

ENTRANCE

**Kirtland AFB Partnering Meeting
May 15, 1996**

**Presentation of Proposed Appendix I Phase 2 RFI Work Plan and
Long-Term Groundwater Monitoring Plan**

Site Descriptions

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LF-01 - Landfill 1 (SWMU 6-1)

Landfill 1 (LF-01) is located in the northwest corner of Kirtland AFB, east of the old Federal Aviation Administration control tower. It is bounded by Southgate Road on the north, a spur of the Atchison, Topeka, and Santa Fe Railroad on the south, an access road to the munitions storage area on the east, and a line from the southwest corner of the landfill scarp to a prominent turn in Kirtland Road to the west. The east-west runway of the Albuquerque International Sunport is approximately 400 feet from the northern edge of LF-01. Kirtland AFB Production Well No. 2 (not a source of drinking water) is located approximately 150 feet northeast of the landfill.

A modified, naturally occurring drainage channel meandering from north to south is the most prominent topographic feature of the landfill cover. It is usually dry, but carries stormwater runoff during rainfall events (SAIC, 1985). The channel also serves as part of the runway area drainage system. In most rainfall events, the flow infiltrates into the channel bottom before reaching the railroad spur culvert, one mile before reaching the Tijeras Arroyo (SAIC, 1985). There is evidence of erosion where the channel banks have cut into the landfill and uncovered fill material (USGS, 1993).

LF-01 overlies the Santa Fe Group, west of the Hubble Springs Fault, an area characterized by deep, unconsolidated, sedimentary soil covering the graben floor. The depth of the groundwater table ranges from approximately 380 to 430 feet below land surface, sloping to the northeast, toward a production well (Kirtland Production Well No. 2). Hydraulic conductivities ranged from 0.197 to 4.668 feet/day (USGS, 1993).

This general-use landfill was operated between 1965 and 1975 (USGS, 1993). According to the 1988 Kearney/Centaur report, no written records of the quantities or nature of the materials disposed in LF-01 have been recovered. Informal, undocumented interviews conducted during previous investigations implied that the landfill contained general refuse, hardfill, and possibly hazardous materials including chemical drums, oil-soaked insulation, and numerous 5-gallon cans containing unknown liquids (USGS, 1993). Aerial photographs taken in 1971 showed numerous 55-gallon drums at this site (SAIC, 1985). The depths of these materials ranged from 10 to 30 feet over approximately 55 acres (SAIC, 1985). The volume of the landfill's constituents was estimated to be 600,000 cubic yards in the 1981 Phase I report (ESI, 1981).

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The landfill was covered with a silty sand of unspecified thickness shortly after operations ended in 1975. However, a large portion of the south bank was either never covered with sand, or the cover was eroded revealing the refuse in that area. Because the old cap has deteriorated, Kirtland AFB placed 5 to 20 feet of clean native soil onto much of this landfill. The south bank was covered by the summer of 1983.

LF-02 - Landfill 2 (SWMU 6-2)

Landfill 2 is located between the Trestle and ARES facilities to the north and the active channel of the Tijeras Arroyo to the south. Its eastern and western boundaries are not as clearly defined. They extend to the "limits of selected man-made surface disturbances" according to the Phase II report (SAIC, 1985). Landfill 2 lies entirely in the Tijeras Arroyo floodplain and ranges in altitude from 5,243 feet on the western edge to 5,278 feet on the eastern edge (SAIC, 1985). Kirtland AFB Production Well No. 8 is approximately 2,100 feet northeast of the landfill, and Production Well No. 4 is 2,400 feet to the north.

Landfill 2 was operated between 1943 and 1967 (ESI, 1981). Operations at the landfill reportedly consisted of trench and fill operations. According to the 1988 Kearney/Centaur report, no written records of the quantities or nature of the materials disposed in Landfill 2 have been recovered. Informal, undocumented interviews conducted during previous investigations implied that the landfill contained general refuse, hardfill, and possibly hazardous material, including 55-gallon drums containing liquid solvents and plastic wastes, with the depths of these materials ranging from nine to 20 feet over approximately 35 acres. The volume of the landfill's constituents was estimated to be one million cubic yards in the 1981 Phase I report (ESI, 1981). The northernmost portion of Landfill 2 was removed and relocated to Landfill 3 to accommodate the construction of the Trestle Facility in the early 1970s.

