Department of Energy
Office of Legacy Management

JUL 0 1 2008

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U.S. Nuclear Regulatory Commission
Mail Stop T-8F42
Washington, DC 20555-0001

Conrad Kuharic
Texas Commission on Environmental Quality
Radioactive Materials Division
P.O. Box 13087, Mail Code 233
Austin, TX 78711

Subject: Transmittal of the Long-Term Surveillance Plan for the Falls City, Texas, Disposal Site

Dear Mr. von Till and Mr. Kuharic:

Enclosed is the revised Falls City Disposal Site Long-Term Surveillance Plan (LTSP) that has been approved by the US Nuclear Regulatory Commission (NRC).

The Department of Energy, Office of Legacy Management (DOE-LM), submitted a request for review dated January 23, 2007 and concurrence data for the *Draft Revised Long-Term Surveillance Plan for the US Department of Energy Falls City Uranium Mill Tailings Disposal Site, Falls City, Texas.*

Based upon NRC staff review and the supporting documents, NRC concurs with the following three DOE proposed revisions. First, the disposal cell performance monitoring of the ground water will be reduced from biannual to annual for the existing monitoring wells. Second, the revised plan will incorporate requirements of the Ground Water Compliance Action Plan (GCAP). Monitoring wells are sampled annually, which has not changed from the current LTSP. Third, the constituents analyzed for the monitoring wells in the disposal cell performance and in the GCAP monitoring will be reduced to total uranium and the field parameters.

The Falls City LTSP has also been revised to make it consistent with the structure and content of current DOE LTSPs governing over 70 other DOE-LM sites.

DOE will continue monitoring the ground water through 2010 at the 12 locations currently sampled. After the 2010 monitoring event, DOE plans to assess the monitoring results and will recommend whether to continue, modify, or terminate the monitoring program.

Please contact me at (970) 248-6016 if you have any questions.

Sincerely,

Jalena Maestas
Site Manager

Enclosures

cc w/o enclosure:
B. Baney, DOE
J. Maestas, DOE
T. Pauling, DOE
R. Plieness, DOE
M. Miller, Stoller
File FCT 505.15(A) (Roberts)

Maestas/Falls City/6-12-08 Falls City LTSP.doc

DOE–LM/1602–2008

Long-Term Surveillance Plan for the U.S. Department of Energy Falls City Uranium Mill Tailings Disposal Site Falls City, Texas

March 2008

U.S. Department of Energy

Office of Legacy Management

Work Performed Under DOE Contract No. DE–AM01–07LM00060 for the U.S. Department of Energy Office of Legacy Management.

DOE-LM/1602-2008

U.S. Department of Energy
Office of Legacy Management

Long-Term Surveillance Plan

for the

U.S. Department of Energy
Falls City Uranium Mill Tailings Disposal Site
Falls City, Texas

March 2008

This document supersedes Document Number
UMTRA-DOE/AL/62350-187, Rev. 3

Work Performed by S.M. Stoller Corporation under DOE Contract No. DE–AM01–07LM00060
for the U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado

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Acronyms, Abbreviations, and Units of Measure

BM	boundary monument
CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
D_{50}	median diameter
EPA	U.S. Environmental Protection Agency
FM	Farm to Market Road
ft	foot or feet
GCAP	Ground Water Compliance Action Plan
LTSP	Long-Term Surveillance Plan
mg/L	milligram(s) per liter
MW	monitor well
NRC	U.S. Nuclear Regulatory Commission
SEI	Solution Engineering, Inc.
SM	survey monument
SMK	site marker
SWI	Susquehanna Western, Incorporated
TDS	total dissolved solids
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978 (Title 49 *United States Code* Section 7901, et seq.)

End of current text

1.0 Introduction

1.1 Purpose

This Long-Term Surveillance Plan (LTSP) explains how the U.S. Department of Energy (DOE), as long-term custodian, will comply with the requirements of the general license for custody and long-term care of the Falls City, Texas, uranium mill tailings disposal site.

The Falls City site was licensed on July 8, 1997, after the U.S. Nuclear Regulatory Commission (NRC) concurred in the original LTSP (DOE 1997b). This revised LTSP incorporates the requirements of the Ground Water Compliance Action Plan (GCAP) (DOE 1998) for the Falls City site into a comprehensive management plan for the site. The GCAP imposed monitoring requirements to ensure protection of human health and the environment from processing-related ground water contamination. The environmental monitoring program developed in the GCAP has been modified in this revised LTSP to reflect results obtained since the disposal cell was closed in 1994.

The modification to the environmental monitoring program for the Falls City disposal site is to continue monitoring the current network of wells annually for the next 5 years as a best management practice and reduce the analyte list to total uranium and field measurements of temperature, pH, conductivity, turbidity, alkalinity, dissolved oxygen, and oxidation-reduction potential.

1.2 Legal and Regulatory Requirements

The Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978 (Title 42 *United States Code* Section 7901, as amended) provides for the remediation and regulation of uranium mill tailings at uranium millsites addressed under Title I and Title II of UMTRCA. Title I sites, such as the Falls City site, are former uranium millsites unlicensed and essentially abandoned when UMTRCA was implemented on January 1, 1978. Title II of UMTRCA addresses reclamation of uranium millsites under specific license on January 1, 1978. NRC is the licensing agency for both Title I and Title II sites, although an Agreement State may elect to regulate a Title II site.

Federal regulations in Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27) provide for the licensing, custody, and long-term care of uranium mill tailings disposal sites remediated under Title I of UMTRCA. NRC regulates a general license for the long-term custody and care of these sites. Long-term care includes institutional controls, inspection, monitoring, maintenance, and other measures to ensure that the sites continue to protect public health, safety, and the environment after remediation is completed.

The general license becomes effective when a site-specific LTSP receives NRC concurrence. The original LTSP for the Falls City site (DOE 1997b) received NRC concurrence on July 8, 1997 (Appendix A).

Table 1–1 lists the requirements in 10 CFR 40.27 for the LTSP and for the long-term custody and care of the Falls City site.

Table 1–1. Requirements for the Long-Term Surveillance Plan and the Long-Term Surveillance and Maintenance of the Falls City, Texas, Disposal Site

Requirements for the LTSP		
No.	*Requirement*	*This LTSP*
1.	Final site conditions	Section 2.0
2.	Legal description of the site	Section 2.3.1 and Appendix B
3.	Long-term surveillance program	Section 3.0
4.	Follow-up inspections	Section 3.4
5.	Maintenance and other actions	Section 3.5
Requirements for Surveillance and Maintenance		
No.	*Requirement*	*This LTSP*
1.	Changes to the LTSP	Section 3.1
2.	Permanent right-of-entry	Section 3.1
3.	Notification of inspections, significant problems, or actions	Sections 3.3, 3.4, 3.5, and 3.6

The plans, procedures, and specifications in this revised LTSP are based on the *Guidance for Implementing the Long-Term Surveillance Program for UMTRCA Title I and Title II Disposal Sites* (DOE 2000). That document and the current LTSP constitute DOE's operational plan for the long-term custody and care of the Falls City site.

1.3 Role of the U.S. Department of Energy

In 1988, DOE designated the office at Grand Junction, Colorado, to be the program office for the long-term surveillance and maintenance of all DOE remedial action project disposal sites, as well as other sites as assigned, and to be the common office for the surveillance, monitoring, maintenance, and institutional control of these sites. DOE established the Long-Term Surveillance and Maintenance Program to carry out this responsibility. In 2003, DOE created the Office of Legacy Management (LM) at DOE Headquarters. DOE–LM assumed the responsibilities of the long-term surveillance and maintenance activities and is responsible for implementing and revising this LTSP.

2.0 Final Site Conditions

2.1 Site History

In 1954, the first uranium deposits on the Gulf Coastal Plain were discovered in western Karnes County. These deposits were in the Eocene sedimentary rocks that underlie the Falls City disposal site and surrounding area. Discovery of these deposits led to extensive exploratory drilling by Susquehanna Western, Incorporated (SWI). Open pit mining began in 1959.

SWI built and operated a mill at the site between 1961 and 1973 (DOE 1991). The mill used a sulfuric acid leach process to extract more than 700 tons of uranium oxide (U_3O_8, or yellow cake) from approximately 2.5 million tons of ore. The ore averaged 0.16 percent U_3O_8. The yellow cake was sold to the U.S. Atomic Energy Commission. The milling operation generated more than 3.1 million tons of tailings. Tailings and waste solutions (acid raffinate) were impounded in seven settling ponds, four of which were formerly open pit mines. The ponds were 30 to 35 feet (ft) deep and unlined except for naturally occurring clay-rich horizons in underlying foundation soils and sedimentary rocks. Once the ponds were filled with tailings, they were called tailings piles. Some references cited use the terms ponds and tailings piles interchangeably.

In 1975, SWI sold the millsite and tailings to Tepcore, Inc. Tepcore in turn sold the property to Solution Engineering, Inc. (SEI) and its partner, Basic Resources, Inc. From late 1978 to early 1982, SEI conducted secondary recovery operations from four of the tailings piles. The recovery operation used a system of shallow injection and recovery wells and an ion exchange process to recover uranium and molybdenum from solution. Acid water from one of the ponds (Pond 7) was used in this operation, and wastewater was pumped back into the pond. All ponds were eventually evaporated except Pond 6, which was recharged by natural seepage.

In 1982, SEI re-contoured the tailings piles and filled the remaining ponds. The disturbed area was covered with 1 to 2 ft of local clay-rich soil and planted with native grasses.

The Falls City millsite was designated for cleanup under Title I of UMTRCA. At the start of remedial action in 1992, the processing site consisted of two parcels of land (Figure 2–1). Parcel A (473 acres) was northwest of the intersection of Farm to Market Road (FM)-1344 and FM-791. This parcel included the former millsite, one mill building, five tailings piles (Piles 1, 2, 4, 5, and 7), and one tailings pond (Pond 6). The Falls City disposal site now occupies the northern part of this parcel. Parcel B (120 acres) was approximately 1 mile east of Parcel A. Parcel B enclosed Pile 3. The two parcels were connected by a corridor that accommodated a slurry line. The slurry line carried waste materials from Parcel A to Pile 3 in Parcel B while the mill was in operation.

Windblown contamination was present on 298 acres associated with Parcel A and 80 acres associated with Parcel B. Thirteen vicinity properties were also contaminated with radioactive materials imported from the millsite. A total of 7,143,000 tons of radioactive materials from all sources were identified for remediation.

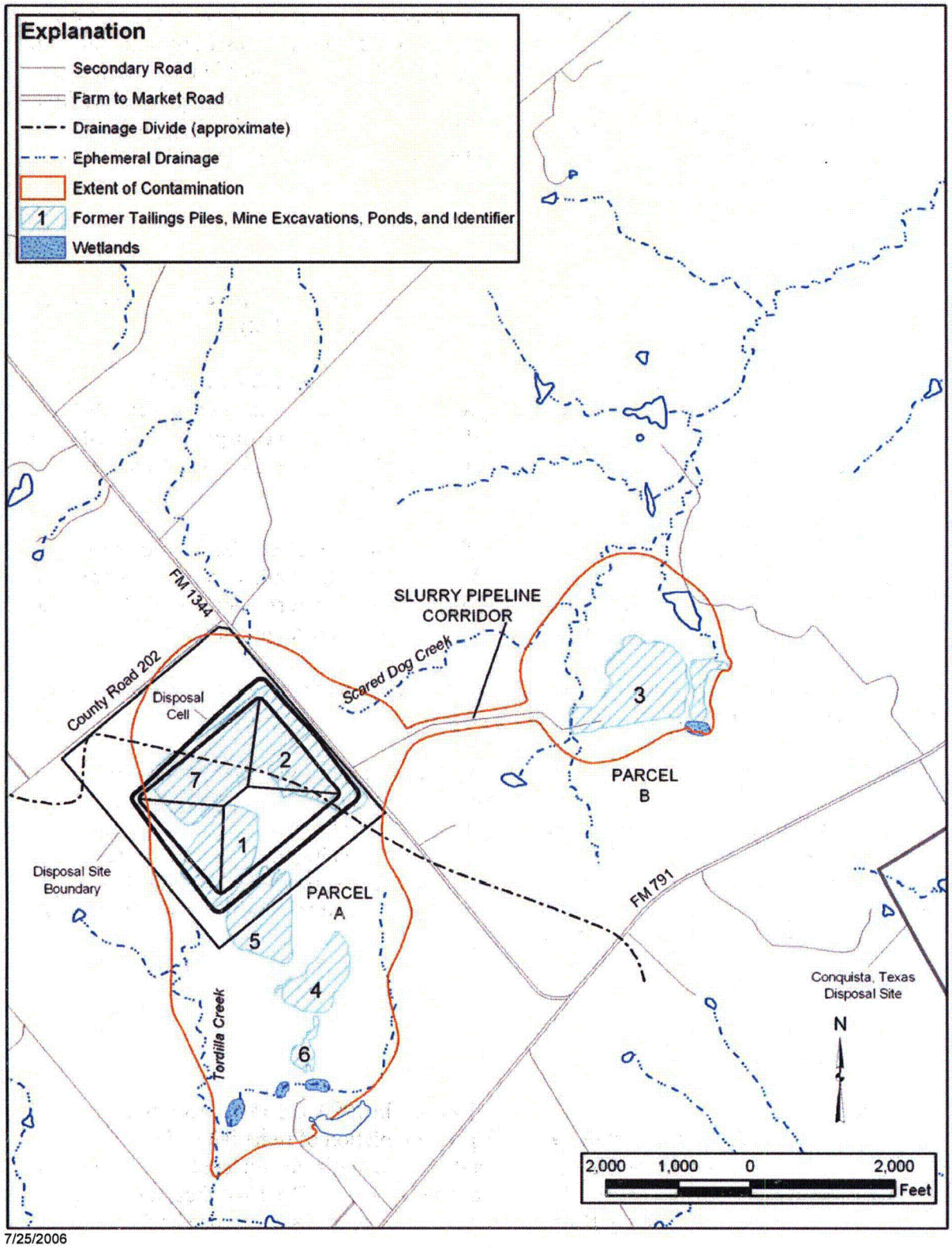

Figure 2–1. Contaminated Areas at the Falls City, Texas, Disposal Site, Before Remedial Action

The approved site remediation strategy was to encapsulate tailings and other residual radioactive materials in an on-site engineered disposal cell. Most of the tailings in Piles 2 and 7 and all of the tailings in Pile 1 were left in place. The remainder of Piles 2 and 7 and all of Piles 3, 4, 5, and tailings in Pond 6, along with windblown and vicinity property materials, were placed within the area occupied by Pile 1 and most of Piles 2 and 7. Remedial action began in 1992 and was completed in 1994. Ford, Bacon, and Davis (1981) and DOE (1991, 1992) provide detailed information on site history and remedial action.

2.2 Area Description

The Falls City disposal site is in Karnes County, Texas, approximately 8 miles southwest of the town of Falls City and 46 air miles southeast of San Antonio (Figure 2–2).

The site is on the northern margin of the West Gulf section of the Gulf Coastal Plain Physiographic Province in an area of low hills underlain by Tertiary sedimentary rocks that dip gently southeast toward the Gulf of Mexico. Relief in the vicinity of the disposal site is 100 ft or less. The site is on a broad drainage divide between the San Antonio and Nueces Rivers at an elevation of approximately 450 ft above sea level.

The surrounding area is rural. Historically, the land has been used for dry-land grain and hay farming and cattle, swine, and dairy production. Before mining, the Falls City site was part of a large dairy farm. Although the area is sparsely populated, about 14 residences are within 1 mile of the disposal site. Former open pit uranium mines are scattered throughout the area.

Vegetation in the vicinity of the site consists of grasses in upland areas and dense woods along stream courses. Mesquite and large cactus are prominent in areas of overgrazing.

Climate is subtropical with hot humid summers and mild winters (DOE 1991). The average annual maximum temperature is 79 °F, and the average annual minimum temperature is 58 °F. Maximum summer temperatures are typically in the 90s and may exceed 100 °F. Winter temperatures below freezing are infrequent. Annual average precipitation is approximately 30 inches and typically ranges from 25 to 38 inches. The greatest rainfall occurs in late spring, summer, and early fall. Heavy rainstorms are not uncommon, and tropical storms (hurricanes) occasionally occur (Ford, Bacon, and Davis 1981).

2.3 Site Description

2.3.1 Legal Description

Pursuant to Section 104 of UMTRCA, the State of Texas, in 1990 and 1991, acquired 746.13 acres for remedial action (DOE 1997b). Upon completion of remedial action, 231.15 acres of land, including the disposal cell and land immediately adjacent, were transferred to DOE for long-term custody. Perpetual access to the site is from FM-1344 that runs along the northeast side of the site and County Road 202 along the northwest side of the site (Figure 2–1).

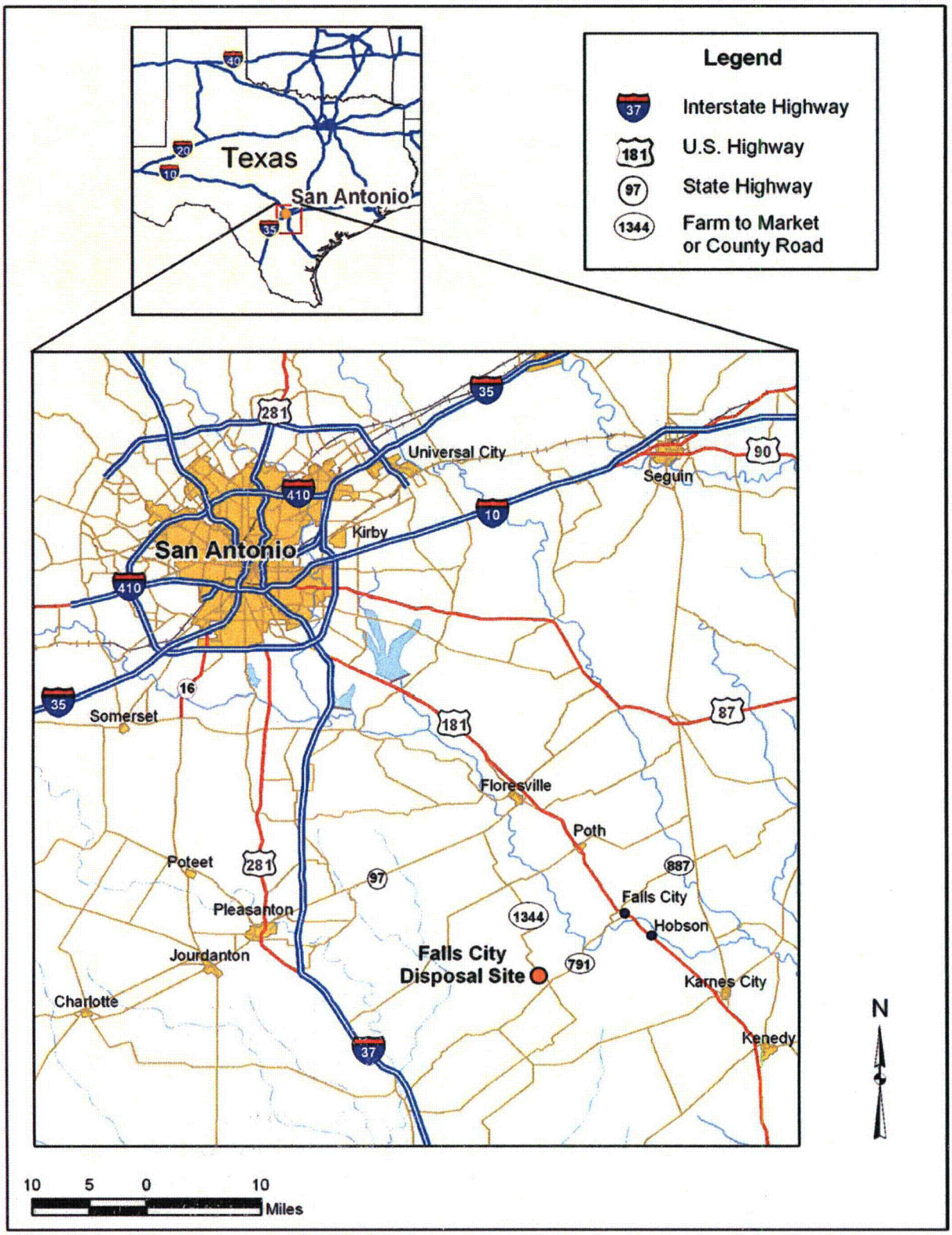

Figure 2–2. Location Map, Falls City, Texas, Disposal Site

The legal description of the site and a brief history of land acquisition are in Appendix B. Site boundaries are shown on Figure 2–4.

Land surrounding the site is privately owned. The remainder of the land acquired by the State was sold in 2005.

2.3.2 Location and Access

Table 2–1 shows mileages and driving directions to the site. See also Figure 2–2.

Table 2–1. Driving Directions to the Falls City, Texas, Disposal Site

Mileage	Route
0.0	Intersection of Interstate Highway 37 South (I–37S) and U.S. Highway 181. Proceed southeast on Highway 181 through Floresville toward Falls City.
32.4	Junction with County Road 887 north of Falls City. Turn right (southwest).
33.6	Junction with Farm-to-Market Road (FM)–791. Turn right (southwest).
41.1	Junction with FM–1344. Turn right (northwest).
41.9	Access gate at the east corner of the site adjacent to FM–1344. At this location, the site is immediately west of FM–1344.

2.3.3 Site Description

Features described in this section are shown on Figure 2–4.

Disposal Site—The site comprises 231.15 acres, of which 127 acres are occupied by the disposal cell, including the apron. The disposal site is on top of a broad drainage divide. Runoff from the northern half of the site flows into natural drainages northeast and east of the site. These ephemeral drainages are tributaries of the San Antonio River. Runoff from the southern half of the site drains south and southwest into Tordilla Creek, an ephemeral tributary of the Nueces River.

Disposal Cell—The disposal cell contains 7,143,000 dry tons of residual radioactive materials. These materials consist of tailings, millsite debris, vicinity property materials, and windblown contamination. Total activity within the cell is 1,277 curies of radium-226.

The disposal cell is a rectangular, flat-topped mound that rises 30 to 40 ft above surrounding grade. It is a surface impoundment, but parts of it are below grade where it was constructed above pre-existing, backfilled, open-pit mines. The highest elevation on top of the cell is 487 ft above sea level. The base of the cell is approximately 2,500 ft long on the northwest and southeast sides, and 2,200 ft long on the northeast and southwest sides.

