a) (1) Response: See Section V-B, Potential for Ground-Water Impact

(a) (2) Response: See Section V-B, Potential for Ground-Water Impact

(a) (3) Response: See Section V-B, Potential for Ground-Water Impact

(a) (4) Response: See Section V-B, Potential for Ground-Water Impact

(a) (5) Response: See Section V-B, Potential for Ground-Water Impact

(a) (6) Response: See Section V-A, Site Description and Section V-B, Potential for Ground-Water Impact

(a) (7) Response: See Section VII-D, Surface Drainage Facilities

(a) (8) Response: See Section VII-E, Leachate Control Facilities

(b) Response: The site is not located in a floodplain.

Section 241.204-3 Recommended procedures: Operations

(a) Response: See Section VII-D, Surface Drainage Facilities
Section 241.203 Design

Section 241.203-1 Requirement

Response: The plans have been approved by a Registered Professional Engineer and a Certified Engineering Geologist.

Section 241.203-2 Recommended procedures: Design

(a) Response: See VII-B, Site Capacity and Service Life

(b) (1) Response: See Drawing 1, Conceptual Grading Plan and Drawing 2, Conceptual Excavation Plan

(b) (2) Response: See Figure 1, Site Location Map

(b) (3) Response: See Figure 1, Site Location Map

(b) (4) Response: See Appendix F, Procedures and Operations Manual for the Sunrise Mountain Landfill

(c) Response: The proposed final use of the site will be undisturbed open space

Section 241.204 Water Quality

Section 241.204-1 Requirement

Response: See Section V-B, Potential for Ground-Water Impact
Response: See Section VII-D, Surface Drainage Facilities

(c) Response: See Section VII-E, Leachate Control Facilities

(d) Response: See Section VII-E, Leachate Control Facilities

Section 241.205 Air Quality

Section 241.205-1 Requirement

Response: See Section IX-C, Control of Nuisance Factors

Section 241.205-2 Recommended Procedures: Design

Response: See Section IX-C, Control of Nuisance Factors

Section 241.205-3 Recommended procedures: Operations

(a) Response: No open burning of solid waste will be allowed at the site.

(b) Response: See Section IX-C, Control of Nuisance Factors
Section 241.206 Gas Control

Section 241.206-1 Requirement

Response: See Section VII-F, Landfill Gas Monitoring Facilities

Section 241.206-2 Recommended procedures: Design

Response: See Section VII-F, Landfill Gas Monitoring Facilities

Section 241.206-3 Recommended procedures: Operations

(a) Response: See Section VII-F, Landfill Gas Monitoring Facilities

(b) Response: See Section VII-F, Landfill Gas Monitoring Facilities

Section 241.207 Vectors

Section 241.207-1 Requirement

Response: See Section IX-D, Health Factors

Section 241.207-2 Recommended procedure: Design

Response: See Section IX-D, Health Factors

Section 241.207-3 Recommended procedures: Operations

Response: See Section IV-D, Health Factors

E-6
Section 241.208 Aesthetics

Section 241.208-1 Requirement

Response: See Section IX, Technical and Environmental Management

Section 241.208-3 Recommended procedures: Operations

(a) Response: See Section IX-E, Site Inspection and Maintenance

(b) Response: See Section VIII-B, Landfilling Procedures

(c) Response: See Section IX, Technical and Environmental Management

(d) Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill

Section 241.209 Cover Material

Section 241.209-1 Requirement

Response: See Section VIII-B, Landfilling Procedures

Section 241.209-2 Recommended procedures: Design

(a) Response: See Section VI, Engineering Properties of Soil/Rock

(b) Response: See Section VII-H, Landfill Slopes and Final Cover
Section 241.209-3 Recommended procedures: Operations

(a) Response: See Section VIII-B, Landfilling Procedures

(b) Response: See Section VIII-B, Landfilling Procedures

(c) Response: See Section VIII-B, Landfilling Procedures

Section 241.210 Compaction

Section 241.210-1 Requirement

Response: See Section VIII-B, Landfilling Procedures

Section 241.210-2 Recommended procedures: Design

(a) Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill

(b) Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill

(c) Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill

Section 241.210-3 Recommended procedures: Operations

(a) (1) Response: See Section VIII-B, Landfilling Procedures
Section 241.211 Safety

Section 241.211-1 Requirement

Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill

Section 241.211-2 Recommended procedures: Design

Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill

Section 241.211-3 Recommended procedures: Operations

(a) Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill

(b) Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill

(c) Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill
(d) Response: See Section IX-C, Control of Nuisance Factors

(e) Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill

(f) Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill

(g) Response: See Appendix F, Procedures and Operations Manual for Sunrise Mountain Landfill

(h) Response: See Section VIII, Operating Provisions

Section 241-212 Records

Response: The necessary records will be maintained by DUMPCO, Inc. Upon site closure, a detailed description of the site will be recorded.
PART 241—GUIDELINES FOR THE LAND DISPOSAL OF SOLID WASTES

Subpart A—General Provisions

Sec.
241.100 Scope.
241.101 Definitions.