Two buried sewer pipes cross Landfill 2. The City of Albuquerque's Tijeras Interceptor Sanitary sewer line is a 21-inch line running east-west in the northeast region of Landfill 2, 200 feet south of monitoring well DM-02. The sewage effluent transmission line (ST-51) runs from the corner of the Trestle and ARES fenceline through the southeast corner of the landfill and joins the sewage lagoons to the Golf Course Main Pond. The sewage effluent transmission line is known to have failed in the past and soil above both lines is reported to have anomalous, dense plant growth.

The landfill was completely covered with two to six feet of silty sand, but by 1985, widespread litter and exposed debris in the north bank of the Tijeras Arroyo channel was reported (SAIC, 1985). The banks of the active channel have since been stabilized with riprap and wire mesh along the contact with Landfill 2 (USGS, 1993). Kirtland AFB has completed the last phase of riprap construction, which was coordinated with the local flood control district and the USACE.

Landfill 2 rests on recent alluvium of the Tijeras Arroyo which overlies the Santa Fe Group. The depth of this deposit is not certain but has been estimated to be greater than 50 feet. This site lies west of the Hubble Springs Fault. The water table was 395 feet below ground surface in 1990,

but has been falling at a rate of about 2.4 feet per year due to withdrawals from service wells. Groundwater gradient is to the northwest at 10 feet to 20 feet/mile (USGS, 1993).

Surface irregularities have caused ponding in the northern portion of the landfill. The Tijeras Arroyo 100-year floodplain covers all of Landfill 2. In the event of a flood of that magnitude, this site would be covered with two to three feet of water, according to SAIC's 1985 report. This could result in infiltration problems as well as the erosion of large sections of the landfill.

LF-07 - Landfill 3 (SWMU 6-3)

Landfill 3 is located in the northwest region of Kirtland AFB. Its northern, eastern, and western boundaries are natural ridges from the old arroyo, which was filled to make the landfill. The southern boundary is the change in slope between the Tijeras Arroyo floodplain and the steep slopes of the Santa Fe Group and landfill.

Landfill 3 was created when the construction of the Trestle Facility required the partial movement of Landfill 2 (SAIC, 1985). It was operated from 1972 through 1977. According to base personnel, Landfill 3 was mostly filled with burned aircraft parts. The depth of fill is approximately ten feet over the seven acres of the landfill (SAIC, 1985). A large portion of this landfill is on the side of a hill.

Landfill 3 is above the Tijeras Arroyo floodplain; no surface drainage crosses the site. This site lies west of the Hubble Springs Fault (USGS, 1993). The groundwater table depth is about 420 feet with a northern hydraulic gradient of about ten feet per mile (USGS, 1993).

LF-08 - Landfills 4, 5, and 6 (SWMU 6-4)

Landfills 4, 5, and 6 are located adjacent to one another in the northwest region of Kirtland AFB. They are bounded by Tijeras Arroyo to the north, a drainage berm to the south, an unpaved road to the west, and the covered slope of the active base landfill about 150 feet east of Powerline Road to the east.

Because of their close proximity to each other, Landfills 4/5 and 6 (formerly two SWMUs 6-4 and 6-6, respectively) were combined into one SWMU (6-4) via an EPA-approved Class I permit modification in 1994. A decision document (DD) to finish Landfill 6 was completed and signed in 1994.

The landfills were used for general refuse between 1960 and 1989 by the City of Albuquerque and Kirtland AFB (USGS, 1993). Although no written records of the quantities or nature of the materials disposed in Landfills 4 and 5 have been recovered, interviews conducted during previous investigations implied that the landfills contained general refuse, possibly hazardous material (including chemical drums), and a large section of hardfill (ESI, 1981; SAIC, 1985; Kearney, 1988). The depths of the fill are estimated to have been two feet deep on the north and south edges and 40 feet near an east-west centerline (SAIC, 1985). In the 1981 Phase I report,

the surface area and total volume of fill were estimated to be 30 acres and 600,000 cubic yards, respectively.

