Tables

Table 1. Summary of Previous Investigations

Date	Consultant/Agency	Activities Conducted
1975	LRWQCB	Collected leachate and surface water samples. Documented leachate discharge from the landfill.
1976	Forest Service	Collected surface water samples from upstream and downstream locations along Saxon Creek. Documented leachate discharge to Saxon Creek.
1976-1977	Forest Service	Approximately 30,000 cubic yards of cover soil was spread over the landfill to fill depressions and control erosion. Drainage systems to collect water from the intermittent stream and spring were installed at the south end of the landfill. The collected water was diverted to Saxon Creek.
1979	BSK Associates /Forest Service	Five monitoring wells (M-1 through M-5) were installed within the boundaries of the landfill. Well M-6 was installed at the base of the northern slope at an unknown time.
1980-1982	Forest Service	Water elevations were measured at the landfill monitoring wells. It is unknown if samples were collected from the wells.
1980-1989	Forest Service	Annual samples were collected from Saxon Creek.
June/August 1991	Weston Analytics/ Forest Service	Sampling of landfill wells for VOC analyses. Report documented VOCs, including vinyl chloride.
March 1992	Alpha Analytical/ Forest Service	Samples were collected from landfill wells and analyzed for VOCs. Report documented VOCs, including vinyl chloride.
October 1994	E&E/Forest Service	Installed upgradient groundwater monitoring well M-7; collected groundwater samples from wells M-4, M-5, and M-7 and surface water samples from Saxon Creek.
May/June 1995	E&E/Forest Service	Drilled 15 borings (HP-1 through HP-15): 10 borings located on the landfill plateau and 5 located off of the landfill. Groundwater samples were collected from 14 of the 15 borings and from monitoring wells M-4, M-5, and M-7. Surface water samples were collected from Saxon Creek and from the French drain outlet. Well M-6 was destroyed.
July 1996	Forest Service	Solid Waste Assessment Test Report was prepared for the site to document activities conducted to date.
July 1996	E&E/Forest Service	Installed groundwater monitoring well M-8 between the landfill and Saxon Creek and wells M-9 and M-10 north of the landfill. Installed four soil vapor probes (GP-1 through GP-4) off of the landfill. No information is available on sampling of these wells by E&E. An undated topographic map of the landfill showing site drainage features and new wells was prepared after this well installation.
August 1996	BAI/Forest Service	Samples were collected from wells M-7 through M-10 and Saxon Creek. Vinyl chloride was documented in well M-10 at 5.5 µg/L.
November 1996	BAI/Forest Service	Samples were collected from wells M-7, M-9, M-10, Saxon Creek, and soil vapor probes GP-1 through GP-4. Vinyl chloride was not detected.
August 1997	PTEM/JPA	Installed three shallow groundwater monitoring wells (M-11, M-12, and M-13) near well M-10. Samples were collected from wells M-7 through M-13.
October/ November 1997	PTEM/JPA	Installed eight shallow groundwater monitoring wells (T-1 through T-8). Samples were collected from wells M-7, M-9 through M-13, and wells T-1 through T-8. Samples could not be collected from Well M-8 because of low water levels.
December 1997	PTEM/JPA	Samples were collected from wells M-7, M-9 through M-13, and wells T-1 through T-8. Samples could not be collected from Well M-8 because of low water levels.

