**U.S. Department of Energy**
Grand Junction Office
2597 B 3/4 Road
Grand Junction, CO 81503

NOV 13 1997

Mr. Joseph H. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
Mail Stop T7J9
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: 1997 Inspection of the Tuba City, Arizona, Title I Site

Dear Mr. Holonich:

Four copies of the 1997 Annual Inspection Report for the Tuba City, Arizona, Title I Site are enclosed. This report is submitted to comply with reporting requirements of 10 CFR 40.27.

The report states that the site was inspected on September 10 and 11, 1997, and was in excellent condition. Minor maintenance tasks are identified in the report. No condition warrants follow-up inspections. Sand accumulation and revegetation warrant continued monitoring during future inspections.

Please note that beginning with the first site inspections in FY 1998, inspection reports will no longer be issued separately, but will be combined into one annual, calendar year (CY) report that will include results of inspection for all licensed Title I Sites. This change was recently discussed with NRC and both agencies agree that it is consistent with 10 CFR 40.27. The first such calendar year report will be submitted in February 1998, and will contain results of inspections completed in the final quarter of CY 1997, inspections of the Canonsburg and Burrell Sites, Pennsylvania. It is anticipated that the CY 1998 report will be issued early in CY 1999 and will included results of inspection for all sites licensed and inspected in CY 1998.

If NRC has comments or questions about this report, please contact me at 970-248-6037.

Sincerely,

Russel W. Edge
Site Manager

NM-04
WM-73

Enclosure

cc w/o enclosure:
C. Jones, MACTEC-ERS

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# 1997 Annual Inspection of the Tuba City, Arizona, UMTRCA Title I Disposal Site

## Summary

The Tuba City site remains in excellent condition. New features at the site —revegetation test plots, hydroprobe ports, and temporary ground-water test wells—were included in the inspection. The experimental Lexan perimeter signs are peeling and should be replaced. Monitor wells no longer in use should be abandoned and wells installed in 1996 should be clearly labeled. A dry year in 1996 increased sand deposition on the disposal cell. This was followed by an abnormally cool and wet year in 1997 that fostered Russian thistle growth and survival. Sand accumulation and success of revegetation should continue to be monitored. Wells not included in current monitoring networks should be properly abandoned.

## 1. ntroduction

This report presents the results of the U.S. Department of Energy's (DOE's) annual inspection of the Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site at Tuba City, Arizona.

J. Waugh, Chief Inspector, and M. Plessinger, Assistant Inspector, both of MACTEC-ERS, Technical Assistance Contractor at the DOE Grand Junction Office (GJO), conducted the inspection on September 10 and 11, 1997. R. Russell, Navajo Uranium Mill Tailings Remedial Action (UMTRA) Compliance Officer, was present at the inspection. The inspection was conducted in accordance with procedures established by the GJO to comply with requirements of 10 CFR 40.27.

The purposes of the Tuba City annual inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

## 2.0 Results of Inspection

Except as noted, significant features mentioned in this report are shown on Attachments 1 and 2. Photographs attached to this report are referred to in the text by photograph location (PL) number.

### 2.1 New Site Features

Although the disposal cell itself has not been disturbed, newly constructed features associated with on-going ground-water remediation issues and long-term surface stabilization render the rest of the site considerably changed from its appearance, when completed, in 1989. Several new features have been constructed on the site since the last inspection in September 1996. These features were inspected for the first time this year:

- Revegetation test plots west of monitor well, MW-936, between the gravel roadway on the north and the security fence to the south (PL-1). These plots are not shown on the attached drawings because of the scale of the drawings.
- Neutron hydroprobe ports arranged in three clusters along the south side of the disposal cell. Each cluster consists of six ports arranged in two parallel lines, three ports to a line, as shown on the drawing (Attachment 2). One cluster lies just east of MW-940, another just east of MW-941, and a third east of MW-940. Each port consists of a polyvinyl chloride (PVC) pipe 5 centimeters (cm) in diameter and 1 meter (m) tall. The PVC pipe has a removable PVC cap (PL-2).
- Several new temporary test wells installed around the site by the UMTRA Ground Water (UGW) Project. The test wells are associated with ground-water remediation research (PL-3). Many of these new test wells have already been abandoned, and the locations of the wells are marked with lath. All of the new test wells are expected to be abandoned before the 1998 inspection. Therefore, locations of the temporary test wells were not added to the attached drawings.

## 2.2 Specific Site Surveillance Features

Several site features associated with access, security, boundary markings, and ground-water monitoring were inspected. A broken hinge observed during the 1996 inspection on the east panel of the automobile access gate at Highway 160 has been repaired. The missing lock on the pedestrian gate just east of the automobile gate was replaced by inspectors during this inspection. The DOE sign on the highway gate, marred by bullet holes, remains legible. The washboard surface of the gravel access road was less severe than described in the 1996 inspection report.

The entrance signs east and west of the entrance gate are in good condition. A test of the relative resistance of aluminum and Lexan perimeter signs to bullet damage and weathering is ongoing at the site. Of the 30 pairs of "no trespassing" and pictorial perimeter signs, 8 aluminum signs have bullet holes (P4, P5, P10, P11, P12, P14, P26, and P27). Perimeter sign P13 is dented and appears to have been hit by rocks thrown from inside the security fence. All aluminum signs are legible. The Lexan signs have no bullet holes. However, about half of the yellow paint has peeled from Lexan sign P9, and it is no longer legible (PL-4). About 2 cm of yellow paint has peeled around the edges of Lexan sign P24. It remains legible but is rapidly weathering (PL-5). Perimeter signs P5 and P24 should both be replaced.