A 6-foot thick, non-RCRA native soil cap was constructed at this site in the fall of 1992 to comply with state regulations. Long-term monitoring of six monitoring wells is anticipated for 10 years after completion of the Corrective Measures Implementation (CMI).

No surface drainage crosses the landfills. Although it is generally well covered, this site has some topographic depressions on its surface which cause some accumulation and channeling of precipitation (SAIC, 1985). This has resulted in erosion of some of the cover material on the western surface of the landfill. This site lies west of the Hubble Springs Fault. The depth to groundwater is approximately 500 feet (USGS, 1993). Groundwater moves northwest with an unknown hydraulic gradient (USGS, 1993).

LF-09 - Abandoned Landfill (SWMU 6-10)

This landfill is located in the west-central region of Kirtland AFB, adjacent to the Tijeras Arroyo and directly southwest of LF-02. According to base personnel, the landfill was used as a target area for practice bombing competitions during World War II. The debris from these bombing runs was thought to have been picked up to be recycled for the war. The size of this site is unknown. No records show usage after 1945.

The cover is a silty sand of an unspecified thickness. The Tijeras Arroyo lies within 1,000 feet to the north of the site. The depth to the groundwater table is approximately 400 feet (USGS, 1993). This site lies west of the Hubble Springs Fault (USGS, 1993). Groundwater gradient is to the northwest at 10 to 20 feet per mile.

LF-15 - Landfill B (SWMU 6-8)

Landfill B covers approximately 1 acre east of Lake Christian in the south-central region of Kirtland AFB. Landfill B was in operation from the 1960s until mid-1994 (AquaTech Environmental, Inc., 1994 and USGS, 1993). Although the landfill reportedly received mostly demolition debris in the past, general refuse and ITRI Laboratory wastes are also thought to have been disposed in the landfill (USGS, 1993). According to a 1994 report by AquaTech Environmental, Inc., eight to ten trenches, eight to ten feet deep, were used to dispose of laboratory wastes. At the same time the contents of a general refuse pit (within the trench area) were excavated and removed to Kirtland AFB Landfills No. 5 and 6, some trenches may have been excavated and removed as well (AquaTech Environmental, Inc., 1994). The trench area, including the general landfill pit, was backfilled using silty sand and gravel from the Tijeras Arroyo. From 1983 aerial photos of at least three open trenches, field observations of several areas of compacted sand and gravel appearing to have the same geometry and dimension of the trenches, and a five- to six-foot mound of sand and gravel, the AquaTech report concludes that some of the trenches may not have been excavated in 1984. In 1994 a notice of violation (NOV) was issued by the NMED when it was discovered that the northeast corner of the landfill had been recently used for disposal of uncontaminated ITRI lab test waste. The current tenants have

submitted a landfill closure plan for this area to meet the requirements of the New Mexico Solid Waste Disposal Act.

The geologic setting consists of terrace deposits, specifically sand and gravel; silty sand was used as cover material. No surface water crosses the landfill. This site lies east of the Hubble Springs Fault. The groundwater depth is 90 to 100 feet and the regional slope of the water table at Landfill B is to the south-southwest (AquaTech Environmental, Inc., 1994). The hydraulic gradient is unknown.

LF-18 - Landfill A (SWMU 6-7)

Landfill A encompasses 3 acres in the northwest region of Kirtland AFB, approximately 550 yards south of the east-west runway of the Albuquerque International Sunport. A portion of this landfill is outside the boundary of Kirtland AFB. This site lies west of the Hubble Springs Fault (USGS, 1993). The depth to groundwater is approximately 420 feet. The hydraulic gradient is unknown. The regional slope of the groundwater table is to the northeast (USGS, 1993).

