

Appendix H. Interim Operations, Maintenance, and Monitoring Plan

**Interim Operations, Maintenance, and Monitoring Plan
Operable Unit 1, Meyers Landfill Site
El Dorado County, CA**

January 2009

Project No. 28-072

Prepared for:

United States Department of Agriculture
Forest Service, Region 5
Lake Tahoe Basin Management Unit
South Lake Tahoe, California

Prepared by:

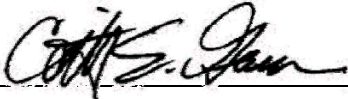


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Appendix H
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Meyers Landfill Site
El Dorado County, CA

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Acronyms and Abbreviations

ATV	all terrain vehicle
CCR	California Code of Regulations
COC	chain of custody
EPA	U.S. Environmental Protection Agency
ERRG	Engineering/Remediation Resources Group, Inc.
Forest Service	U.S. Department of Agriculture Forest Service
LFG	landfill gas
LLDPE	linear low-density polyethylene
LTBMU	Lake Tahoe Basin Management Unit
NNIS	non-native invasive species
OHV	off highway vehicle
OM&M	Operations, Maintenance, and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
RAOs	remedial action objectives
RD	Remedial Design
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
VOC	Volatile organic compound
§	Section

Section 1. Introduction

Engineering/Remediation Resources Group, Inc. (ERRG) has prepared this Operations, Maintenance, and Monitoring (OM&M) Plan as part of the Remedial Design (RD) for Operable Unit (OU)-1, the Meyers Landfill Site, in El Dorado County, California, within the Late Tahoe Basin Management Unit (LTBMU). This OM&M Plan includes OM&M requirements for (1) the new cap system for the landfill, (2) a new French drain, and (3) a passive landfill gas (LFG) emissions control system and perimeter LFG monitoring network. The RD for OU-1 was based on the remedy (Alternative 3) selected in the Supplemental Remedial Investigation/Feasibility Study (RI/FS) Report ([Weston Solutions, Inc., 2007](#)) and documented in the Record of Decision (ROD) for OU-1 (U.S. Department of Agriculture Forest Service [[Forest Service](#)], 2007).

The selected remedy meets the following remedial action objectives (RAOs) for OU-1:

- Landfill area: Protection of humans and wildlife from exposure to landfill refuse and soil contamination by eliminating exposure pathways and contaminant migration.
- Source area groundwater: Minimization of the effects of landfill refuse and soil contaminants on groundwater quality (e.g., rainwater infiltration) and rainwater runoff.
- LFG: Protection of humans and wildlife by minimizing exposure pathways and gas migration.

This OM&M Plan has been prepared to ensure compliance with the substantive requirements of Title 27 of the California Code of Regulations (CCR) relating to postclosure maintenance of the landfill cover and gas monitoring. This draft OM&M Plan will be amended, as needed, following construction of the designed final landfill cap.

OPERATIONS, MAINTENANCE, AND MONITORING APPROACH

The OM&M program will primarily involve the evaluation of the performance of the final cap, French drain, and LFG control system and monitoring network. The OM&M program will include the following activities:

- Inspect the landfill cap
- Inspect the surface water control system, storm water controls, and French drain
- Inspect and monitor the passive gas extraction and perimeter gas monitoring systems
- Maintenance, as needed based on site inspection results

All site inspection activities will be documented on inspection forms (see [Attachments H1, H2, and H3](#)), field log forms, and photographic logs.

Section 2. Operations, Maintenance, and Monitoring Procedures

The following sections discuss the procedures required to ensure maintenance of the cap, record-keeping, and health and safety protocols. A summary of OM&M monitoring requirements, including action items and responses, is presented in [Table H-1](#).

2.1. SITE INSPECTIONS

Quarterly inspections of the landfill cap will be conducted by a qualified engineer under the direct supervision of a California-registered Professional Engineer to evaluate the integrity of the cover system. In addition, the site will be inspected after any major storm event, significant seismic event, flood, fire, or other catastrophic event that could adversely affect the cap system or site features (see [Section 3](#) for a description of catastrophic events warranting a site inspection). A general site inspection checklist to be completed during each inspection is included in [Attachment H1](#). A step-by-step series of inspection procedures is described in [Section 2.1.1](#). [Table H-1](#) summarizes all required inspection items and response actions for required maintenance.

Every 5 years, a licensed professional land surveyor will conduct a topographic survey of the landfill site to evaluate settlement of the landfill cap. The topographic survey will tie in to the two permanent survey monuments (settlement markers) installed on the cap immediately following construction. Results of the survey will be used to evaluate the elevation of waste and LFG control system components to determine whether settlement has adversely affected any critical components of the cap or LFG control system and monitoring network.