Subpart B—Requirements and Recommended Procedures

241.200 Solid wastes accepted.
241.200-1 Requirement.
Sec. 241.200-2 Recommended procedures: Design.
Sec. 241.200-3 Recommended procedures: Operations.
Sec. 241.201 Solid wastes excluded.
Sec. 241.201-1 Requirement.
Sec. 241.201-2 Recommended procedures: Design.
Sec. 241.201-3 Recommended procedures: Operations.
Sec. 241.202 Site selection.
Sec. 241.202-1 Requirement.
Sec. 241.202-2 Recommended procedures: Design.
Sec. 241.202-3 Recommended procedures: Operations.
Sec. 241.203 Design.
Sec. 241.203-1 Requirement.
Sec. 241.203-2 Recommended procedures: Design.
Sec. 241.203-3 Recommended procedures: Operations.
Sec. 241.204 Water quality.
Sec. 241.204-1 Requirement.
Sec. 241.204-2 Recommended procedures: Design.
Sec. 241.204-3 Recommended procedures: Operations.
Sec. 241.205 Air quality.
Sec. 241.205-1 Requirement.
Sec. 241.205-2 Recommended procedures: Design.
Sec. 241.205-3 Recommended procedures: Operations.
Sec. 241.206 Gas control.
Sec. 241.206-1 Requirement.
Sec. 241.206-2 Recommended procedures: Design.
Sec. 241.206-3 Recommended procedures: Operations.
Sec. 241.207 Vectors.
Sec. 241.207-1 Requirement.
Sec. 241.207-2 Recommended procedures: Design.
Sec. 241.207-3 Recommended procedures: Operations.
Sec. 241.208 Aesthetics.
Sec. 241.208-1 Requirement.
Sec. 241.208-2 Recommended procedures: Design.
Sec. 241.208-3 Recommended procedures: Operations.
Sec. 241.209 Cover material.
Sec. 241.209-1 Requirement.
Sec. 241.209-2 Recommended procedures: Design.
Sec. 241.209-3 Recommended procedures: Operations.
Sec. 241.210 Compaction.
Sec. 241.210-1 Requirement.
Sec. 241.210-2 Recommended procedures: Design.
Sec. 241.210-3 Recommended procedures: Operations.
Sec. 241.211 Safety.

APPENDIX—RECOMMENDED BIBLIOGRAPHY


SUBPART A—GENERAL PROVISIONS

§ 241.100 Scope.

(a) The guidelines are generally applicable to the land disposal of all solid waste materials. However, the guidelines do not apply to hazardous, agricultural, and mining wastes because of the lack of sufficient information upon which to base recommended procedures. Concerning the specific practice of land disposal of milled solid wastes, EPA guidance is contained in a position statement issued in November 1972.

(b) The requirement sections contained herein delineate minimum levels of performance required of any solid waste land disposal site operation. The recommended procedures sections are presented to suggest preferred methods by which the objectives of the requirements can be realized. The recommended procedures are based on the practice of sanitary landfilling municipal solid waste. Normally, residential, and commercial solid waste generated within a community. Sanitary landfilling is the most widely applied environmentally acceptable land disposal method. If techniques other than the recommended procedures are used, or wastes other than municipal solid wastes are dis-

1 Further guidance may be found in the EPA publication, “Sanitary Landfill Design and Operation,” which served as a basis for the development of these guidelines.
posed, it is the obligation of the proposed facility's owner and operator to demonstrate to the responsible agency in advance by means of engineering calculations and data that the techniques employed will satisfy the requirements.

(c) Pursuant to section 211 of the Solid Waste Disposal Act, as amended, these guidelines are mandatory for Federal agencies. In addition, they are recommended to State, interstate, regional, and local government agencies for use in their activities.

