U.S. DEPARTMENT OF ENERGY | Legacy Management

# Tuba City, Arizona, Disposal Site

## FACT SHEET

*This fact sheet provides information about the Uranium Mill Tailings Radiation Control Act of 1978 Title I disposal site at Tuba City, Arizona. This site is managed by the U.S. Department of Energy Office of Legacy Management.*

## Site Description and History

The Tuba City, Arizona, Disposal Site is within the Navajo Nation and close to the Hopi Reservation, approximately 5 miles east of Tuba City and 85 miles northeast of Flagstaff, Arizona. The Rare Metals Corporation and its successor, El Paso Natural Gas Company, operated a uranium mill at the site between 1956 and 1966. During its 10 years of operations, the Tuba City mill processed about 800,000 tons of uranium ore. The milling operations created low-level radioactive mill tailings, a predominantly sandy material. The tailings were conveyed in a slurry from the mill to evaporation ponds at the site. These ponds covered an area of 33.5 acres, and windblown tailings affected an additional 250 acres northeast of the millsite. The U.S. Department of Energy (DOE) began surface remedial action at the Tuba City site in 1988. All uranium mill tailings from the onsite piles, debris from demolished mill buildings, and windblown tailings were moved and stabilized in an engineered disposal cell on site. DOE completed site cleanup in 1990.


*Location of the Tuba City Disposal Site*

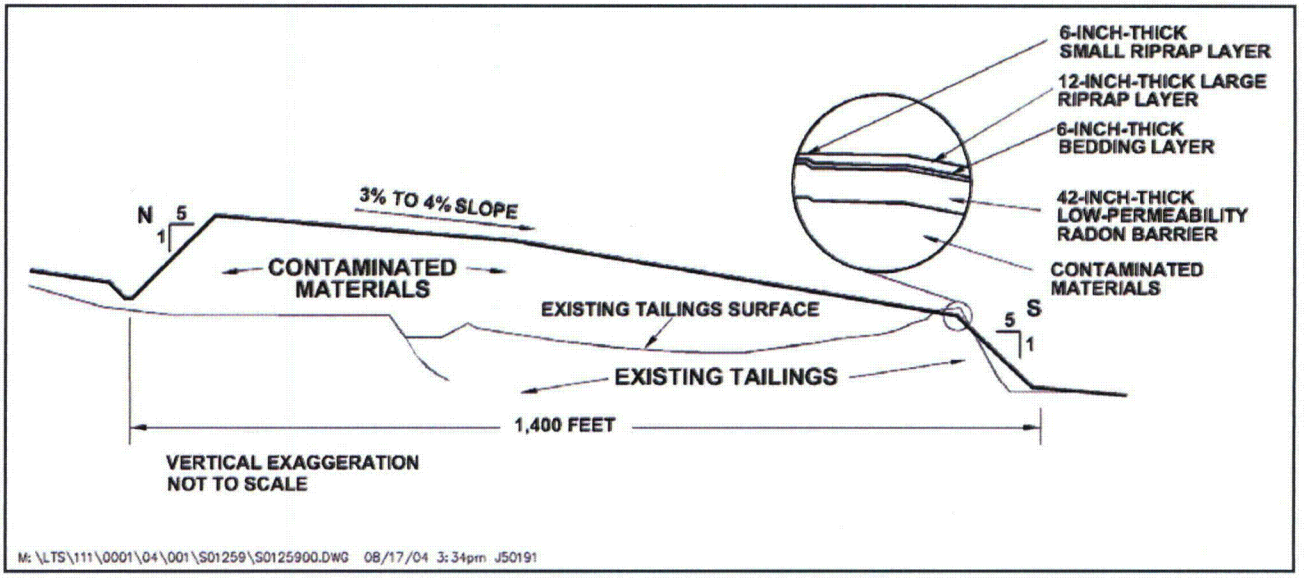
## Regulatory Setting

Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA) in 1978 (Public Law 95-604), and DOE remediated 22 inactive uranium-ore-processing sites under the Uranium Mill Tailings Remedial Action Project in accordance with standards promulgated by the U.S. Environmental Protection Agency in Title 40 *Code of Federal Regulations* (CFR) Part 192. Subpart B of 40 CFR 192 regulated cleanup of contaminated groundwater at the processing sites. The radioactive materials were encapsulated in U.S. Nuclear Regulatory Commission–approved disposal cells. The U.S. Nuclear Regulatory Commission general license for UMTRCA Title I sites is established in 10 CFR 40.27. The Tuba City disposal cell was included under the general license in 1996.

## Disposal Site

The disposal site is approximately 6,000 feet northwest of and 300 to 400 feet in elevation above Moenkopi Wash, an intermittent stream that drains to the southwest into the Little Colorado River. The disposal site lies at an elevation of approximately 5,100 feet above sea level on the middle of three alluvial terraces associated with ancestral flows in Moenkopi Wash. Thin surficial deposits of unconsolidated dune sand and alluvial gravels overlie the Navajo aquifer, which is the main aquifer near the Tuba City site and is regionally vast within sedimentary deposits comprising the Navajo Sandstone Formation. The saturated thickness of the aquifer near the disposal cell is about 500 feet, although within 2,000 feet south of the disposal cell the aquifer thins rapidly because of topography and regional groundwater discharge at Moenkopi Wash. Depth to groundwater ranges from about 60 to 75 feet below land surface.

Land near the site is used only for occasional grazing; adjacent land is used for dry and irrigated farming and (although not extensively) residential purposes. There is no known domestic, industrial, or agricultural use of groundwater from the contaminated region of the




*North-South Cross Section of the Tuba City Disposal Cell*

aquifer. Nearby residences receive water from the Navajo Tribal Utility Authority; this water comes from a well completed in the bedrock aquifer approximately 1.5 miles northwest (hydraulically upgradient) of the site.

The only surface water associated with the Tuba City site is located approximately 4,000 feet south of the site, where seeps are present along cliff bands that border Moenkopi Wash. Water from Moenkopi Wash may occasionally be used for stock watering and agricultural diversions by the Navajo and Hopi residents near the site. Early site characterization efforts and ongoing annual monitoring have found no contamination in the seeps in this area.

Historical milling operations contaminated groundwater in the Navajo aquifer. The primary source of contamination is water that drained from the unlined evaporation ponds and infiltrated into the subsurface. Site-related contamination in the uppermost part of the aquifer has been detected 2,500 feet hydraulically downgradient from the disposal site. Groundwater contaminants with concentrations that exceed their standards in 40 CFR 192 are molybdenum, nitrate, selenium, and uranium. High levels of sulfate are also present in the groundwater. Although sulfate is not regulated in 40 CFR 192, its concentration in groundwater is high enough to cause a potential health risk, and a restoration goal was established for comparison to monitoring results.

### *Compliance Strategy*

The compliance strategy for contaminated groundwater underlying the site is active remediation. The objective of this strategy is to remove uranium (the primary site contaminant) and other site-related contaminants from the aquifer to meet 40 CFR 192 standards or the water quality restoration goals established in the Groundwater Compliance Action Plan.

The groundwater remediation system currently comprises 37 extraction wells completed within the contaminated region of the aquifer. The extracted water is conveyed in underground piping to an onsite treatment plant, where it is distilled following ion exchange softener pretreatment. A lined solar evaporation pond receives the waste liquid (brine) and the softener regeneration waste. An infiltration trench located upgradient of the contaminant plume receives the treated water (distillate), where it is returned to the aquifer. Apart from a temporary suspension in 2010–2011 for plant upgrades, the active remediation system has been in full-scale operation since mid-2002. Numerous groundwater monitoring wells that are used to track water quality and water level trends are situated within and surrounding the network of extraction wells.

### *Disposal Cell Design*

The five-sided disposal cell occupies an area of 50 acres on the 145-acre site. The cell rises 44 feet above the surrounding land. An interceptor ditch was constructed on the upslope side of the site. A woven wire fence with locked gates surrounds the site, and the site perimeter is marked with warning signs and permanent monuments.