The landfill site should be visually inspected to ensure the following conditions are maintained at the site:

- Proper warning signs are present
- Protective fences or cages are in good condition and secured
- LFG vents, perimeter LFG monitoring points, and monitoring well surface completions and casings are in good condition
- No large trees, brush, or weeds (with deep taproots) are present on the cap that may penetrate the cap
- No noxious weeds or non-native invasive species (NNIS) have been established on the cap
- No soil erosion is evident at the site (on the cap or in areas adjacent to the cap)
- No rodent burrows or other disturbances to the cap surface are evident

- Any erosion control facilities are intact, including, but not limited to, silt fences, hay bales, fiber rolls, and gravel or sandbags
- No noticeable depressions or ponded water are present on the cap
- No noticeable sliding (slope failure) or desiccation cracks are present in the soil cover
- The landfill liner is not protruding, exposed, or torn
- The LFG passive vents and turbines are in good working order

The surface water control system will be visually inspected. The visual inspection will identify any accumulation of debris, silt, or sediment that could impede runoff from the cap, block culverts, or contribute to cap erosion. The lined drainage channels will be inspected for cracks or other signs of damage that may allow excessive infiltration of surface water in areas upgradient from or within the groundwater plume (OU-2). All drainage channels will also be inspected for ponding conditions or other types of grading-related impedance of flow.

The French drain will be inspected in conjunction with the general site inspections. Particular attention will be paid to outflow from the drain during the spring inspection. The primary goal of this inspection will be to establish that flow is emerging from the drain, and that the drain is functioning properly.

A botanist or equally competent person will conduct vegetative cover inspections on the cap and at areas adjacent to the cap at least twice per year in late spring and early fall. These inspections are conducted to ensure that proper vegetation growth prevents soil erosion and does not damage the geosynthetic membrane. A vegetative cover inspection checklist is provided in [Attachment H2](#). The vegetative cover should be inspected for the following:

- Areas of stressed or missing vegetation
- Areas of continual poor growth despite reseeding efforts
- Noxious weeds, NNIS, or deep-rooting species on the cap (a list of invasive species of concern is included in [Table H-2](#). Additional details on these species are presented in [Attachment H2](#))
- Effects to vegetation from burrowing animals on the cap
- Maturity of seeds to allow for mowing

The inspection requirements are included in [Table H-1](#). [Table H-2](#) presents a list of native species that have been approved by the Forest Service for growth on the cap and lists noxious weeds and NNIS that should be kept off the cap. The seed mix that will be applied to the cap following construction will consist of some of the approved native species. The exact seed mix will be determined in consultation with the Forest Service's botanist and will be specified in the RD Work Plan, to be completed by the construction contractor prior to the start of site work. The list of species in [Table H-2](#) of this OM&M Plan will be updated, following submittal and Forest Service approval of the final seed mix. Inspections conducted within the first year after construction completion should also include monitoring construction work areas, such as the borrow area, for newly established noxious weeds or NNIS

2.1.1. Inspection Procedures

This section describes the general procedures for performing a site inspection. A site inspection checklist will be completed during each quarterly inspection using the inspection form provided in Attachment H1. All site inspection activities will be photographed, and any areas requiring action will be clearly shown on site maps and drawings. Each step of a site inspection is summarized below.

1. Arrive at site access gate. Note any signs of disturbance or tampering with the padlocked gates located at the entry points to the site.
2. Walk the perimeter of the site, outside the landfill footprint, along the boundary of the area requiring institutional controls (see [Figure A-3, Appendix A](#)). Note any missing or damaged signage.
3. Walk the perimeter of the landfill, just outside the landfill footprint. Look for any signs of sloughing or sliding of the cap material. Identify any cracks and signs of erosion. Locate any signs of burrowing. Check for exposed geosynthetics (e.g., geogrid, geocomposite drainage layer, or linear low-density polyethylene [LLDPE] liner).
4. Traverse the landfill in passes spaced approximately 50 feet apart. Observe and note cover conditions across the entire cap. Look for any signs of sloughing or sliding of the cap material. Identify any cracks or visible signs of erosion. Look for signs of burrowing mammals. Check for exposed geosynthetics (e.g., geogrid, geocomposite drainage layer, or LLDPE liner). Note any missing or patchy vegetation, excessively dry vegetation, areas of continual poor vegetative growth, noxious species, or oversized vegetation such as brush or bushes. Check for low spots or signs of ponding.
5. Walk along each of the drainage channels. Check lined channels for cracks or other signs of physical damage. Inspect all channels for damage, silt buildup, and debris. Note any signs of excess erosion along edges of channels.
6. Check French drain outfall. Note whether water appears to freely exit from the outfall pipe. Note any visible blockage of water flow.
7. Inspect check dams. Locate any damage to gabion baskets or rock piles.
8. Walk along perimeter of sediment and infiltration basins. Note any signs of flow out of the basins. Check for excessive sediment buildup.
9. Check LFG vents and perimeter monitoring points for signs of damage or vandalism. Inspect caged enclosures for signs of physical damage to their integrity, locks, or stabilizing guy wires. Inspect perimeter monitoring points for signs of damage or vandalism. Inspect monitoring wells within the waste footprint to ensure their integrity.¹
10. Inspect permanent survey monuments on the cap for signs of damage or vandalism.