(d) These guidelines are intended to provide for environmentally acceptable land disposal site operations. The guidelines do not establish new standards but set forth requirements and recommended procedures to ensure that the design, construction, and operation of both existing and future land disposal sites meet the health and environmental standards for the area in which they are located. The guidelines are intended to apply equally to all solid waste generated by Federal agencies, regardless of whether processed or disposed of on or off Federal property; and solid waste generated by non-Federal entities, but processed or disposed of on Federal property. However, in the case of many Federal facilities such as Post Offices, military recruiting stations, and other offices, local community solid waste processing and disposal facilities are utilized, and processing and disposal is not within the management control of the Federal agency. Thus, implementation of the guidelines can be expected only in those situations where the Federal agency is able to exercise direct management control over the processing and disposal operations. However, every effort must be made by the responsible agency, where off-site facilities are utilized, to attain processing and disposal facilities that are in compliance with the guidelines. Where non-Federal generated solid waste is processed and disposed of on Federal land and/or facilities, those facilities and/or sites must be in compliance with these guidelines. Determination of compliance to meet the requirements of the guidelines rests with the responsible agency, and they have the authority to determine how such compliance may occur.


§ 241.101 Definitions.

As used in these guidelines:

(a) "Cell" means compacted solid wastes that are enclosed by natural soil or cover material in a land disposal site.

(b) "Cover material" means soil or other suitable material that is used to cover compacted solid wastes in a land disposal site.

(c) "Daily cover" means cover material that serves the same functions as daily cover but, in addition, may be permanently exposed on the surface.

(d) "Final cover" means cover material that serves the same functions as daily cover but, in addition, may be permanently exposed on the surface.

(e) "Free moisture" means liquid that will drain freely by gravity from solid materials.

(f) "Groundwater" means water present in the saturated zone of an aquifer.

(g) "Hazardous wastes" means any waste or combination of wastes which pose a substantial present or potential hazard to human health or living organisms because such wastes are non-degradable or persistent in nature or because they can be biologically magnified, or because they can be lethal, or because they may otherwise cause or tend to cause detrimental cumulative effects.

(h) "Infectious waste" means: (1) Equipment, instruments, utensils, and fomites of a disposable nature from the rooms of patients who are suspected to have or have been diagnosed as having a communicable disease and must, therefore, be isolated as required by public health agencies; (2) laboratory wastes, such as pathological specimens (e.g. all tissues, specimens of blood elements, excreta, and secretions obtained from patients or laboratory animals) and disposable fomites (any substance that may harbor or transmit pathogenic organisms) at-
tendant thereto; (3) surgical operating room pathologic specimens and disposable fomites attendant thereto and similar disposable materials from outpatient areas and emergency rooms.

(i) "Intermediate cover" means cover material that serves the same functions as daily cover, but must resist erosion for a longer period of time, because it is applied on areas where additional cells are not to be constructed for extended periods of time.

(j) "Leachate" means liquid that has percolated through solid waste and has extracted dissolved or suspended materials from it.

(k) "Municipal solid wastes" means normally, residential, and commercial solid waste generated within a community.

(l) "Open burning" means burning of solid wastes in the open, such as in an open dump.

(m) "Open dump" means a land disposal site at which solid wastes are disposed of in a manner that does not protect the environment, is susceptible to open burning, and is exposed to the elements, vectors, and scavengers.

(n) "Plans" means reports and drawings, including a narrative operating description, prepared to describe the land disposal site and its proposed operation.

(o) "Residue" means all the solids that remain after completion of thermal processing, including bottom ash, fly ash, and grate sittings.

(p) "Responsible agency" means the organizational element that has the legal duty to ensure that owners, operators, or users of land disposal sites comply with these guidelines.

(q) "Runoff" means the portion of precipitation that drains from an area as surface flow.

(r) "Salvaging" means the controlled removal of waste materials for utilization.

(s) "Sanitary landfill" means a land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying and compacting cover material at the end of each operating day.

(t) "Scavenging" means uncontrolled removal of solid waste materials.

(u) "Sludge" means the accumulated semiliquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluents, dissolved materials in irrigation return flows or other common water pollutants.

(v) "Solid wastes" means garbage, refuse, sludges, and other discarded solid materials resulting from industrial and commercial operations and from community activities. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluents, dissolved materials in irrigation return flows or other common water pollutants.

(w) "Vector" means a carrier, usually an arthropod, that is capable of transmitting a pathogen from one organism to another.

(x) "Water table" means the upper water level of a body of groundwater.