Table 1. Summary of Previous Investigations *(continued)*

Date	Consultant/Agency	Activities Conducted
May 1998	PTEM/JPA	Samples were collected from wells M-7, M-9 through M-13, and wells T-1 through T-8. Installed eight shallow groundwater monitoring wells (T-9, T-10, M-8A, OW-1 though OW-5) and one deeper "intermediate" well (D-1). Installed three soil vapor probes (M-13, T-3, and T-6). Samples were collected from the wells that were installed.
June 1998	PTEM/JPA	Samples were collected from 23 groundwater monitoring wells and 3 soil vapor probes.
August 1998	PTEM/JPA	Samples were collected from 23 groundwater monitoring wells.
October 1998	PTEM/JPA	Installed two shallow groundwater monitoring wells (T-11 and T-12), two wells to an intermediate depth (D-2 and D-3), and three deep wells (D-4 through D-6).
November 1998	PTEM/JPA	Samples were collected from 30 groundwater monitoring wells, and 3 surface water samples were collected from Saxon Creek.
May 1999	PTEM/JPA	Samples were collected from 29 groundwater monitoring wells, excluding well M-7, and 5 surface water samples were collected from Saxon Creek.
June/July 1999	PTEM/JPA	Drilled 23 borings (B-1 through B-23) in and around the landfill and collected 16 groundwater samples from the borings. Installed and collected samples from two shallow groundwater monitoring wells.
August/ September 1999	PTEM/JPA	Collected samples from 31 groundwater monitoring wells, and collected five surface water samples from Saxon Creek.
October 1999	PTEM/JPA	Installed one extraction well (X-1) and conducted a 3-day aquifer pump test.
1999 - 2005	BAI/Forest Service	Operation and maintenance of the pilot pump and treat system. The system was not effective at controlling the plume and was shut down in 2005.
November 1999	PTEM/JPA	Collected samples from 31 groundwater monitoring wells, and collected 5 surface water samples from Saxon Creek.
May 2000	PTEM/JPA	Collected samples from 31 groundwater monitoring wells, and collected 5 surface water samples from Saxon Creek.
June 2000	PTEM/JPA	Prepared Meyers Landfill RI Report for Forest Service.
June 2000	Tetra Tech EM Inc./Forest Service	Prepared a Draft Baseline Human Health Risk Assessment and Screening-Level Ecological Risk Assessment.
January 2002	E&E/Forest Service	Prepared Meyers Landfill FS Report for Forest Service.
October/ November 2003	GeoSyntec/City	Excavated 55 test pits in and adjacent to landfill. Installed one LFG extraction well and three LFG monitoring probes. Performed a 5-day LFG extraction test.
October/ November 2003	Geomatrix/County	Collected samples from 31 groundwater monitoring wells and collected 3 surface water samples from Saxon Creek. Drilled 11 borings (GB-1 through GB-11) downgradient of the landfill. Collected groundwater grab samples from 10 of the 11 borings.
May/ June 2004	Geomatrix/County	Installed two shallow groundwater monitoring wells (OW-6 and OW-7) and drilled two borings (GB-12 and GB-13) for the collection of groundwater samples. Collected samples from 11 groundwater monitoring wells and collected 3 surface water samples from Saxon Creek. Samples were collected for the evaluation of appropriate groundwater remedial alternatives, including bioattenuation.

Table 1. Summary of Previous Investigations *(continued)*

Date	Consultant/Agency	Activities Conducted
September/ November 2005	Weston/Forest Service	Installed four groundwater monitoring wells, two piezometers, and drilled six borings for the collection of depth discrete groundwater samples. Collected samples from 24 groundwater monitoring wells, including the newly installed wells. Installed and collected samples from 17 soil vapor probes. Collected sewer gas and sewer solid samples.
September 2005	South Tahoe Public Utility Department	Conducted video inspection of Trout Creek sewer trunk line between manholes 46 and 50.
October 2005	Weston/Forest Service	Conducted geophysical survey that included the landfill plateau and slopes. Performed a 5-day LFG extraction test.
January 2006	Weston/Forest Service	Collected samples from 12 monitoring wells, including 7 wells with passive diffusion bags installed at various depths in the selected wells.
May 2006	Weston/Forest Service	Collected samples from 20 groundwater monitoring wells. Conducted cone penetration test at 13 locations, and collected depth discrete groundwater samples from 6 of the 13 borings. Installed two soil vapor probes.
June 2006	Weston/Forest Service	Conducted investigative trenching in landfill near sewer, inspected sewer bedding material, and trenched west side of landfill in perched water area. Installed one soil vapor probe in sewer backfill. Located and elevated buried manhole number 48 in landfill. Collected soil vapor samples from 15 soil vapor probes.
June 2006	Forest Service	Conducted a fly-over of the site, and prepared an aerial photograph and topographic map of the landfill and surrounding area.
May 2007	Weston	Prepared Meyers Landfill Supplemental RI/FS Report for Forest Service.
November 2007	Forest Service	Prepared Meyers Landfill ROD.