The cover of the disposal cell is a multicomponent system designed to encapsulate and protect the contaminated materials. The disposal cell cover comprises (1) a low-permeability radon barrier (first layer placed over compacted tailings) consisting of clayey soil, (2) a granular bedding material placed as a capillary break, and (3) rock (riprap) erosion protection layers.

The cell location and design were selected to minimize the potential for erosion from wind and storm water

runoff. Surrounding disturbed areas were regraded and reseeded with native vegetation.

## Legacy Management Activities

DOE's Office of Legacy Management (LM) is responsible for ensuring that the selected groundwater compliance strategy at the Tuba City disposal site continues to be protective of human health and the environment.

LM manages the disposal site according to a site-specific Long-Term Surveillance Plan to ensure that the disposal cell systems continue to prevent release of contaminants to the environment. Under provisions of this plan, LM conducts annual inspections of the site to evaluate the condition of surface features, performs site maintenance as necessary, and monitors groundwater to verify the continued integrity of the disposal cell.

In accordance with 40 CFR 192.32, the disposal cell is designed to be effective for 1,000 years, to the extent reasonably achievable, and, in any case, for at least 200 years. However, the general license has no expiration date, and LM's responsibility for the safety and integrity of the Tuba City disposal cell will last indefinitely.

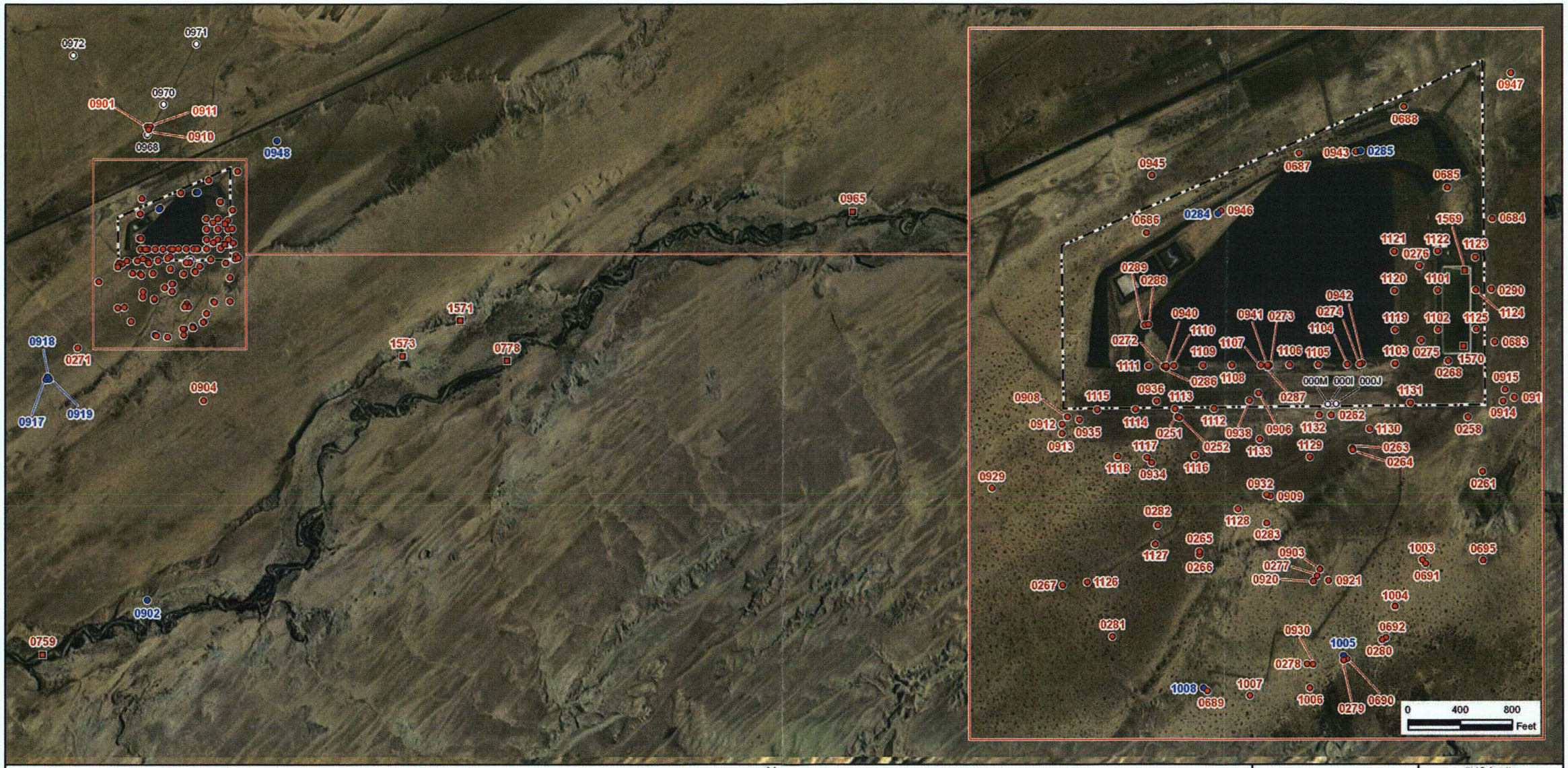
## Contacts

Documents related to the Tuba City disposal site are available on the LM website at http://www.lm.doe.gov/tuba/Sites.aspx.

For more information about LM activities at the Tuba City disposal site, contact

U.S. Department of Energy
Office of Legacy Management
2597 Legacy Way, Grand Junction, CO 81503

(970) 248-6070 (monitored continuously), or
(877) 695-5322 (toll-free)




**LEGEND**

- WELL TO BE SAMPLED
- SURFACE LOCATION TO BE SAMPLED
- WATER LEVEL ONLY WELL
- EXISTING WELL
- SITE BOUNDARY

N

0 3,000 6,000 Feet

| | |
|---|---|
| U.S. DEPARTMENT OF ENERGY<br>GRAND JUNCTION, COLORADO | Work Performed by<br>S.M. Stoller Corporation<br>Under DOE Contract<br>No. DE-AM01-07LM00060 |
| Planned Sampling Map<br>Tuba City, AZ, Disposal Site<br>August 2011 | |
| DATE PREPARED:<br>June 2, 2011 | FILENAME:<br>S0781600 |

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*Tuba City, Arizona, Disposal Site, Sample Location Map*

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# 19.0 Tuba City, Arizona, Disposal Site

## 19.1 Compliance Summary

The Tuba City, Arizona, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on April 6, 2011. The disposal cell and all associated surface water diversion and drainage structures were in excellent condition and functioning as designed. Although sand accumulation is still evident in the apron ditch and diversion channel along the northwest side of the disposal cell, it is not adversely affecting the function of these features.

Results of groundwater monitoring performed in 2011 indicate no significant change in groundwater quality when compared to historical results. However, groundwater quality downgradient of the former millsite is still degraded due to residual historical (processing-related) contamination. No other maintenance needs or cause for a follow-up or contingency inspection was identified.

## 19.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Tuba City Disposal Site are specified in the *Long-Term Surveillance Plan for the Tuba City, Arizona, Disposal Site* (DOE/AL/62350–182, Rev. 0, U.S. Department of Energy [DOE], October 1996; LTSP) and in procedures established by DOE to comply with the requirements of Title 10, *Code of Federal Regulations,* Part 40.27 (10 CFR 40.27). Table 19–1 lists these requirements.

*Table 19–1. License Requirements for the Tuba City Disposal Site*

| Requirement | Long-Term Surveillance Plan | This Report |
|---|---|---|
| Annual Inspection and Report | Section 6.0 | Section 19.3.1 |
| Follow-Up or Contingency Inspections | Section 7.0 | Section 19.3.2 |
| Routine Maintenance and Repairs | Section 8.0 | Section 19.3.3 |
| Groundwater Monitoring | Section 5.2 | Section 19.3.4 |
| Corrective Action | Section 9.0 | Section 19.3.5 |

**Institutional Controls**—The U.S. Bureau of Indian Affairs holds the 145-acre disposal site in trust. The Navajo Nation retains title to the land. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. The U.S. Nuclear Regulatory Commission (NRC) required DOE to enter into Cooperative Agreement DE–FC04–85AL26731 with the Navajo Nation to perform remedial actions at the former processing sites prior to bringing the site under the general license. DOE and the Navajo Nation executed a Custodial Access Agreement (CAA) that conveys to the federal government title to the residual radioactive materials stabilized at the repository site and ensures that DOE has perpetual access to the site.