(y) "Working face" means that portion of the land disposal site where solid wastes are discharged and are spread and compacted prior to the placement of cover material.

Subpart B—Requirements and Recommended Procedures

§ 241.200 Solid wastes accepted.

§ 241.200-1 Requirement.

In consultation with the responsible agencies the owner/operator shall determine what wastes shall be accepted and shall identify any special handling required. In general, only wastes for which the facility has been specifically designed shall be accepted; however, other wastes may be accepted if it has been demonstrated to the responsible agency that they can be satisfactorily disposed with the design capability of the facility or after appropriate facility modifications.
§ 241.200-2 Recommended procedures: Design.

The plans should specify the procedures to be employed for wastes requiring special handling.

§ 241.200-3 Recommended procedures: Operations.

(a) Routine sanitary landfill techniques of spreading and compacting solid wastes and placing cover material at the end of each operating day should be used to dispose of municipal solid wastes.

(b) Certain bulky wastes, such as automobile bodies, furniture, and appliances may be salvaged in a controlled manner at a point other than the working face. Otherwise, they should be crushed on solid ground and then pushed onto the working face near the bottom of the cell. Other bulky items, such as demolition and construction debris, tree stumps, and large timbers, should be pushed onto the working face near the bottom of the cell.

(c) Procedures for disposing of dead animals have been established by law in most States, and the operation should comply accordingly. In most cases, small carcasses should be placed on the working face with other municipal solid wastes and covered immediately. In the absence of applicable State laws, large carcasses should be placed in a pit and provided with a cover of compacted soil or other suitable material to encourage runoff of precipitation.

(d) Water treatment plant sludges containing no free moisture and digested or heat treated waste water treatment plant sludges containing no free moisture should be placed on the working face along with municipal solid wastes and covered with soil or municipal solid wastes. The quantities accepted should be determined by operational problems encountered at the working face.

(e) Incinerator and air pollution control residues containing no free moisture should be incorporated into the working face and covered at such intervals as necessary to prevent them from becoming airborne.

§ 241.201 Solid wastes excluded.

§ 241.201-1 Requirement.

Using information supplied by the waste generator/owner, the responsible agency and the disposal site owner/operator shall jointly determine specific wastes to be excluded and shall identify them in the plans. The generator/owner of excluded wastes shall consult with the responsible agency in determining an alternative method of disposal for excluded wastes. The criteria used in considering whether a waste is unacceptable shall include the hydrogeology of the site, the chemical and biological characteristics of the waste, alternative methods available, environmental and health effects, and the safety of personnel. Disposal of pesticides and pesticide containers shall be consistent with the Federal Environmental Pesticides Control Act of 1972 (Pub. L. 92-516) and recommended procedures and regulations promulgated thereunder.

§ 241.201-2 Recommended procedures: Design.

Under certain circumstances it may be necessary to accept special wastes at land disposal sites. The following special wastes require specific approval of the responsible agency for acceptance at the site: Hazardous wastes, infectious institutional wastes, bulk liquids and semi-liquids, sludges containing free moisture, highly flammable or volatile substances, raw animal manure, septic tank pumpings, raw sewage sludge, and certain industrial process wastes. Where the use of the disposal site for such wastes is planned, a special assessment is required of the following items: The site characteristics, nature and quantities of the waste, and special design and operations precautions to be implemented to insure environmentally safe disposal.

§ 241.201-3 Recommended procedures: Operations.

Regular users of the land disposal site should be provided with a list of the materials to be excluded. The list should also be displayed prominently at the site entrance. If a regular user
persists in making unacceptable deliveries, he should be barred from the site and reported to the responsible agency.

§ 241.202 Site selection.

§ 241.202-1 Requirement.

Site selection and utilization shall be consistent with public health and welfare, and air and water quality standards and adaptable to appropriate land-use plan.

§ 241.202-2 Recommended procedures: Design.

(a) The hydrogeology of the site should be evaluated in order to design site development in a manner to protect or minimize the impact on groundwater resources. Unacceptable hydrogeologic conditions may be altered to render the site acceptable, but all alterations should be detailed in the plans. Precipitation, evapotranspiration, and other climatological conditions should be considered in site selection and design.

(b) Characteristics of on-site soil should be evaluated with respect to their effects on site operations, such as vehicle maneuverability and use as cover material.

(c) Environmental factors, climatological conditions, and socioeconomic factors should be given full consideration as selection criteria.

(d) The site should be accessible to vehicles which the site is designed to serve by all-weather roads leading from the public road system; temporary roads should be provided as needed to deliver wastes to the working face.