From 1941 to 1946, Landfill A received and burned non-medical hospital waste and mess hall general refuse. All disposal appears to be at the surface. Although Landfill A was not used after 1946, it did not officially close until the 1980s.

LF-20 - Manzano Landfill (SWMU 6-29)

The Manzano Landfill is located on the southwest corner of the Manzano Weapons Storage Area (MSWA), outside the fenced area, in the central region of Kirtland AFB. The landfill is approximately 1 to 3 acres in size (USGS, 1993). Previous investigations include a review of historic air photos. Based on this review, it appears that the site was used and covered prior to 1959 (USGS, 1993). In a 1956 photo, however, it appears as a water-filled depression. LF-20 was operated as a disposal area for general refuse from the Manzano base housing area and also used for open burning (USGS, 1993). According to facility representatives, the site was also used for fire training activities prior to its use as a dump. On the basis of current waste management practices at the active landfill on base and observed black oily stains at LF-20, this site may also contain hazardous constituents. The site has a soil cover of unknown thickness and is currently inactive. A softball field has been constructed on a portion of the landfill cover.

This site is located west of the Sandia fault zone. Fractured granite is overlain by the Santa Fe Group. The land surface at this site slopes gently to the west. The depth of the water table is unknown. Groundwater may exist in fractured granite at depths greater than 100 feet (USGS, 1993). Groundwater flow in the region is generally westward; however, because groundwater flow is probably controlled by fractures in granite, the flow direction in the immediate vicinity of the site is unknown (USGS, 1993).

LF-44 - Fill Area Southeast of Sewage Lagoons (SWMU 6-11)

LF-44 encompasses approximately 2 acres and is located in the northwest part of Kirtland AFB about a quarter of a mile northwest of the Trestle Facility and immediately southeast of the Kirtland AFB sewage lagoons. The northern edge is bounded by the fence around the sewage lagoons and on the south by the railroad. The site has been used for the disposal of construction rubble for an unspecified period of time (USGS, 1993). The land surface in the vicinity of the site slopes moderately to the south toward the Tijeras Arroyo. The site is approximately 500 feet from Kirtland AFB Production Well No. 4. This site lies west of the Hubble Springs Fault (USGS, 1993). The depth to groundwater is approximately 480 feet (USGS, 1993). The hydraulic gradient is unknown. The direction of groundwater flow is generally to the northwest (USGS, 1993).

It is unknown when landfill operations began; however, according to base personnel, no further refuse has been added since 1988. The 8-foot-deep landfill contained mainly construction debris, including concrete, asphalt, roofing shingles, metal sheets, motor oil pans, and bottles. These materials were removed from October 1992 through March 1993.

LF-45 - Explosive Test Site/Unnamed Dump (SWMU 6-15)

This site, approximately 3 to 5 acres in size, is located in the northwest region of Kirtland AFB, one mile southwest of Landfill A (LF-18) and about one-half mile south of the east-west runway of the Albuquerque International Sunport. This site lies west of the Hubble Springs Fault (USGS, 1993). The land surface in the vicinity of the site slopes moderately to the southeast towards the Tijeras Arroyo. The site is located at the top of a small mesa and has no surface drainage. The depth to groundwater is approximately 380 feet (USGS, 1993). The hydraulic gradient is unknown and the general direction of groundwater flow is northeastward (USGS, 1993).

This site was used as a explosive test site between 1951 and 1955. Some charred, scattered debris such as bottles and construction rubble were noted in earlier reports, but were later removed from the site. Large steel panels were used in the construction of berms for the test site. These panels are currently the only visible evidence of the explosives testing performed at this site. Kirtland AFB will be responsible for removal and disposal of the steel panels.