Past maintenance of the security fence involved clearing tumbleweeds and sand; filling gaps under the fence to keep dogs, coyotes, and children out; and repairing posts and chain link fabric damaged during recent construction activities. Additional fence maintenance is not required at this time. Progressive plant succession in regraded areas has restricted tumbleweed growth and limited sand movement. Minor fence damage east of the southwest corner does not warrant repair.

There are a large number of monitor wells at this site, far more than at any other Title I site. Some wells were installed during surface remedial action. Presumably, these, at a minimum, should be inspected annually. Many others were installed later by UGW. Many wells are already marked to be abandoned. Information provided in the Long-Term Surveillance Plan (LTSP) on monitor wells is confusing and out-of-date. The LTSP is not clear on how many wells are to be included in the Long-Term Surveillance and Maintenance (LTSM) Program monitoring network or which wells these are to be. A new inventory of

wells and their status is needed. Once this inventory is completed, the ground-water monitoring section of the LTSP should be reviewed, then rewritten to restore accuracy and clarity.

In light of the uncertainty over the number and identity of wells to be inspected, the 13 wells identified in the LTSP and all of the wells installed in 1996 were inspected (Table 1). For locations of these wells, see Attachments 1 and 2.

Table 1. Tuba City Ground-Water Wells

| Well Type | | Well Number |
|---|---|---|
| Pre-1996 wells | Not inspected; to be abandoned | 902, 905, 911, 915, 916, 918, 919, 968 |
| | Inspected | 901, 903, 904, 906, 908, 909, 910, 912, 913, 914, 917, 920, 921 |
| Wells installed in 1996 | Monitor wells | 928, 929, 930, 932, 933, 934, 935, 937, 938, 940, 941, 942, 943, 944, 945, 946, 947 |
| | Extraction wells | 925, 926, 936, 939 |
| | Water supply well | 948 |

Cracked or disintegrated collars around the surface casing were observed at 9 of the 13 pre-1996 wells: 903, 904, 908, 912, 913, 914, 917, 920, and 921. These damaged collars should be repaired or replaced to assure the integrity of the well. The remaining eight pre-1996 wells are not part of the LTSM or UGW monitoring networks and should be abandoned. Numbers on wells installed in 1996 are illegible. Because there are so many wells at this site, it is recommended that these wells be permanently labeled to ensure positive identification of each well.

## 2.3 Transects

The condition of the disposal cell, site perimeter, and outlying areas was inspected. Sand erosion and deposition are a concern at this site. Unstable coppice dunes (30 to 60 cm high) in the area surrounding the site are evidence of the likelihood for continuing sand accumulation along the fence line, in diversion channels, and in the rock cover on the disposal cell. Plantings of desert shrubs and grasses in 1996 and 1997 by LTSM and UGW inside the security fence, upwind of the disposal cell, are intended to reduce sand accumulation on site. The success of these plantings will be evaluated in 1998.

**Disposal Cell**

Contrasting climatic years 1996 and 1997 have influenced conditions on the disposal cell. The drought of 1996 produced meager rangeland forage surrounding the site; overgrazing was more severe than normal. This may have accelerated sand movement and accumulation on the disposal cell in 1996. An abnormally cool wet spring and summer in 1997 fostered plant encroachment on the disposal cell. Sand

accumulation in the south rock apron and at the toe of the southeast corner of the disposal cell appears to have increased since 1996; the size and abundance of shrubs and grasses growing in the accumulated sand also increased since 1996 (PL-6). Soil accretion was also evident at locations on the top slope of the disposal cell where the rock layer is thin (PL-7).

In the past, heat loading in the dark basalt that covers the disposal cell during the hot summer months appeared to desiccate emerging seedlings. In 1997, Russian thistle seedlings survived the relative cool and wet summer, normally a period of drought, and matured into seed-producing plants on the south side slope (PL-8) and top slope of the disposal cell. One sparse crop of Russian thistle on the cover in 8 years does not warrant spraying or other intervention. However, plant encroachment will continue to be monitored.

**Site Perimeter**

Construction of three evaporation ponds by the UGW, between the inner and outer diversion channels west of the disposal cell (Attachment 2), caused an increase in sand deposition along the top of the inner diversion channel in 1996. In 1997, the UGW attempted to reduce erosion and sand movement by covering the embankment slopes around the evaporation ponds with a geoweb material. This effort appears to have succeeded. Sand accumulation in the inner diversion channel remains unchanged since the 1996 inspection (PL-9). Areas of sand deposition in the northwest segment of the outer diversion channel is also unchanged since the 1996 inspection. However, the geoweb armoring appears to have slipped in some places on pond embankments (PL-9) and should continue to be monitored.

The westernmost evaporation pond contained liquid effluent from extraction well tests conducted by the UGW during 1997 (PL-10). Evaporation has caused a decrease in effluent volume and, therefore, may have increased contaminant concentrations in the pond. Exposed, contaminated pond water may pose a risk to waterfowl and other species. UGW was advised of the situation.