Notes: This table was originally presented as Table 1-1 in the RI/FS Report (Weston, 2007).

1. From 1997-2000, the County, through its JPA, performed site investigations under a voluntary Administrative Order on Consent under Forest Service direction and oversight.
2. From 2003-2004, the City performed supplemental site investigations of the waste disposal area pursuant to an ASAOC under Forest Service direction and oversight.
3. From 2003-2004, the County performed supplemental groundwater investigations pursuant to an ASAOC under Forest Service direction and oversight.
4. Additional groundwater investigation work is currently being conducted by the County for OU-2.

µg/L = microgram per liter
ASAOC = Administrative Settlement Agreement and Order on Consent
BAI = Broadbent & Associates, Inc.
City = City of South Lake Tahoe
County = El Dorado County
E&E = Ecology and Environment, Inc.
Forest Service = U.S. Department of Agriculture Forest Service
FS = feasibility study
Geomatrix = Geomatrix Consultants, Inc.
JPA = Joint Power Authority
LFG = landfill gas
LRWQCB = Lahontan Regional Water Quality Control Board
OU = Operable Unit
PTEM = Phase Three Environmental Management
RI = remedial investigation
ROD = Record of Decision
VOC = volatile organic compound
Weston = Weston Solutions, Inc.

Table 2. Metals Concentrations in Background Soil Samples

Metal	Sample I-1 10/13/06	Sample I-2 9/28/06	Sample GMX-1 10/11/06	Sample GMX-2 9/26/06
Aluminum	5,700	7,600	9,400	4,000
Arsenic	0.68	0.56	0.89	0.55
Barium	30	33	49	19
Beryllium	<1.0	<1.0	<1.0	<1.0
Cadmium	<1.0	<1.0	<1.0	<1.0
Chromium (total)	2.7	1.7	3.1	1.7
Cobalt	2.3	2.1	3.0	1.5
Copper	17	33	19	14
Iron	8,400	7,600	1,100	7,400
Mercury	<0.20	<0.20	0.15	<0.20
Manganese	140	180	200	100
Molybdenum	2.6	2.9	1.3	1.2
Nickel	2.5	<2.0	2.2	3.4
Potassium	0.76	<0.20	--	0.98
Lead	15	2	1.9	1.1
Antimony	2.1	<1.0	<1.0	<1.0
Selenium	<1.0	<1.0	<1.0	<1.0
Thallium	<1.0	1.2	<1.0	<1.0
Vanadium	16	14	16	17
Zinc	22	24	29	<20

Note: All concentrations are in mg/kg.

Source: Table entitled “Draft Historical Metals and Inorganic Data in Soil” (Forest Service, 2009)