OT-28 - McCormick Ranch (SWMU 6-31)

McCormick Ranch is an explosives testing area located adjacent to the southwest corner of Kirtland AFB on land leased from the State of New Mexico. A total of 747.24 acres of McCormick Ranch have been leased for explosives testing. The ground surface of McCormick Ranch gradually slopes southward toward Hell's Canyon Wash, approximately 3.5 miles from this site. There are no surface drainage channels that carry runoff onto McCormick Ranch nor are there any water bodies or significant drainage features. The site is almost featureless with only 30 feet of difference in elevation between its lowest and highest points. The lowest portion

of the site is on the southern boundary which is the location of a large playa. At one time this playa was thought to be 160 acres which collected all of the surface runoff. However, the size of the playa and surface drainage has been significantly altered by the explosive testing activities during the site's operation. This site lies west of the Hubble Springs Fault (USGS, 1993). The depth of the water table ranges from approximately 350 feet in the south to 380 feet in the north (top of casing elevations from the Philips Laboratory (PL) Phase II Environmental Baseline Survey (EBS) were consistently lower, up to 4 feet, than the KAFB, USGS 1993 report). The groundwater flow direction is to the north with the hydraulic gradient of 0.0001 (PL Phase II EBS, 1993).

From 1963 to 1992, explosives testing was conducted at McCormick Ranch for small scale high explosives development, analysis and modeling. The main explosives used were ammonium nitrate, pentaerythritol, and/or trinitrotoluene. The majority of tests were conducted on the surface and shallow subsurface. However, one test was conducted at a depth of approximately 300 feet below land surface. According to the PL Phase I and II EBS, there were 377 tests conducted from 1963 to 1992. Testing has ceased at this site. There are no plans for future testing. These tests resulted in numerous crater-like features (USGS, 1993).

OT-29 - Explosives Ordnance Disposal (EOD) Range (SWMU 6-19)

The EOD Range is located in the south-central region of Kirtland AFB, southeast of the MWSA and northeast of the Solar Thermal Test site. The EOD range is a circular, unvegetated area of 38 acres located on a flat, featureless surface that slopes slightly to the west. The range is an alluvial plain with no surface drainage crossings. The soil is mixed with an asphalt-like material serving as a defoliant. This site lies east of the Hubble Springs Fault (USGS, 1993). Groundwater depth is estimated at 100 feet and the water table slopes to the southwest (USGS, 1993). The hydraulic gradient is unknown.

Operations at this site began in 1972 and continue today. The EOD Range has a radius of 2,500 feet, but most of that area is used as a buffer zone. The area is covered with conical-shaped detonation pits, averaging 20 feet across and eight to ten feet deep. The pits are located as close to the center of the range as possible in order to maximize the buffer zone. Normally, one detonation pit is operated at a time. Once a pit has been used once or twice, a new pit is dug. The ordnance destroyed on the EOD Range includes magnesium flares, percussion grenades, ammunition boxes, firearms, explosive waste, confiscated narcotics, outdated and problematic gas cylinders, and chemical wastes. On the northeast edge of the range, there is a burn pit approximately 15 by 40 feet with a depth reaching eight feet (USGS, 1993). In the pit, small arms ammunition and spent flare casings are burned by igniting scrap wood drenched with kerosene (USGS, 1993).

OT-46 - Lake Christian (SWMU 6-22)

Lake Christian is a manmade lake located in the southeastern region of Kirtland AFB, about 1,000 feet west-northwest of Landfill B (LF-15). Lake Christian is 40 feet deep and 100 feet in diameter. The lake has approximately one foot of freeboard, and an abundance of foliage

surrounds it. An open drainage ditch is located less than 250 feet north of the site. This site lies east of the Hubble Springs Fault. Land surface in the vicinity slopes moderately to the west. The water table at the site is a minimum of about 80 feet below the ground surface (USGS, 1993). The hydraulic gradient is unknown. Groundwater near the site flows generally southwestward; however, the direction of groundwater flow in the immediate vicinity of the site is uncertain (USGS, 1993).

The lake was constructed in the 1950s for use as an underwater explosives testing facility (USGS, 1993). This unit was active until the mid-1960s to study the effects of underwater detonation of explosives such as TNT and pentolite.