The site was accepted under NRC general license (10 CFR 40.27) in 1996 for compliance with 40 CFR 192, Subpart A. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal control of the property, a site perimeter security fence, warning/no-trespassing signs (called perimeter signs) along the property boundary, and a locked gate at the entrance to the

site. Verification of these institutional controls is part of the annual inspection. Inspectors found no evidence that these institutional controls were ineffective or violated.

## 19.3 Compliance Review

### 19.3.1 Annual Inspection and Report

The site, located east of Tuba City, Arizona, was inspected on April 6, 2011. Results of the inspection are described below. Figure 19–1 shows the features and photograph locations (PLs) mentioned in this report. Numbers in the left margin of this report refer to items summarized in the "Executive Summary" table.

Many structures and features at the site—including an office building, a water treatment plant, a solar water-heating system, a solar photovoltaic system, evaporation ponds, an extensive network of extraction and monitoring wells, and a treated water infiltration system—are associated with the active treatment of contaminated groundwater, which is ongoing. The purpose of the active groundwater remediation is to mitigate contamination resulting from former uranium processing that occurred at the site. These activities are not addressed in the LTSP, however, because they are not related to the long-term disposal and stabilization of encapsulated contaminated materials. As such, associated features are not included in the annual inspection and are only addressed herein as they relate to site integrity or safety concerns. Operation of the remediation system was suspended for the bulk of this reporting period (from October 2010 through September 2011) to upgrade and replace treatment system components.

#### *19.3.1.1 Specific Site-Surveillance Features*

**Access Road, Fence, Gate, and Signs**—The site is accessed directly from U.S. Highway 160. Perpetual access to the site is granted by the CAA. A gate in a fence on the highway right-of-way allows access to the site along a gravel access road; the site entrance gate is at the perimeter security fence. The access gate, road, and entrance gate to the site were in good condition. The gates were open at the time of the inspection because of ongoing groundwater remediation operations at the site. The security fence around the site perimeter was in good condition, as were the entrance signs posted on both gates.

Perimeter signs are posted in pairs at regular intervals around the site perimeter. Each sign pair, secured to a metal post, consists of a "No Trespassing" sign with a radioactive materials trefoil symbol and a schematic sign with a diagram of the disposal cell (also identified by the radioactive materials trefoil symbol) and the site boundary. Faded perimeter signs noted during the 2010 inspection (P7, P8, and P9) were replaced prior to the 2011 inspection. All of the signs were in good condition.

**Markers and Monuments**—The two granite site markers, one just inside and to the right of the entrance gate and the other on top of the disposal cell, were in good condition. The survey and boundary monuments that were observed were also in good condition. As was the case last year, boundary monument BM–3, at the northeast corner of the site, was buried by windblown sand.

**Monitoring wells**—Seven wells comprise the cell performance monitoring network: 0903, 0906, 0908, 0940, 0941, 0942, and 0945. The six wells inside and immediately adjacent to the disposal site were secure. Monitoring well 0903, located about 0.25 mile south of the disposal cell, was not inspected.

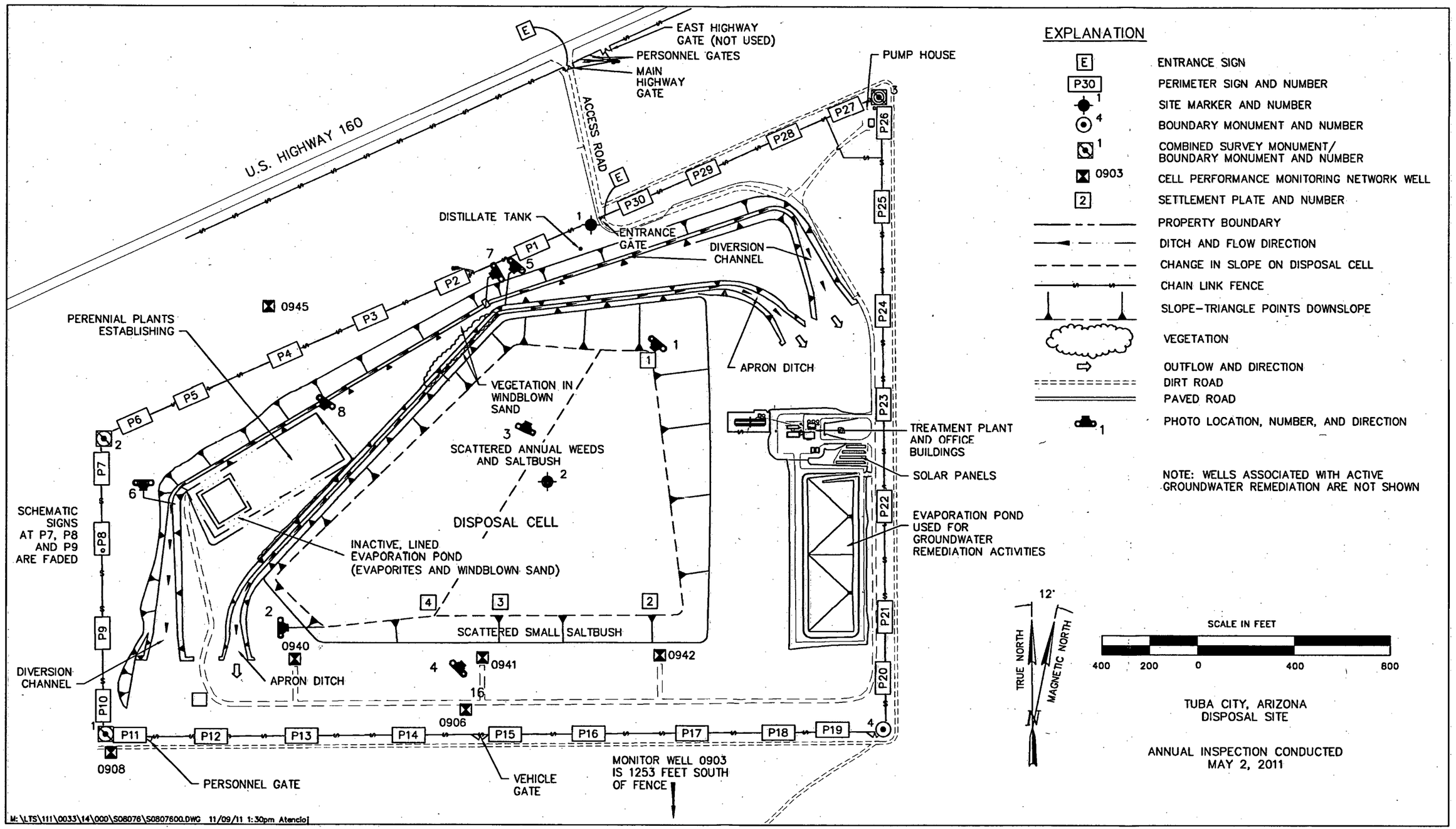


*Figure 19–1. 2011 Annual Compliance Drawing for the Tuba City Disposal Site*

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### *19.3.1.2 Transects*

In accordance with the LTSP, the site is divided into three areas, referred to as transects, to ensure a thorough and efficient inspection: (1) the disposal cell; (2) the area between the disposal cell and the site boundary; and (3) the outlying area. The area inside each transect is inspected by walking a series of traverses.

Within each transect, the inspectors examined specific site-surveillance features, such as the integrity of the cover, drainage structures, vegetation, and other features. Inspectors also examined the site for evidence of settlement, erosion, vandalism, or other disturbances or modifying processes that might affect site integrity or the long-term performance of the disposal cell.