**Regraded and Outlying Areas**

The 1990 seeding of regraded areas surrounding the disposal cell and outside the security fence, with a mixture of drought-tolerant shrubs, forbs, and grasses, was, at first, only marginally successful. Up to 10 cm of soil loss was observed in some regraded areas during the years following the seeding. Since about 1993, a combination of (1) increasing plant abundance, primarily Indian ricegrass (*Stipa hymenoides*) and sand dropseed (*Sporobolus cryptandrus*), and (2) formation of a gravel veneer as a consequence of sand winnowing, has, for the most part, stabilized regraded areas. Following the wet summer of 1997, plant communities in these seeded areas appeared particularly healthy; many new seedlings emerged and mature plants produced copious crops of seed (PL-8, foreground). The prospect for these seeded areas is a diverse plant community in better condition than surrounding, heavily grazed rangeland. The GJO will continue to monitor seeded areas.

# 3.0 Conclusions and Recommendations

## 3.1 Conclusions

Overall, this inspection found the Tuba City site in excellent condition with no major disturbances.

## 3.2 Observations and Recommendations

1. Several new, temporary test wells have been installed at the site. Many have already been abandoned. (See page 2.)

   **Recommendation**: Prior to the 1998 inspection, the status of new test wells should be verified with the UGW. New test wells that are permanent should be included in the next annual inspection. Wells still considered temporary can be disregarded. (See also Recommendation 3).

2. Yellow paint has peeled from half the surface of one Lexan test sign (P9) and up to 2 cm around the edges of the other (P24). (See page 2.)

   **Recommendation:** Replace Lexan signs P9 and P24.

3. Information provided in the LTSP on monitor wells is confusing and out-of-date. Many new wells have been installed since the LTSP was written. A new inventory of wells and their status is needed. Based on this inventory, the groundwater monitoring section of the LTSP should be rewritten. (See pages 2-3.)

   **Recommendation**: Coordinate with the UGW to inventory all monitor wells and their status. Revise the groundwater monitoring section of the LTSP as necessary for clarity and accuracy.

4. Cracked or disintegrated collars around the surface casing were observed at nine monitor wells. Eight wells, none part of the LTSM or UGW monitoring networks, should be abandoned. Numbers on wells installed in 1996 are illegible. (See page 3).

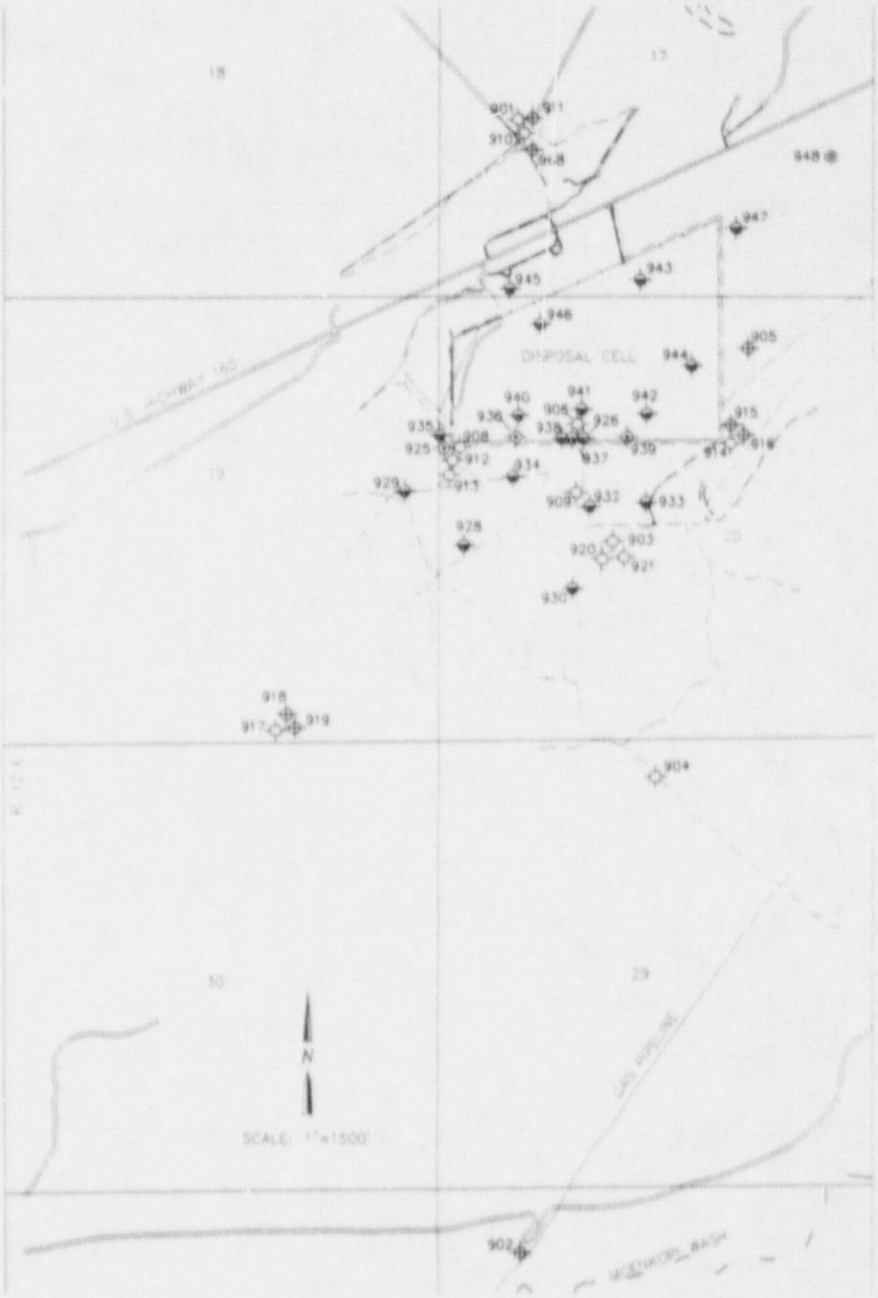
   **Recommendation**: Repair collars at nine wells. Abandoned wells no longer used. Permanently label new wells for positive identification.