Table 3. Basis of the Design

Parameter	Requirements/Basis of Design Criteria	Design Element Addressing Basis of Design Criteria
Landfill Cover Configuration, Performance, and Maintenance	▪ Protect humans and wildlife from exposure to landfill refuse and soil contamination (*RAO*) ▪ Conform to general standards for closure of all solid waste management units, including performance goals for closing such units (Title 27 CCR, Division 2, 20950) (*action-specific ARAR*) ▪ Conform to final cover requirements of the SWRCB, including a prescriptive, multilayer cap design (Title 27 CCR, Section 21090) (*action-specific ARAR*) ▪ Meet the following general construction and containment criteria (Title 27 CCR, Sections 20310 and 20320) (*action-specific ARARs*) o Design shall prevent migration of wastes from the landfill to adjacent geologic materials, ground water, or surface water o Design shall meet seismic design criteria (to withstand the maximum credible earthquake [MCE] without damage) o The containment structures shall be designed and certified by a registered civil engineer or a certified engineering geologist o A stability analysis shall be performed in accordance with Title 27 CCR, Section 21750(f)(5) o The materials used shall have appropriate chemical and physical properties to ensure that the containment structures do not fail ▪ Meet the following CIWMB requirements for closed and inactive sites. In particular, CIWMB closure and post-closure maintenance requirements (Title 27 CCR § 21100 et seq., §§21140(a)(b), 21142(a), 21145(a), and 21150(a) and (b)) (*action-specific ARARs*): o Function with minimum maintenance o Provide waste containment to protect public health and safety o Achieve compatibility with post-closure land use o Provide equivalent protection from wind and surface water soil erosion with an erosion layer that contains a minimum of 6 inches of earthen material capable of sustaining native plant growth	▪ Design incorporates a cover meeting Title 27 configuration requirements to ensure that performance provides adequate waste containment for protection of human health and the environment, and meets closure requirements, and to minimize production of leachate and LFG. ▪ Design incorporates a multilayer cover system, including a foundation layer, low-hydraulic conductivity layer (geomembrane), and an erosion-resistant vegetative layer conforming to Title 27 CCR § 21090 requirements. ▪ Design was prepared under the supervision of a Registered Professional Civil and Geotechnical Engineer. ▪ Final cap to be compacted to an average of 90 percent of the maximum dry density and graded to promote surface water runoff and reduce potential soil erosion and off-site migration. ▪ Cover and containment systems were designed to withstand the peak ground acceleration associated with the MCE of magnitude 6.0. ▪ Slope stability of design under static and seismic conditions was verified using XSTABL model. Final cover slope to be mostly 6 percent with the steepest areas no more than 4:1 (H:V). ▪ Design analyses include slope failure calculation for the designed cover slopes, and loading calculations that account for future unauthorized use of the landfill by site visitors, including motorized dirt bikes and OHV traffic. ▪ Materials included in the design were tested to verify that they will not fail under anticipated future conditions. ▪ Design incorporates passive containment systems, including passive LFG control system and gravity drivendrainage control systems. ▪ Finished cover designed to accommodate vegetations for erosion control. Cover to be seeded with native species mixture established by the Forest Service.

Table 3. Basis of the Design *(continued)*

Parameter	Requirements/Basis of Design Criteria	Design Element Addressing Basis of Design Criteria
Landfill Cover Configuration, Performance, and Maintenance *(continued)*	▪ Maintain a written post-closure emergency response plan that identifies occurrences that may exceed the site design and endanger public health or the environment (Title 27 CCR § 21130) (*action-specific ARAR*). ▪ Satisfy qualitative CIWMB requirements for final grading, slope stability, and drainage and erosion control (Title 27 CCR §§ 21142, 21145, and 21150) (*action-specific ARARs*). ▪ Implement a post-closure monitoring and maintenance program for a period of no less than 30 years (Title 27 CCR § 21180(a)) (*action-specific ARARs*). ▪ Proposed post-closure land uses be designated and maintained to protect health and safety and prevent damage to structures, roads, utilities and gas monitoring and control systems; to prevent public contact with waste, landfill gas and leachate; and prevent landfill gas explosions. (Title 27 CCR 21190, Subsections (a), (d), (e), (f) and (g)) (*action-specific ARARs*). ▪ Classified waste management units must be closed in accordance with an approved preliminary closure and post-closure maintenance plan, which provides for continued compliance with the applicable standards for waste containment and precipitation and drainage controls and monitoring requirements. (Title 27 CCR 21769) (*action-specific ARAR*). ▪ Final post-closure maintenance plan must be implemented. (Title 27 CCR 21830) (*action-specific ARAR*). ▪ Final closure plan must include a detailed description of each item contained in Section 21790(b) and a detailed description of the sequence of closure stages. (Title 27 CCR 21800(c)) (*action-specific ARAR*).	▪ Design includes requirements and guidelines for preparing an operations, maintenance, and monitoring plan that includes an emergency response plan. ▪ Engineering cost estimate includes costs for a 30-year post-closure operation, maintenance and monitoring program. ▪ Monitoring wells located on the cover designed to be flush mounted, and gas vents designed to be protected by chain link fence enclosures to minimize the risk of damage by vehicle traffic and vandalism. ▪ In areas where existing utilities are buried beneath landfill waste, the design specifies that waste be excavated and consolidated on-site (away from the utilities) to ensure worker protection in the event of future utility repairs. ▪ Design includes an OM&M plan and an Engineering Cost Estimate are relevant to the preparation of the postclosure maintenance plan, providing: o Emergency response action information o Descriptions of the proposed monitoring and control systems at the landfill o Detailed descriptions of the methods, procedures and processes that will be used to maintain, monitor and inspect the closed landfill during the post closure maintenance period o O&M information for the gas control system o A summary of the requirements for reporting monitoring results ▪ Postclosure maintenance cost estimates