In the lower part of the cell, debris from the mill building was placed above pre-existing tailings and the surface of the ground. Organic materials such as woody debris and grubbed vegetation were distributed throughout the cell. Relatively clean, fine-grained, windblown material was placed above the other materials toward the top of the cell to restrict the release of radon to the

atmosphere (radon flux) (DOE 1996). Contaminated materials underlie the side slopes of the cell.

The tailings are encapsulated and protected by an engineered cover on the top and side slopes of the disposal cell. The component layers of the cover are designed to prevent erosion, limit radon flux, and restrict infiltration of rainwater (Figure 2–3). The disposal cell is designed to withstand a probable maximum precipitation event (defined as the largest storm that could hypothetically occur as a result of the most severe meteorological conditions possible occurring simultaneously over a watershed at a given time) of 19.2 inches of rainfall in 1 hour and a seismic event with horizontal ground acceleration of 0.1 g (g = standard acceleration of gravity) (DOE 1992).

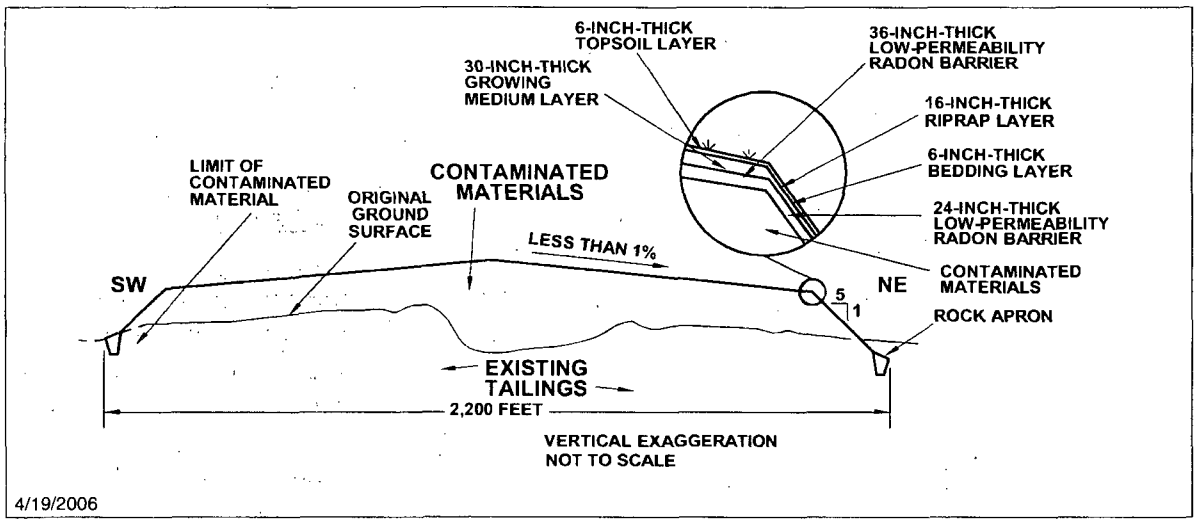

Figure 2–3. Disposal Cell Cross Section

On top of the disposal cell, the cover is 72 inches thick. It consists of a 36-inch-thick layer of highly compacted, clay-rich soil (radon barrier), a 30-inch-thick layer of soil suitable as a growing medium, and a 6-inch-thick layer of topsoil. The radon barrier is designed to limit radon flux to less than the U.S. Environmental Protection Agency (EPA) standard at 40 CFR 192.02 of 20 picocuries per square meter per second. The highly compacted, fine-grained radon barrier also serves to restrict the infiltration of rainwater into the tailings.

The 6-inch-thick layer of topsoil above the radon barrier supports a dense mixture of range grasses, primarily Kleingrass (Table 2–2). The grass provides erosion protection and removes moisture from the soil through evapotranspiration. The grass is cut several times each year, depending upon rainfall. The hay is bailed for feed (Section 3.5). Because of the mild climate, the radon barrier and soil cover are not subject to freeze-thaw cycles.

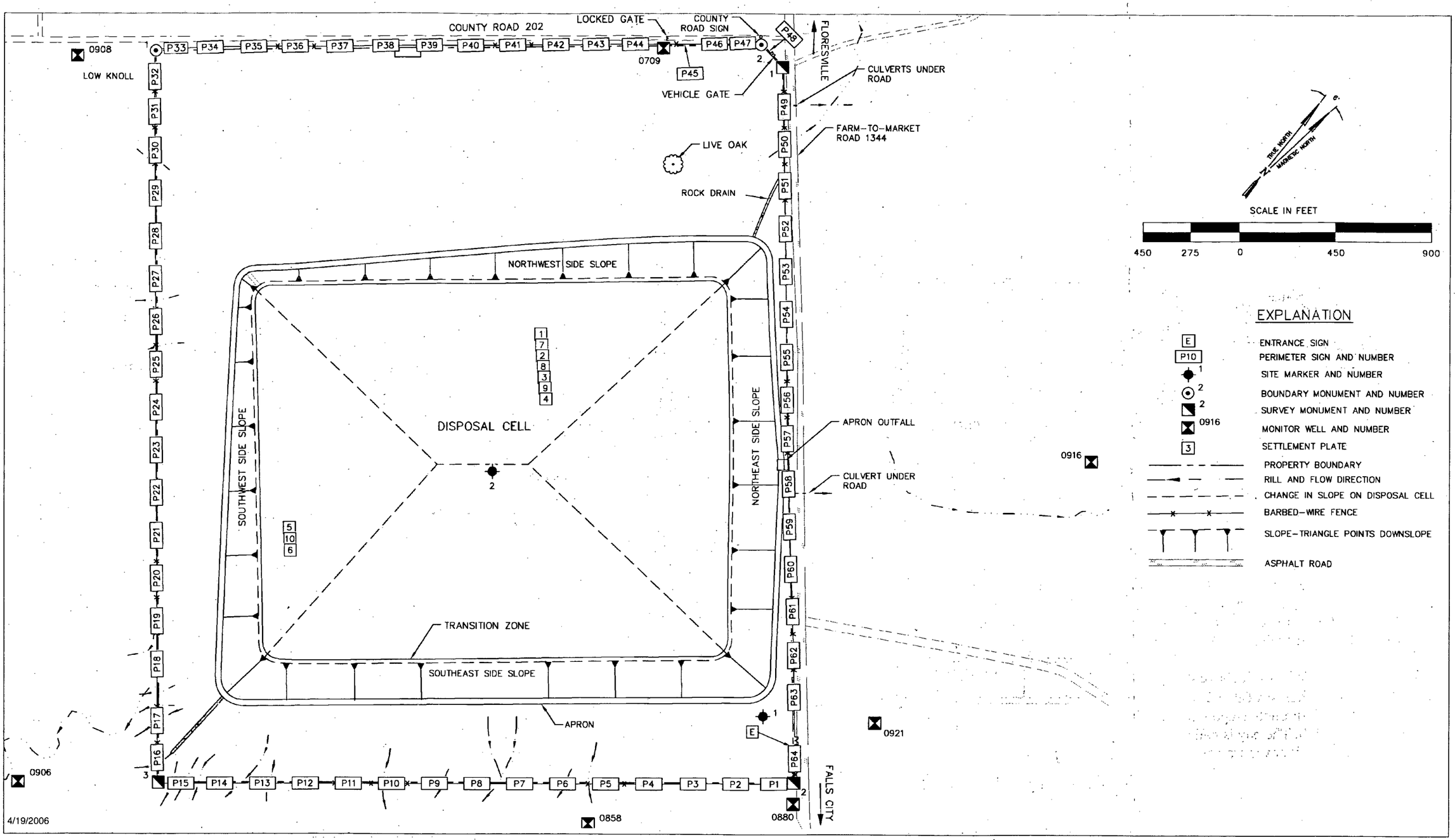

Figure 2–4. Site Map, Falls City, Texas, Disposal Site

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Table 2–2. Top Slope Seed Mixture, Falls City, Texas, Disposal Site

Species	Rate (pounds per acre)
Green sprangletop	1.90
Common Bermuda	10.20
Sideoats grama	0.96
Kleingrass	5.14
Total	18.20

The top of the disposal cell has a 100:1 (1 percent) slope to prevent standing water and minimize the velocity of runoff. The cover over the top of the disposal cell has a high water storage capacity. It stores water during periods when rainfall exceeds runoff and evaporation, and returns water to the atmosphere through evapotranspiration.

The cover on the side slopes is 46 inches thick. It consists of a 24-inch-thick radon barrier of the same compacted clay-rich soil used for the top slope. This layer is covered with 6 inches of bedding material and a 16-inch-thick layer of riprap. The riprap has a median diameter (D_{50}) of 7 inches (D_{50} is the diameter of rock such that 50 percent of the rock by weight is of that diameter or larger.) The bedding layer was placed over the radon barrier to protect it during placement of the riprap. The bedding layer also facilitates runoff following storms. The side slopes of the disposal cell have 5:1 (20 percent) slopes.

An apron of rock surrounds the base of the disposal cell on all sides. The apron is from 6 to 10 ft deep and extends 29 ft beyond the toe of the side slopes. Riprap in the apron has a D_{50} of 11 inches. The apron protects the side slopes of the disposal cell from erosion adjacent to the disposal cell and is graded to direct runoff away from the cell.

Rock drains at the north and south corners of the cell extend outward from the apron for a distance of 350 ft. An apron outfall, constructed of the same rock as the apron and rock drains, is midway along the northeast side of the disposal cell. The apron outfall and rock drains convey runoff away from the cell.

The side slopes, rock apron, rock drains, and apron outfall are designed to withstand a Probable Maximum Precipitation event.

2.3.4 Institutional Controls

Institutional controls at the site consist of federal ownership (withdrawal) of the land within the boundaries of the DOE-owned disposal site, which allows DOE full control of on-site land use.

DOE has imposed use restrictions in the form of deed restrictions on the portion of the former processing site acquired by the State of Texas but not incorporated into the disposal site (Appendix B). This parcel was sold to a private entity in 2005.

2.3.5 Specific Site Surveillance Features

Features described in this section are shown on Figure 2–4. Specifications for construction of these features are in the guidance document (DOE 2000).

Fence and Gates—A barbed-wire stock fence on the property line encloses the site. The entrance gate is a tubular metal gate at the eastern corner of the site adjacent to FM–1344. A second gate is at the north corner of the site between boundary monument BM–2 and survey monument SM–1. The second gate is a simple wire gate wide enough for vehicles. Another wire gate is on the northwest side of the property, adjacent to County Road 202. All gates are locked.

Boundary and Survey Monuments—There are two boundary monuments. BM–1 is near the west corner of the site, and BM–2 is near the north corner of the site. Both are Berntsen Model A-1 federal aluminum survey monuments. Boundary monuments extend about 12 inches above the ground.

There are three survey monuments. SM–1 is near the north corner of the site approximately 150 ft east of BM–2 where the property corner is truncated. SM–2 is near the east corner of the site, and SM–3 is near the south corner of the site. All survey monuments are Berntsen RT–1 survey monuments set in concrete. The concrete bases extend about 4 inches above the ground.

Each boundary and survey monument is set approximately 5 ft inside the property boundary.

Site Markers—Site markers are unpolished granite monuments embedded in concrete. SMK–1 is just inside the entrance gate at the east corner of the site. SMK–2 is at the crest of the disposal cell. The markers are identically inscribed with the following information: a diagram to show the site boundary and location of the disposal cell, the date of closure (February 9, 1994), the quantity of tailings (7,143,000 dry tons), and the level of radioactivity within the disposal cell (1,277 curies of radium-226).

Signs—Sixty-four perimeter (warning) signs are mounted on steel posts at 500-ft intervals around the edge of the site. The signposts are set back 5 ft from the site boundary and are set in concrete. The signs are numbered P1 through P64 on Figure 2–4.

The signs are metal or plastic placards, approximately 24 inches wide and 18 inches high. Information on the signs states that the site is a uranium mill tailings repository, U.S. Government property, no trespassing allowed. The international symbol for radioactive materials (trefoil) is on each sign to warn of the potential hazard, although there is no hazard as long as the engineered cover over the tailings remains intact. Signs have black lettering on a yellow background.

In addition to the perimeter signs, an entrance sign is on a post just inside and to the left of the entrance gate. This sign provides the same information as the perimeter signs and also a 24-hour telephone number ([970] 248-6070) for the public to contact DOE in case of an emergency or inquiry.

Settlement Plates—There are 10 settlement plates in two groups on top of the disposal cell. Settlement plates were used to monitor settlement during and immediately following

construction of the disposal cell. Settlement or movement, as measured, did not exceed 1 inch vertically or 0.7 inch laterally, and was determined to be insignificant. Monitoring of settlement plates was terminated soon after the disposal cell was completed. The settlement plates are artifacts of construction and are no longer monitored or maintained.

Monitor Wells—There are twelve DOE monitor wells remaining at the Falls City site (Figure 2–5). Wells are constructed to State of Texas specifications for monitor wells and are protected by locked steel covers. Completion diagrams are appended to the GCAP (DOE 1998).

2.4 Geology

The Falls City site is underlain by surficial deposits (soils) and clastic sedimentary rocks of the Eocene Whitsett Formation. The three members of the Whitsett Formation are, in descending order, the Deweesville Sandstone, Conquista Clay, and Dilworth Sandstone. The Conquista Clay is composed of three subunits: an oxidized upper clay/silt, a middle sandstone, and a lower clay. The Manning Clay underlies the Whitsett Formation. Both the Deweesville Sandstone and Conquista Clay are composed of poorly lithified, fine-grained sandstones and carbonaceous siltstones and claystones deposited in lagoonal to strand plain, barrier bar environments. The Dilworth Sandstone is predominantly fine-grained. Uranium ore occurs primarily in the sandstone units. Volcanic ash, abundant in some units, is the likely source of the uranium. The Whitsett Formation underlies the surficial soils at the Falls City site.

Geologic structure at the site is relatively simple. Strata dip uniformly one to four degrees southeast toward the Gulf of Mexico and are undeformed. The Falls City fault is one mile north, and the Fashing fault system is 5 miles south of the site (DOE 1991); these are typical gulf coast slump faults that parallel the coast. Neither is active or considered capable of generating sufficient seismic activity to threaten cell integrity. Minor seismic activity was reported on 12 occasions in Karnes and Atascosa Counties between 1973 and 1993. Only one report of seismic activity was in Karnes County; the other 11 were in adjacent Atascosa County. All 12 events were listed as "probably man-made" (i.e., attributed to oil and gas withdrawal) (University of Texas, undated).

2.5 Ground Water

2.5.1 Ground Water Occurrence

Two aquifers of interest underlie the site: the shallow Deweesville/Conquista aquifer and the deeper Dilworth aquifer. Because the two aquifers are hydraulically connected, they constitute the uppermost aquifer for regulatory purposes. The Dilworth aquifer is underlain by the Manning Clay, a 300-ft-thick aquitard that isolates the uppermost aquifer from better quality ground water in deeper aquifers.

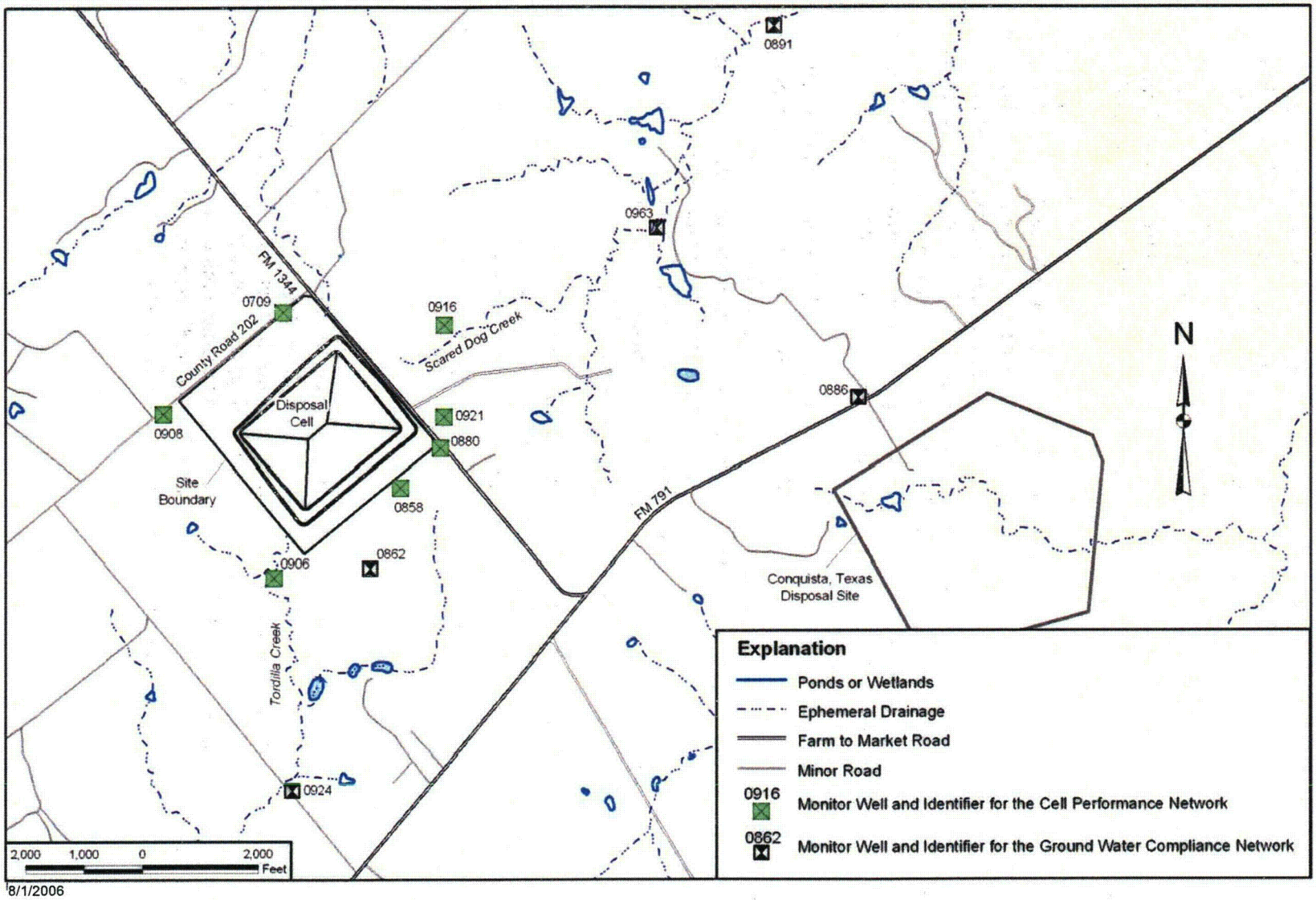

Figure 2–5. Ground Water Monitor Wells, Falls City, Texas, Disposal Site

Ground water occurs in the Deweesville/Conquista aquifer under unconfined conditions at depths ranging from 5 to 30 ft (DOE 1997a). Recharge is primarily from precipitation falling on areas of outcrop and some seepage from other formations. When the tailings ponds were active (some consisted of open pit mines excavated into the ore-bearing Deweesville and Conquista units), they provided an additional component of recharge. Discharge in the downdip direction is to Tordilla Creek and an unnamed tributary southeast of the site. Discharge may also occur to Conquista Creek southeast of FM–791. North of Parcel B (Pond 3), discharge is to the Scared Dog Creek drainage. A downward hydraulic gradient exists between the Deweesville/Conquista aquifer into the Dilworth aquifer. No continuous impermeable strata separate the two aquifers.

Ground water occurs in the Dilworth aquifer at depths ranging from 30 to 100 ft beneath the site. Ground water is unconfined in the updip direction near the outcrop and is confined by 30 to 50 ft of carbonaceous clay in the lower part of the overlying Conquista Clay in the downdip direction beneath the disposal cell. This lower clay unit acts as an aquitard to downward seepage of ground water from the Conquista sandstone unit. However, some hydraulic connection between the overlying Deweesville/Conquista aquifer and the Dilworth aquifer is believed to occur because uranium exploration boreholes were drilled through both aquifers across the region. The boreholes probably were not properly decommissioned, as was a common practice of the time.

Before site remediation, the potentiometric surface of the Deweesville/Conquista aquifer defined a ground water mound beneath the former processing site that was created by infiltration of processing solutions (DOE 1997a). Literature research and historical data indicate the Deweesville/Conquista strata beneath the site were unsaturated before milling operations began (DOE 1995). Recent ground water monitoring results indicate that the ground water mound is dissipating. This is most likely the result of regional potentiometric equilibrium becoming reestablished after some local sources of recharge were eliminated (i.e., cessation of ore-processing activities and removal of tailings ponds during remedial action).

Aside from the lowering of water levels in some monitor wells near the disposal cell, ground water elevations measured in many of the existing DOE-owned monitor wells have remained relatively stable since completion of the disposal cell. Some monitor wells reflect a slight regional rise in water levels for the past 3 to 4 years. No significant deviations of the water level have been noted in the vicinity of the disposal site (Figure 2–6).

2.5.2 Ground Water Quality

Ground water in the Deweesville/Conquista and Dilworth aquifers in the vicinity of the Falls City site is of limited use and is unsuitable as a source of drinking water because of widespread ambient contamination (naturally occurring uranium mineralization) and degradation caused by associated human activities (uranium exploration and mining) not related to uranium-ore processing. The disposal cell is located near former open pit uranium mines in a geochemically active environment. Remnant uranium mineralization is being redistributed through recharge by oxidizing meteoric water at the formation outcrop immediately updip of the site.