**Disposal Cell**—The disposal cell is covered with riprap to control erosion. The rock cover material was in excellent condition and showed no signs of deterioration. No evidence of differential settlement or slumping was observed, and all visible components of the disposal cell and cover were in excellent condition (PL–1 and PL–2).

In accordance with the LTSP, deep-rooted vegetation, primarily saltbush, is removed or controlled to prevent potential penetration of the radon barrier. The most recent removal effort occurred in 2004. Since then, periodic application of herbicide has been very effective in controlling deep-rooted vegetation growth on the cell cover. All shrubs on the disposal cell were treated with herbicide during the 2010 inspection; only a few small shrubs were noted during the 2011 inspection. Scattered patches of grass and annual weeds also grow on the cell top and side slopes; however, these shallow-rooted plants are not a concern. Windblown sand continues to accumulate on the rock-covered surfaces, providing a favorable environment for plant growth (PL–3).

Sand accretion and vegetation encroachment are still evident at several locations along the south side slope of the disposal cell. Photographs are taken at these locations annually to document changes in sand accretion and vegetation conditions. The gradually increasing vegetation coverage likely indicates that sand accumulation on the rock-covered slope continues to increase (PL–4).

**Area Between the Disposal Cell and the Site Boundary**—The apron drainage ditch at the base of the disposal cell (PL–5) and the diversion channel (PL–6), both located along the north and northwest sides of the cell, are in good condition. Windblown sand deposition continues to be monitored at the site because unstable dunes in outlying areas can contribute to sand accumulation along fence lines, in diversion channels, and in the rock cover of the disposal cell. Sand accretion and vegetation encroachment have been checked annually since 2001 in the diversion channel and apron drainage ditch on the north and northwest sides of the cell. The sand tends to periodically accumulate and scour but, overall, sand accretion and concomitant new vegetation growth continues to increase (PL–7). However, these accumulations are not adversely affecting the performance of these features.

In 2007, two of the three evaporation ponds located near the northwest side of the disposal cell were removed, and the area was reclaimed and seeded with a native vegetation seed mix. Although the area is scoured by wind, perennial vegetation continues to establish (PL–8). The

progress of revegetation in this area will continue to be monitored. The remaining pond is retained as a backup for the main evaporation pond located on the east side of the site.

**Outlying Area**—The area beyond the site boundary for a distance of about 0.25 mile was examined for erosion, disturbance, change in land use, and other features of possible concern. No changes were observed.

### 19.3.2 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No follow-up or contingency inspections were required in 2011.

### 19.3.3 Routine Maintenance and Repairs

No maintenance or repairs were required in 2011.

### 19.3.4 Groundwater Monitoring

19A In accordance with the LTSP, DOE monitors groundwater to compare current conditions to baseline post-construction (disposal cell) groundwater quality at the site. Groundwater quality beneath and downgradient of the disposal cell has been degraded by contamination from former uranium-processing activities. This preexisting (legacy) processing-site-related groundwater contamination might mask any contamination leaching from the disposal cell. Additionally, transient drainage resulting from the presence of wet tailings and slimes placed within the disposal cell may also occur that would not reflect cell performance. These conditions limit the effectiveness of normal point-of-compliance (POC) groundwater monitoring as a reliable indicator of cell performance (40 CFR 192, Subpart A).

Given the preexisting processing-site-related contamination described above, long-term groundwater monitoring at POC wells in the uppermost aquifer to demonstrate cell performance is not technically feasible at the Tuba City Site. Therefore, groundwater monitoring is performed in accordance with Section 5.2.2 of the LTSP and is defined as *evaluative monitoring*. According to the LTSP, the purpose of this monitoring is to (1) evaluate trends in groundwater quality in the uppermost aquifer, (2) monitor the downgradient extent of contamination in groundwater, and (3) analyze the impacts of transient drainage and surface runoff. Preexisting processing-site-related groundwater contamination at the site is currently under remediation (40 CFR 192, Subpart B).

In accordance with the LTSP, seven compliance wells (Table 19–2) are monitored for four target analytes: molybdenum, nitrate (nitrate plus nitrite as nitrogen), selenium, and uranium. Because of the preexisting groundwater contamination, the LTSP provides provisional upper baseline limits (UBLs) as the main criteria for assessing the results of the evaluative monitoring (Table 19–3). As stated in the LTSP, maximum concentration limits (MCLs) are not appropriate for determining the concentration limits needed to evaluate disposal cell performance.

*Table 19–2. Groundwater Monitoring Network at the Tuba City Disposal Site*

| Monitoring Well | Hydrologic Relationship | Monitoring Frequency |
|---|---|---|
| 0903 | Downgradient (Off-site) | Annually |
| 0906 | Downgradient | Semiannually |
| 0908 | Downgradient | Semiannually |
| 0940[a] | Downgradient | Semiannually |
| 0941 | Downgradient | Semiannually |
| 0942 | Downgradient | Semiannually |
| 0945 | Upgradient (Background) | Annually |

[a] Between August 2004 and February 2010, it was not possible to obtain a sample from well 0940 because of an insufficient volume of water, reflecting the ongoing groundwater remediation pumping being conducted at the site. However, in July 2010 and during both 2011 monitoring events, the volume of water in well 0940 has been sufficient for sampling.

*Table 19–3. Provisional Upper Baseline Limits for Groundwater at the Tuba City Disposal Site*

| Constituent | Provisional UBL (mg/L)[a] | MCL (mg/L) |
|---|---|---|
| Molybdenum | 0.14 | 0.10 |
| Nitrate (as Nitrogen) | 311[b] | 10[c] |
| Selenium | 0.05 | 0.01 |
| Uranium | 1.17 | 0.044 |

[a] UBL = Upper Baseline Limit (as documented in the 1996 LTSP)
[b] 311 mg/L (for nitrate as nitrogen) was calculated based on the 1,379 mg/L UBL for nitrate as $NO_3$
[c] 10 mg/L (for nitrate as nitrogen) was calculated based on the 44 mg/L MCL for nitrate cited in the LTSP
mg/L = milligrams per liter

Evaluative groundwater monitoring in 2011 was conducted in February (for those wells sampled semiannually) and in August (for all wells; see Table 19–2). Figures 19–2 through 19–5 show time-concentration plots for the four target analytes, beginning in 1998. In these figures, the legends list the background well (0945) first; remaining wells are listed in general order of increasing distance from the disposal cell. The UBLs and MCLs listed in Table 19–3 are also shown.

Sample results from the 2011 evaluative monitoring indicate that groundwater quality immediately downgradient of the former millsite (in on-site wells, 0940, 0941, and 0942, 0906, and 0908) is still degraded with respect to concentrations of nitrate, selenium and uranium in the upgradient well (0945). However, this is not the case for the more distal off-site downgradient well 0903 (approximately 1,250 feet from the site). For all four target analytes, concentrations in this well are still comparable with those detected in the upgradient (background) well 0945, significantly lower than the on-site cell performance wells, and well below corresponding MCLs and UBLs.

As has been the case since 2004, in 2011, molybdenum (Mo) concentrations in groundwater were below both the 0.1 mg/L MCL and the 0.14 mg/L UBL in all wells (Figure 19–2). With respect to upgradient (background) well 0945, Mo has been elevated only in wells 0906, 0941, and 0942. Concentrations of Mo in wells 0908, 0940, and offsite well 0903 have been comparable to background. Molybdenum concentrations in wells 0906 and 0941 were highly variable between 1998 and 2005 (occasionally exceeding the UBL), but have since stabilized

(<0.03 mg/L). Given these results, and those obtained for biannual sampling of the more extensive (non-LTSP) network, Mo is the least important of the four target analytes.