Table 3. Basis of Design *(continued)*

Parameter	Requirements/Basis of Design Criteria	Design Element Addressing Basis of Design Criteria
Groundwater and Surface Water Protection	▪ Minimize the effects of landfill refuse and soil contaminants on groundwater quality and rainwater runon (*RAO*) ▪ Meet National Ambient Water Quality Criteria for discharges to waters of the United States (Clean Water Act, as Amended, 33 U.S.C., Ch. 26, §§ 1251–1387, and 40 CFR § 131.36(b)). (*chemical-specific ARAR*) ▪ Meet WQOs in Porter-Cologne Water Quality Control Act, California. Water Code, div. 7, §§ 13241, 13243, 13263(a), 13269, and 13360. The substantive provisions of §§ 13241, 13243, 13263(a), 13269, and 13360 of the Porter-Cologne Act enabling legislation, as implemented through waste discharge requirements, promulgated policies of the Water Quality Control Plan for the Lahontan Region (Basin Plan). (*chemical-specific ARAR*) ▪ Minimize water percolation through the waste to control migration of vinyl chloride (and other compounds) from the waste to the underlying groundwater to achieve groundwater MCLs (Federal and State SDWA) (*chemical-specific ARAR*) ▪ Develop and implement a storm water pollution prevention plan, and perform storm water discharge monitoring (State Water Resources Control Board Order No. R6T-2005-0007 [Updated Waste Discharge Requirements And National Pollutant Discharge Elimination System General Permit No. CAG616002-Discharges of Storm Water Runoff Associated With Construction Activity Involving Land Disturbance In The Lake Tahoe Hydrologic Unit, El Dorado, Placer, And Alpine Counties] and State Water Resources Control Board Order No. 97-03-DWQ (Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities) (*action-specific ARARs*)	▪ Design incorporates a multilayer cover system into the design, including a foundation layer, low-hydraulic conductivity layer (geomembrane), and an erosion-resistant vegetative layer conforming to Title 27 CCR Section 21090 requirements. ▪ Design includes extending the existing French drain system on the southwest portion of the landfill to limit groundwater migration through waste. ▪ Design includes surface water runoff and erosion controls to minimize discharges of sediments and toxic substances that might adversely affect surface water quality. ▪ Design includes requirement for implementation of a SWPPP, including stormwater BMPs, during construction to control suspended sediment migration off site. ▪ Proposed multilayer cover system and drainage control structures incorporated to minimize water percolation through the waste to limit migration of COCs (primarily vinyl chloride) from the waste to underlying groundwater ▪ Design includes modeling (using HELP3) of percolation through the proposed multilayer cover and into the waste to estimate cover performance