The following features should be monitored during future annual site inspections:

- Newly installed neutron hydroprobe ports and revegetation test plots.
- Sand and tumbleweed accumulations along fence lines.
- Desert shrubs and grasses, planted in 1996 and 1997, to stabilize soil and reduce sand accumulation.
- Sand accumulation on the disposal cell and in diversion channels. (See page 4.)
- Russian thistle and other plant encroachment on the disposal cell and in diversion channels. (See page 4.)
- Placement of the geoweb around evaporation pond embankments, and effectiveness of the material in stabilizing the embankments. (See page 4.)
- Success of reseeding in areas surrounding the disposal cell. (See page 4.)

# 4.0 Photographs

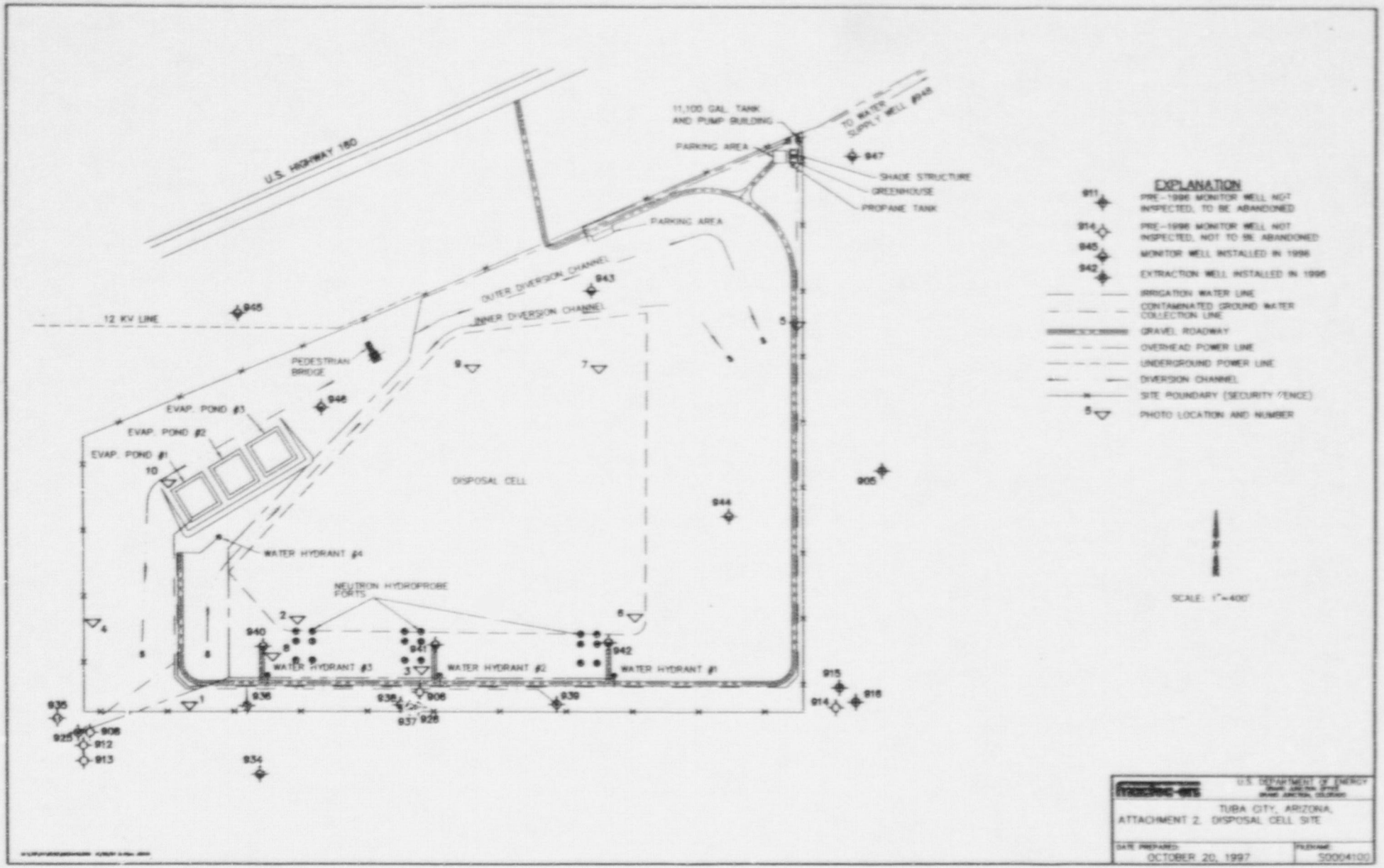
| Location No. | Photographer's Azimuth | Photograph Description/Remarks |
|---|---|---|
| 1 | 90 | Revegetation test plots near well 936: 1996 plantings in foreground; 1995 plantings in background. |
| 2 | 180 | Neutron hydroprobe access ports east of well 940. |
| 3 | 195 | UGW research contractor conducting tracer tests near well 906. |
| 4 | --- | Peeling Lexan sign at perimeter sign location P9. |
| 5 | --- | Peeling Lexan sign at perimeter sign location P24. |
| 6 | 270 | Sand accumulation and plant growth in the south apron of the disposal cell. |
| 7 | --- | Soil deposition where the riprap layer is thin near the northeast corner of the disposal cell top slope. |
| 8 | 50 | Background: Russian thistle growing on the south side slope of the disposal cell. Foreground: typical condition of reseeded areas around the perimeter of the disposal cell. |
| 9 | 300 | Evaporation ponds with geoweb on south slope and sand deposition in inner diversion channel. |
| 10 | 125 | Western most evaporation pond with effluent from UGW pump test. |