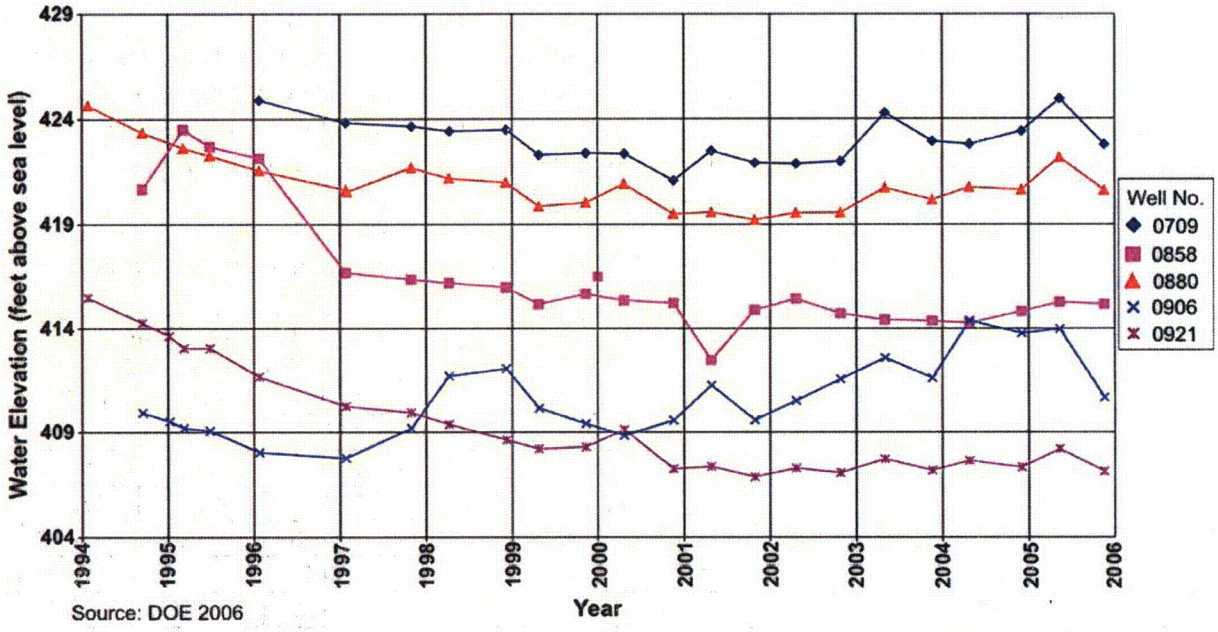

Figure 2–6. Static Ground Water Levels Near the Falls City, Texas, Disposal Site

DOE has monitored the ground water from 10 monitor wells at the Falls City disposal site as specified in the LTSP (DOE 1997b) and GCAP (DOE 1998). Ground water monitoring data are available in the DOE–LM SEEPro database, and analyses of results from the November 2005 sampling event are available in the Data Validation Package (DOE 2006). A summary of ground water quality measurements is presented in this section.

Background Ground Water Quality—The Deweesville/Conquista aquifer was unsaturated beneath the site before mining and milling activities began. Consequently, background ground water quality information for the former Falls City millsite does not exist (DOE 1997a). DOE obtained representative background ground water quality information from an area of the Deweesville/Conquista aquifer near Hobson, a small town about 3.5 miles south of Falls City, in an area removed from the effects of uranium-ore processing (DOE 1997a).

Ground water quality varies within the Deweesville/Conquista and Dilworth aquifers in the vicinity of the disposal site depending on oxidation state and length of time the ground water has been in contact with aquifer materials. The ground water chemistry in each permeable zone is distinct. Oxidizing conditions exist within the permeable zones beneath the millsite, and conditions become more reducing downdip. Table 2–3 shows typical water compositions for the various zones, determined during remedial action.

Ground Water Contamination—Ground water monitoring has identified milling-related contamination in the Deweesville/Conquista and Dilworth aquifers. Hazardous constituents in ground water that were derived from uranium milling operations at the Falls City site include arsenic, cadmium, molybdenum, radium, selenium, and uranium. These constituents have been detected at concentrations that exceed EPA maximum concentration limits in 40 CFR 192. In both aquifers, contamination in ground water generally coincides with pH values that are lower than typical background values. Typically, pH values for the tailings pore fluids were

approximately 3.0 standard units, and pH values in affected ground water in the Deweesville/Conquista and Dilworth aquifers range from 3.5 to 6.3 and 5.5 to 7.0 standard units, respectively. Because ground water pH initially has been shown to influence contaminant fate and transport, pH changes have been monitored as an indicator of ground water quality. The Deweesville/Conquista and Dilworth aquifers naturally buffer the low pH as ground water moves downgradient (DOE 1997a).

Table 2–3. Typical Background Water Quality Data for the Deweesville/Conquista and Dilworth Aquifers

Constituent	Tailings Fluid	Reduced Zone		Transitional Zone		Oxidized Zone (outcrop area)		
	0607[a]	0667	0668	0951	0969	0967	0968	0979
Alkalinity[b]	–	252	250	307	291	116	226	193
Calcium	510	335	405	364	495	278	90	258
Chloride	1,040	785	944	708	779	793	338	672
Iron	544	0.45	0.19	0.03	0.87	< 0.03	< 0.03	< 0.03
Magnesium	214	31.8	45.1	29	61	30.5	8.1	28.3
Manganese	22.6	0.21	0.78	0.21	2.94	0.02	< 0.01	0.07
Nitrate	< 1.0	4.9	3.5	4	1.3	10.2	12.4	4.4
pH	2.93	6.65	6.63	6.75	6.70	5.98	6.58	6.08
Potassium	2.38	43	29	45	43	30	18	36
Sodium	832	678	583	652	550	675	121	531
Sulfate	7,390	1,043	930	856	1,290	817	156	569
TDS[c]	11,900	3,120	3,310	2,291	3,650	2,750	6,224	2,210
Uranium	0.908	0.015	0.017	0.008	0.010	0.003	0.068	0.25

Notes: All concentrations are in milligrams per liter except pH.
Wells 0951, 0667, and 0668 are completed in the Deweesville/Conquista aquifer. Wells 0967, 0968, 0969, and 0979 are completed in the Dilworth aquifer.
Analytical results are from the June/July 1991 sampling.
Source: DOE 1997a.

[a]These are monitor well identifiers.
[b]Reported as milligrams per liter $CaCO_3$
[c]Total dissolved solids

Two areas have been identified in the Deweesville/Conquista aquifer on the basis of pH values that are lower than pH values in portions of the aquifer that were not affected by ore-processing activities. These areas are defined by the pH isopleths in Figure 2–7. The source appears to be the open pit mining operations that occurred on Parcels A and B and the processing solutions pumped to the pits and piles on Parcel A. One area has been delineated in the Dilworth aquifer beneath Parcel B (see Figure 2–8). Tailings pore fluids were also generally lower in pH than background ground water and are essentially indistinguishable from processing-related contamination.

Contaminant mobility generally increases as pH decreases. Recent pH values for ground water in all monitor wells were generally consistent with historical data, although slight increases were observed at some locations. Increasing pH most likely reflects equilibrating ground water chemistry as potentiometric surfaces adjust to elimination of some sources of recharge.

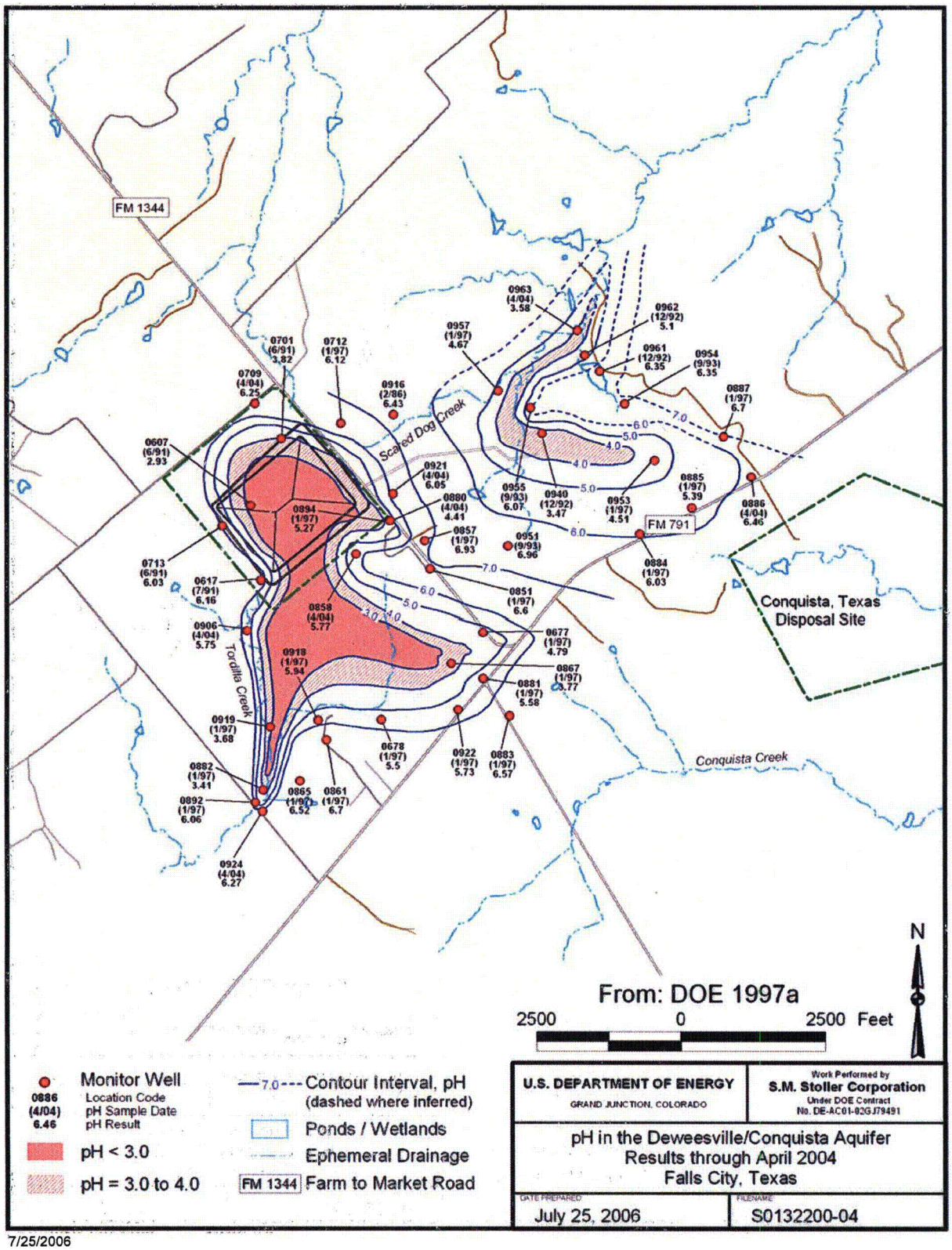

Figure 2–7. Ground Water pH in the Deweesville/Conquista Aquifer

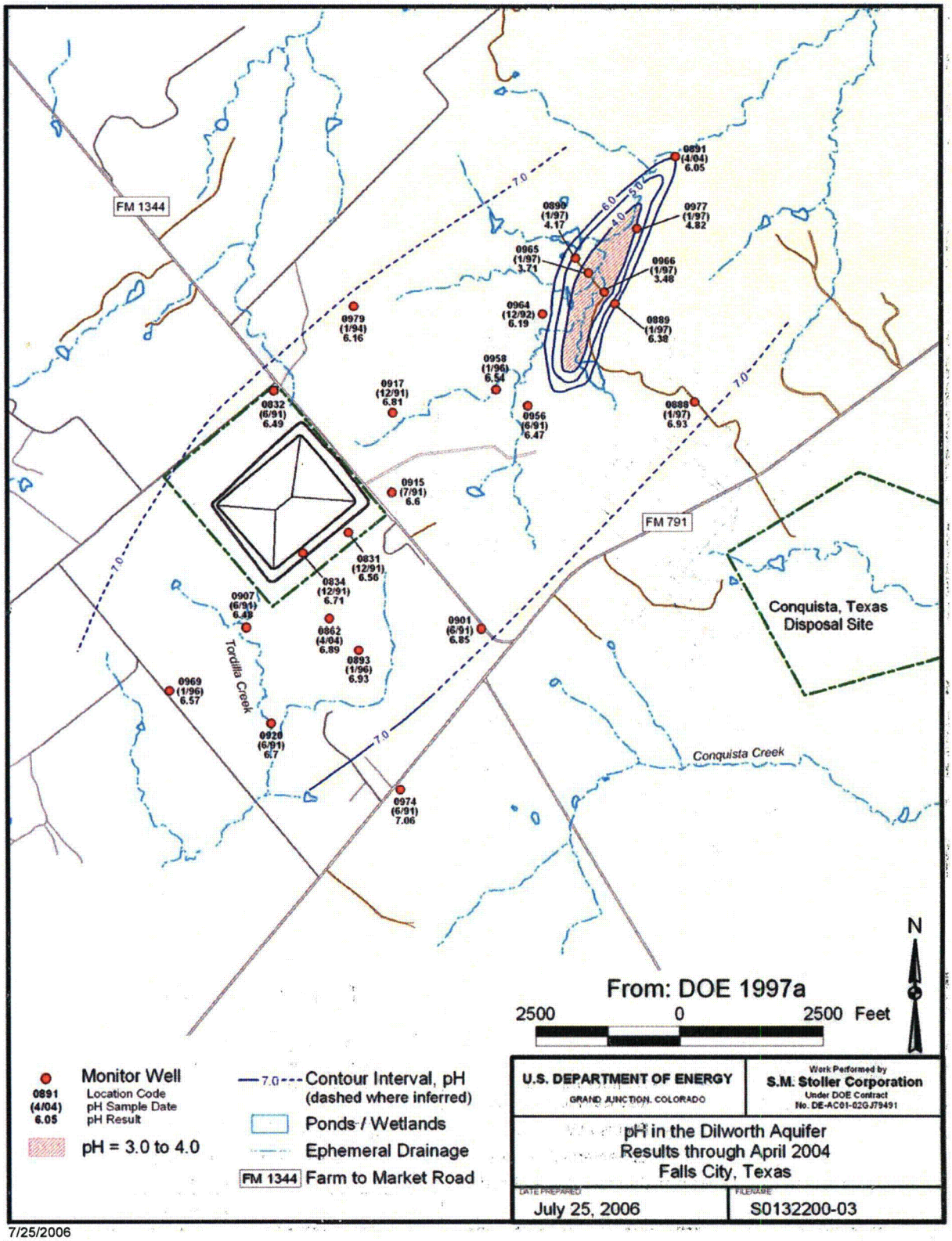

Figure 2–8. Ground Water pH in the Dilworth Aquifer

Monitoring results indicate that pH is not necessarily an indicator of contaminant concentrations. For instance, at monitor well 0880, cadmium, radium, and gross alpha levels have historically been higher, and pH has generally been lower, than at the other wells in the monitoring network. Uranium concentration in monitor well 0880 has increased in recent years and is now decreasing; concentrations in the May 2005 and November 2005 samples were 9.2 and 8.5 milligrams per liter (mg/L), respectively. The overall increase in uranium in ground water at well 0880 may be an indication of seepage from the disposal cell, which might be expected since some of the tailings material was not completely dry at the time of disposal. However, the Remedial Action Plan (DOE 1992) states that "the distribution of other hazardous constituents...shows isolated points of elevated concentrations...[that] are contributed by the natural redistribution of mineralization rather than tailings seepage." These trends have persisted since before 1994 when the disposal cell was completed, and ground water at other monitor wells nearby does not show similarly elevated concentrations of analytes. Subsequent statistical analysis has indicated only moderate correlation between pH and uranium concentration in the affected portions of the uppermost aquifer beneath the Falls City site.

Uranium concentrations in ground water near the former tailings piles (several of which were located in the former open pit mines) were, in places, an order of magnitude higher than uranium concentrations in the tailings pore fluids from those piles, indicating that the source included remnant uranium mineralization at the site and was not solely related to ore-processing operations.

Health Risk—Ground water in the Deweesville/Conquista and Dilworth aquifers is classified as limited use. This ground water is unsuitable for agricultural or domestic use because of the widespread ambient contamination that results from elevated levels of naturally occurring constituents. Elevated concentrations of arsenic, cadmium, molybdenum, radium, selenium, and uranium are associated with oxidized ore deposits and open pit mining near the site. Ground water in the reduced portion of the Deweesville/Conquista aquifer is in direct contact with regional uranium mineralization and may contain locally elevated concentrations of lead, manganese, radium-226, sulfate, and uranium. Ground water in the Dilworth aquifer typically contains elevated concentrations of arsenic, manganese, and sulfate. These constituents occur naturally in the uppermost aquifer and render the water untreatable by methods used in public water systems in the region.

Currently, ground water from the Deweesville/Conquista aquifer is not used as a source of domestic or drinking water because of low yields (less than 150 gallons per day) and poor quality (total dissolved solids range from 7,000 to 9,000 mg/L in the vicinity of the disposal cell). Ground water from the Dilworth aquifer is not used as a source of domestic or drinking water within 2 miles of the site (DOE 1998). Because the ground water from the shallow aquifers is not used, ground water contamination does not pose an unacceptable risk to human health and the environment.

Potable (domestic) water is produced locally from the Carrizo Sandstone that lies 2,000 ft below the surface in the vicinity of the disposal site.

2.6 Surface Water

The Falls City site is situated on a drainage divide. There is no catchment above the site, so flooding is not a credible risk.

Two ephemeral drainages, Tordilla Creek and Scared Dog Creek, originate on the site. Runoff from the northern half of the site flows toward Scared Dog Creek, a minor headwater tributary to the San Antonio River many miles to the northeast. Runoff from the southern half of the site flows toward Tordilla Creek, a tributary to the Nueces River. Both San Antonio and Nueces Rivers eventually flow into the Gulf of Mexico.

Although both Scared Dog and Tordilla Creeks receive base flow from ground water, water chemistry data indicate that the surface water in the creeks is unaffected by regional ground water contamination.

There are no significant lakes or ponds near the site. There is a permanent fish pond on a farm about 0.6 mile south of the site. The pond is on the south side of a small tributary to Tordilla Creek and topographically above that tributary. This tributary lies between the disposal site and the farm (Figure 2–5).

End of current text

3.0 Long-Term Surveillance

3.1 General License for Long-Term Custody

With NRC concurrence in the original LTSP (DOE 1997b and Appendix A), the Falls City site was included under the general license for long-term custody established at 10 CFR 40.27(b).

Although sites remediated under UMTRCA are designed and constructed to last "for up to 1,000 years, to the extent reasonably achievable, and, in any case, for at least 200 years" (40 CFR 192, Subpart A, 192.02 [a]), there is no provision for the termination of the general license or DOE's responsibility for the long-term custody of these sites (10 CFR 40.27[b]).

An LTSP is a requirement of the general license. When DOE determines that revision of the LTSP is necessary, DOE will notify NRC. Changes to the LTSP may not conflict with the requirements of the general license (Section 3.2).

In addition, DOE must guarantee NRC permanent right-of-entry to the site so that NRC may conduct site inspections. The Falls City site is easily accessible from FM-1344, a public right-of-way (Section 2.3.2).

3.2 Requirements of the General License

Requirements of the general license are at 10 CFR 40.27 and 10 CFR 40, Appendix A, Criterion 12. Table 3–1 lists the requirements of the general license and the sections in this LTSP where each is addressed.

Table 3–1. Requirements of the General License and DOE Response

Requirement	This Revised LTSP
1. Annual site inspection	Section 3.3
2. Annual inspection report	Section 3.3.5
3. Follow-up inspections and follow-up inspection reports, as necessary	Section 3.4
4. Site maintenance, as necessary	Section 3.5
5. Emergency measures in the event of catastrophe	Section 3.6
6. Environmental monitoring, if required.	Section 3.7

3.3 Annual Site Inspections

3.3.1 Frequency of Inspections

At a minimum, sites must be inspected annually to confirm the integrity of visible features at the site and to determine the need, if any, for maintenance, additional inspections, or monitoring (10 CFR 40, Appendix A, Criterion 12).

To meet the inspection requirement, DOE will inspect the site once each calendar year. The date of the inspection may vary from year to year, but DOE will endeavor to inspect the site once every 12 months unless circumstances warrant variance. The variance will be explained in the inspection report. DOE will notify NRC of the annual inspection at least 30 days in advance.

3.3.2 Inspection Procedure

To ensure a thorough and uniform inspection, the site is divided into areas called transects (Table 3–2).

Table 3–2. Transects for the Annual Inspection of the Falls City, Texas, Disposal Site

Transect	Description
Disposal Cell	Top, side slopes, and apron of the disposal cell, apron outfall, and rock drains
Site Perimeter	Area between the disposal cell and boundary of the site, including the boundary fence
Outlying Area	Area within 0.25 mile of the site

Each transect inside the site is visually inspected by walking a series of random traverses across each transect so that the entire transect surface is inspected. Within each transect, inspectors examine specific site surveillance features, such as survey and boundary monuments, signs, site markers, rock drains, and other features listed in Sections 2.3.5 and 3.3.3 and on the Inspection Checklist (Appendix C).

Inspectors also examine each transect for success of previous maintenance, and for erosion, settling, slumping, plant or animal encroachment, human intrusion or vandalism, and other activity or phenomenon that might affect the safety, integrity, long-term performance, or institutional control of the site.

Inspectors note changes within 0.25 mile of the site. Changes in the surrounding area that might be significant include new development, changes in land use, and erosion or instability of slopes around the site.

Inspectors use photographs and measurements, as necessary, to support or supplement written observations.

3.3.3 Inspection Checklist

Inspectors are briefed, and the inspection checklist is reviewed before the annual inspection. A sample checklist is provided in Appendix C. The actual checklist may vary from year to year, depending on site conditions, and the format for the checklist is not prescribed.

The checklist includes

- Specific site surveillance features to be inspected.
- Routine observations to be made.
- Special issues or problems, if any, to be observed and evaluated.

The checklist is reviewed annually and revised as necessary to reflect changes or new conditions at the site.

3.3.4 Personnel

Typically, two inspectors will perform the annual inspections. Inspectors will be experienced engineers or scientists who have the required knowledge, skills, and abilities to evaluate site conditions and recognize imminent or actual problems.

Inspectors will be assigned for a given inspection of the Falls City Disposal Site on the basis of site conditions and inspector expertise. Areas of expertise include civil, geotechnical, and geological engineering, geology, hydrology, biology, and environmental science (e.g., ecology, soils, or range management). If conditions warrant, more than two inspectors specialized in specific fields may be assigned to the inspection to evaluate serious or unusual problems and make appropriate recommendations.