(e) The site should not be located in an area where the attraction of birds would pose a hazard to low-flying aircraft.


Not applicable.

§ 241.203 Design.

§ 241.203-1 Requirement.

Plans for the design, construction, and operation of new sites or modifications to existing sites shall be prepared or approved by a professional engineer. The plans shall be submitted to the responsible agency for review and, if warranted, approval.

§ 241.203-2 Recommended procedures: Design.

(a) The types and quantities of all solid wastes expected to be disposed of at the facility should be determined by survey and analysis to form a basis for design.

(b) Site development plans should be prepared or approved by a professional engineer and should include: The various design factors addressed elsewhere in the guidelines, as well as:

(1) Initial and final topographies at contour intervals of 5 feet or less.

(2) Land use and zoning within one-quarter mile of the site including location of all residents, buildings, wells, water courses, arroyos, rock outcappings, roads, and soil or rock borings. All airports within the vicinity of the site should be identified to aid in assessing the potential hazard of birds to aircraft.

(3) Location of all utilities within 500 feet of the site.

(4) Employee convenience and equipment maintenance facilities.

(5) Narrative descriptions, with associated drawings, indicating site development and operation procedures.

(c) Plans should describe the projected use of the completed land disposal site. In addition to maintenance programs and provisions, where necessary, for monitoring and controlling decomposition gases and leachate, the plans should address the following ultimate use criteria:

(1) Cultivated area. The major concern if the completed site is to be cultivated is that the integrity of the final cover not be disturbed by agricultural cultivation activities. In this regard, a sufficient depth of cover material to allow cultivation and to support vegetation should be applied in addition to that recommended for final cover.

(2) Structures. It is not recommended practice to construct major structures on a completed land disposal site. If major structures are to be built near a completed land disposal site, a professional engineer should approve
their design and construction including provision for protection against potential hazards of solid waste decomposition gases.

§ 241.203-3 Recommended procedures: Operations.

Not applicable.

§ 241.204 Water quality.

§ 241.204-1 Requirement.

The location, design, construction, and operation of the land disposal site shall conform to the most stringent of applicable water quality standards established in accordance with or effective under the provisions of the Federal Water Pollution Control Act, as amended. In the absence of such standards, the land disposal site shall be located, designed, constructed and operated in such a manner as to provide adequate protection to ground and surface waters used as drinking water supplies.

§ 241.204-2 Recommended procedures: Design.

(a) Plans should include:

(1) Current and projected use of water resources in the potential zone of influence of the land disposal site.

(2) Groundwater elevation and movement and proposed separation between the lowest point of the lowest cell and the predicted maximum water table elevation.

(3) Potential interrelationship of the land disposal site, local aquifers, and surface waters based on historical records or other sources of information.

(4) Background and initial quality of water resources in the potential zone of influence of the land disposal site.

(5) Proposed location of observation wells, sampling stations, and testing program planned, when appropriate.

(6) Description of soil and other geologic material to a depth adequate to allow evaluation of the water quality protection provided by the soil and other geologic material.

(7) Provision for surface water runoff control to minimize infiltration and erosion of cover material.

(8) Potential of leachate generation and proposed control systems, where necessary, for the protection of ground and surface water resources.

(b) If a land disposal site is located in a flood plain, it should be protected against at least the 50-year design flood by impervious dikes and other appropriate means to prevent the floodwaters from contacting municipal solid waste.

§ 241.204-3 Recommended procedures: Operations.

(a) Surface water courses and runoff should be diverted from the land disposal site (especially from the working face) by means such as trenches, conduits, and proper grading. The land disposal site should be constructed and graded so as to promote rapid surface water runoff without excessive erosion. Regrading should be done as required during construction and after completion to avoid ponding of precipitation and to maintain cover material integrity.

(b) Siltation or retention basins or other approved methods of retarding runoff should be used where necessary to avoid stream siltation or flooding problems due to excessive runoff.

(c) Leachate collection and treatment systems should be used where necessary to protect ground and surface water resources.

(d) Municipal solid wastes and leachate therefrom should not be allowed to contact ground or surface water so as to impair the water's use.

§ 241.205 Air quality.

§ 241.205-1 Requirement.

The design, construction, and operation of the land disposal site shall conform to applicable ambient air quality standards and source control regulations established under the authority of the Clean Air Act, as amended, or State or local standards effective under that Act, if the latter are more stringent.