## EXPLANATION

- 911 — PRE-1996 MONITOR WELL NOT INSPECTED, TO BE ABANDONED
- 901 — PRE-1996 MONITOR WELL INSPECTED, NOT TO BE ABANDONED
- 945 — MONITOR WELL INSTALLED IN 1996
- 942 — EXTRACTION WELL INSTALLED IN 1996
- 948 — WATER SUPPLY WELL INSTALLED IN 1996
- SECONDARY ROADS

| | |
|---|---|
| macTec-ers | U.S. DEPARTMENT OF ENERGY GRAND JUNCTION OFFICE GRAND JUNCTION, COLORADO |
| TUBA CITY, ARIZONA | |
| ATTACHMENT 1. MONITOR WELL DESIGNATIONS | |
| DATE PREPARED: OCTOBER 20, 1997 | FILENAME: 10004000 |


U.S. HIGHWAY 160
11,100 GAL. TANK AND PUMP BUILDING
TO WATER SUPPLY WELL #940
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947
SHADE STRUCTURE
GREENHOUSE
PROPANE TANK
PARKING AREA
OUTER DIVERSION CHANNEL
INNER DIVERSION CHANNEL
943
12 KV LINE
945
PEDESTRIAN BRIDGE
946
EVAP. POND #3
EVAP. POND #2
EVAP. POND #1
10
DISPOSAL CELL
905
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WATER HYDRANT #4
NEUTRON HYDROPROBE PORTS
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WATER HYDRANT #3
WATER HYDRANT #2
WATER HYDRANT #1
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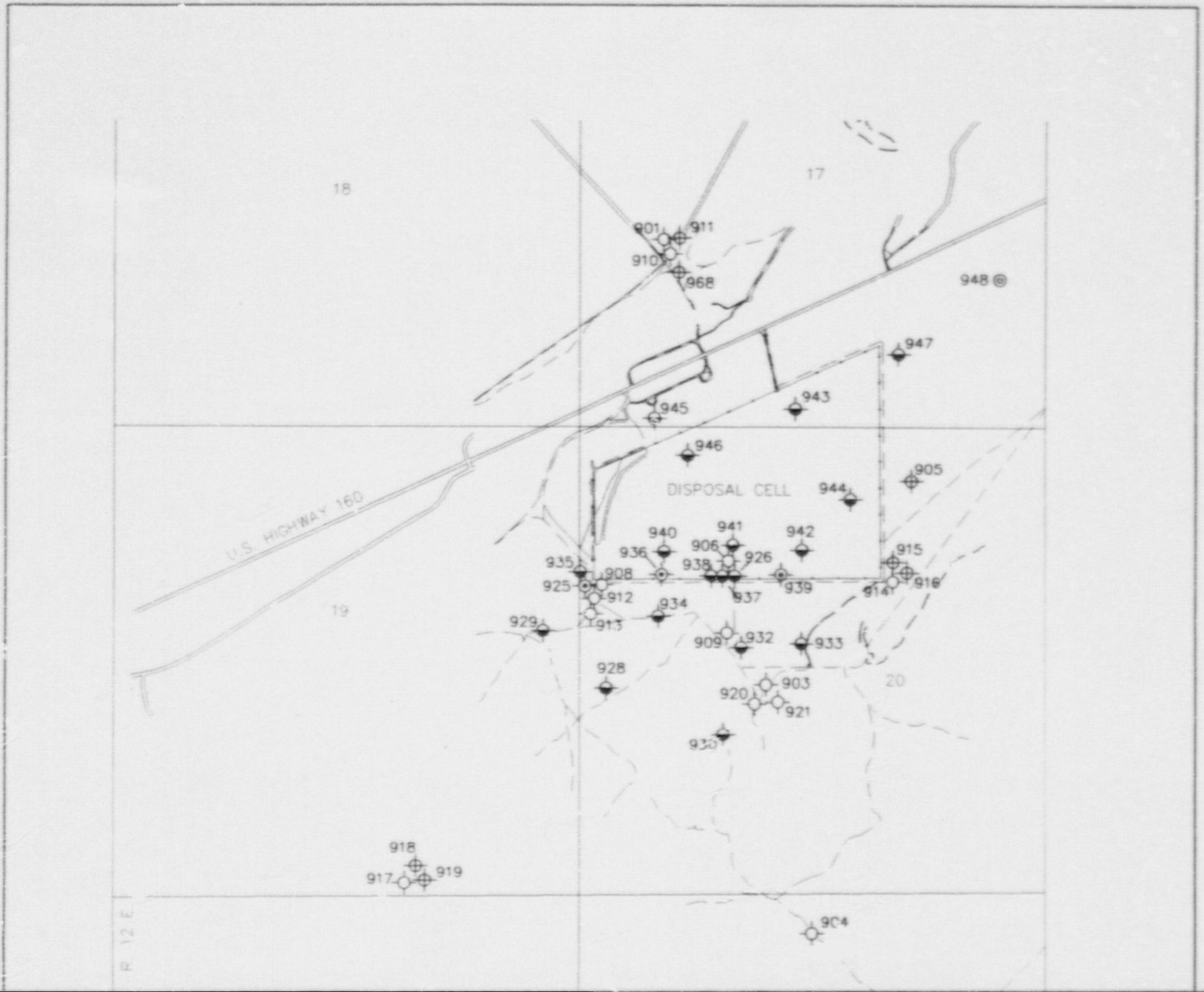
EXPLANATION
911 PRE-1996 MONITOR WELL NOT INSPECTED, TO BE ABANDONED
914 PRE-1996 MONITOR WELL NOT INSPECTED, NOT TO BE ABANDONED
945 MONITOR WELL INSTALLED IN 1996
942 EXTRACTION WELL INSTALLED IN 1996
IRRIGATION WATER LINE
CONTAMINATED GROUND WATER COLLECTION LINE
GRAVEL ROADWAY
OVERHEAD POWER LINE
UNDERGROUND POWER LINE
DIVERSION CHANNEL
SITE BOUNDARY (SECURITY FENCE)
5 PHOTO LOCATION AND NUMBER
SCALE: 1"=400'
U.S. DEPARTMENT OF ENERGY
TUBA CITY, ARIZONA
ATTACHMENT 2. DISPOSAL CELL SITE
DATE PREPARED: OCTOBER 20, 1997
FILENAME: 50004100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## EXPLANATION