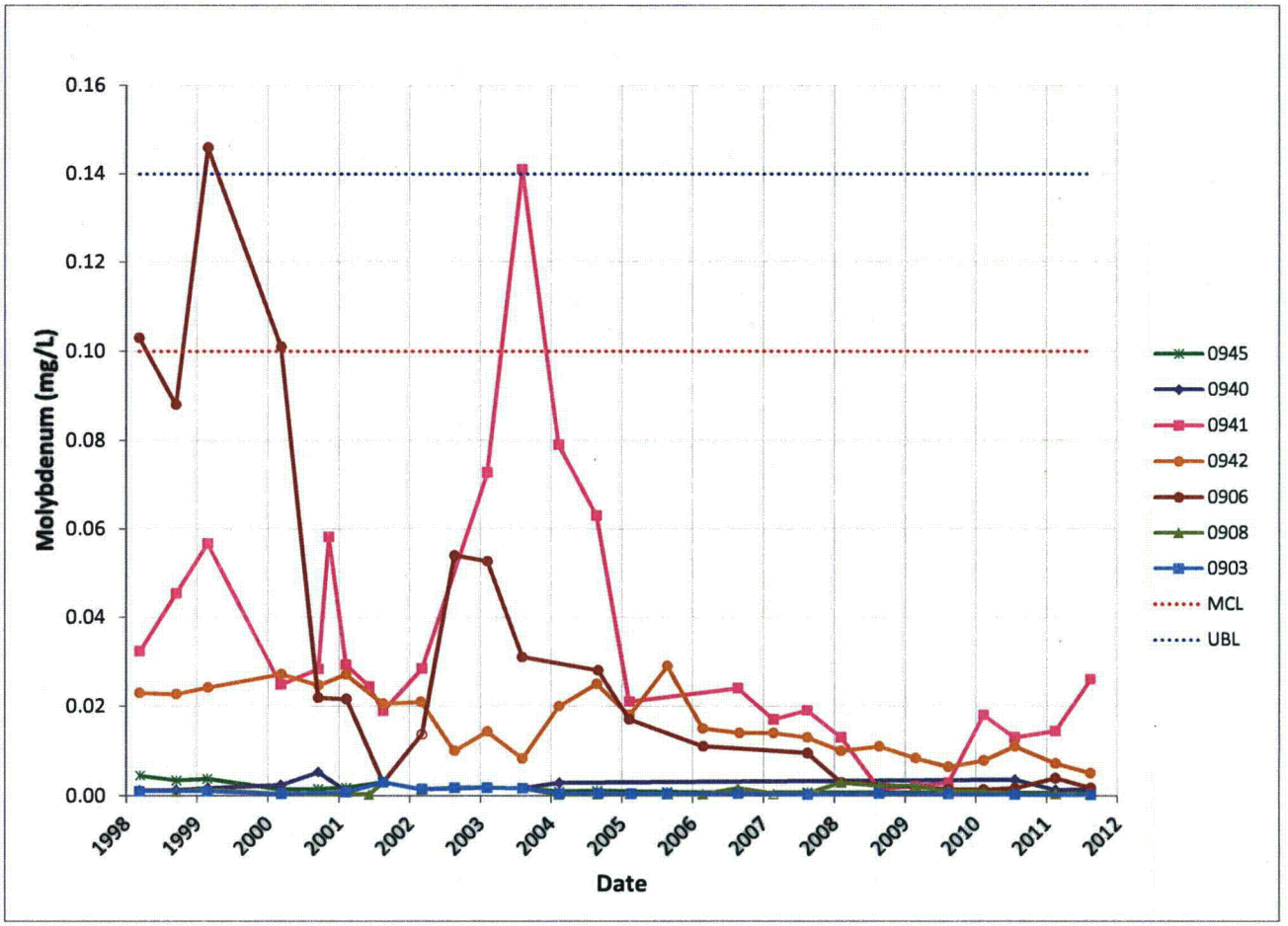



*Figure 19–2. Time-Concentration Plots of Molybdenum in Groundwater at the Tuba City Disposal Site*

Since 1998, nitrate concentrations in all on-site downgradient wells—0906, 0908, 0941, and 0942—have exceeded the 10 mg/L MCL, most by an order of magnitude or more (Figure 19–3). Nitrate concentrations exceeding the 311 mg/L UBL have only been measured in 0906 (currently 350 mg/L), 0942 (last exceedance in August 2008), and 0940 (currently 440 mg/L). Wells 0908 and 0941 are the only wells indicating any notable trending (with gradual increases evident since 1998–2000), but nitrate concentrations have stabilized somewhat in the last few years. Nitrate concentrations measured in the off-site downgradient well 0903, although above background and occasionally exceeding the MCL (average and maximum historical concentrations are 11.4 and 20 mg/L), are still well below the UBL. Concentrations in the upgradient background well 0945 remain below the MCL.

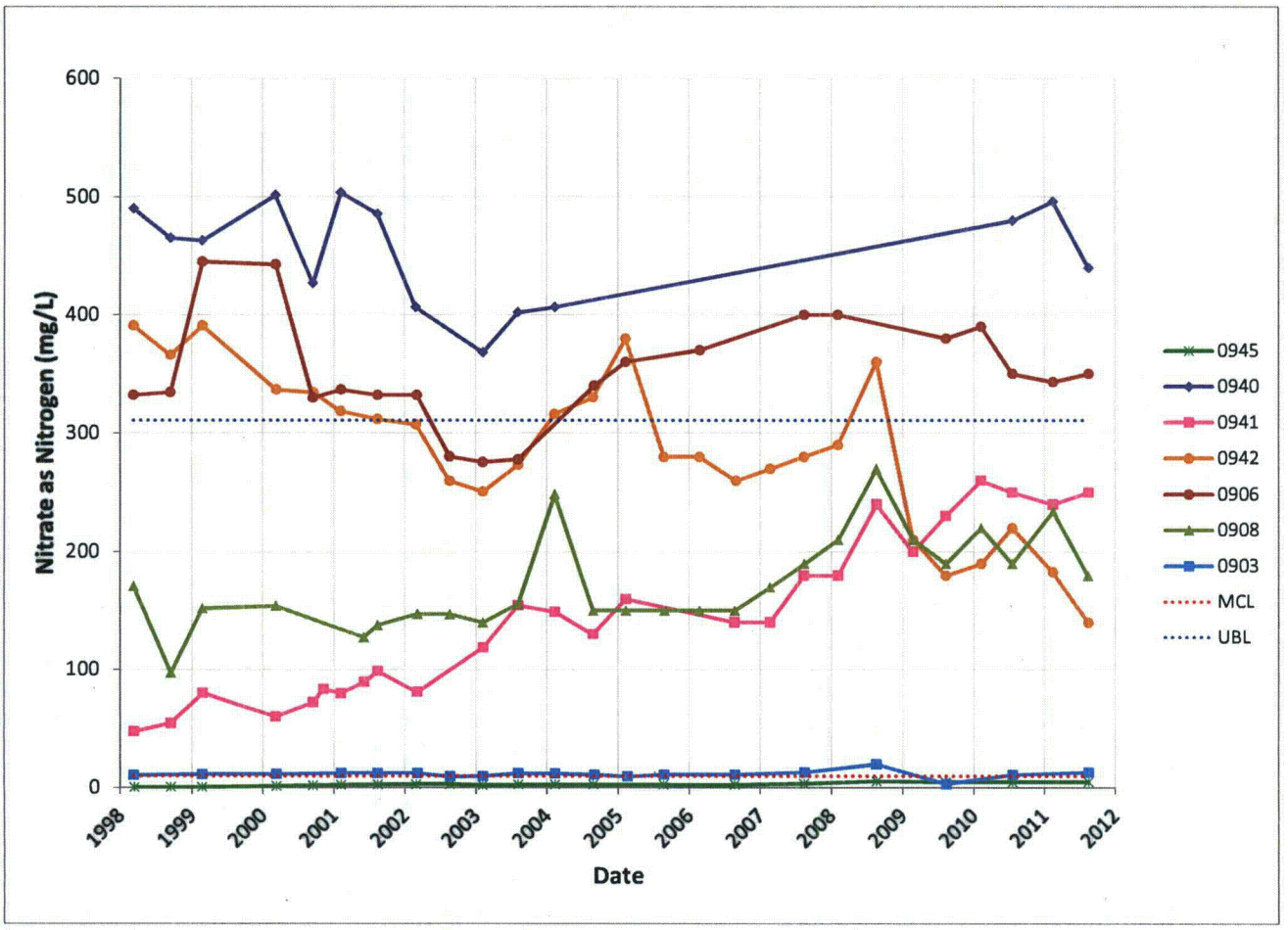



*Figure 19–3. Time-Concentration Plots of Nitrate in Groundwater at the Tuba City Disposal Site*

As shown in Figure 19–4, selenium concentrations measured in groundwater in 2011 exceeded the 0.01 mg/L MCL in all wells except for the off-site downgradient well 0903 and background well 0945. Selenium concentrations exceed the 0.05 mg/L UBL in wells 0940, 0941, and 0942; levels in 0941 have increased by close to an order of magnitude since 1998. Apart from 0941, no trending is evident. Selenium concentrations in 0903 have consistently been below both the UBL and the MCL.