3.3.5 Annual Inspection Report

DOE will report results of the annual inspection to NRC within 90 days of the last Title I site inspection in the calendar year (10 CFR 40, Appendix A, Criterion 12). If the report cannot be submitted in accordance with 10 CFR 40, DOE will notify NRC. Annual reports are available to the public and other agencies.

3.4 Follow-up Inspections

Follow-up inspections are unscheduled inspections that are conducted in response to threatening or unusual site conditions.

3.4.1 Criteria for Follow-Up Inspections

Criteria for follow-up inspections are at 10 CFR 40.27(b)(4). DOE will conduct a follow-up inspection when:

- A condition is identified during the annual inspection (or other site visit) that requires personnel, perhaps with specific expertise, to return to the site to evaluate the condition; or
- DOE is notified by a citizen or outside agency that conditions at the site are substantially changed.

The public may use the 24-hour DOE telephone number posted prominently on the entrance sign to request information or to report a problem at the site (Section 2.3.5).

Once a new or changed condition is identified, DOE will evaluate the information and determine whether a follow-up inspection is warranted. Conditions that may require a follow-up inspection

include changes in vegetation, erosion, storm damage, wildfires, low-impact human intrusion, minor vandalism, or the need to evaluate, design, or perform maintenance projects. Conditions that threaten the safety of the site or the integrity of the disposal cell may require a more urgent follow-up inspection or emergency response. Slope failure, disastrous storm, major seismic event, and deliberate human intrusion are among these conditions. DOE may request the assistance of local agencies to confirm the seriousness of a condition before conducting a follow-up inspection or emergency response (Section 3.6.3).

DOE will use a graded approach with respect to follow-up inspections. Urgency will be proportional to the potential seriousness of the condition. For example, a follow-up inspection to investigate or control vegetation may be postponed until a particular time during the growing season.

In the event of "unusual damage or disruption" (10 CFR 40, Appendix A, Criterion 12), damage that may compromise or threaten the safety, security, or integrity of the site, DOE will:

- Notify NRC pursuant to 10 CFR 40, Appendix A, Criterion 12, or 10 CFR 40.60, whichever applies;
- Begin the DOE internal occurrence notification process (DOE Order 232.1A);
- Respond with an immediate follow-up inspection or emergency response team; and
- Implement emergency measures, as necessary, to prevent or contain exposure or release of radioactive materials (Section 3.6).

3.4.2 Personnel

DOE will assign inspectors to follow-up inspections on the same basis as the annual site inspection (see Section 3.3.4).

3.4.3 Reports

Results of follow-up inspections for incidents or conditions that do not threaten disposal cell integrity will be included in the annual inspection report to NRC (Section 3.3.5). Separate reports will not be issued unless DOE determines that is it advisable to notify NRC and other agencies of a potentially serious problem at the site.

If follow-up inspections are required for more urgent reasons, DOE will submit a preliminary report of the follow-up inspection to NRC within the 60-day period required by 10 CFR 40, Appendix A, Criterion 12.

3.5 Maintenance

Sites remediated under UMTRCA are designed and constructed so that "ongoing active maintenance is not necessary to preserve isolation" of radioactive material (10 CFR 40, Appendix A, Criterion 12). No "ongoing active" maintenance is required at the Falls City site, although the vegetation requires management, and minor repairs to as-built features are required from time to time.

Vegetation Management—The top of the disposal cell and the area around the disposal cell are covered with dense range grass. The grass is cut two to three times each year, depending on rainfall. The work is performed by a subcontractor, who provides appropriate equipment. The subcontractor cuts and bales the grass, removes the bales, and fertilizes the grass, as necessary. Frequent cutting of the grass reduces the danger of range fire and generally prevents the establishment of deep-rooted, woody species on top of the disposal cell. The minor deep-rooted vegetation that establishes within the grass-covered areas is spot sprayed with herbicide.

Access to the top of the disposal cell for grass cutting operations is at the west corner of the disposal cell where the distance from the bottom of side slope to the top is shortest. DOE installed a ramp constructed of aggregate at this location to prevent displacement of riprap by farming equipment.

Small trees and woody plants tend to propagate in the riprap on the side slopes of the disposal cell. This is a potential concern because tailings extend under the side slopes of the cell where the radon barrier over the tailings is only 24 inches thick. Encroaching species include bee bush, yerba de pasmo, rabbit brush, and mimosa. These plants are cut down, and the cuttings removed as necessary. Cut stumps are treated with herbicide.

Site Features—DOE will maintain site features such as the fence, entrance gate, perimeter, and entrance signs, as required.

Reports—Reports of maintenance during the previous 12 months will be summarized in the annual site inspection report (Section 3.3.5).

3.6 Emergency Response

Emergency response is action DOE will take in response to "unusual damage or disruption" that threatens or compromises site safety, security, or integrity (10 CFR 40, Appendix A, Criterion 12).

3.6.1 Criteria for Emergency Response

Conceptually, there is a continuum in the progression from small-scale, minor, routine maintenance (Section 3.4) to large-scale intervention that might include reconstruction of the disposal cell following an unlikely disaster. Although required by 10 CFR 40.27(b)(5), criteria for initiating specific responses to progressively more serious problems are not easily established because the nature of all potential problems is unforeseeable and the threat of those that can be anticipated is highly scale dependent. The information in Table 3–3 is a guide to the actions DOE may make in response to increasingly serious problems.

The table shows that the difference between routine maintenance and different emergency responses is primarily one of risk or urgency. Priorities listed in the table are inversely related to the probability of the problem occurring. The highest priority responses are the least likely to be required.

Table 3–3. Criteria for Emergency Response

Priority	Event	Example	Response
1 Urgent	Breach of containment with release of contaminated materials.	Side slope of disposal cell fails. Radioactive materials are dispersed.	1. Notify NRC. 2. Conduct immediate follow-up inspection by DOE emergency response team. 3. Recover radioactive materials. 4. Repair side slope.
2	Breach of containment without release of contaminated materials.	Side slope of disposal cell fails or is threatened by erosion. Radioactive materials are not dispersed.	1. Notify NRC. 2. Conduct immediate follow-up inspection by DOE emergency response team. 3. Repair side slope.
3	Cover materials no longer meet design objectives.	Riprap deteriorates due to weathering. Grass cover is lost due to fire, climate, pest, or other cause.	1. Perform risk assessment. 2. If risk unacceptable, design for repair. 3. Complete repair.
4	Breach of site security with or without excavation or removal of materials.	Willful human intrusion or significant vandalism.	Restore security. Harden security as necessary.
5 Routine	Minor problems, small-scale changes.	Minor vandalism, fence repairs, undesirable changes in vegetation.	Routine maintenance.

3.6.2 Notification

In accordance with 10 CFR 40.60, DOE will notify the following organization within 4 hours of discovery of a Priority 1 or 2 (or similar) event (Table 3–3):

Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety and Security
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Telephone (301) 816-5100.

3.6.3 Procedure for Emergency Response

In the event of a Priority 1 or 2 event, a DOE emergency response team will assess the damage and decide whether evaluation of the problem is required or if immediate intervention is essential. This decision will be based on the emergency team's evaluation of the adequacy of the damaged feature to perform its intended function.

To make this decision, the emergency response team will evaluate the following:

- Adequacy of the design specifications for the damaged feature to control or accommodate the observed problems;
- Extent of the damage, degradation, or departure from the design (or as-built condition) of the damaged feature; and
- Ability of the feature, in its damaged condition, to withstand a design-basis event.

The evaluation may include assessment of risk. DOE will provide NRC with a clear, technical explanation for its decision to study and evaluate or intervene with additional remedial action (DOE 2000).

3.7 Environmental Monitoring

Environmental monitoring at the Falls City site has consisted of ground water monitoring to assess compliance with two regulations. DOE monitored initial disposal cell performance in accordance with 40 CFR 192.03. DOE also monitored ground water contaminated by historical ore-processing activities to comply with 40 CFR 192, Subpart B, as established in the GCAP (DOE 1998). This revised LTSP combines the requirements of both the initial LTSP (DOE 1997b) and the GCAP. The monitoring program reflects the results of the DOE evaluation of ground water quality data collected from 10 monitor wells at the Falls City site from 1996 through 2005 (Section 2.5.2). The conditions that were found to be protective in the initial LTSP and the GCAP prevail.

DOE has fulfilled the environmental monitoring requirements for disposal cell performance and ground water compliance as specified in the LTSP and the GCAP, respectively. In addition, monitoring results indicate that

- There are no unexpected trends and no indication of unacceptable risk to human health and the environment resulting from historical processing of uranium ore at the site.
- Except for uranium, contaminant concentrations in ground water are stable and no longer require monitoring. Uranium will continue to be present in ground water in varying concentrations where geochemical conditions favor mobilization of this constituent as it is released from naturally occurring uranium minerals in the uppermost aquifer.
- Because of widespread, naturally occurring contaminants, ground water in the uppermost aquifer will never be suitable for agricultural or domestic use.

However, to demonstrate that legacy contamination is not affecting downgradient ground water quality in the uranium milling district (including the Title II sites), DOE will continue monitoring the current network of wells annually during early spring through 2010. DOE will analyze ground water for uranium and field parameters (including pH) and will measure water levels. The two components of the revised monitoring program are described below in more detail. After the 2010 monitoring event, DOE will assess monitoring results and recommend whether to continue, modify, or terminate the monitoring program. DOE will recommend termination of monitoring if monitoring results do not vary significantly from current conditions, or if variances from current conditions can be shown to be attributable to naturally occurring processes in the site ground water systems.

3.7.1 Cell Performance Monitoring

DOE has conducted post-closure monitoring since cell closure in 1994 as a best management practice to assess the initial performance of the disposal cell. This monitoring was conducted to demonstrate that the encapsulation system is preventing ground water degradation by comparing ground water sample results to historical conditions and assessing if differences can be attributed to leachate escaping from the disposal cell.

The 1997 LTSP established a screening monitoring program using pH as the indicator parameter to evaluate disposal cell performance. This program was established because pH was expected to correlate to processing-related contamination. Tailings pore fluids were generally lower in pH than background ground water, and mobility of the contaminants of concern generally increases as pH decreases. The pH values for ground water in all monitor wells were generally consistent with historical data, although slight increases were observed at some locations. Increasing pH does not trigger a disposal cell performance evaluation and most likely reflects equilibrating ground water chemistry and potentiometric surfaces. A follow-on investigation and evaluation of disposal cell performance is triggered by pH results of two successive sampling events that fall below the lower 95th percentile (i.e., 2 standard deviations) of the baseline pH values established shortly after cell closure in 1994.

Using ground water chemistry as an indicator of disposal cell performance is problematic at the Falls City site. A comparison of the chemistry of tailings pore water and ground water suggests that contamination that might leach from the disposal cell, either through transient drainage or percolation of precipitation through the cover, would be chemically similar and most likely indistinguishable from site ground water (DOE 1992). Also, monitoring results demonstrate that pH does not co-vary with uranium levels in a statistically significant manner, as had been postulated in the initial LTSP, and results validate the earlier observation that water quality shows significant local variation (DOE 1992). Therefore, decreasing pH does not indicate that contamination originating within the disposal cell is affecting site ground water. Some analyte concentrations have varied with time (e.g., uranium at monitor well 0880). Water level monitoring has indicated dissipation of the legacy ground water mound, which will cause low-pH legacy contamination to move downgradient. This movement of legacy contamination occurs within the hydrologically active ground water system; in areas where reducing conditions prevail, uranium is removed from the ground water, and uranium minerals form. In oxidized zones, uranium remains in solution.

The disposal cell performance monitoring network consists of seven wells (0709, 0858, 0880, 0906, 0908, 0916, and 0921) surrounding the disposal cell and completed in the Conquista and Deweesville sandstone units, which together constitute the upper water-bearing units of the uppermost aquifer (Figure 2–5 and Table 3–4). Because the disposal cell is located on a ground water divide, ground water generally flows away from the area. Monitor wells 0908 and 0916 are located updip of the intersection of the water table and the bottom of the Deweesville/Conquista aquifer, and are usually dry. The remaining wells are completed in saturated permeable zones that underlie the disposal cell and the areas immediately adjacent. Ground water samples will be collected annually from these seven wells and analyzed for total uranium. Sampling will include field measurements of pH, ground water temperature, conductivity, turbidity, water levels, dissolved oxygen, and oxidation-reduction potential.

Table 3–4. Sample Locations for Disposal Cell Performance Monitoring at the Falls City, Texas, Disposal Site

Location	Hydrologic Relationship	Screened Interval[a]
0709	Conquista Sandstone downgradient from cell	13–33
0858	Conquista Sandstone, downgradient from cell	41–51
0880	Deweesville Sandstone, downgradient from cell	24–34
0906	Conquista Sandstone, downgradient from cell	13–28
0908[b]	Conquista Sandstone, unsaturated zone	38–57
0916[b]	Conquista Sandstone, unsaturated zone	13–33
0921	Conquista Sandstone, downgradient from cell	45–55

[a]Feet below ground surface.
[b]Water level measurement only, unless enough water is present to sample.

3.7.2 Ground Water Compliance Monitoring

As described in Section 2.4.1, ground water in the uppermost aquifer in the vicinity of the Falls City site is not suitable for use for any purpose because of naturally elevated levels of uranium. The compliance strategy for ground water protection at the Falls City site is no further remediation and application of supplemental standards (40 CFR 192.21[g]). This strategy is based on a classification of "limited use ground water," which means ground water that is not a current or potential source of drinking water because of widespread, ambient contamination not due to activities involving residual radioactive materials from a designated processing site (at the Falls City site, natural uranium mineralization and mining activities) exists that cannot be cleaned up using treatment methods reasonably employed in public water systems (40 CFR 192.11[e][2]). NRC and the State of Texas concurred with application of supplemental standards as the ground water compliance strategy for the Falls City site (Appendix A).

Numerical ground water quality standards are not applicable under the supplemental standards compliance strategy approved for the site, and ground water monitoring is not required. Neither compliance concentration limits nor points of compliance have been established. DOE will conduct ground water monitoring of the downgradient limit of the processing-related contamination as a best management practice to verify protection of human health and the environment (DOE 1998). This verification is accomplished by using monitoring results to determine if downgradient users might be at risk if they use the ground water in the Deweesville/Conquista and Dilworth aquifers.

The GCAP required monitoring downgradient of the affected areas of ground water through 2002 as a best management practice to ensure that existing or anticipated beneficial uses of ground water and surface water are not adversely affected (DOE 1996). DOE continued to monitor ground water to demonstrate that legacy ground water contamination is not degrading downgradient ground water. Two areas were identified: (1) east of the site in the Conquista/ Deweesville aquifer and the underlying Dilworth aquifer, and (2) an area underlying the cell and extending to the south in the Conquista/Deweesville aquifer. These areas were delineated where ground water pH dropped below 4.0 (Figures 2–7 and 2–8).

The ground water compliance monitoring network consists of five monitor wells (0862, 0886, 0891, 0924, and 0963) located downgradient from the identified affected areas (Figure 2–7 and Figure 2–8). Sample locations were selected on the basis of ground water flow direction from the

two areas. Ground water samples will be collected annually from these five wells and analyzed for total uranium. Sampling will include field measurements of pH, ground water temperature, conductivity, dissolved oxygen, oxidation-reduction potential, turbidity, and water levels.

Table 3–5. Ground Water Compliance Monitoring Locations at the Falls City Site

Location	Hydrologic Relationship	Screened Interval[a]
862	Dilworth aquifer beneath Parcel A.	120–130
886	Downgradient of the low pH plume in the Deweesville/Conquista aquifer, beneath Parcel B.	19–49
891	Downgradient of the low pH plume in the Dilworth aquifer, beneath Parcel B.	13–23
924	Downgradient of the low pH plume in the Deweesville/Conquista aquifer, south of Parcel A.	19–29
963	Downgradient of the low pH plume in the Deweesville/Conquista aquifer, beneath Parcel B.	8–18

[a]Feet below ground surface.

3.8 Records

DOE–LM maintains active records for the Falls City site that are accessible to the site custodian. These records contain information essential to the long-term care and custody of the site pursuant to applicable laws and regulations. These records include site characterization reports, remedial action plans, National Environmental Policy Act documents, engineering design and construction documents, as-built drawings, results of ground water monitoring, and annual inspection reports. Records are available for public inspection. Selected records are available online at http://lts1.gjo.doe.gov/lm_main.htm.

Records for the Falls City site are maintained in compliance with DOE requirements in DOE Order 200.1, *Information Management Program,* and 36 CFR Parts 1220–1238, "Records Management."

3.9 Quality Assurance

The long-term care of the Falls City site and all activities related to the annual surveillance, monitoring, and maintenance of the site comply with DOE Order 414.1C, *Quality Assurance,* and ANSI/ASQ E4-2004, *Quality Systems for Environmental Data and Technology Programs: Requirements with Guidance for Use* (American Society for Quality 2004).

Quality assurance requirements are transmitted to subcontractors through procurement documents when appropriate.

3.10 Health and Safety

Long-Term Surveillance and Maintenance activities are conducted in accordance with health and safety procedures established for DOE–LM and are consistent with DOE orders, regulations, codes, and standards.

Health and safety concerns specific to work at the Falls City site are in the *U.S. Department of Energy Office of Legacy Management Project Safety Plan* (DOE current version). This plan contains a list of emergency telephone numbers and addresses for local fire, hospital, ambulance, and police or sheriff agencies, as well as a map to the nearest emergency medical facility. Personnel are briefed on health and safety requirements before each annual inspection or site visit and carry a copy of the project safety plan.

DOE maintenance subcontractors are advised of health and safety requirements through appropriate procurement documents. Subcontractors are required to have a health and safety plan that complies with Occupational Safety and Health Administration requirements and the project safety plan. A Job Safety Analysis that addresses work-place hazards and mitigation measures will be developed by the subcontractor and will be subject to DOE approval.

End of current text

4.0 References

10 CFR 40.27. U.S. Nuclear Regulatory Commission, "General License for Custody and Long-Term Care of Residual Radioactive Material Disposal Sites," *Code of Federal Regulations,* January 1, 2006.

10 CFR 40, Appendix A, Criterion 12. U.S. Nuclear Regulatory Commission, "Long-Term Site Surveillance," *Code of Federal Regulations,* January 1, 2006.

10 CFR 40.60. U.S. Nuclear Regulatory Commission, "Domestic Licensing of Source Material: Reporting Requirements," *Code of Federal Regulations,* January 1, 2006.

36 CFR 1220–1238, Chapter 12, Subchapter B. National Archives and Records Administration, "Records Management," *Code of Federal Regulations,* July 1, 2005.

40 CFR 192.04. U.S. Environmental Protection Agency, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," Table 1 to Subpart A, "Maximum Concentration of Constituents for Groundwater Protection," *Code of Federal Regulations,* July 1, 2005.

42 U.S.C. 7901 et seq., as amended. Uranium Mill Tailings Radiation Control Act of 1978, *United States Code.*

American Society for Quality, 2004. *Quality Systems for Environmental Data and Technology Programs: Requirements with Guidance for Use,* ANSI/ASQ E4-2004.

DOE Order 200.1, *Information Management Program,* September 30, 1996.

DOE Order 414.1C, *Quality Assurance*, June 17, 2005.

DOE (U.S. Department of Energy), 1991. *Environmental Assessment of Remedial Action at the Falls City Uranium Mill Tailings Site, Falls City, Texas*, Final, DOE/EA-0468, Albuquerque Operations Office Albuquerque, New Mexico, December.

DOE (U.S. Department of Energy), 1992. *Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings Site at Falls City, Texas*, 050520 UMTRA-DOE/AL .0000, Albuquerque Operations Office, Albuquerque, New Mexico, September.

DOE (U.S. Department of Energy), 1995. *Baseline Risk Assessment of Ground Water Contamination at the Uranium Mill Tailings Site near Falls City, Texas*, DOE/AL 62350-64, Rev. 1, Albuquerque Operations Office, Albuquerque, New Mexico, September.

DOE (U.S. Department of Energy), 1996. *Falls City, Texas, Final Completion Report*, DOE Albuquerque Operations Office, Albuquerque, New Mexico, August.

DOE (U.S. Department of Energy), 1997a. *Final Site Observational Work Plan for the UMTRA Project Site at Falls City, Texas*, DOE/AL-62350-157, Rev. 1, Grand Junction Office, Grand Junction, Colorado, May.

DOE (U.S. Department of Energy), 1997b. *Long-Term Surveillance Plan for the Falls City Disposal Site, Falls City, Texas,* DOE/AL/62350-187, Rev. 3, Albuquerque Operations Office, Albuquerque, New Mexico, July.

DOE (U.S. Department of Energy), 1998. Ground Water Compliance Action Plan (GCAP), *Subpart B, Ground Water Compliance Modification to the Remedial Action Plan of the Inactive Uranium Mill Tailings Site at Falls City, Texas*, letter report from D.R. Metzler, DOE-Grand Junction, to J.J. Holonich, NRC, Washington D.C., U.S. Department of Energy, Grand Junction Office, Grand Junction, Colorado, April 13.

DOE (U.S. Department of Energy), 2000. *Guidance for Implementing the Long-Term Surveillance Program for UMTRCA Title I and Title II Disposal Sites* (draft), U.S. Department of Energy, Grand Junction Office, Grand Junction, Colorado.

DOE (U.S. Department of Energy), 2006. Data Validation Package, November 2005 Falls City, Texas, Disposal Site, DOE-LM/GJ1124-2006, Office of Legacy Management, Grand Junction, Colorado, February.

Ford, Bacon & Davis Utah, Inc., 1981. *Engineering Assessment of Inactive Uranium Mill Tailings, Falls City Site, Falls City, Texas,* DOE/UMT-0111, Salt Lake City, Utah, October.

University of Texas, undated. "South Central Texas Earthquakes of Magnitude 3 or Greater," University of Texas Institute for Geophysics. Accessed June 7, 2006, on the Internet at http://www.ig.utexas.edu/research/projects/eq/compendium/DEM_s_central.htm.

Appendix A

NRC Concurrence with Completion of Remedial Action

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

LTSM003139

July 8, 1997

Mr. George Rael, Director
U.S. Department of Energy
Albuquerque Operations Office
ERD/UMTRA
P.O. Box 5400
Albuquerque, NM 87185-5400

SUBJECT: ACCEPTANCE OF THE LONG-TERM SURVEILLANCE PLAN FOR THE FALLS CITY DISPOSAL SITE

Dear Mr. Rael:

The U.S. Nuclear Regulatory Commission staff hereby accepts the U.S. Department of Energy's (DOE's) Long-Term Surveillance Plan (LTSP), dated July 1997, for the Uranium Mill Tailings Remedial Action Project site at Falls City, Texas. This action establishes the Falls City site under the general license in 10 CFR Part 40.27.