- 911 — PRE-1996 MONITOR WELL NOT INSPECTED, TO BE ABANDONED
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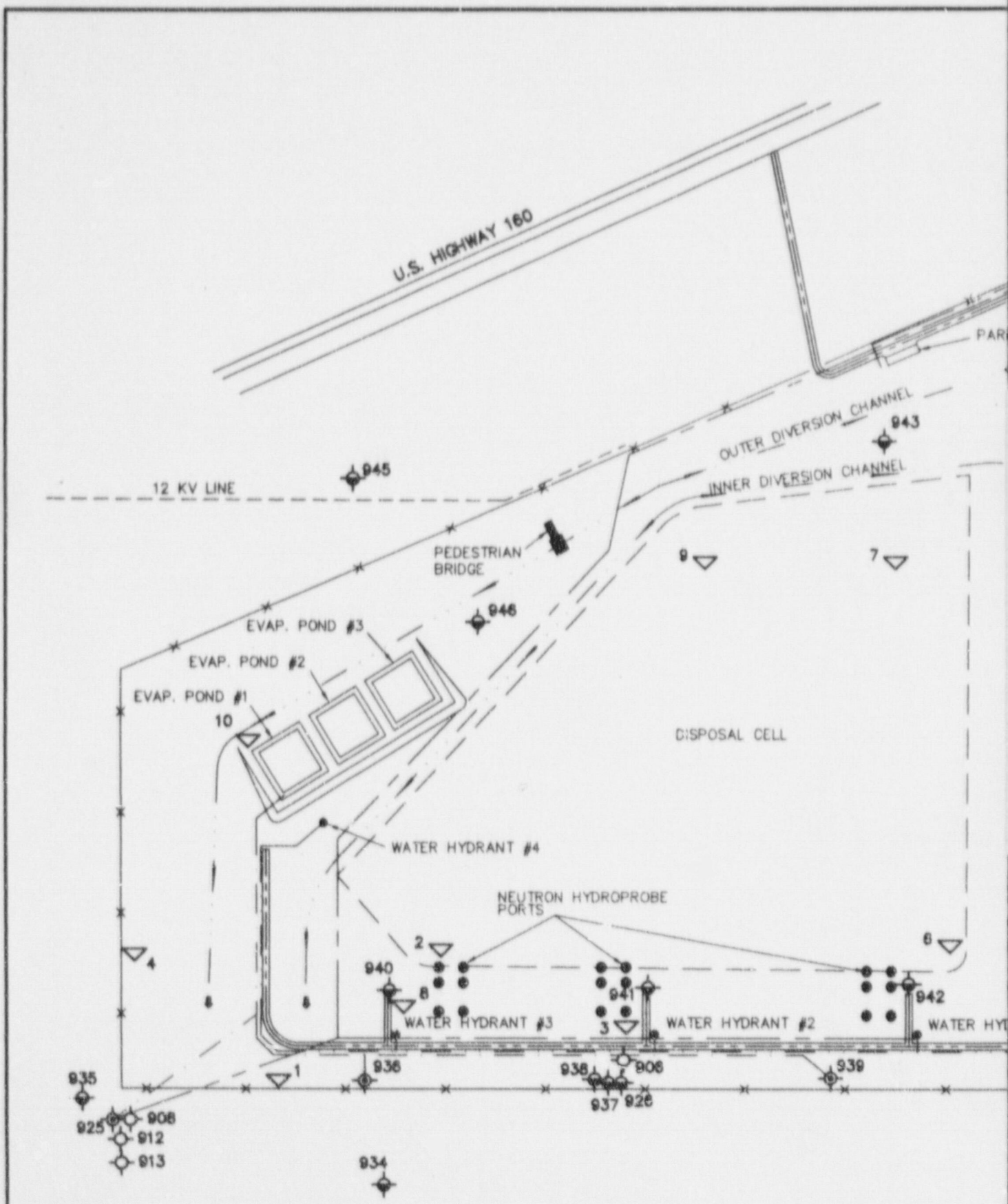
- 942 — EXTRACTION WELL INSTALLED IN 1996
- 948 — WATER SUPPLY WELL INSTALLED IN 1996
- SECONDARY ROADS



| | |
|---|---|
| macTec-ers | U.S. DEPARTMENT OF ENERGY, GRAND JUNCTION OFFICE, GRAND JUNCTION, COLORADO |
| TUBA CITY, ARIZONA, ATTACHMENT 1. MONITOR WELL DESIGNATIONS | |
| DATE PREPARED: OCTOBER 20, 1997 | FILENAME: S0004000 |