§ 241.205-2 Recommended procedures: Design.

Plans should include an effective dust control program.
§ 241.209 Cover material.

§ 241.209-1 Requirement.

Cover material shall be applied as necessary to minimize fire hazards, infiltration of precipitation, odors, and blowing litter; control gas venting and vectors; discourage scavenging; and provide a pleasing appearance.

§ 241.209-2 Recommended procedures: Design.

Plans should specify:
(a) Cover material sources and soil classifications (Unified Soil Classification System or U.S. Department of Agriculture Classification System).
(b) Surface grades and side slopes needed to promote maximum runoff, without excessive erosion, to minimize infiltration.
(c) Procedures to promote vegetative growth as promptly as possible to combat erosion and improve appearance of idle and completed areas.
(d) Procedures to maintain cover material integrity, e.g., regarding and recovering.

§ 241.209-3 Recommended procedures: Operations.

(a) Daily cover should be applied regardless of weather; sources of cover material should, therefore, be accessible on all operating days. The thickness of the compacted daily cover should not be less than 6 inches.
(b) Intermediate cover should be applied on areas where additional cells are not to be constructed for extended periods of time; normally, 1 week to 1 year. The thickness of the compacted intermediate cover should not be less than 1 foot.
(c) Final cover should be applied on each area as it is completed or if the area is to remain idle for over 1 year. The thickness of the compacted final cover should not be less than 2 feet.

§ 241.210 Compaction.

§ 241.210-1 Requirement.

In order to conserve land disposal site capacity, thereby preserving land resources, and to minimize moisture infiltration and settlement, municipal solid waste and cover material shall be compacted to the smallest practicable volume.

§ 241.210-2 Recommended procedures: Design.

(a) Arrangements should be made and indicated in the plans whereby substitute equipment will be available to provide uninterrupted service during routine equipment maintenance periods or equipment breakdowns.
(b) An equipment maintenance facility should be provided onsite, or appropriate contract arrangements should be made to receive such service.
(c) Equipment manuals, catalogs, and spare parts lists should be compiled and readily available onsite.

§ 241.210-3 Recommended procedures: Operations.

(a) Municipal solid waste handling equipment should on any operating day be capable of performing the following functions:
(1) Spread the solid waste accepted in layers no more than 2 feet thick while confining it to the smallest practicable area;
(2) Compact the spread solid wastes to the smallest practicable volume (several such compacted layers will form a cell); and
(3) Place, spread, and compact the cover material over the cell at least by the end of each day's operation.
(b) A preventive maintenance program should be employed to maintain equipment in operating order.
(c) An operating manual describing the various tasks that must be performed during a typical shift should be available to employees for reference.

§ 241.211 Safety.

§ 241.211-1 Requirement.

The land disposal site shall be designed, constructed, and operated in such a manner as to protect the health and safety of personnel associated with the operation. Pertinent provisions of the Occupational Safety and Health Act of 1970 (Pub. L. 91-596) and regulation promulgated thereunder shall apply.
§ 241.211-2 Recommended procedures: Design.

A manual describing safety precautions and procedures to be employed should be developed.

§ 241.211-3 Recommended procedures: Operations.

(a) A safety manual should be available for use by employees, and they should be instructed in application of its procedures.

(b) Personal safety devices such as hardhats, gloves, safety glasses, and footwear should be provided to facility employees.

(c) Safety devices, including but not limited to such items as rollover protective structures, seatbelts, audible reverse warning devices, and fire extinguishers should be provided on all equipment used to spread and compact solid wastes or cover material at the facility.

(d) Provisions should be made to extinguish any fires in wastes being delivered to the site or which occur at the working face or within equipment or personnel facilities.

(e) Communications equipment should be available onsite for emergency situations.

(f) Scavenging should be prohibited at all times to avoid injury and to prevent interference with site operations.

(g) Access to the site should be controlled and should be by established roadways only. The site should be accessible only when operating personnel are on duty. Large containers may be placed at the site entrance so that users can conveniently deposit waste after hours. The containers and the areas around them should be maintained in a sanitary and litter-free condition.

(h) Traffic signs or markers should be provided to promote an orderly traffic pattern to and from the discharge area, maintain efficient operating conditions, and, if necessary, restrict access to hazardous areas. Drivers of manually discharging vehicles should not hinder operation of mechanically discharging vehicles. Vehicles should not be left unattended at the working face or along traffic routes. If a regular user persistently poses a safety hazard, he should be barred from the site and reported to the responsible agency.