As indicated by the NRC letter dated April 24, 1997, all issues related to the LTSP were closed and we were awaiting the land transfer documents. The DOE letter of June 24, 1997, included the documents that NRC staff has reviewed and finds to be acceptable. The DOE letter of July 3, 1997, transmitted the final page changes and new cover sheet for the LTSP. It is our understading that the land transfer documents will be incorporated into Attachment 2 of the LTSP along with this letter of concurrence. Therefore, NRC staff has determined that the revised LTSP satisfies the requirements set forth in the Uranium Mill Tailings Radiation Control Act of 1978 for long-term surveillance of a disposal site, and all requirements in 10 CFR Part 40.27 for an LTSP.

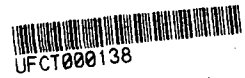
In accordance with DOE's guidance document for long-term surveillance, all further NRC/DOE interaction on the long-term care of the Falls City site will be conducted with the DOE's Grand Junction Project Office. If you have any questions concerning this letter, please contact the NRC Project Manager for the Falls City site, Ms. Elaine Brummett, (301) 415-6606.

Sincerely,

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

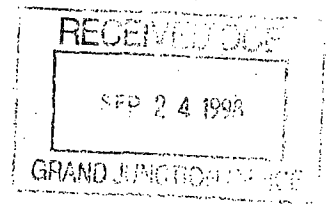
cc: L. Woodworth, DOE Alb
F. Bosiljevac, DOE Alb
E. Artiglia, TAC Alb
J. Virgona, DOE GJPO
A. Hamilton-Rogers, TNRCC
G. Smith, Texas DOH

RECORD



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 18, 1998



ORD

RECORD

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

SUBJECT: ACCEPTANCE OF THE FINAL GROUND WATER COMPLIANCE ACTION PLAN FOR THE INACTIVE URANIUM MILL TAILINGS SITE AT FALLS CITY, TEXAS

Dear Mr. Plieness:

The U.S. Nuclear Regulatory Commission (NRC) staff hereby concurs with the U.S. Department of Energy's (DOE's) Ground Water Compliance Action Plan (GCAP), dated April 8, 1998, for the Uranium Mill Tailings Remedial Action Project site at Falls City, Texas. This action completes the remedial action for the Falls City site under the Uranium Mill Tailings Radiation Control Act of 1978, as amended (UMTRCA).

DOE submitted a final Remedial Action Plan and Site Conceptual Design for Stabilization of the Inactive Uranium Mill Tailings at Falls City, Texas, dated November 1991. The staff reviewed and conditionally concurred with the proposal in August 1992. The conditional concurrence was based on DOE's deferring compliance with the ground-water cleanup provisions of Title 40 Code of Federal Regulations Part 192 (40 CFR 192), Subparts B and C. DOE's final Completion Report dated August 1996, was reviewed by NRC staff and accepted by letter dated April 16, 1997. NRC staff accepted DOE's Long Term Surveillance Plan for the site by letter dated July 8, 1997, and the site was transferred to long-term care under the general license provisions of 10 CFR 40.27.

As discussed in the enclosed Supplemental Technical Evaluation Review (TER), NRC staff has determined that the GCAP and modification of the Falls City Remedial Action Plan satisfies the requirements set forth in the UMTRCA, and the regulations in 40 CFR 192, Subparts B and C for the cleanup of ground-water contamination resulting from the processing of ores for the extraction of uranium.

DOE must modify the LTSP to include monitoring of the existing plume for five years (until 2003) in wells 862, 886, 891, 924, and 963 for the protection of beneficial water use. This action completes the remedial action for this site under UMTRCA.

RECORD COPY
FCT 402.02

If you have any questions concerning this letter, please contact the NRC Project Manager, Elaine Brummett, at (301) 415-6606.

Sincerely,

Charlotte Abrams for

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

cc: D. Metzler, DOE GJPO

SUPPLEMENTAL TECHNICAL EVALUATION REPORT
TITLE I GROUND WATER REMEDIATION

DATE: September 9, 1998

FACILITY: Falls City, Texas

PROJECT MANAGER: Elaine Brummett, Uranium Recovery Branch, DWM/NMSS

TECHNICAL REVIEWER: Michael Layton, Uranium Recovery Branch, DWM/NMSS

BACKGROUND:

The U.S. Department of Energy (DOE) submitted a final Remedial Action Plan (RAP) and Site Conceptual Design for the Stabilization of the Inactive Uranium Mill Tailings at Falls City, Texas, dated November 1991, for NRC staff review. The staff reviewed the RAP and conditionally concurred on the proposed remedial action as documented in the August 1992, Technical Evaluation Report (TER). The conditional concurrence was based on DOE's deferring compliance with the ground-water cleanup provisions of Title 40 Code of Federal Regulations Part 192 (40 CFR 192), Subparts B and C. DOE demonstrated that there was no health, safety, or environmental impact from the ground-water situation at the Falls City site. Therefore, DOE proposed to address compliance with these requirements as part of a separate program for ground water cleanup.

DOE's final Completion Report for surface remediation dated August 1996, was reviewed by staff and accepted by letter dated April 16, 1997. The staff accepted DOE's Long-Term Surveillance Plan (LTSP) for the site by letter dated July 8, 1997, and the site was transferred to long-term care under the general license provisions of 10 CFR 40.27.

The ground-water restoration phase of the Uranium Mill Tailings Remedial Action (UMTRA) Project was initiated by DOE's final Programmatic Environmental Impact Statement (PEIS) for the UMTRA Ground Water Project. The final PEIS was approved for distribution on September 19, 1996, and the Record of Decision was approved and published on April 28, 1997.

This supplemental TER documents the staff's review of DOE's Ground Water Compliance Action Plan (GCAP), dated April 8, 1998, for the Falls City Uranium Mill Tailings Remedial Action Project site at Falls City, Texas, and modifies the conditional concurrence in the August 1992 TER.

SUMMARY AND CONCLUSIONS:

Staff has determined that the GCAP and modification of the Falls City RAP satisfy the requirements set forth in the Uranium Mill Tailings Radiation Control Act of 1978, as amended (UMTRCA), and the standards in 40 CFR 192, Subparts B and C for the cleanup of ground-water contamination resulting from the processing of ores for the extraction of uranium. DOE must modify the LTSP to include monitoring of the existing plume for five years (until 2003) in

Enclosure

wells 862, 886, 891, 924, and 963 for the protection of beneficial water use. This action completes the remedial action for this site under UMTRCA.

DESCRIPTION OF DOE's REQUEST:

DOE requested a RAP modification to revise the Aquifer Restoration portion of the Water Resource Protection Strategy. The modification identified DOE's compliance approach for ground-water cleanup, which involves no remediation, based on the uppermost aquifer meeting the limited use classification due to wide-spread ambient contamination unrelated to uranium milling operations at the Falls City site.

TECHNICAL EVALUATION:

DOE submitted the Site Observational Work Plan (SOWP) for the Falls City site to the NRC for an informational and "fatal flaw' review in May 1997, to determine if the approach was technically feasible and consistent with the regulatory requirements. DOE's described compliance approach of no remedial action was based on the uppermost aquifer (Deweesville/Conquista and Dilworth formations) meeting the limited use classification, and no apparent risk to human health or the environment from the contaminated ground water because of no known exposure pathway in the uppermost aquifer. DOE's characterization and analysis showed that there is no discharge of ground water from the uppermost aquifer to deeper aquifers or surface waters, no one is using or projected to use the uppermost aquifer since it meets the limited use classification, and better quality water is readily available from deeper aquifers.

DOE concluded there is no known livestock, domestic, or drinking water wells in the contaminated ground water of the Deweesville/Conquista aquifer. The background ground-water quality is sufficiently poor in this aquifer that it has no historical or current use as a drinking water supply. There is no known current use of the Dilworth aquifer as a drinking water supply within a 3-kilometer (2-mile) radius of the site. Water from this aquifer has historically been considered poor quality. Water from the Dilworth aquifer has been used to water livestock and gardens in the site vicinity. DOE concluded this beneficial use can continue without adverse risk to animals or humans.

DOE indicated that it will monitor the ground water in the uppermost aquifer to ensure that beneficial uses are protected. Wells 862, 886, 891, 924, and 963 will be sampled and analyzed annually for five years (until 2003) to monitor plume movement. At the end of the five-year period, DOE will consult with the NRC and the State of Texas to determine if continued monitoring will be required. This ground-water monitoring commitment is in addition to the disposal cell performance monitoring, consequently, DOE will modify the LTSP to include the additional monitoring.

Staff reviewed the SOWP from an informational perspective and concluded that DOE's approach for complying with the ground-water cleanup provisions in 40 CFR 192, Subparts B and C, had no fatal flaws. Staff's review of the GCAP also concludes that the approach is consistent with requirements in the regulations and DOE's PEIS. Therefore, the staff concurs with the DOE ground-water reclamation for the Falls City site.

REFERENCES:

U.S. Department of Energy, 1996. Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Ground Water Project, October 1996. DOE/EIS-0198.

U.S. Department of Energy, 1997. Final Site Observational Work Plan for the UMTRA Project Site at Falls City, Texas, May 1997. DOE/AL/62350-157 Rev. 1.

U.S. Department of Energy, 1998. Final (GCAP) Subpart B, Ground Water Compliance Modification to the Remedial Action Plan of the Inactive Uranium Mill Tailings Site at Falls City, Texas. Transmitted by letter dated April 8, 1998.

U.S. Nuclear Regulatory Commission, 1992. Final Technical Evaluation Report for the Proposed Remedial Action at the Falls City Uranium Mill Tailings Site, Falls City, Texas.

U.S. Nuclear Regulatory Commission, 1997. Falls City, Texas, Site Observational Work Plan. Letter to Mr. George Rael, DOE/AL from Mr. Joseph Holonich NRC/URB, October 7, 1997.

SUPPLEMENTAL TECHNICAL EVALUATION REPORT
TITLE I GROUND WATER REMEDIATION

DATE: September 9, 1998

FACILITY: Falls City, Texas

PROJECT MANAGER: Elaine Brummett, Uranium Recovery Branch, DWM/NMSS

TECHNICAL REVIEWER: Michael Layton, Uranium Recovery Branch, DWM/NMSS

BACKGROUND:

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DOE's final Completion Report for surface remediation dated August 1996, was reviewed by staff and accepted by letter dated April 16, 1997. The staff accepted DOE's Long-Term Surveillance Plan (LTSP) for the site by letter dated July 8, 1997, and the site was transferred to long-term care under the general license provisions of 10 CFR 40.27.

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SUMMARY AND CONCLUSIONS:

Staff has determined that the GCAP and modification of the Falls City RAP satisfy the requirements set forth in the Uranium Mill Tailings Radiation Control Act of 1978, as amended (UMTRCA), and the standards in 40 CFR 192, Subparts B and C for the cleanup of ground-water contamination resulting from the processing of ores for the extraction of uranium. DOE must modify the LTSP to include monitoring of the existing plume for five years (until 2003) in

Enclosure

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Staff reviewed the SOWP from an informational perspective and concluded that DOE's approach for complying with the ground-water cleanup provisions in 40 CFR 192, Subparts B and C, had no fatal flaws. Staff's review of the GCAP also concludes that the approach is consistent with requirements in the regulations and DOE's PEIS. Therefore, the staff concurs with the DOE ground-water reclamation for the Falls City site.

REFERENCES:

U.S. Department of Energy, 1996. Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Ground Water Project, October 1996. DOE/EIS-0198.

U.S. Department of Energy, 1997. Final Site Observational Work Plan for the UMTRA Project Site at Falls City, Texas, May 1997. DOE/AL/62350-157 Rev. 1.

U.S. Department of Energy, 1998. Final (GCAP) Subpart B, Ground Water Compliance Modification to the Remedial Action Plan of the Inactive Uranium Mill Tailings Site at Falls City, Texas. Transmitted by letter dated April 8, 1998.

U.S. Nuclear Regulatory Commission, 1992. Final Technical Evaluation Report for the Proposed Remedial Action at the Falls City Uranium Mill Tailings Site, Falls City, Texas.

U.S. Nuclear Regulatory Commission, 1997. Falls City, Texas, Site Observational Work Plan. Letter to Mr. George Rael, DOE/AL from Mr. Joseph Holonich NRC/URB, October 7, 1997.

End of current text

Appendix B

Real Estate Documentation

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Falls City, Texas UMTRA Site
Texas Department of Health
Cooperative Agreement No.
DE-FC04-87 W0532

DEED WITHOUT WARRANTY

STATE OF TEXAS

COUNTY OF KARNES

VOL 0706 PAGE 117

WHEREAS, the United States of America, acting through the Department of Energy and the State of Texas, acting through its Department of Health entered into a Cooperative Agreement No. DE-FC04-87AL20532, for the Falls City, Texas, Uranium Mill Tailings Remedial Action (UMTRA) Project and:

WHEREAS, under Article 3 of said cooperative agreement, the Texas Department of Health agreed that at the conclusion of said remedial action, to convey, without additional consideration, to the United States of America and it assigns, all of its tight, title and interest in and to the real property hereinafter described lying within the project limits of said UMTRA project;

NOW THEREFORE, KNOW ALL MEN BY THESE PRESENTS: That TEXAS DEPARTMENT OF HEALTH, a State agency, for and in consideration of the foregoing premises and the benefits to the Parties as set

After Deed to

out in Cooperative Agreement No. DE-FC04-87AL20532, the sufficiency of which is hereby acknowledged, does by these presents bargain, sell, grant and convey without warranty, express or implied, unto the UNITED STATES OF AMERICA and its assigns, all of its right, title and interest in the land described in Exhibit "A", attached hereto and made a part of this document as if set out in full.

VOL. 07 OCT 1418

TO HAVE AND TO HOW the premises, together with all and singular the right, privileges and appurtenances thereto in any manner belonging unto the United States of America and its assigns, forever, so that neither Texas Department of Health, or its assigns, at any time hereafter have, claim or demand any right or title to the aforesaid premises or appurtenances, or any part thereof

The title hereinabove conveyed is subject to the following:

Existing easements for public roads and highways, public utilities, railroads, and pipelines.

Mineral Reservation retained in Deed dated July 5, 1944, executed by B. W. Nuhn to Clyburn Montgomery, recorded in Volume 148, at Page 157, Deed Records of Karnes County, Texas.

Mineral Reservation retained in Deed dated February 24, 1945, executed by B. W. Nuhn to Clyburn Montgomery, recorded in Volume 149, at Page 437, Deed Records of Karnes County, Texas.

2

The acquiring agency is the U. S. Department of Energy. Its address shall be: U. S. Department of Energy, Albuquerque Operations Office, P.O. Box 5400, Albuquerque, NM 87185-5400.

IN WITNESS WHEREOF, I have hereunto set my hand this 12th day of May, A.D., 1997.

VOL 07200 PAGE 419

TEXAS DEPARTMENT OF HEALTH

By [signature]
Patti J. Patterson, M. D.
Commissioner of Health
Texas Department of Health

ACKNOWLEDGMENT

STATE OF TEXAS

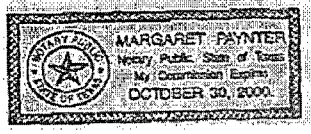
COUNTY OF TRAVIS

BEFORE ME, the undersigned, a Notary Public, on this day personally appeared Patti J. Patterson, M. D., as the Commissioner of Health for the Texas Department of Health, a state agency, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me the same was the act of the said Texas Department of Health, a state agency, that she was duly authorized to perform the same and that she executed the same as the act of such state agency for the purposes and consideration therein expressed, and in the capacity therein stated.

3

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this 12th day of May, 1997.

(Seal)



Margaret Paynter
Notary Public, State of Texas
Notary's name printed:
Margaret Paynter
Notary's Commission expires:
October 30, 2000

VOL 0700 PAGE 420

4

EXHIBIT A

VOL 07009 PG 121

The land referred to in this Policy is situated in the County of Karnes
State of Texas and is described as follows:

Being a tract of land containing 231.15 acres, more or less. out of the Samuel A.J. Mays Survey, A-212, Karnes County Texas and being comprised of 34.32 acres out of that 249.88 acre tract conveyed by Jimmie E. Nix to the Texas Department of Health by Warranty Deed dated March 6, 1991, recorded in Volume 618, Page 615, of the Deed Records of Karnes County, Texas and all of that 43.68 acre tract conveyed by Solution Engineering, Inc., to the Texas Department of Health by Warranty Deed dated March 13, 1991, recorded in Volume 618, Page 422, of said Deed Records and 153.15 acres out of that 186.59 acre tract conveyed by Solutfon Engineering, Inc. to the Texas Department of Health by Warranty Deed dated April 27, 1990, recorded in Volume 597, Page 617, of said Deed Records and being more particularly described as follows:

BEGINNING at a 5/8" iron rod found in a fence corner in the northwest line of said 249.88 acre tract and the southeastern boundary of a 40 ft. wide private road for the west corner of the tract herein described, also being the northerly north corner of a 514.98 acre tract "A" surveyed this date, whence a 5/8" iron rod found at the west corner of said 249.88 acre tract at the north corner of a called 180.10 acre tract conveyed by Rodney Seidel, et ux. to Concord Oil Company by Deed dated November 26, 1982, recorded in Volume 532, Page 563, of said Deed Records bears S 50° W 2,728.19 ft.;

THENCE N 50° E 667.69 ft. with the fence and the northwest line of said 249.88 acre tract and the southeastern boundary of said private road to a 5/8" iron rod found at the north corner of said 249.88 acre tract and the west corner of said 43.68 acre tract for an interior corner of this tract;

THENCE N 50° E 2,161.51 ft. continuing with the fence and the southeastern boundary of said private road and the northwest line of said 43.68 acre tract to a concrete right-of-way monument found at the intersection of same with the southwestern boundary of Texas Farm to Market Highway No. 1344 at the north corner of said 43.68 acre tract for the north corner of this tract;

THENCE with the fence along the southwestern boundary of said FM. Highway No. 1344 and the northeast line of said 43.68 acre tract and the northeast line of said 186.59 acre tract with the following seven (7) calls:

1. S 82° E 148.20 ft. to a concrete right-of-way monument found at an angle to the right in same, being a point in a curve to the left, whence the center of said curve bears N 50° E 11,509.20 ft.;

2. 154.28 ft. with the arc of said curve having a central angle of 00°46' 05" and a radius of 11,509.20 ft. to a concrete right-of-way monument found at a point of tangency for a corner of this tract, whence the center of said curve bears N 49°30' E 11,509.20 ft.;

EXHIBIT A

3. S 40°30' E 870.66 ft. to a concrete right-of-way monument found at the point of curvature of a curve to the right for a corner of this tract, whence the center of said curve bears S 49°30' W 11,459.20 ft.;

4. 308.60 ft. with the arc of said curve having a central angle of 01°32'35" and a radius of 11,459.20 ft. to a 5/8" iron rod found at the point of tangency for a corner of this tract, whence the center of said curve bears S 51° 03' W 11,459.20 ft.;

5. S 38°57' E 568.39 ft. to a concrete right-of-way monument found at an angle to the right in same for a corner of this tract;

6. S 41°31' E 194.85 ft. to a concrete right-of-way monument found at an angle to the left for same for a corner of this tract; and

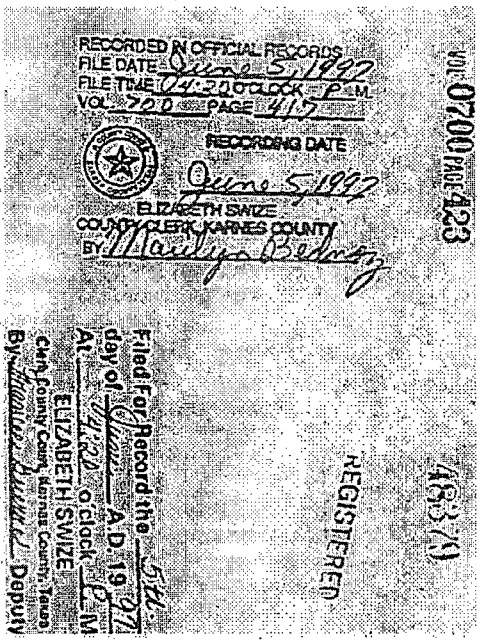
7. S 38°34' E 244.98 ft, to a 5/8" iron rod found in a fence corner at the east corner of said 186.59 acre tract for the east corner of this tract and the lower north corner of said Tract "A", also being the North corner of a 265.98 acre tract conveyed by Corpus Christi National Bank (formerly MBank) to the Texas Department of Health by Warranty Deed dated February 8, 1991, recorded in Volume 615, Page 770, of said Deed Records;

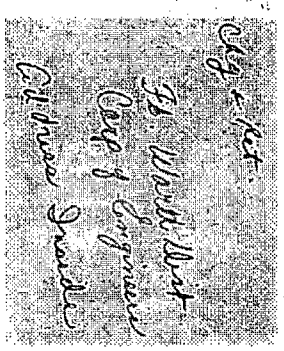
THENCE S 51°24' W with the fence and a southeast line of said 186.59 acre tract and the lower northwest line of said Tract "A" and a northwest line of said 265.98 acre tract, at 1,671.40 ft. pass an exterior corner of said 265.98 acre tract and an interior corner of said 186.59 acre tract, at 2,770.73 ft. crossing a portion of said 186.59 acre tract pass an interior corner thereof and the east corner of said 249.88 acre tract, and continuing with the fence and a northwest line of said 186.59 acre tract and a southeast line of said 249.88 acre tract for a total distance of 2,821.22 ft. to a 5/8" steel fence post in concrete found at an exterior corner of said 186.59 acre tract and an exterior corner of said 249.88 acre tract for an exterior corner of this tract and an interior corner of said Tract "A";

THENCE S 51°11' W 100.00 ft. with the fence and a northwest line of said Tract "A" and said 265.98 acre tract and a southeast line of said 249.88 acre tract to a 5/8" iron rod found at an interior corner of said Tract "A" for the south corner of this tract;

THENCE N 39°45' W 3,421.96 ft. with the fence and a northeast line of said Tract "A" to the place of BEGINNING.