FT-13 - Kirtland Fire Training Area (SWMU 6-16)

The Kirtland Fire Training Area (FTA) is located in the northwest region of the base, approximately 600 feet southwest of the old Federal Aviation Administration (FAA) Tower. The site consists of the former FTA (two unlined pits), the deactivated FTA (FT-52, Jet Engine Burn Area--a 200-foot diameter, graded area surrounding a 5-foot diameter concrete pad with an airplane mockup in the center), and the storm drains and piping. An 18-inch-high earthen berm surrounds the concrete pad. A fuel storage tank located southeast of the graded area fed a sprinkler system on the pad during training exercises.

The two storm drains are the former FT-39 (SWMU 6-17); they service the runway and other developed areas to the north (SAIC, 1985). Both are located southeast of the graded area. The easternmost drain discharges into the open ditch east of the FTA (SAIC, 1985). The other drain is partially buried and discharges southeast of the concrete pad area (SAIC, 1985). Because of their proximity and similar use, the EPA approved combining FT-39 with FT-13 and FT-52. The Class I permit modification and finished site DD were completed and signed in 1994.

Prior to 1976, fire training activities were held twice per week in two unlined fire pits located about 110 feet east of the graded area (USGS, 1993). The pits would first be soaked with water then filled with approximately 200 to 300 gallons of contaminated fuel, waste oil, or solvents. The fuel was ignited and then extinguished with aqueous film-forming foam (AFFF). The remaining liquids were allowed to evaporate and infiltrate. These unlined pits were allegedly also used for monthly disposal of one to two 55-gallon drums of waste solvents and oils from the base shops (SAIC, 1985). Since the construction of the new facility in 1976, these unlined pits have been filled with soil and graded flat (USGS, 1993).

At the deactivated FTA, quarterly activities were restricted to burning uncontaminated JP-4 jet fuel. Typically, the jet fuel was applied to the mockup airplane and then ignited. The AFFF was used to extinguish the fires (USGS, 1993). After an exercise, residual liquids (JP-4, AFFF, and water) were allowed to evaporate (USGS, 1993). No fire training activities have been conducted at the site since March 1990.

After unusually large precipitation events, or when the valves on the drains on the pad are open, discharge from the FTA can flow into the storm drain. Most of the graded area is sandy and

infiltration is likely. Small cracks in the concrete pad probably only resulted in small amounts of infiltration; the rest probably evaporated. The FTA is not presently threatened by surface erosion; however, an unnamed arroyo with an active head cut southeast of the FTA could possibly threaten the site in the future. This site lies west of the Hubble Springs Fault (USGS, 1993). Groundwater is approximately 400 feet deep with a northeasterly hydraulic gradient of about seven feet per mile (SAIC, 1985).

WP-16 - Manzano Sewage Treatment Facility (SWMU 6-24)

This site consists of an Imhoff tank, sludge drying beds, and four sewage lagoons (formerly WP-40, 41, 42, and 43). The Imhoff tank is located about 100 feet west of Sewage Lagoon 1 in the central region of Kirtland AFB. The sludge drying beds are located southwest of the Imhoff Tank on the southwest edge of the MWSA administrative area. This site lies east of the Hubble Springs Fault (USGS, 1993). The water table at this site is approximately 500 feet below land surface. Groundwater at the site generally flows westward (USGS, 1993).

The Imhoff tank is a 30,000-gallon concrete tank used in the sewage treatment process to settle solids out of liquid effluent. The tank and sludge drying beds were in operation from 1969 until 1990, when a pipeline was constructed to transport waste to a municipal treatment plant. The sludges collected in the Imhoff tank were directed to the sludge drying beds. These beds are actually one rectangular unit divided lengthwise into two beds by a 3-foot high, 6-inch thick concrete wall. The total surface area is 1,740 square feet. The bottom of the bed is a 1-foot thick layer of sand over natural soil (USGS, 1993).

In 1984, untreated raw sewage was reportedly dumped into the beds (USGS, 1993). According to the Kearney/Centaur report (1988), samples collected from discharge effluent in the open receiving ditch contained low levels of dichlorobenzene, toluene, and xylenes.