§ 241.212 Records.

§ 241.212-1 Requirement.

The owner/operator of the land disposal site shall maintain records and monitoring data to be provided, as required, to the responsible agency.

§ 241.212-2 Recommended procedures: Design.

Where appropriate, plans should prescribe methods to be used in maintaining records and monitoring the environmental impact of the land disposal site. Information on recording and monitoring requirements should be obtained from the responsible agency.

§ 241.212-3 Recommended procedures: Operations.

(a) Records should be maintained covering at least the following:

(1) Major operational problems, complaints, or difficulties.

(2) Qualitative and quantitative evaluation of the environmental impact of the land disposal site, with regard to the effectiveness of gas and leachate control, including results of: (i) Leachate sampling and analyses; (ii) gas sampling and analyses; (iii) ground and surface water quality sampling and analyses upstream and downstream of the site.

(3) Vector control efforts.

(4) Dust and litter control efforts.

(5) Quantitative measurements of the solid wastes handled. This should be accomplished through routine or periodic utilization of scales and topographic surveys of the site.

(6) Description of solid waste materials received, identified by source of materials.

(b) Upon completion of the site, a detailed description, including a plat, should be recorded with the area's land recording authority. The description should include general types and locations of wastes, depth of fill, and other information of interest to potential landowners.
APPENDIX—RECOMMENDED
BIBLIOGRAPHY


Appendix F

PROCEDURES AND OPERATIONS MANUAL
SUNRISE MOUNTAIN LANDFILL
This manual describes the procedures that will be used in the operation of the landfill, safety requirements for the landfill, and maintenance of the landfill site.

The procedures and requirements outlined in the manual will ensure that the landfill is operated in compliance with all applicable federal, state and local environmental and safety regulations.

LANDFILL OPERATION

Control of Incoming Wastes

All vehicles delivering refuse to the site will be stopped at the gatehouse. Vehicles will then be routed to the landfill area and directed to the appropriate discharge location by site personnel. Any vehicle suspected of carrying materials not permitted to be disposed of at the facility will be prevented from entering the landfill.

If a load that has been discharged appears to contain unacceptable material, the hauler will be ordered to reload and remove it from the landfill site.

If hazardous or other unacceptable wastes are detected, and the hauler cannot be identified, site personnel will immediately cordon off the designated area from the general public. The landfill superintendent should be notified immediately of the incident. Site management will notify a State-approved contractor who will be responsible for the cleanup, transport, and disposal of the wastes. The wastes will be disposed of at an approved facility. The incident and response will be
recorded in the site records. The Clark County Department of Health will be notified of all incidents and the action taken.

If the producer of the waste is known, the producer will be contacted and notified of the incident and DUMPCO, Inc.'s action. The producer will be billed for all costs incurred in the proper cleanup, transport, and disposal of the waste.

**Landfilling Procedures**

The landfill will be generally constructed by the areal method. Refuse fill will typically be placed in lifts up to 20 feet in thickness, with perimeter slopes of 3:1 or flatter. Refuse will be spread and compacted in 2-foot-thick horizontal layers or on a working face approximately 200 feet wide and sloped at 3:1 or 4:1. The compaction equipment will traverse the entire length of the working face and make several passes over each 2-foot-thick layer of refuse so that adequate compaction of the wastes is achieved. Large or bulky wastes will be separated to prevent bridging of the surrounding refuse, placed in the lower portion of the advancing lift, and thoroughly crushed by compacting equipment. At the end of each working day, the advancing face will be covered with at least 6 inches of daily soil cover. When additional waste materials will not be placed over the surface within 180 days, the cover thickness will be increased to a minimum of 12 inches.

Temporary berms will be placed on lifts, where needed, to divert surface water run-off around the active working face. Working faces that are advanced upslope will be aligned as necessary to avoid trapping the run-off.

As each lift is advanced adjacent to final perimeter slopes, the intermediate cover will be removed from the previous lift along a 50-foot-wide strip adjacent to the final perimeter slope. Removal of the cover will promote downward movement of any water that infiltrates the cover.
soil and will reduce the possibility of localized seepage through the final soil cover on the perimeter slope.

Personnel

The duties and responsibilities of various site personnel are outlined below:

- **Superintendent:** Responsible for all facets of the landfill operation.

- **Assistant Superintendent:** Responsible for laying out of disposal areas and grade elevation control. Directs disposal operator and special waste handling.