The bearings recited hereon are based on the called bearing between two (2) 5/8" iron rods found on the southeast line of said 265.98 acre tract conveyed by Corpus Christi National Bank (formerly MBank) to the Texas Department of Health by Warranty Deed dated February 8, 1991, recorded in Volume 616, Page 770, of said Deed Records (called S 51°14' W). Distances are surface.


RECORDED IN OFFICIAL RECORDS
FILE DATE June 5, 1997
FILE TIME 04:20 O'CLOCK P.M.
VOL. 700 PAGE 417
RECORDING DATE
June 5 1997
ELIZABETH SWIZE
COUNTY CLERK, KARNES COUNTY
BY: Marilyn Bednorz
Filed For Record the 5th day of June A.D. 19 97
At 4:20 o'clock P.M.
ELIZABETH SWIZE
Clerk County Court, Karnes County, Texas
By Marilyn Bednorz Deputy
REGISTERED
VOL 0700 PAGE 423



NOTICE OF CONFIDENTIALITY: IF YOU ARE A NATURAL PERSON, YOU MAY REMOVE OR STRIKE ANY OF THE FOLLOWING INFORMATION FROM THIS INSTRUMENT BEFORE IT IS FILED FOR RECORD IN THE PUBLIC RECORD: YOUR SOCIAL SECURITY NUMBER OR YOUR DRIVERS LICENSE NUMBER.

DEED WITHOUT WARRANTY

STATE OF TEXAS §
§ **KNOW ALL BY THESE PRESENTS:**
COUNTY OF KARNES §

That the **STATE OF TEXAS, by and through JERRY E. PATTERSON, COMMISSIONER OF THE TEXAS GENERAL LAND OFFICE, on behalf of THE DEPARTMENT OF STATE HEALTH SERVICES, successor in interest to the TEXAS DEPARTMENT OF HEALTH,** ("GRANTOR"), whose address is P.O. Box 12873, Austin, Texas 78711-2873, by virtue of the authority set forth in the provisions of Chapters 31 and 32, Texas Natural Resources Code, Annotated, for and in consideration of Three Hundred Thirty Eight Thousand Six Hundred and NO/100 Dollars ($338,600.00), the receipt and sufficiency of which is hereby acknowledged, and for which no lien is either expressed or implied, has GRANTED, SOLD and CONVEYED, and by these presents does GRANT, SELL and CONVEY to the **ALAMO FUNDING GROUP, INC., a Texas Corporation** ("GRANTEE"), whose mailing address is 100 W. Houston Street, Suite 1500, San Antonio, Texas 78205-1424, the following described land in Karnes County, Texas, to-wit:

> 513.01 acres of land, more or less, out of the **DON GASPAR FLORES GRANT, ABSTRACT NO. 1, AND THE SAMUEL A.J. MAYS SURVEY, ABSTRACT NO 212,** Karnes County, Texas, the said 513.01 acre tract being described in Deeds recorded in Volume 616, Page 770, Volume 597, Page 617, and Volume 618, Page 615, all in the Deed Records of Karnes County, Texas, and more particularly described by metes and bounds in **Exhibit "A"** attached hereto and made a part hereof for all pertinent purposes, hereinafter called the **"Land"**.

TO HAVE AND HOLD the above described Land, together with any and all buildings and other improvements now located on said Land and together with all and singular the rights and appurtenances pertaining to such Land, including any right, title or interest of Grantor to adjacent roads, streets, alleys and easements of right of way, if any, unto the GRANTEE, its successors and assigns forever.

This conveyance is made subject to all covenants, conditions, reservations, rights-of-way, easements, and leases, if any, that are valid, in existence, and of record, or visible and apparent upon the ground of the above described Land, together with the "Permitted Exceptions" on **Exhibit "B"** attached hereto and made a part hereof for all pertinent purposes.

The Grantor hereby reserves any and all oil, gas, and all other minerals, mineral royalty rights that may lie beneath the Land, together with the right to explore and develop said minerals. Notwithstanding the foregoing, Grantor hereby waives its right to use the surface of the Land for the purpose of exploration or development of the reserved oil, gas and other minerals, mineral royalty rights, which shall be by directional drilling or pooling. The GRANTOR also reserves and retains, for the use and benefit of the Permanent School Fund, all rights to groundwater and groundwater leasing, except GRANTEE shall have the right to use groundwater for residential

and domestic purposes only. The GRANTOR hereby waives its right to use the surface of the Land for the purpose of exploration or development of the reserved rights to groundwater and groundwater leasing, which shall be by directional drilling or pooling. Grantee, its successors, and assigns covenant and agree not to use any groundwater underlying the Land conveyed herein for commercial or industrial purposes.

Grantee herein named assumes liability and responsibility for any and all ad valorem taxes which may be assessed for the current year.

This conveyance is further made subject to the following Covenants, Conditions and Restrictions to the Land and running with the Land, to-wit:

The Grantee covenants to hold harmless the Grantor and the Department of Energy for any liability associated with disruption of any public purpose ventures on the property conveyed by this deed, the disruption of any improvement on said property made by the Grantee, its successors and assigns, and any temporary or permanent limitations to the use of the property, should the Grantor and the Department of Energy be required to perform additional surface remedial activities on the property by this deed.

The Grantee covenants (i) to comply with the applicable provisions of the Uranium Mill Tailings Radiation Control Act (UMTRCA), 42 U.S.C. sec. 7901 et seq., as amended; (ii) not to use ground water in near surface aquifers from the site for any purpose, and not to construct wells or any means of exposing ground water to the surface unless prior written approval for such use is given by the Grantor and the U.S. Department of Energy; however, this provision (ii) would not apply to aquifers located below the Dilworth formation; (iii) that any sale or transfer of the property described in this deed shall have prior written approval from the Grantor and the U.S. Department of Energy, and that any deed or other document created for such sale or transfer and any subsequent sale or transfer will include information stating that the property was once used as a uranium milling site and all other information regarding the extent of residual radioactive materials removed from the property as required by Section 104(d) of the UMTRCA, 42 U.S.C. sec 7914 (d), and as set forth in the annotation attached hereto; (iv) not to perform construction and/or excavation or soil removal of any kind on the property without permission from the Grantor and the U.S. Department of Energy unless prior written approval of construction plans (e.g., facilities type and location), is given by the Grantor and the U.S. Department of Energy; (v) no human habitation structures shall be constructed on the property; and (vi) that its use of the property shall not adversely impact ground water quality, nor interfere in any way with ground water remediation under UMTRCA activities.

Grantee shall provide the Grantor and the U.S. Department of Energy free and unlimited ingress and egress to the property, which is the subject matter of this sale, in order to perform any necessary monitoring, well sampling, drilling of wells, or any other necessary surface and/or subsurface work as required to implement UMTRCA, 42 U.S.C. sec 7901, et seq.

These covenants are made in favor and to the benefit of Grantor and the U.S. Department of Energy. They shall run with the land and be binding upon the Grantee and its successors and assigns, and shall be enforceable by the Grantor and its successors and assigns.

THE PROPERTY IS OFFERED FOR SALE "AS IS", WITHOUT WARRANTY, WITH ANY AND ALL LATENT AND PATENT DEFECTS. PURCHASER HAS INSPECTED, OR WILL HAVE INSPECTED AS OF THE DATE OF CLOSING, THE PHYSICAL AND TOPOGRAPHIC CONDITION OF THE PROPERTY (INCLUDING THE IMPROVEMENTS LOCATED THEREON, IF

ANY) AND SHALL ACCEPT TITLE TO THE SAME "AS IS" IN ITS EXISTING PHYSICAL AND TOPOGRAPHIC CONDITION. PURCHASER ACKNOWLEDGES THAT IT IS NOT RELYING UPON ANY REPRESENTATION, WARRANTY, STATEMENT, OR OTHER ASSERTION OF THE STATE OF TEXAS AS SELLER, INCLUDING THE GENERAL LAND OFFICE, U.S. DEPARTMENT OF ENERGY, U.S. NUCLEAR REGULATORY COMMISSION, OR ANY OF THEIR OFFICIALS, AGENTS, REPRESENTATIVES OR EMPLOYEES, WITH RESPECT TO THE PROPERTY CONDITION, BUT IS RELYING ON PURCHASER'S OWN EXAMINATION OF THE PROPERTY. THE STATE, INCLUDING THE GENERAL LAND OFFICE AND THE TEXAS HEALTH AND HUMAN SERVICES COMMISSION, DISCLAIMS ANY AND ALL EXPRESS OR IMPLIED WARRANTIES, AND SPECIFICALLY MAKES NO WARRANTIES OF HABITABILITY, MERCHANTABILITY, SUITABILITY, FITNESS FOR ANY PURPOSE, OR ANY OTHER WARRANTY WHATSOEVER. PURCHASER IS HEREBY PUT ON NOTICE THAT ANY PRIOR GRANT AND/OR ENCUMBRANCE MAY BE OF RECORD AND PURCHASER IS ADVISED TO EXAMINE ALL PUBLIC RECORDS AVAILABLE REGARDING THE PROPERTY. THE PROVISIONS OF THIS SECTION 7 SHALL SURVIVE CLOSING OR EARLIER TERMINATION OR EXPIRATION OF THIS CONTRACT. THE DEED IS MADE AND ACCEPTED WITHOUT ANY WARRANTIES WHATSOEVER, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, THAT WHICH MAY ARISE BY COMMON LAW OR THE WARRANTIES IN §5.023, TEXAS PROPERTY CODE, AS NOW WRITTEN OR HEREAFTER AMENDED.

Witness my hand this Thirty-First **day of** October **2005.**

By: Jerry E. Patterson

Jerry E. Patterson, Commissioner,
Texas General Land Office, on Behalf of
The Department of State Health Services

APPROVED:

Contents
Legal Services
Deputy Comm.
General Counsel
Chief Clerk

After recording return to:

Alamo Funding Group, Inc.
100 W. Houston Street, Suite 1500
San Antonio, Texas 78205-1424

Archive File No. OA 000078

STATE OF TEXAS
COUNTY OF KARNES

EXHIBIT A 970411 BK OR Vol 825 Pg 276

FIELD NOTES FOR 513.01 ACRES OF LAND

BEING 513.01 acres of land of which approximately 55.72 acres are out of the Don Gaspar Flores Grant, A-1 and approximately 457.29 acres are out of the Samuel A. J. Mays Survey, A-212, Karnes County, Texas; being all of the land described in a conveyance to the Texas Department of Health by Warranty Deed of record in Volume 616, Page 770, Karnes County Deed Records; parts or portions of the land described in conveyances to the Texas Department of Health by Warranty Deed of record in Volume 597, Page 617 and Volume 618, Page 615, Deed Records of Karnes County, Texas and being more particularly described as follows:

BEGINNING at a found steel pin on the southeast right-of-way line of a private road for the north corner of the Concord Oil Company land described in Volume 532, Page 563, Karnes County Deed Records; the west corner of the Texas Department of Health land and of this tract.

THENCE; North 50° 37' 09" East, with said right-of-way line of the private road and northwest line of the Texas Department of Health land, 2728.19 feet to a set ½ inch rebar for the westerly north corner of this tract.

THENCE: South 39° 05' 17" East, into the Texas Department of Health land, along existing fence, 3422.04 feet to a set ½ inch rebar for an interior corner of this tract.

THENCE: North 51° 12' 40" East, continuing along existing fence, 2972.12 feet to a set ½ inch rebar for the easterly north corner of this tract on the southwest right-of-way line of F.M. Highway No. 1344.

THENCE: South 39° 13' 03" East, with said highway right-of-way line, 282.56 feet to a found steel pin for an easterly corner of this tract and north corner of the Bruce and Nora Tilley land described in Volume 635, Page 615, Karnes County Deed Records.

THENCE: South 50° 23' 07" West, with the common line of the Tilley land and of this tract, 186.10 feet to a found steel pin for a common corner.

THENCE: South 39° 06' 17" East, continuing with last said common line, 416.57 feet to a found steel pin for a common corner.

THENCE: North 50° 37' 57" East, continuing with last said common line, 186.74 feet to a found steel pin for a common corner on the southwest right-of-way line of F.M. Highway No. 1344.

THENCE: South 39° 10' 31" East, with said highway right-of-way line, 1597.33 feet to a found steel pin for the lower east corner of this tract and north corner of the Teresa Jane Lowak land described in Volume 492, Page 212, Deed Records of Karnes County, Texas.

THENCE: South 51° 04' 24" West, with the common line of the Lowak land and of this tract, generally along fence, 5700.14 feet to a found steel pin for the west corner of the Lowak land and south corner of this tract on the northeast line of the aforementioned Concord Oil Company land.

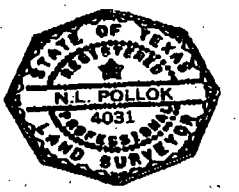
THENCE: North 39° 07' 24" West, with the common line of the Concord Oil Company land and of this tract, generally along fence, 2303.05 feet to a found steel pin for an angle point.

THENCE: North 39° 07' 51" West, continuing with last said common line, generally along fence, 3401.76 feet to the POINT OF BEGINNING containing 513.01 acres of land.

THE basis of the bearing system is WGS '84.

POLLOK & SONS SURVEYING, INC.

Norman L. Pollok, R.P.L.S. No. 4031
June 21, 2005
Ref: TX. Dept. of Health
07200501



00070411 Bk OR Vol 825 Pg 278

Exhibit "B"
Permitted Exceptions

1. Easement shown in instrument from Vincent Lyssy, et ux, to Central Power & Light Co., dated May 23, 1951, recorded in Volume 209, Page 277, Deed Records of Karnes County, Texas.

2. Mineral interest, royalties, bonuses, rentals and all other rights in connection with said mineral rights, bonuses and rentals, described in instrument from B.W. Nuhn to Clyburn Montgomery dated July 5, 1944 and recorded in Volume 148, Page 157 of the Deed Records of Karnes County, Texas.

3. Mineral interest, royalties, bonuses, rentals and all other rights in connection with said mineral rights, bonuses and rentals, described in instrument from B.W. Nuhn to Clyburn Montgomery dated February 24, 1945 and recorded in Volume 149, Page 437 of the Deed Records of Karnes County, Texas.

Filed for Record in:
Karnes County

On: Nov 04,2005 at 02:48P

As a:
Recordins Official Record

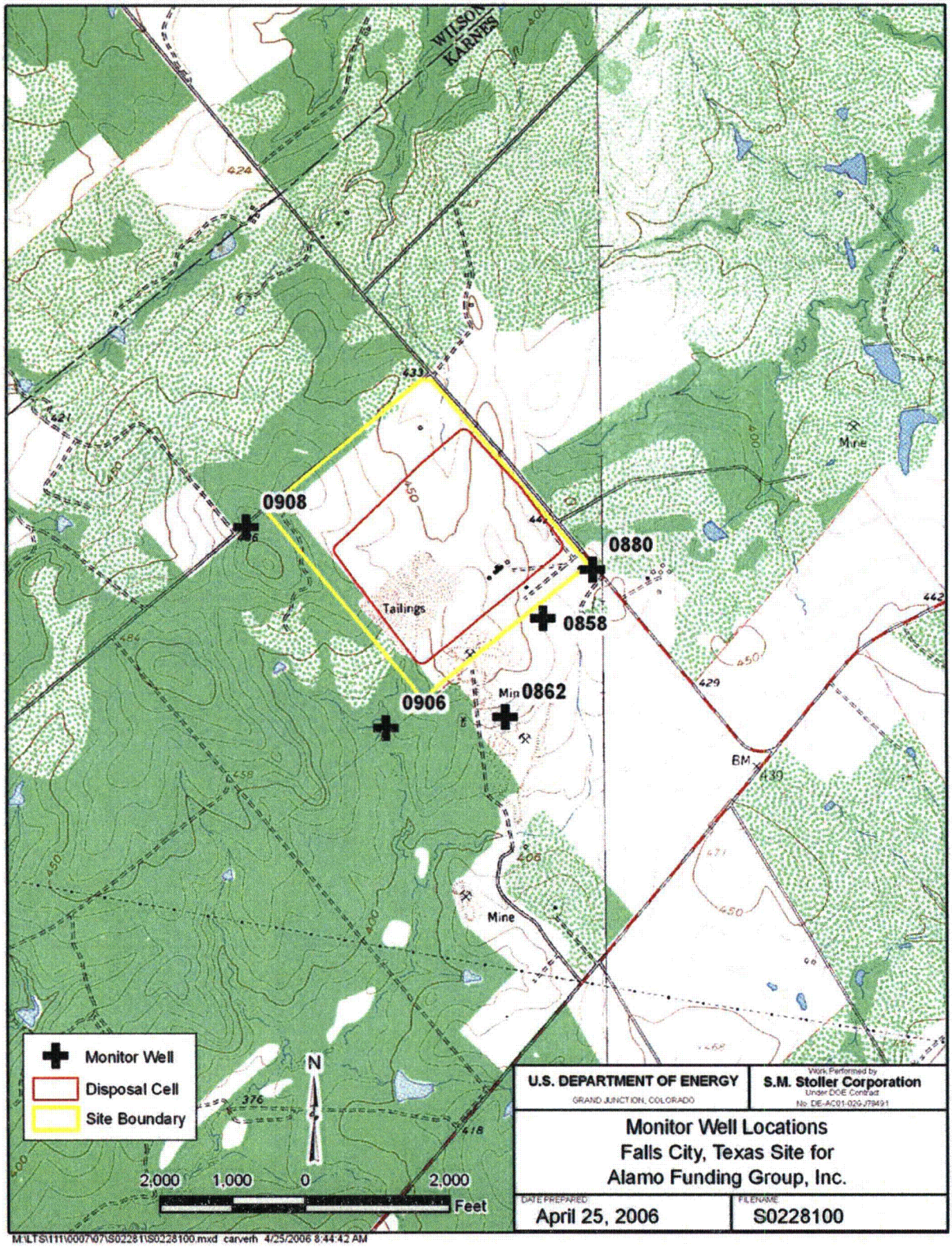
Document Number: 00070411

Amount: 36.00

Receipt Number - 6440
By:
Frances Guerra

STATE OF TEXAS COUNTY OF KARNES
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the volume and page of the named records of:
Karnes County
as stamped hereon by me.
Nov 04,2005

Honorable Alva Jones, County Clerk
Karnes County


WILSON
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Tailings
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U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO
Work Performed by
S.M. Stoller Corporation
Under DOE Contract
No. DE-AC01-02G-79491
Monitor Well Locations
Falls City, Texas Site for
Alamo Funding Group, Inc.
DATE PREPARED
April 25, 2006
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Appendix C

Inspection Checklist

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2006 INSPECTION CHECKLIST
FALLS CITY, TEXAS, UMTRCA TITLE I DISPOSAL SITE

Status of Site Inspections

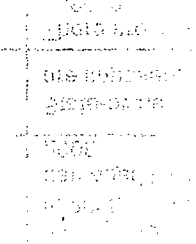
Date of This Revision: January 5, 2006
Last Annual Inspection: January 26, 2005
Inspectors: Widdop and Gardner
Next Annual Inspection (Planned): January 24, 2006

No.	Item	Issue	Action
1	Protocols	Notify Louis McGee (DOE), NRC, and Patricia Bobeck (State of Texas).	Lou and Pat will attend the inspection, along with Lou Gloystein, a State of TX engineer. Sent notification to Paul Michalak at NRC; NRC participation not expected.
2	Access	Access to the site is through a vehicle gate directly off Farm-to-Market Road FM 1344 near the east corner of the site. Another vehicle gate is located at the north corner.	Check condition of the gates and confirm they are locked. Roger Lyssy was considering making modifications to the entrance gate because it sags.
3	Specific site surveillance features	See attached table. Seven signs were stolen before the 2005 inspection and replaced. Water samplers replaced 2 more missing signs in November 2005.	Inspect and note conditions. Carry replacement signs (note larger [3-in.-dia.] sign posts).
4	Top and side slopes of the disposal cell	Site integrity and long-term performance. Ponded water from a recent heavy rainfall was noted along the northwest edge of the cell top during the 2003 inspection, not noted in 2004 or 2005. A local farmer (Roger Lyssy) mows the grass-covered top and bales the hay. Woody vegetation tends to grow along the edge of the cover and on the side slopes. Mr. Lyssy cuts and treats the vegetation. Fractured riprap has been noticed on the side slopes. To date, fractures appear to be artifacts of quarrying and rock placement.	Check for settling, slumping, erosion, or other modifying process. Check evidence of the cover not draining properly. Region experiencing drought. Note condition of the grass cover and evidence of mowing. Contacted Roger, asked him to come by site on morning of inspection. Assess effectiveness of vegetation control. Note locations of woody vegetation on the inspection map. Take reference photo from P11. Assess the condition of the riprap to determine if the fractured riprap is an indication of rock degradation.
5	Site perimeter	Grass is mowed and bailed by Roger Lyssy.	Check condition of the grass and for evidence of erosion, particularly along southern side. Roger intended to disk rilled area to smooth it.

No.	Item	Issue	Action
		Grass is growing in the rock drains, but may be beneficial in dissipating energy of site runoff. Willows were establishing in the south drain. The fence was installed on the NE, SE, and SW sides of the property by the UMTRA Project and is in good condition. On the NW boundary, the old ROW fence leans outward above a steep bank but was stable in 2005. A portion of the older fence along the NW boundary was damaged by road maintenance crews and is funded for replacement in 2006.	Evaluate the effect of grass encroachment on the performance of the rock drains, look for encroachment in apron. Mr. Lyssy was retained to cut and treat the willows in 2005. Check condition and stability of the fence. Be prepared to make other fence repairs. Obtain final measurements and complete arrangements with Mr. Lyssy to replace the fence along the NW boundary.
6	Outlying area	State-owned land southeast of the site has been sold. Use restrictions are imposed.	Visually inspect area within 0.25 mile of the site and note land use activity and changes. Inspect the former state parcel for violations of use restrictions.
7	Ground water monitoring	There are 7 cell performance wells sampled twice a year (0709, 0858, 0880, 0906, 0908, 0916, and 0921) and 5 ground water compliance wells sampled annually (0862, 0886, 0891, 0924, and 0963). Last sampling in November 2005. Inspection of wells is not required.	Note condition and security of the cell performance wells encountered during the site inspection.
8	Biela Property	Well 0891 located on this.	Ms. Bobeck wants to conduct a drive-by to see where well is in relation to UMTRA site. Sent GEMS link 1/5/06.
9	Ramp to cell top	Mr. Lyssy drives across the E corner of the side slope to get haying equip to the cell top. Funding approved to install a ramp.	Confirm needed characteristics with Mr. Lyssy. Assume ramp will be built of layers of progressively smaller angular rock.