U.S. HIGHWAY 160
12 KV LINE
945
OUTER DIVERSION CHANNEL
943
INNER DIVERSION CHANNEL
PEDESTRIAN BRIDGE
946
EVAP. POND #3
EVAP. POND #2
EVAP. POND #1
10
DISPOSAL CELL
WATER HYDRANT #4
NEUTRON HYDROPROBE PORTS
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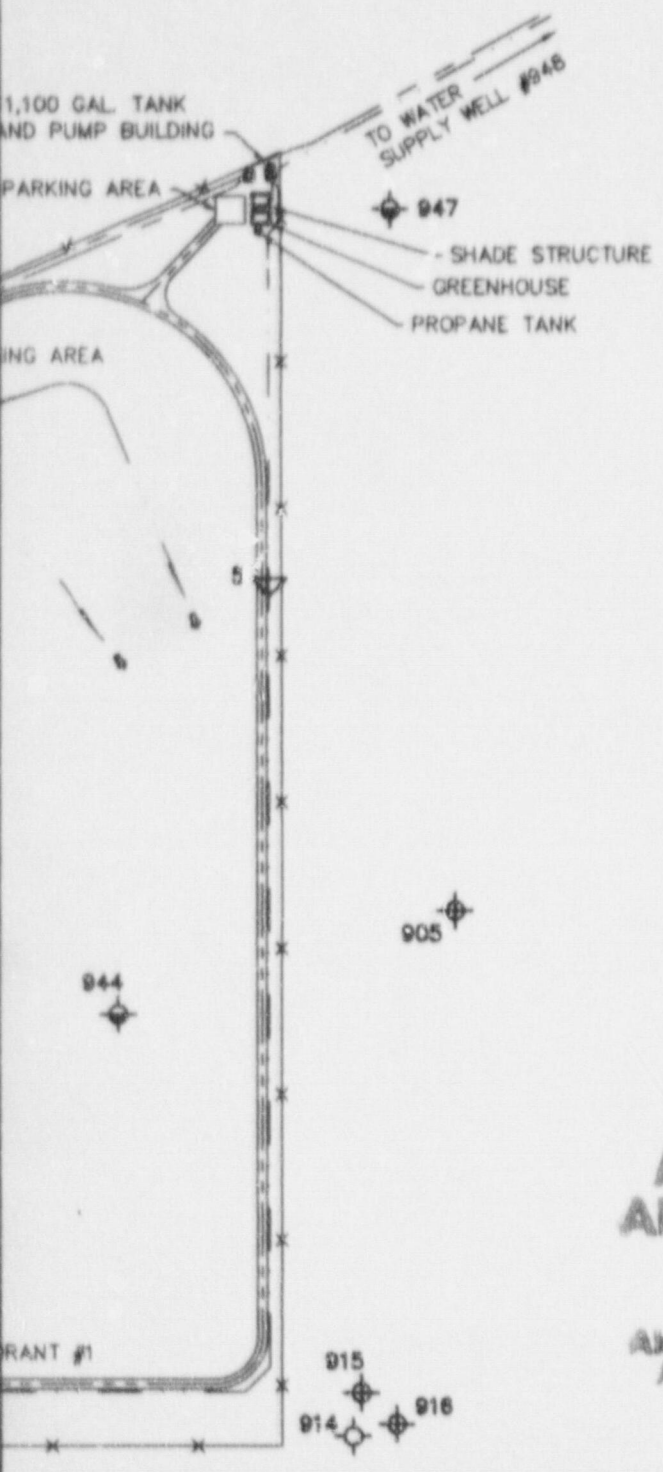


## EXPLANATION

- 911 — PRE-1996 MONITOR WELL NOT INSPECTED, TO BE ABANDONED
- 914 — PRE-1996 MONITOR WELL NOT INSPECTED, NOT TO BE ABANDONED
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- 942 — EXTRACTION WELL INSTALLED IN 1996
- IRRIGATION WATER LINE
- CONTAMINATED GROUND WATER COLLECTION LINE
- GRAVEL ROADWAY
- OVERHEAD POWER LINE
- UNDERGROUND POWER LINE
- DIVERSION CHANNEL
- SITE BOUNDARY (SECURITY FENCE)
- 5 — PHOTO LOCATION AND NUMBER

N

SCALE: 1"=400'



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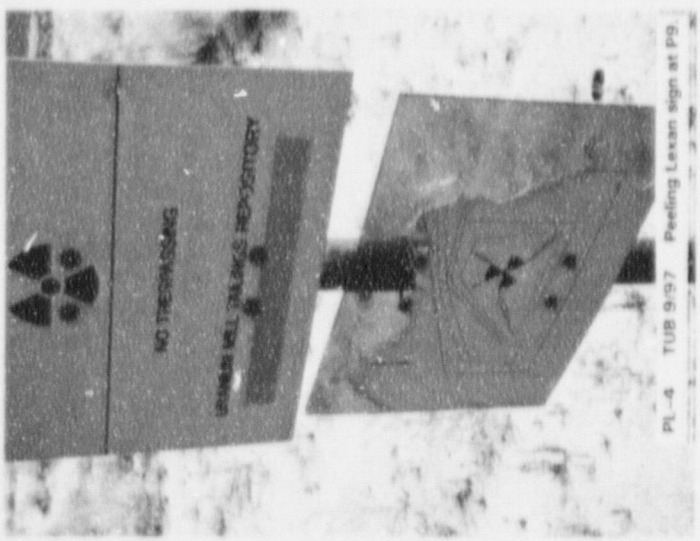
|---|---|
| macTec-ers | U.S. DEPARTMENT OF ENERGY GRAND JUNCTION OFFICE GRAND JUNCTION, COLORADO |
| TUBA CITY, ARIZONA, ATTACHMENT 2. DISPOSAL CELL SITE | |
| DATE PREPARED: OCTOBER 20, 1997 | FILENAME: S0004100 |