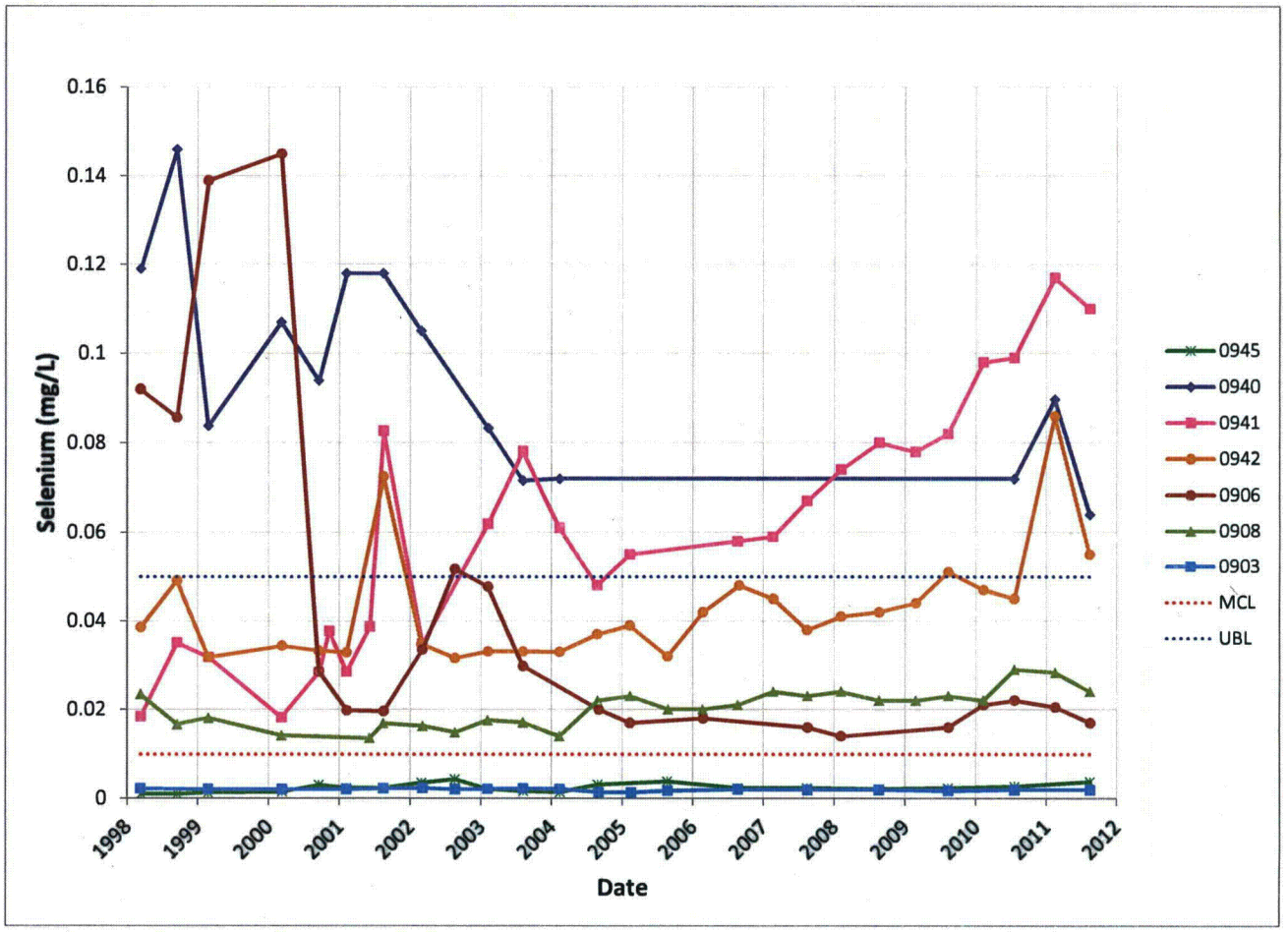



*Figure 19–4. Time-Concentration Plots of Selenium in Groundwater at the Tuba City Disposal Site*

In 2011, uranium concentrations in groundwater exceeded the 0.044 mg/L MCL but remained below the 1.17 mg/L UBL in all on-site downgradient wells. This has been the case historically as shown in Figure 19–5. Concentrations in the upgradient well 0945 and the off-site downgradient well 0903 remain below the MCL. Trending (either increasing or decreasing) is not evident in any well. Uranium concentrations in most wells have been quite stable. Exceptions are found in wells 0906 and 0942, where uranium has varied erratically at times; most recent measurements are between 0.4 and 0.5 mg/L.