Specific Site Surveillance Features—Falls City, Texas, Disposal Site
January 2006

Feature	Comment
Entrance Gate (2)	The main entrance gate is located at the east corner of the site, and another gate is located at the north corner.
Entrance Sign (1)	Located next to the main entrance gate.
Perimeter Sign (64)	Located on "larger-diameter" posts inside the perimeter fence.
Site Marker (2)	SMK–1 located near the main entrance, and SMK–2 located near the center of the cell top.
Survey Monuments (3)	Located on the north, east, and south property corners.
Boundary Monuments (2)	Located on the north and west property corners. Extend 12 inches above ground surface.



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Appendix D

NRC Technical Evaluation Report on Revised LTSP

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 28, 2008

Ms. Jalena Maestas
Civil Engineer/Project Manager
US Department of Energy
2597 B¾Road
Grand Junction, CO 81503

SUBJECT: REVIEW OF DRAFT REVISED LONG-TERM SURVEILLANCE PLAN FOR THE U.S. DEPARTMENT OF ENERGY FALLS CITY URANIUM MILL TAILINGS DISPOSAL SITE, FALLS CITY, TEXAS

Dear Ms. Maestas:

The U.S. Nuclear Regulatory Commission (NRC) has completed its review of the U.S. Department of Energy's *Draft Revised Long-Term Surveillance Plan (LTSP) for the U.S. Department of Energy Uranium Mill Tailings Disposal Site at Falls City, Texas* (January 2007). NRC staff has determined that the changes in the revised LTSP, including modification to the environmental monitoring program are appropriate. The enclosed Technical Evaluation Report contains a detailed discussion of the NRC's findings.

Please provide us with a copy of the revised LTSP when it is finalized. If you have any questions regarding this letter, please contact me at (301) 415-0724 or, by e-mail, at DTM1@nrc.gov.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Sincerely,

Douglas Mandeville

Douglas Mandeville, Geotechnical Engineer
Uranium Recovery Branch
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No.: WM-65

Enclosure:
Technical Evaluation Report

copy to [illegible]

FCT 505.15 (Roberts)

TECHNICAL EVALUATION REPORT
DRAFT REVISED LONG -TERM SURVEILLANCE PLAN
FOR THE U.S. DEPARTMENT OF ENERGY
FALLS CITY URANIUM MILL TAILINGS DISPOSAL SITE,
FALLS CITY, TEXAS

DATE: February 15, 2008

FACILITY: Falls City Uranium Mill Tailings Disposal Site, Falls City, Texas

TECHNICAL REVIEWER: Jon Peckenpaugh

PROJECT MANAGER: Paul Michalak

SUMMARY AND RECOMMENDATIONS

The U.S. Department of Energy (DOE) Office of Legacy Management submitted by letter dated January 23, 2007, a request for review and concurrence of a *Draft Revised Long-Term Surveillance Plan for the U.S. Department of Energy Falls City Uranium Mill Tailings Disposal Site, Falls City, Texas.* Based upon U.S. Nuclear Regulatory Commission (NRC) staff's review of this and supporting documents, the NRC concurs with the following DOE proposed revisions:

- The disposal cell performance monitoring of the ground water will be reduced from biannual to annual for the existing monitoring wells.
- The revised plan will incorporate requirements of the Ground Water Compliance Action Plan. Monitoring wells are sampled annually, which does not change from the current Long-Term Surveillance Plan (LTSP).
- The constituents analyzed for the monitoring wells in the disposal cell performance and in the Ground Water Compliance Action Plan monitoring will be reduced to total uranium and the field parameters.

In addition, the NRC staff has noted that Well 0891, located approximately 1.7 miles northeast of the Falls City Uranium Mill Tailings Disposal Site (the Site), has exhibited a significant increase in uranium ranging from 0.05 to 0.45 mg/L between May 2005 to May 2006. For the most recent sampling event (October 2007), the Well 0891 uranium concentration was 0.033 mg/L (slightly above U.S. Environmental Protection Agency's (EPA's) uranium drinking water standard of 0.03 mg/L). NRC staff acknowledges that Well 0891 is located within the Dilworth aquifer, which has a Class III designation in the vicinity of the Site (no current or potential ground water use due to widespread ambient contamination). However, Well 0891 is the furthest outlying well in the Falls City ground water compliance network. As a result, NRC staff believes DOE should continue to monitor uranium trends in Well 0891.

SITE HISTORY

The Site is located at a former uranium-ore processing facility in Karnes County, Texas, approximately 8 miles southwest of Falls City. Uranium deposits were discovered in the Eocene sedimentary rocks beneath the Site and surrounding area in the 1950s. Susquehanna Western Incorporated (SWI) started pit mining in this area in 1959. SWI built and operated a mill at this

Enclosure

site between 1961 and 1973. The mill used a sulfuric acid leach process to extract about 700 tons of uranium oxide (U_3O_8) from ore that averaged 0.16 percent U_3O_8. The milling operation generated more than 3.1 million tons of tailings that were deposited in three settling ponds and four former pit mines. The ponds/pits were 30 to 35 feet deep and unlined except for clay-rich horizons in the strata underlying the ore deposits (DOE, 2006a).

In 1975, SWI sold the mill and tailings to Tepcore, Inc., which sold the property to Solution Engineering, Inc. (SEI). Between 1978 and 1982, SEI conducted solution mining to extract uranium and molybdenum from the four former pit mines using injection and recovery wells. In 1982, these operations ceased; and SEI evaporated the active ponds except for Pond 6, which was recharged by natural seepage, filled these evaporation ponds with existing site materials, and re-contoured the tailing piles (ponds). The disturbed areas were covered with 1 to 2 feet of clay-rich soil and planted to native grasses (DOE, 2006a).

The Site was designated for cleanup under Title I of the Uranium Mill Tailings Radiation Control Act (UMTRCA). Remedial actions commenced in 1992 with two parcels of land (Figure 1). Parcel A (473 acres) included the former mill, one mill building, five tailings piles (Piles 1, 2, 4, 5, and 7), and one tailings pond (Pond 6). The Site now occupies the northern part of this parcel. Parcel B (120 acres) was about one mile east of Parcel A, and it enclosed Pile 3. The two parcels were connected by a corridor that contained a slurry line that carried waste materials from Parcel A to Pile 3 in Parcel B while the mill was in operation (DOE, 2006a).

The NRC issued a general license (under provisions in 10 CFR 40.27) to the DOE for long-term custody of the Site after the NRC concurred with the original LTSP in a letter dated July 8, 1997. On September 18, 1998, the NRC concurred with the DOE's Ground Water Compliance Action Plan (GCAP) dated April 8, 1998. The DOE was required to modify the LTSP to include ground water monitoring of an existing plume for 5 years (until 2003) in Wells 0862, 0886, 0891, 0924, and 0963 for the protection of beneficial water use. The NRC staff had decided that the GCAP and the Falls City Remedial Action Plan satisfied requirements set forth in UMTRCA and the regulations of 40 CFR 192, Subparts B and C.

GEOLOGY AND HYDROGEOLOGY

The Site is located within the coastal plain of the Gulf of Mexico. The main topographic element in Karnes County is a series of ridges that are sloping plains (cuestas) formed by resistant southeastward-dipping clastic sedimentary rocks that have northeast to southwest trends. Relief from the ridges to the intervening drainage is usually less than 100 feet. A surface water drainage divide cuts across the Falls City Disposal Cell with drainage to the west and northwest on one side and to the east to southeast on the other side of the divide (DOE, 1997a).

This Site is underlain by unconsolidated sand, silt, and clay sedimentary rocks that gently dip to the southeast, approximately 20 feet per 1,000 feet. The site also rests upon outcrops of the Dubose Clay, Deweesville Sandstone (Deweesville), and Conquista Clay (Conquista) members of the Whitsett formation. Tailings were placed in several old open pits excavated in the uranium ore-bearing Deweesville and Conquista members. Underlying the Conquista is the Dilworth Sandstone (Dilworth) member, which overlies the Manning Clay formation (DOE, 1997a).

The shallow ground water at the Site is found 5 to 30 feet below the land surface within the water-bearing units of the Deweesville and Conquista members. These adjacent water-bearing

units are referred as one aquifer that is under unconfined conditions in the northern and western portions of the Site. Near the disposal cell this aquifer has been saturated primarily by the uranium mining and milling activities, including past uranium mining boreholes that may not have been properly abandoned in these units. In addition, the uranium mineralization associated with the uranium ore bodies has caused background water quality in these units to vary with depth and location. Due to the fact that the former tailing piles were located on the up dip surface of the Deweesville and the upper Conquista outcrops, it is not possible to install upgradient, background monitor wells screened in this aquifer (DOE, 1997a).

Both the Deweesville and Conquista aquifer and the underlying Dilworth water-bearing unit (aquifer) are low-yield aquifers. Seepage from the tailing disposed in the old pits and on the outcrop of the Deweesville and upper Conquista has resulted in a ground water mound in the Deweesville and Conquista aquifer (DOE, 1997a).

The Dilworth member, which is referred to as the Dilworth aquifer, outcrops north of the Falls City Disposal site. In this area, the Dilworth is recharged from precipitation and the water-bearing portion of this unit is unconfined. To the southeast, the Dilworth aquifer dips below younger rock strata. The depth to ground water in the Dilworth aquifer is approximately 100 feet below the ground level in the disposal cell area. Down dip to the southeast, ground water in the Dilworth aquifer becomes confined by the lower Conquista Clay. The Dilworth aquifer is separated from the Deweesville and Conquista aquifer by 30 to 50 feet of carbonaceous clay of the lower Conquista Clay subunit, which acts as an aquitard to downward seepage (DOE, 1997a).

A downward hydraulic conductivity (K) occurs between the Deweesville and Conquista aquifer and the Dilworth aquifer. The K between the Deweesville and Conquista aquifer and the Dilworth aquifer (determined by aquifer tests and single-packer pressure testing) ranges from 0.5 to 2.6 feet/day (1.8×10^{-4} cm/s) (DOE, 1997a).

Ground water movement occurs among these three water-bearing units because of improper well installation. Mining companies drilled about 370 boreholes in this area that have penetrated the Dilworth, and in some cases these boreholes were improperly abandoned (BEG, 1992). The Texas Bureau of Economic Geology has identified three discrete potentiometric highs as an indication of leakage from the Deweesville and Conquista aquifer into the Dilworth aquifer. These leakages were caused by mining companies exploring for uranium ore. DOE refers to the Deweesville and Conquista aquifer and Dilworth aquifer as the "uppermost aquifer" because of this ground water movement between these units (DOE, 1997a).

The likelihood of leakage of ground water naturally or by man's activities through the uppermost aquifer into the Manning Clay formation below the Dilworth member of the Whitsett formation is low because of the small number of boreholes drilled through these upper units into this lower formation. The Manning Clay formation is a 300 feet thick aquitard of carbonaceous clays and lignite seams (DOE, 1997a).

The ground water in the uppermost aquifer near the Site is unsuitable as a source of drinking water. This has occurred because of widespread contamination from naturally occurring uranium mineralization and degradation caused by uranium exploration and mining not related to onsite uranium-ore processing. For example, the disposal cell is located near former open pit uranium mines in an active geochemical environment (DOE, 2006a). Also, the Deweesville and Conquista aquifer has low yield units with poor quality (the total dissolved solids range from

7,000 to 9,000 mg/L near the disposal cell). The Dilworth aquifer is also a low yield unit where the ground water is not used as a source of domestic or drinking water within 2 miles of the site (DOE, 1998).

SURFACE WATER

The Site is situated on a drainage divide. Two ephemeral streams, Tordilla Creek and Scared Dog Creek originate or head on or near the disposal cell. Runoff from the northern half of the Site flows toward Scared Dog Creek, a tributary of the San Antonio River several miles to the northeast. Runoff from the southern half of the Site flows toward Tordilla Creek, a tributary of the Nueces River. Other small ephemeral streams are near the Site (for example, Conquista Creek); however, there are no significant lakes or ponds near the Site. Figure 1 delineates the location of Scared Dog and Tordilla Creeks within and nearby the Site (DOE, 2006a).

The water quality of Scared Dog and Tordilla Creeks is impacted by base flow from the uppermost aquifer. However, DOE states that the water chemistry of these creeks is unaffected by the regional ground water contamination (DOE, 2006a).

EXISTING LONG-TERM SURVEILLANCE PLAN

The LTSP, as approved in 1997, describes how the DOE will perform long-term care at this Site. The LTSP covers the requirements under 10 CFR 40.27 by addressing the following:

- Final site conditions,
- Legal description of the site,
- Long-term surveillance program,
- Follow-up inspections, and
- Maintenance and other actions (DOE, 2006 and DOE, 1997b).

Only the ground water monitoring program will be addressed in this section. The ground water monitoring program for the LTSP was modified by including the GCAP monitoring approved in 1998 (DOE, 2006a). Thus, the existing LTSP includes the performance cell monitoring and GCAP monitoring of the uppermost aquifer.

Both components of the ground water monitoring are impacted by classification of the ground water in the uppermost aquifer. DOE, NRC, and the State agreed that ground water monitoring for the disposal cell performance and for the GCAP would not be based upon concentration limits. Instead, a narrative supplemental standard was applied to the ground water, which does not include numerical concentrations limits or point of compliance {40 CFR 192.21(g)}. The Class III designation of the ground water results from no current or potential use of ground water in the area as a source of drinking water because it contains widespread ambient contamination that cannot be cleaned up using methods reasonably employed by public water supply systems. Background water quality varies by order of magnitude in the area since the aquifer is in an area of redistribution of uranium mineralization from ore bodies (DOE, 1997b).

DOE states that currently ground water from Deweesville and Conquista aquifer is not used as a source of domestic or drinking water because of low yield and poor water quality (total dissolved solids range from 7,000 to 9,000 mg/L near the disposal cell). Also, ground water from the Dilworth aquifer is not used as a source of domestic or drinking water within 2 miles of the site. This ground water may have been used for stock and to water gardens. For additional

information on the ground water classification, consult Appendix A of the draft revision of the LTSP report (DOE, 2006a).

The performance cell monitoring and the GCAP monitoring wells are delineated in Figure 2. The performance cell monitoring network consists of 7 wells (0709, 0858, 0880, 0906, 0908, 0916, and 0921) surrounding the disposal cell and screened in the Deweesville and Conquista aquifer. Monitor wells 0908 and 0916 are located updip of the intersection of the typical water table and the bottom of the Deweesville and Conquista aquifer; therefore, these wells are usually dry. Ground water samples are collected biannually from these wells, and they are analyzed for the analytes listed in Table 1 (DOE, 1997b and DOE, 2006b).

Table 1. Analytes for Disposal Cell Performance and GCAP Monitoring of the Uppermost Aquifer (Based upon Table 5.6 from DOE, 1997b, Table 1 DOE, 2006b, and Attachment 3 from DOE, 2006b)

Analyte	Analyte
Field Measurements	Laboratory Measurements
Alkalinity	Gross Beta
Dissolved Oxygen	Iron
Redox Potential	Lead
pH	Magnesium
Specific Conductance	Manganese
Turbidity	Molybdenum
Temperature	Nickel
Laboratory Measurements	Nitrate +Nitrate as N (NO_3 + NO_2) - N
Aluminum	Potassium
Ammonia as N (NH_3-N)	Radium-226
Antimony	Radium-228
Arsenic	Selenium
Beryllium	Sodium
Bromide	Sulfate
Cadmium	Sulfide
Calcium	Total Dissolved Solids
Chloride	Thallium
Chromium	Tin
Cobalt	Uranium
Copper	Vanadium
Gross Alpha	Zinc

The ground water compliance network consists of 5 monitor wells (0862, 0886, 0891, 0924, and 0963) located downgradient from the identified affected areas (Figures 3 and 4). Monitoring wells 0886, 0924, and 0963 are screened in the Deweesville and Conquista aquifer, and monitoring wells 0862 and 0891 are screened in the Dilworth aquifer. Ground water samples are collected annually from these wells, and they are analyzed for the analytes in Table 1 (DOE, 1997b and DOE, 2006b).

PROPOSED REVISIONS IN THE LONG-TERM SURVEILLANCE PLAN

The proposed revised Long-Term Surveillance Plan includes the following:

- The disposal cell performance monitoring of the ground water will be reduced from biannual to annual for the existing monitoring wells.
- The revised plan will incorporate requirements of the GCAP. Monitoring wells are sampled annually, which does not change from the current LTSP.
- The constituents analyzed for the monitoring wells in the disposal cell performance and in the GCAP monitoring for the downgradient plumes will be reduced to only total uranium and the field parameters.
- The institutional controls imposed on the former State-owned portion of the processing site are described and included in inspection objectives.

The LTSP will also be revised to make it consistent with the structure and content of current LTSPs.

DOE proposes to continue monitoring the ground water through 2010 at the 12 locations currently sampled as discussed above. After the 2010 monitoring event, DOE plans to assess the monitoring results and recommend whether to continue, modify, or terminate the monitoring program.

EVALUATION AND RECOMMENDATIONS PERTAINING TO THE PROPOSED REVISION TO THE LONG-TERM SURVEILLANCE PLAN

Figures 3 and 4 delineate the pH in the Deweesville and Conquista aquifer and Dilworth aquifer, respectively. The pH isopleths on these figures are surrogates for uranium and some of the other metals listed in Table 1. Figure 3 shows that there are two areas of lower pH, which would represent uranium plumes in the Deweesville and Conquista aquifer. Figure 4 indicates that there is one area of lower pH, which would represent a uranium plume in the Dilworth aquifer.

The results of the analytical analyses and the ground water levels for the disposal cell performance and the ground water compliance monitoring wells are presented in "Data Validation Package" reports. A recent report is the May 2006 report (DOE, 2006b).

An evaluation of the ground water levels for the disposal cell performance and the ground water compliance monitoring wells from 1996 through May 2006 indicates that the water levels for monitoring wells of the disposal cell performance (0709, 0858, 0880, 0906, and 0921) have fluctuated, probability based upon variations in climatic conditions. Also, these ground water levels have an overall decreasing trend which may be caused by dewatering of the disposal cell. However, ground water levels for the ground water compliance monitoring wells (0862, 0886, 0891, 0924, and 0963) have changed very little over this same time period. This may be due to their generally greater distance from the disposal cell and in some cases deeper screened intervals from the land surface.

The NRC concurs with DOE's assessment that the analytical results of the disposal cell performance monitoring wells do not represent a health concern. For most of the wells, the concentrations of metals analyzed in the ground water have changed very little during the 1996 to May 2006 time period. Also uranium concentrations have changed very little for all the wells except for Well 0880 (DOE, 2006b). This well has the largest uranium concentration, and it has also increased from about 3 to 7 mg/L over this time period. This change is not a health concern because ground water in the Deweesville and Conquista aquifer is not used for human or stock use as previously discussed.

The analytical results of the ground water compliance monitoring wells from 1996 through May 2006 indicate that the concentrations of metals in the ground water from these wells have usually changed very little. However, Wells 0924 and 0891, which are screened in the Deweesville and Conquista aquifer and the Dilworth aquifer, respectively, do exhibit changes in gross alpha and uranium. Well 0924 has variable gross alpha values and an overall increasing trend for uranium. These changes are not a health concern because ground water in the Deweesville and Conquista aquifer is not used for human or stock use.

Well 0891 has variable gross alpha values and uranium concentrations with a significant increase in uranium from 0.05 to 0.45 mg/L from May 2005 to May 2006. It should be noted that due to overgrown vegetation, Well 0891 was not identified or sampled during DOE's April 2007 sampling event (Ransbottom, 2007); however, uranium in an October 2007 ground water sample of this well was 0.033 mg/L (Maestas, 2008). The earlier increase in uranium in Well 0891 presents a concern because this well is located along the front of the pH plume, the surrogate uranium plume (Figure 4). As discussed above, ground water from the Dilworth aquifer is not used as a source of domestic or drinking water within 2 miles of the site; however, Well 0891 is located about 1.7 miles from the site. Reportedly, use of the Dilworth aquifer downgradient of Well 0891 is for livestock watering or gardening.

Based upon NRC staff review of the revised draft LTSP and supporting documents, the NRC concurs with the DOE proposed revisions contained in the draft LTSP. In addition, based upon recent uranium concentration trends in Well 0891, the NRC staff believes that the DOE should continue to monitor uranium trends in Well 0891.