- **Heavy Duty Equipment Operators:** Five (5)  
  These personnel are capable of operating dozers, scrapers, motor graders, trucks and tipper.

- **Heavy Duty Equipment Mechanics:** Two (2)  
  These personnel are master mechanics, experienced in the repair and maintenance of heavy duty machinery.

- **Welder:** One (1)

- **Serviceman:** One (1)  
  The serviceman conducts all of the oil and lube changes on the equipment and maintains service records on the same.

- **General Facilities:** One (1)  
  This person performs the general housekeeping tasks of keeping the building area and yard area in an orderly fashion. Also doubles as a water truck driver.
- Water Truck Driver: One (1)

- Landfill Cashier: One (1)
  The cashier is in charge of all accounts using the sanitary landfill and records the type and nature of the materials being deposited.

Equipment

The following list of equipment is in use at the sanitary landfill at the present time:

1986    Caterpillar 637 Scrapers (2)
1986    Caterpillar 826 Compactor
1974    Caterpillar D8K Bulldozer
1981    Komatsu D-355-A3 Bulldozer
1982    Komatsu D-355-A3 Bulldozer
1978    Caterpillar 623B Elevating Scraper
1984    M R S 105F Elevating Scraper
1974    Caterpillar 14F Motor Grader
1978    Ford F9000 Water Truck
1973    White 5,000-Gallon Water Truck
1972    Peerless Trailer Tipper
1973    White Service Truck
1968    Dodge 10,000-pound Winch Truck
1970    Lincoln 500 AMP Welder
1981    Coleman Light Plant
1975    Ford Light Plant Road Magnet
1970    Worthington Air Compressor

Equipment (Cont.)

1968    GMC 3/4-Ton Pickup Truck
1982    GMC 1/2-Ton Pickup Truck
1976    Lift all Forklift
Training

Each new employee is given sixteen (16) hours of on the job training in safety, landfill procedures, types of wastes handled, maintenance and operation procedures, and instruction in the use of the guidance manuals readily available in the operations office.

Safety

Employees will be instructed in safety procedures and provided with the proper safety equipment.

Plant Facilities (Existing)

A. Employee Facilities:

1. Lunch Room
2. Restrooms
3. Change Room
4. Showers
5. Office


B. Equipment Maintenance:

1. Garage for repairs
2. Paved parking area for large equipment
Special Wastes

Asbestos:

All asbestos waste must be double bagged in 20-mil plastic sacks. The wastes will be placed in a designated disposal area. Shipments are normally received on a weekly basis. Upon disposition of the materials, 1 foot of soil is placed over the material. When the cell is completed, a final cover 4 feet deep is placed over the cell.

Septic Tank Pumpings:

Septic tank fluids are placed in an oxidation pond where the combination of oxidation, solar radiation, and evaporation reduce the fluids. When reduced to a dry state, the sludge is added to the landfill operation. An area has been set aside (see plans) for the purpose of handling septic tank fluids. The bottom area of this pond is composed of tightly cemented gravels that reduce the possibility of seepage.

Dead Animals:

Dead animals are received on a daily basis, and are placed in a designated disposal area. The area is well posted with signs to eliminate any confusion with other disposal areas. After each daily deposit of dead animals, the deposit is covered with 1 foot of earth material. When the cell has been completed, the final earth cover is 4 feet deep.

No other wastes will be accepted for disposal without approval from the Clark County Health Department.

Dust Control

Water trucks are used to control dust created by wind or vehicular traffic. At least one water truck is kept in continuous operation. The second water truck is placed in operation when wind conditions require
additional dust control.

Debris Control

A portable debris fence is maintained to control wind-borne debris. The surface of finished cells are cleaned on a monthly basis, or oftener, should wind conditions require this.

Vectors

Insects, such as mosquitoes, which carry pathogenic organisms, are non-existent. Flies are practically non-existent inasmuch as dead animals are covered immediately after deposition. Rodents have yet to be observed at the landfill.

Sea gulls, crows, and smaller birds such as sparrows, are present daily on the face of the cell being filled. These species of birds are not normally associated as being carriers of the rickettsia organism that causes psittacosis in human beings.

Recordkeeping

Daily records are kept of all operations at the landfill site. These records include, but are not limited to, the following:

1. Total tonnage deposited by the operating company
2. Tabulation of all commercial/public depositions
3. Equipment in operation
4. Equipment on standby
5. Equipment down for repair
6. Special wastes, if any, accepted for deposit
7. Other information incidental to daily operation