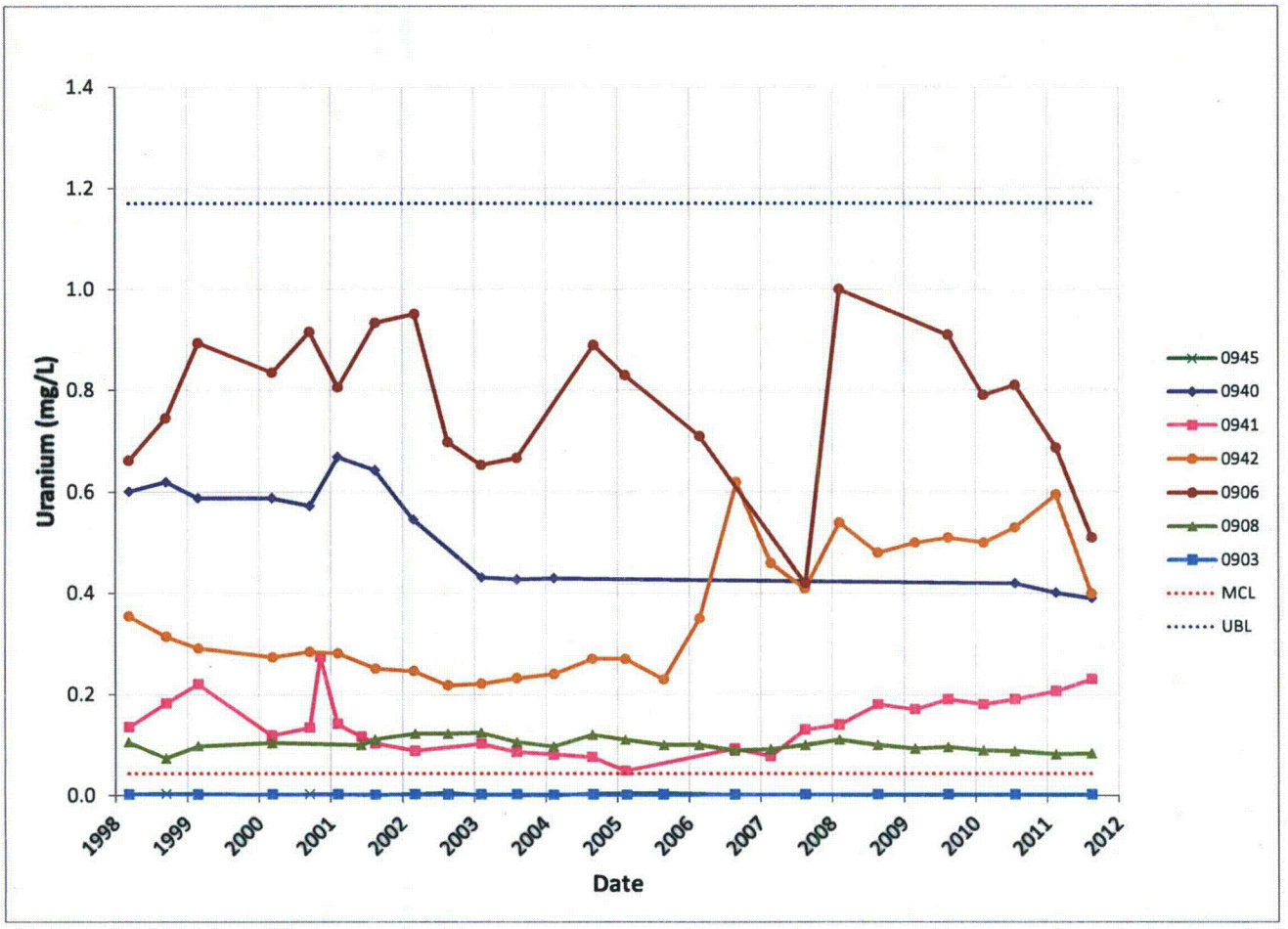



*Figure 19–5. Time-Concentration Plots of Uranium in Groundwater at the Tuba City Disposal Site*

Active groundwater remediation is ongoing at the site. The wells used for the evaluative monitoring of cell performance are a subset of the larger groundwater remediation monitoring well network. The progress of groundwater remediation is evaluated annually, but remediation has not been active long enough to determine if the disposal cell is performing as designed.

### 19.3.5 Corrective Action

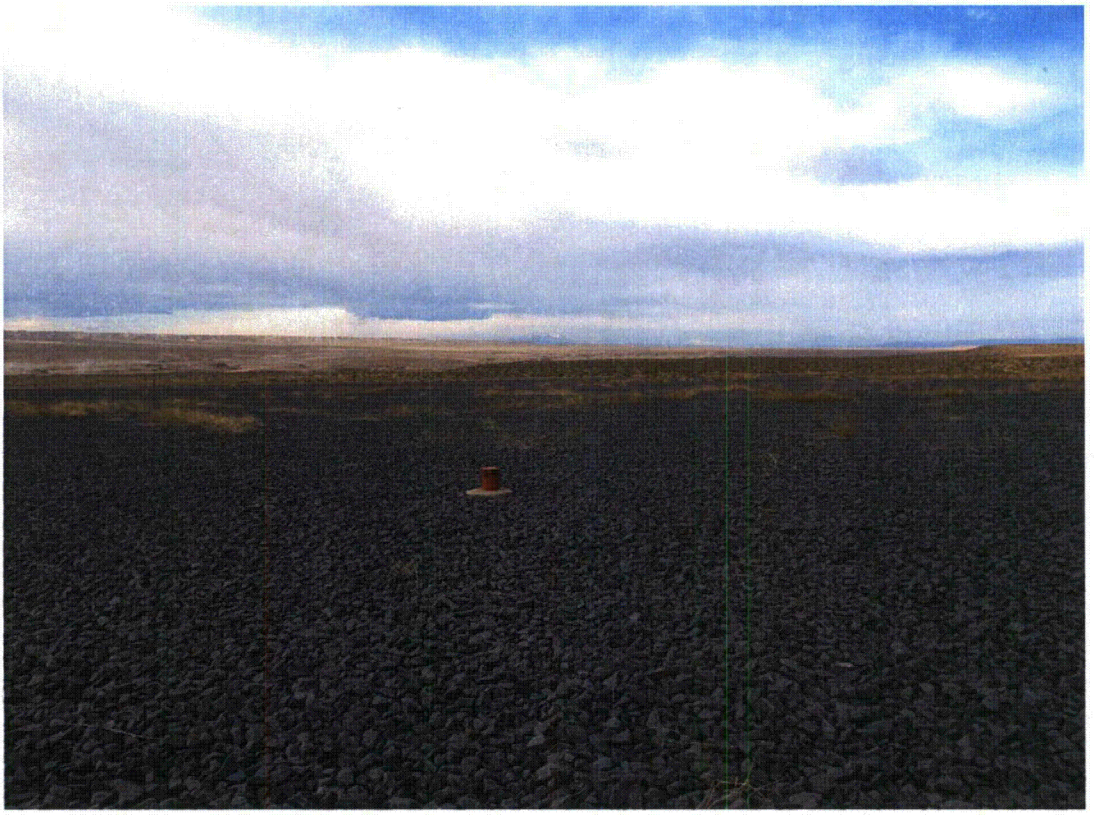
Corrective action is taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2011.

### 19.3.6 Photographs

*Table 19–4. Photographs Taken at the Tuba City Disposal Site*

| Photograph Location Number | Azimuth | Description |
|---|---|---|
| PL–1 | 220 | Northeast portion of the disposal cell cover. |
| PL–2 | 90 | South side slope of the disposal cell cover. |
| PL–3 | 25 | Windblown sand accumulation on the disposal cell cover. |
| PL–4 | 45 | Vegetation encroachment on the south side slope of the disposal cell. |
| PL–5 | 220 | Northwest side slope and apron ditch of the disposal cell. |
| PL–6 | 180 | Diversion channel on the west side of the site. |
| PL–7 | 240 | Windblown sand deposition on the south bank of the diversion channel. |
| PL–8 | 215 | Reclaimed area of former evaporation ponds. |



*TUB 4/2011. PL–1. Northeast portion of the disposal cell cover.*

*TUB 4/2011. PL–2. South side slope of the disposal cell cover.*

*TUB 4/2011. PL–3. Windblown sand accumulation on the disposal cell cover.*

*TUB 4/2011. PL–4. Vegetation encroachment on the south side slope of the disposal cell.*

*TUB 4/2011. PL–5. Northwest side slope and apron ditch of the disposal cell.*

*TUB 4/2011. PL–6. Diversion channel on the west side of the site.*

*TUB 4/2011. PL–7. Windblown sand deposition on the south bank of the diversion channel.*

*TUB 4/2011. PL–8. Reclaimed area of former evaporation ponds.*

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BLVD
ARLINGTON, TEXAS 76011-4511

May 11, 2012

MEMORANDUM TO: DOCKET FILE WM-00073

THROUGH: D. Blair Spitzberg, PhD, Chief ***/RA/***
Repository and Spent Fuel Safety Branch

FROM: Linda M. Gersey, Health Physicist
Robert J. Evans, CHP, PE, Senior Health Physicist
Repository and Spent Fuel Safety Branch

SUBJECT: TUBA CITY DISPOSAL SITE
OBSERVATIONAL SITE VISIT

On April 4, 2012, NRC Region IV staff conducted an observational site visit at the U.S. Department of Energy's (DOE) Tuba City Title I disposal site located at Tuba City, Arizona. This site visit was conducted using guidance approved April 17, 2012 (ML120930240). The purpose of the site visit was to observe DOE's routine, annual visit to the facility. Attached is the NRC's observational trip report for this site visit.

In summary, the DOE representatives conducted the annual inspection in accordance with the Long-Term Surveillance Plan for the Tuba City, Arizona (UMTRCA Title I) Disposal Site dated October 1996. No regulatory issues or safety concerns were identified during the site visit.