REFERENCES

BEG (Bureau of Economic Geology), 1992. Hydrogeology and Hydrochemistry of Falls City Uranium Mine Tailings Remedial Action Project, Karnes County, Texas. The University of Texas at Austin. [ADAMS Legacy Accession No. 9603140087]

DOE (U.S. Department of Energy), 1997a. Final Site Observational Work Plan for the UMTRA Project Site at Falls City, Texas. DOE/AL/62350-157 Rev.1. [ADAMS Legacy Accession No. 9706040234]

DOE (U.S. Department of Energy), 1997b. Long-Term Surveillance Plan for the U.S. Department of Energy Falls City Uranium Mill Tailings Disposal Site, Falls City, Texas. DOE/AL/62350-187, Rev.3. [ADAMS Legacy Accession No. 9704300263]

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Uranium Mill Tailing Sit at Falls City, Texas. Transmitted by letter dated April 8, 1998. [ADAMS Legacy Accession No. 9805220233]

DOE (U.S. Department of Energy), 2006a. Draft Revised Long-Term Surveillance Plan for the U.S. Department of Energy Falls City Uranium Mill Tailings Disposal Site, Falls City, Texas. DOE-LM/1257-2006. [Adams Accession No. ML070540157]

DOE (U.S. Department of Energy), 2006b. Data Validation package, May 2006 Falls City, Texas, Disposal Site. DOE-LM/1263-2006. [Adams Accession No. ML070710338]

Maestas, Jalena, 2008. E-mail titled "Falls City Well 0891 Results – October 2007." [Adams Accession Number No. ML080520397]

Ransbottom, Robert, 2007. E-mail titled "RE: Falls City Well Sampling." {Adams Accession Number No. ML080520396]

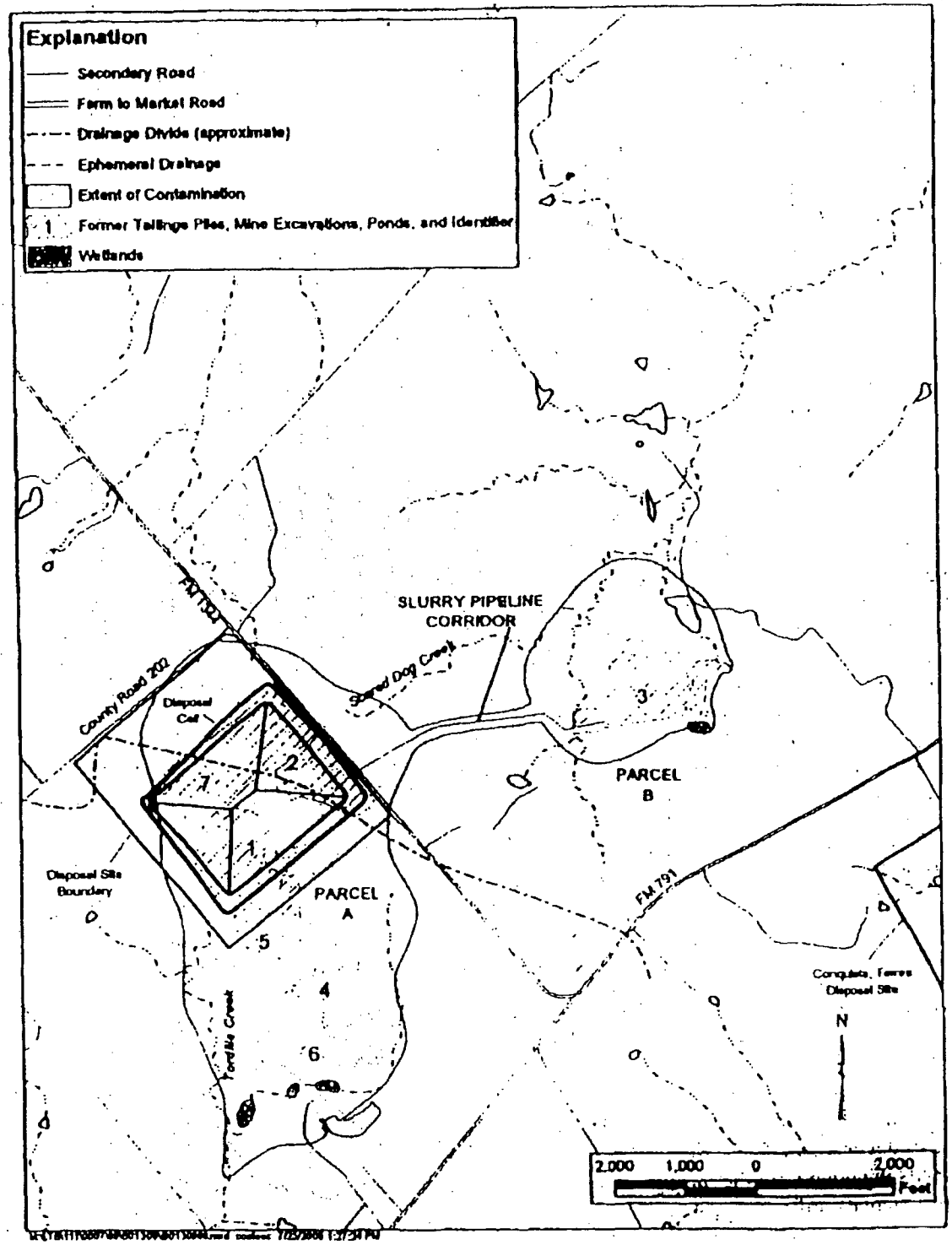

Figure 1. Contaminated Areas at Falls City Disposal Site, Before Remedial Action (Figure 2-1 from DOE, 2006a)

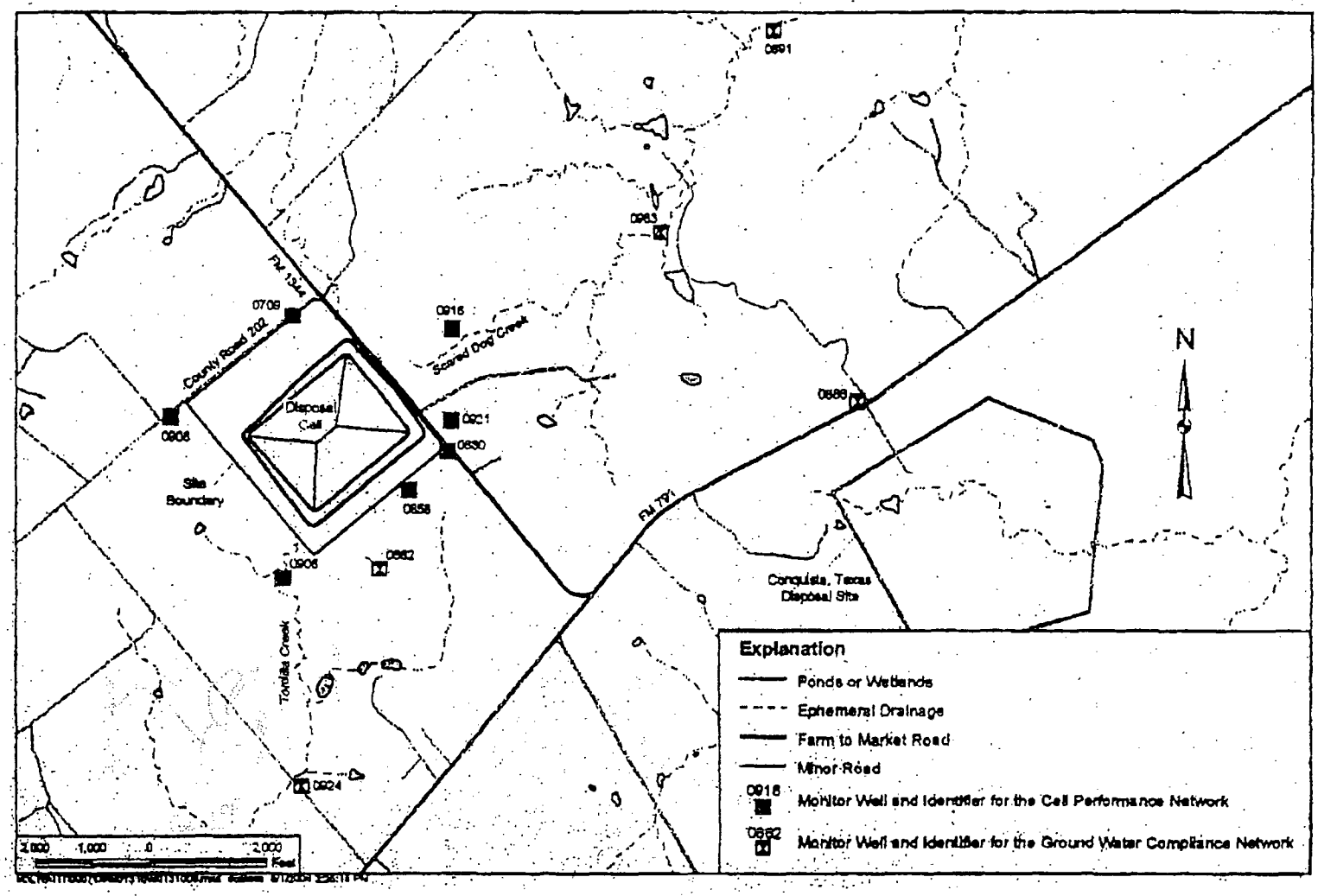

Figure 2. Ground Water Monitor Wells at the Falls City Disposal Site (Figure 2-5 from DOE, 2006a)

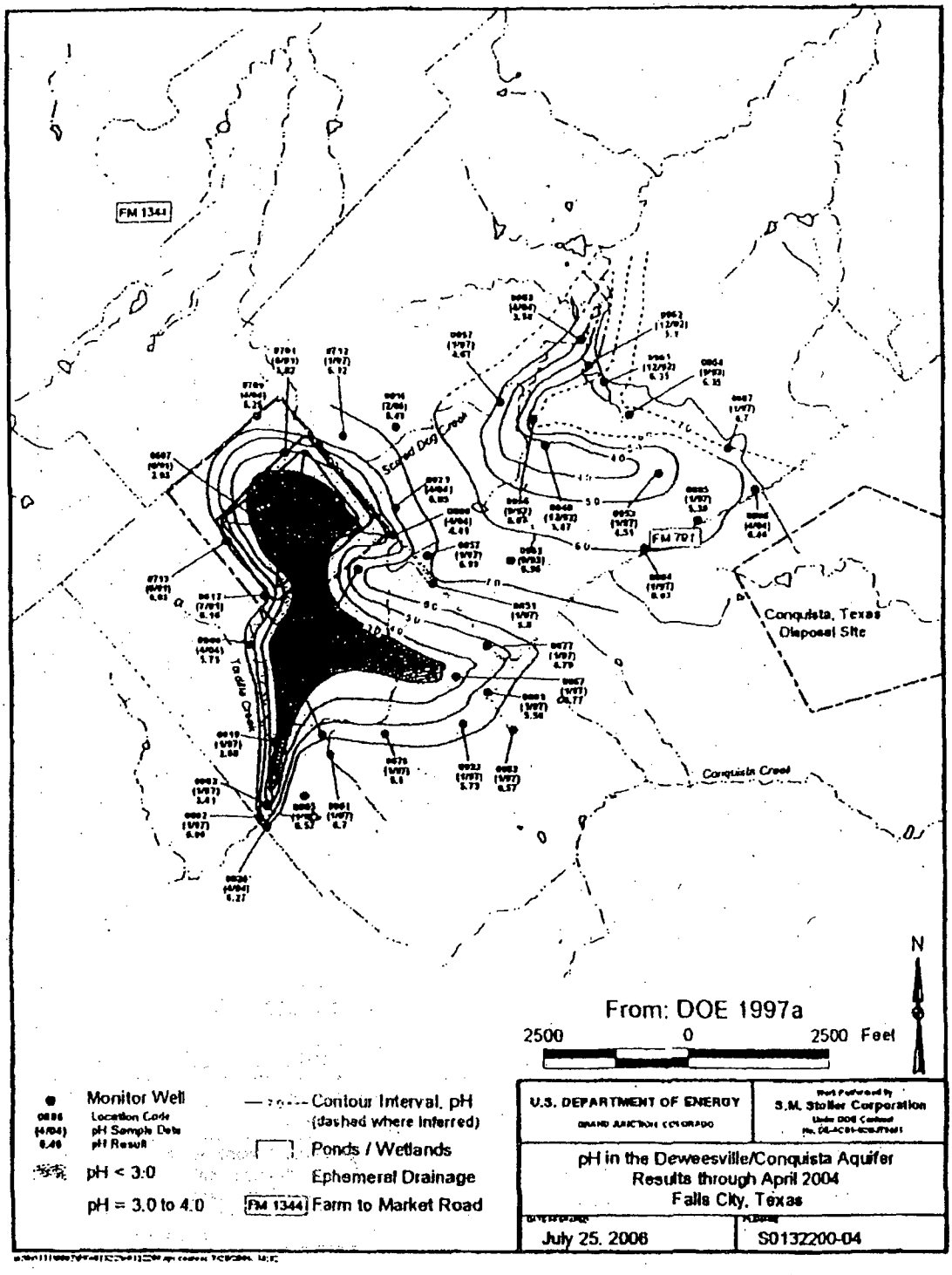

Figure 3. Ground Water pH in the Deweesville and Conquista Aquifer (Figure 2-7 from DOE, 2006a)

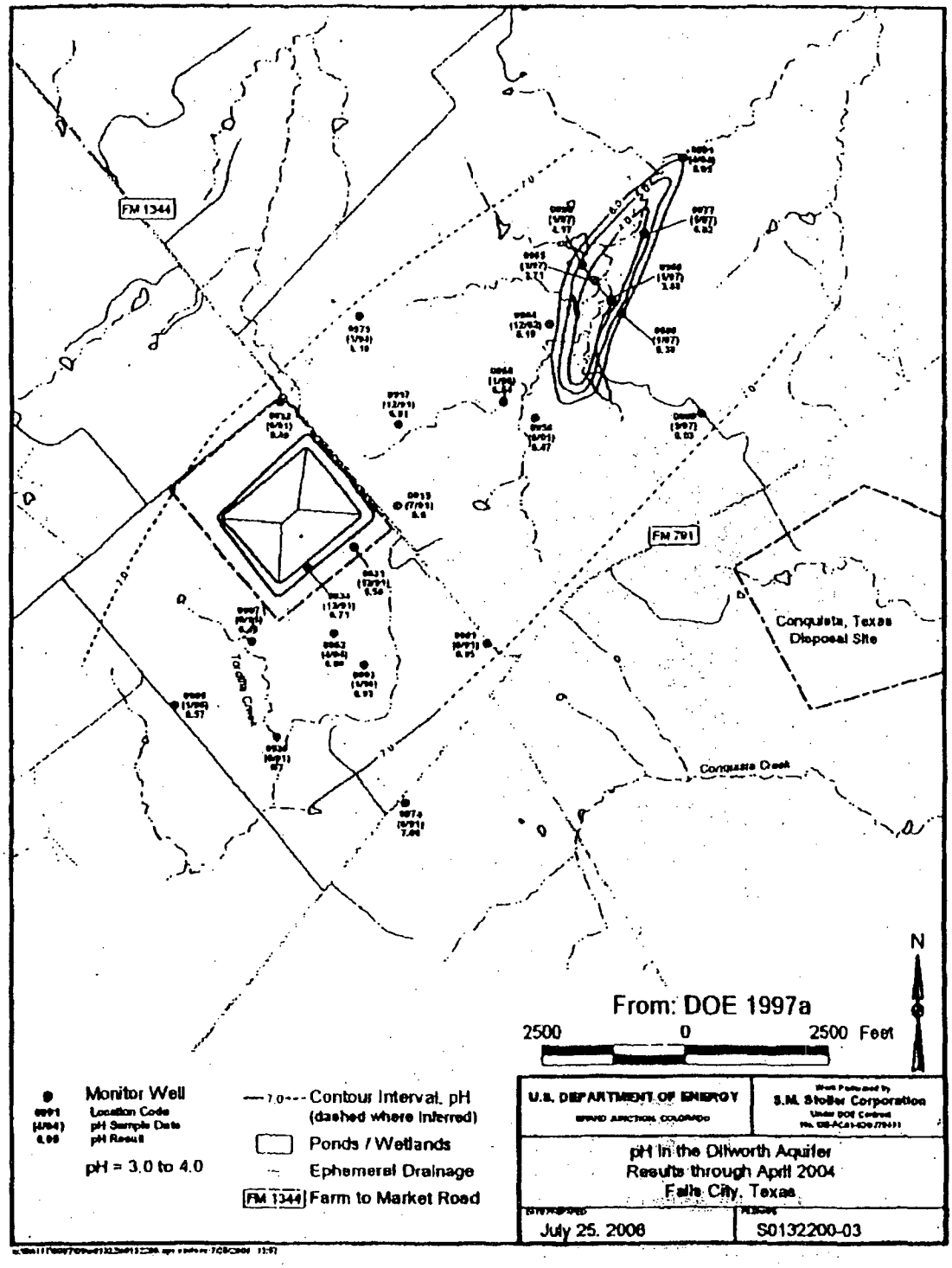

Figure 4. Ground Water pH in the Dilworth Aquifer (Figure 2-8 from DOE, 2006a)

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Appendix E

Agency Notification Agreements

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DRAFT

Terry Schmidt
Karnes County Sheriff
113 W. Panna Maria
Karnes City, Texas 78118

Dear Mr. Schmidt:

The U.S. Department of Energy (DOE) Uranium Mill Tailings Remedial Action Project is requesting notification in the event of any unusual activities or events in Karnes County, Texas, or around the Falls City disposal site located 46 miles (74 kilometers [km]) southeast of San Antonio, and 8 miles (13 km) southwest of Falls City, Texas.

The purpose of the notification request is to assist the DOE in surveying and maintaining the integrity of its disposal site and to ensure public safety.

If during the course of routine activities, anything out of the ordinary is observed by your staff or reported to your office, we would appreciate notification to the DOE Grand Junction Projects Office's 24-hour phone line at (970) 248-6070. If the notification request discussed above is agreeable to you, please sign and return the attached reply letter for our records as soon as possible.

Should you have any questions, please contact me at (505) 845-5637. Thank you for your attention in this matter.

Woody Woodworth
Project Site Manager
Environmental Restoration Division
U.S. Department of Energy

Enclosure

cc: w/o enclosure
EArtiglia (TAC)
SHamp (ERD)
CJones (GJPO)
MHansen (TAC)
CSilva (TAC)
JVirgona (GJPO)

DRAFT

Woody Woodworth
Project Site Manager
Environmental Restoration Division
U.S. Department of Energy
P.O. Box 5400
Albuquerque, NM 87185

Dear Mr. Woodworth:

This letter is to concur with the U.S. Department of Energy (DOE) request for notification as set forth in the DOE's letter. As requested in your letter, this office will contact the DOE's Grand Junction Projects Office at (970) 248-6070 if any unusual event or anomaly is observed or reported at the Falls City disposal site, Falls City, Texas.

Sincerely,

Mr. Terry Schmidt
Karnes County Sheriff

cc: EArtiglia (TAC)
SHamp (ERD)
CJones (GJPO)
MHansen (TAC)
CSilva (TAC)
JVirgona (GJPO)

DRAFT

Dr. Joe Friday
Cooperative Program Manager
National Weather Service
2090 Airport Road
New Braunfels, Texas 78130

Dear Dr. Friday:

The U.S. Department of Energy (DOE) Uranium Mill Tailings Remedial Action Project is requesting notification in the event of issuance of flash flood or tornado warnings in Karnes County, Texas. We would appreciate notification to the DOE Grand Junction Projects Office's 24-hour phone line at (970) 248-6070 within 8 hours of issuance of a warning or episode of warnings.

The purpose of this warning is to assist the DOE in surveying and maintaining the integrity of its disposal site located 46 miles (74 kilometers [km]) southeast of San Antonio and 8 miles (13 km) southwest of Falls City, Texas.

If the notification request discussed above is agreeable to you, please sign and return the enclosed reply letter for our records as soon as possible.

Should you have any questions, please contact me at (505) 845-5637.

Sincerely,

Woody Woodworth
Project Site Manager
Environmental Restoration Division
U.S. Department of Energy

Enclosure

cc: w/o enclosure
EArtiglia (TAC)
SHamp (ERD)
CJones (GJPO)
MHansen (TAC)
CSilva (TAC)
JVirgona (TAC)

DRAFT

Woody Woodworth
Project Site Manager
Environmental Restoration Division
U.S. Department of Energy
P.O. Box 5400
Albuquerque, New Mexico 87185

Dear Mr. Woodworth:

This letter is to concur with the U.S. Department of Energy (DOE) request for notification as set forth in the DOE's letter. As requested in your letter, this office will contact the Grand Junction Projects Office at (970) 248-6070 in the event of issuance of a flash flood or tornado warning in Karnes County, Texas.

Sincerely,

Dr. Joe Friday
Cooperative Program Manager
National Weather Service

cc: EArtiglia (TAC)
SHamp (ERD)
CJones (GJPO)
MHansen (TAC)
CSilva (TAC)
JVirgona (GJPO)

National Earthquake Information Center

World Data Center A for Seismology

Director
(303) 236-1510
Research
(303) 236-1506

U.S. Geological Survey
Box 25046, DFC, MS-967
Denver, Colorado 80225 USA
Telex: (WUTCO) 510601412IESL UD

Operations
(303) 236-1500
QED
(800) 358-2663

Clinton C. Smythe
Engineering and Construction Group Leader
Uranium Mill Tailings Remedial Action
Project Office
2155 Louisiana NE, Suite 4,000
Albuquerque, NM 87110

Dear Mr. Smythe:

This letter is to confirm that the DOE Grand Junction Projects Office (24-hour phone line, (303) 248-6070 has been added to our notification list for the occurrence of earthquakes near the following locations:

Disposal Site	Latitude	Longitude
COLORADO		
Durango (Bodo Canyon)	N37.15	W107.90
Grand Junction	N38.91	W108.32
Gunnison (Landfill)	N38.51	W106.85
Maybell	N40.55	W107.99
Naturita (Dry Flats)	N38.21	W108.60
Rifle (Estes Gulch)	N39.60	W107.82
Slick Rock (Burro Canyon)	N38.05	W108.87
IDAHO		
Lowman	N44.16	W115.61
NEW MEXICO		
Ambrosia Lake	N35.41	W107.80
NORTH DAKOTA		
Bowman	N46.23	W103.55
OREGON		
Lakeview (Collins Ranch)	N42.2	W120.3
PENNSYLVANIA		
Canonsburg	N40.26	W80.25
Burrell VP	N40.62	W79.65
TEXAS		
Falls City	N28.91	W98.13
UTAH		
Mexican Hat	N37.10	W109.85
Salt Lake City (Clive)	N40.69	W113.11

National Earthquake Information Center

World Data Center A for Seismology

Director
(303) 236-1510
Research
(303) 236-1506

U.S. Geological Survey
Box 25046, DFC, MS-967
Denver, Colorado 80225 USA
Telex: (WUTCO) 8106014123ESL UD

Operations
(303) 236-1500
QED
(800) 358-2663

Clinton C. Smythe -2-

We have entered the following selection criteria into our notification program:

1. Any earthquake of magnitude 3.0 or greater, within 0.3 degrees (about 20 miles) of any site shown above, or

2. Any earthquake of magnitude 5.0 or greater, within 1.0 degrees (about 70 miles) of any site shown above..

Sincerely,

Bruce W. Presgrave

Bruce Presgrave
U.S. Geological Survey
National Earthquake Information Center
P.O. Box 25046
Mail Stop 967
Denver Federal Center
Denver, Colorado 80225

Please address future correspondence to Stuart Koyanagi at the above address. I have moved to a different project.

Thank you + best regards,

Bruce Presgrave