Table 3. Basis of the Design *(continued)*

Parameter	Requirements/Basis of Design Criteria	Design Element Addressing Basis of Design Criteria
LFG Control and Monitoring	▪ Protect humans and wildlife by minimizing exposure pathways and LFG migration (*RAO*) ▪ Monitor to ensure that methane gas concentrations at site boundaries do not exceed the LEL (5 percent methane by volume) [Title 27 CCR § 20921(a)(2)] (*chemical-specific ARAR*) ▪ Control trace gases to prevent severe acute and chronic exposure to toxic and carcinogenic compounds [Title 27 CCR § 20921(a)(3)] (*chemical-specific ARAR*) ▪ Monitor discharges of vinyl chloride (Title 17 CCR §70200.5) (*chemical-specific ARAR*) ▪ Meet requirements for construction and operation of a perimeter landfill gas monitoring network and the implementation of a landfill gas monitoring program (Title 27 CCR §§ 20921, 20923, 20925, 20932, 20933, 20937, and 21160) (*action-specific ARARs*)	▪ A passive LFG control system is incorporated into the design to control LFG migration and to allow for long-term monitoring of gases generated by landfill waste. ▪ A perimeter LFG monitoring network is incorporated into the design to allow for compliance boundary sampling.
Environmental Protection	▪ MBTA of 1972 makes it unlawful to pursue, capture, hunt, or take actions adversely affecting a broad range of migratory birds. The MBTA and its implementing regulations are applicable to remedial activities that could affect any protected migratory birds (16 U.S.C. §§ 703 - 712) (*location-specific ARAR*) ▪ NFMA of 1976 requires that the Forest Service develop coordinated land and resource management plans to govern the management and use of National Forest System lands (i.e. the LTBMU Forest Plan). (16 U.S.C. §§ 1600-1614) (*location-specific ARAR*) ▪ Conduct construction activities and monitor emissions of fugitive dust to ensure that PM10 levels do not exceed 50 micrograms per cubic meter when determined, by simultaneous sampling, as the difference between upwind and downwind samples (California Clean Air Act, Title 17 CCR, El Dorado County Air Quality Management District Rule 223.1) (*action-specific ARAR*)	▪ Design incorporates requirements to perform construction in a manner that avoids harming protected migratory bird species, including individual birds or their nests. ▪ The Forest Service expects to maintain closure status on the property; however, it is understood that without significant additional enforcement resources, the area will likely remain popular for unauthorized OHV recreational use. The multilayer cover system was designed to accommodate OHV traffic, while maintaining the integrity of the cover system. Also, on-site structures, such as monitoring wells and gas vents, were designed to minimize vandalism and damage by trespassers. ▪ Design includes safety and occupational health requirements that identify the fugitive dust control requirements and require implementation of upwind and downwind air monitoring during construction.

Notes:

CCR = California Code of Regulations
CFR = Code of Federal Regulations
COC = chemical of concern
H:V = horizontal versus vertical
LFG = landfill gas
LLDPE = linear low-density polyethylene
MCL = maximum contaminant level
OHV = off-highway vehicle
RAO = remedial action objective
SDWA = Safe Drinking Water Act
U.S.C. = United States Code
§ = Section

Table 4. Cut and Fill Design Volumes

Activity	Cut Volume (cubic yard)	Fill Volume (cubic yard)
Remove top 2 feet of existing cover	33,400	--
Excavate and relocate waste	33,900	--
Place 2-foot foundation layer[1]	--	35,500
Excavate from on-site borrow source[2]	97,170	
Place 12-inch sand drainage layer on 25% slopes [3]		3,500
Place 24-inch cover soil layer	--	35,500
Place 12-inch vegetative layer	--	17,700
Regrade east cut area		16,700

Notes:

1. Includes using existing cover for 24-inch foundation layer in new multilayer cap.
2. Includes native material excavated for use in foundation layer, cover and vegetative layers, plus material excavated for sand (increased by 10 percent to account for screening from the source material).
3. Drainage layer will consist of on-site material, screened to comply with specifications (Appendix F). Based on the sieve analyses conducted during the geotechnical investigation (Appendix B) on-site materials are likely to be adequate for the remaining drainage material. On-site materials in the borrow area contain less than 8 percent fines and have a maximum grain size of approximately 3/8-inch.