Docket: WM-00073

Attachment:
NRC Trip Report

cc with attachment:
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| ADAMS: ☐No ■ Yes | ■ SUNSI Review Complete | Reviewer Initials: LMG |
| | ■ Publicly Available | ■ Non-Sensitive |
| | ☐ Non-publicly Available | ☐ Sensitive |

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| 05/07/12 | 05/07/12 | 05/11/12 | |

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

| | |
|---|---|
| Docket: | WM-00073 |
| Report: | WM-00073/12-001 |
| Licensee: | U.S. Department of Energy |
| Facility: | Tuba City Disposal Site |
| Location: | Coconino County, Arizona |
| Date: | April 4, 2012 |
| Inspectors: | Linda M. Gersey, Health Physicist<br>Robert J. Evans, CHP, PE, Senior Health Physicist<br>Repository and Spent Fuel Safety Branch |
| Accompanied by: | D. Blair Spitzberg, PhD, Chief<br>Repository and Spent Fuel Safety Branch |
| Approved by: | D. Blair Spitzberg, PhD, Chief<br>Repository and Spent Fuel Safety Branch |

Attachment

NRC Trip Report

1. Background

The Tuba City disposal site is held in trust by the U.S. Bureau of Indian Affairs. The Navajo Nation retains title to the land. Pursuant to the Uranium Mill Tailings Radiation Control Act (UMTRCA), the U.S. Department of Energy (DOE) is the licensee and is responsible for the custody and long-term care of the site. The DOE and the Navajo Nation execute a Custodial Access Agreement that conveys to the federal government title to the residual radioactive materials stabilized at the repository site and ensures that DOE has perpetual access to the site.

The Tuba City disposal site is located on the Navajo Nation reservation in Coconino County, Arizona. The DOE completed the remediation of the Tuba City disposal site during 1990, and the NRC accepted the site under the NRC general license (10 CFR 40.27) during 1996. The disposal cell contains approximately 1.4 million cubic yards of residual radioactive wastes including mill tailings. The disposal cell covers approximately 50 acres of the 145-acre site.

The last annual DOE inspection was conducted by a contractor on April 6, 2011. During that inspection, no significant changes were noted from the previous year's inspection. Further, no problems were identified that required immediate contingency action.

2. Site Status

The site consists of a disposal cell located within a fenced boundary. The above-grade disposal cell is roughly triangular, with a maximum height of 30 feet (10 meters) above ground level. A drainage ditch on the north and west sides of the disposal cell directs runoff water away from the site. The disposal cell was constructed with a rip-rap (rock erosion protection) layer, bedding layer, and radon barrier over the contaminated materials. DOE installed 30 perimeter signs, 2 site markers located at the entrance gate and on top of the disposal cell, and 3 combined survey/boundary monuments.

Regulation 10 CFR 40.27(c) states that the DOE shall implement the long-term surveillance plan (LTSP), and care for the disposal site in accordance with the provisions of the LTSP. The most recent LTSP for the Tuba City site was submitted to the NRC by DOE during October 1996. The DOE used this version of the LTSP during its annual inspection.

The Tuba city site has active groundwater remediation to mitigate contamination resulting from former uranium processing that occurred at the site. These activities are not addressed in the LTSP because they are not related to the long-term disposal and stabilization of contaminated materials contained within the disposal cell. Also, no groundwater activities were reviewed during this inspection. Inspection of the groundwater treatment facilities and groundwater sampling are performed by DOE twice a year. The NRC staff may observe the implementation of the groundwater monitoring and remediation program during a future site visit.

3. Site Observations and Findings

To conduct the annual inspection, the DOE contractors created an inspection checklist. The checklist included requirements to inspect the fences, boundary monuments, site markers, perimeter signs, and entrance gate. Also, the DOE contract inspectors were required to check the condition of the disposal cell top, side slopes, diversion ditches, the area between the cell and the site boundary, and the outlying areas. Further, the DOE contract inspectors were required to observe the status of vegetation.

During the inspection, DOE contractors observed that the site fences were adequately intact, all markers and monuments were in place, and the entrance gate was intact. There was sand accumulation along the west fence, although the fence was still functional. The disposal cell appeared to be in excellent condition, with small amounts of scattered vegetation on the top and sides. The erosion barrier was in place, and no settlement was observed. Tumbleweed was found accumulating at the small bridge over the rock diversion channel. Sand accumulation and vegetation encroachment were found along the south side slope of the disposal cell, although it does not seem to impact the integrity of the cell.

The DOE representatives determined that minor fence repairs and sand accumulation cleanup were necessary at some future date. The DOE representatives did not identify any significant problems during the annual inspection that required immediate contingency actions.

The NRC inspectors measured the ambient gamma exposure rates using hand-held survey meters (Ludlum Model 19 survey meters, NRC Nos. 015525 and 015540, calibration due dates of 04/27/12 and 04/27/12, respectively). With a background of about 8-10 microRoentgens per hour (μR/hr), ~~most~~ measurements ranged from background to about 13 μR/hr. Overall, the survey results indicate that the site property was at background levels.

4. Conclusions

The NRC inspectors concluded that the DOE contract inspectors conducted the site inspection in accordance with LTSP and 10 CFR 40.27 requirements. The condition of the site was nearly identical to the condition that was reported during the previous year's DOE inspection, as documented in the 2011 annual report.

5. Meeting Summary

The NRC staff conducted a pre-planning meeting with the DOE representatives the day before the site inspection. During this meeting, the NRC and DOE contract staff discussed topics such as site status, inspection plan, and potential hazards.

6. Persons Contacted

L. Benally, Jr., Navajo AML Reclamation
N. Honie, Hopi Nation Representative
R. Bush, Site Manager, DOE Office of Legacy Management
J. Gillespie, Site Lead/Geologist, S.M. Stoller Corporation
R. Johnson, Site Lead/Geologist, S.M. Stoller Corporation

Figure 1: Site Marker

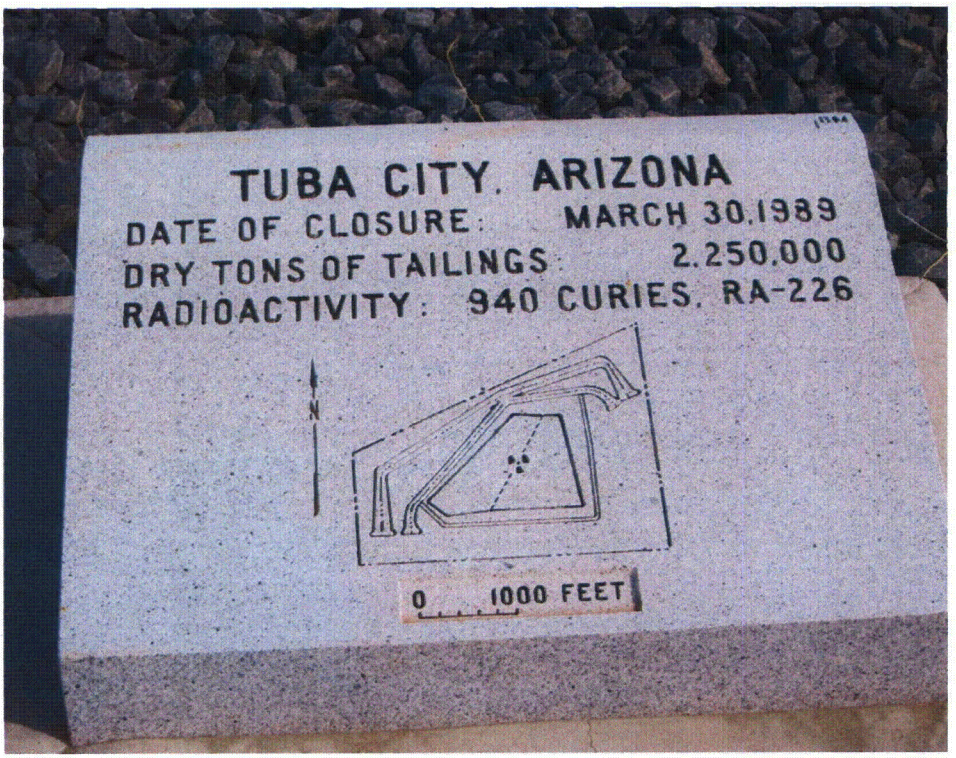


Figure 2: Diversion Ditches as Seen from Top of Impoundment