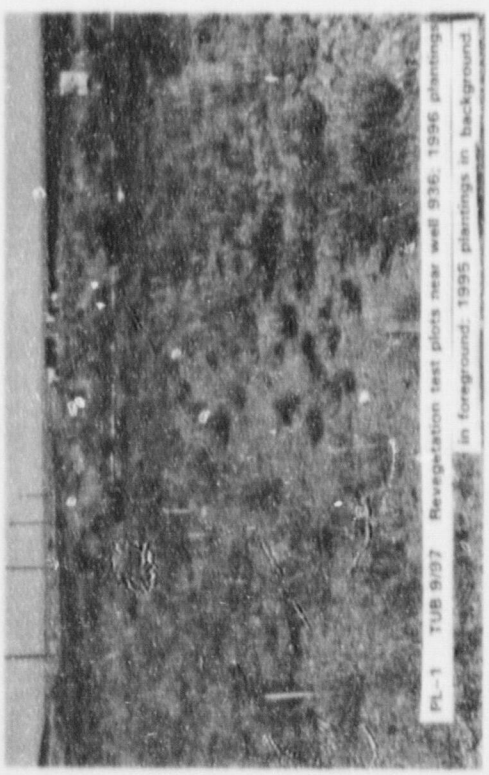
9711280009-02

PL-2 TUB 9/97 Neutron hydroprobe access ports east of well 940.

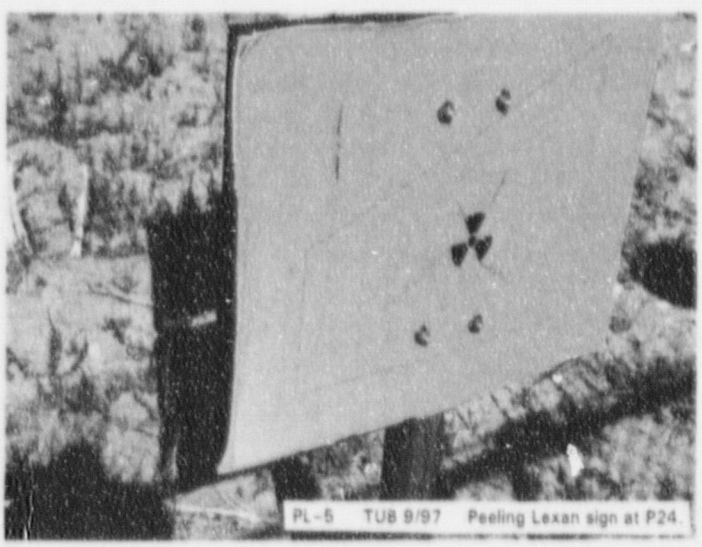
PL-3 TUB 9/97 UGW research contractor conducting tracer tests near well 906.




PL-4 TUB 9/97 Peeling Lexan sign at P9.

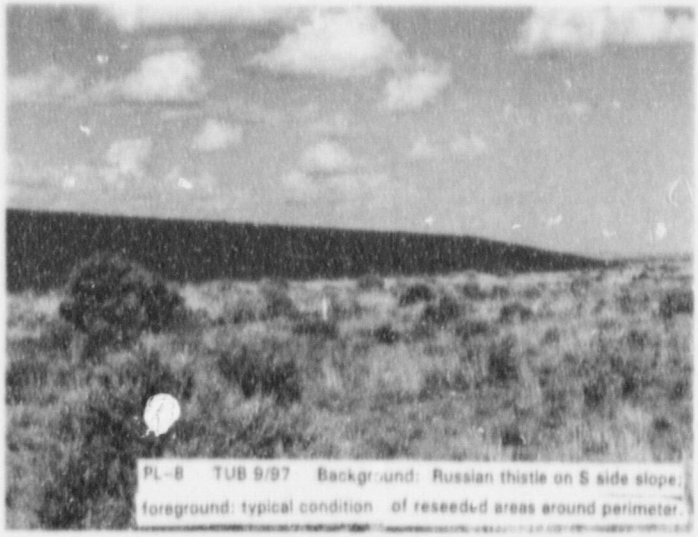


PL-1 TUB 9/97 Revegetation test plots near well 936; 1996 plantings in foreground; 1995 plantings in background.



PL-5 TUB 9/97 Peeling Lexan sign at P24.

PL-7 TUB 9/97 Soil deposition; riprap layer is thin near NE corner of top slope.



PL-8 TUB 9/97 Background: Russian thistle on S side slope; foreground: typical condition of reseeded areas around perimeter.

PL-9 TUB 9/97 Evaporation ponds with geoweb on S slope and sand disposition in inner diversion channel.

PL-6 TUB 9/97 Sand accumulation and plant growth in S apron.

PL-10 TUB 9/97 Westernmost evaporation pond with effluent from UGW pump test.