¹ Note: Groundwater monitoring well inspections will also be conducted as part of the regular groundwater monitoring activities for OU-2, but any damage should be noted in the “additional notes” section of the general inspection form ([Attachment H1](#)).

2.2. LANDFILL GAS VENT AND MONITORING POINT SAMPLING

LFG vents will be sampled monthly for the first 2 years and quarterly thereafter. LFG perimeter monitoring points will be sampled quarterly in accordance with standards outlined in 27 CCR Section (§) 20933². Sampling frequencies may be reevaluated and adjusted following the first 2 years, once an adequate database has been established. If the perimeter monitoring data indicate that LFG is not migrating away from the landfill, less frequent monitoring at perimeter points may be proposed.

The landfill gas control system will be inspected during each sampling event. The inspection will entail a visual inspection of the aboveground vents and the surface above all underground conveyance pipes. The surface conditions above the pipes will be inspected for depressions or soft spots that could indicate pipeline damage. The visual inspection of the aboveground vents will include the standpipe, turbine, valve, and sample port conditions, as outlined in [Table H-1](#).

LFG samples will be collected from gas vents and perimeter points in the field and tested with a direct-read device and will be sent to a laboratory for analysis. All samples will be analyzed for methane, carbon dioxide, oxygen, and hydrogen sulfide gases (using field instruments) and for volatile organic compounds (VOCs), permanent and fixed gases, and sulfur compounds (by laboratory methods). As indicated in the RI/FS Report and ROD for this project ([Weston Solutions, Inc., 2007](#); [Forest Service, 2007](#)), no active LFG treatment system is included as part of the RD. Sample results will be evaluated following a maximum of 1 year of sampling to determine whether a gas treatment system is required. Treatment will be required if, after 1 year of sampling, concentrations of chemicals in gas samples consistently exceed appropriate state and federal criteria. The U.S. Environmental Protection Agency (EPA) has established federal regional screening levels (RSLs) for concentrations in industrial and residential air ([EPA, 2008a](#)). For this project, industrial air standards are appropriate. El Dorado County Air Quality Management ambient air quality standards are consistent with the concentrations presented in CCR (as cited in the table below). The following table summarizes the current standards for vinyl chloride, methane, and hydrogen sulfide that will be used to evaluate landfill gas concentrations.

Chemical	Screening Levels	Criteria citation
Vinyl chloride	2.8 µg/m ³ h 0.010 ppm (or 25.6 µg/m ³) in a 24-hour period	EPA 2008 (RSL for industrial air) ^a 17 CCR § 70200 ^b
Methane	No more than 5 percent by volume will migrate off site	27 CCR § 20921a ^c
Hydrogen sulfide	8.8 µg/m ³ 0.03 ppm (or 42 µg/m ³) in a 24 hour period	EPA 2008 (RSL for industrial air) ^a odor threshold, 17 CCR § 70200 ^b

Note: These values may be periodically updated; the latest available updated values should be used for screening and the lowest applicable standard should be used in the evaluation of landfill gas concentrations.

ppm = parts per million

µg/m³ = micrograms per cubic meter

a = RSLs are provided in "Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites" ([EPA, 2008a](#))

b = Available Online at: <http://weblinks.westlaw.com/Find/Default.wl?DB=CA%2DADC%2DTC%3BRVADCCATOC&DocName=17CAADCS70200&FindType=W&AP=&fn=_top&rs=WEBL8.10&vr=2.0&spa=CCR-1000&trailtype=26&Cnt=Document>.

c = Available Online at: <<http://www.ciwmb.ca.gov/Regulations/Title27/ch3sb4b.htm#Article6>>.

² <http://www.ciwmb.ca.gov/regulations/Title27/ch3sb4b.htm>

2.2.1. Field Sampling

LFG samples from gas vents and perimeter points will be collected using a hand-held field sampling device (a Landtec GEM™ 2000 land fill gas monitor or similar device). This device will be calibrated prior to use and be used to detect the presence and determine the concentrations of methane, carbon dioxide, oxygen, and hydrogen sulfide gases. Prior to sampling the LFG vents, the ball valve above the sample port on the vent standpipe will be closed. The gas monitor will be connected to the sample port using Teflon tubing, the sample port will be opened, and the monitor pump activated. For samples from perimeter points, the gas monitor and Teflon tubing will be connected to the sample port at the top of each probe. All LFG readings will be monitored until stable readings representing actual landfill gas concentrations are obtained. Readings will be documented on field forms and included in summary reports. To ensure representative samples, a minimum of three well volumes should be purged from each sampling port (for both LFG vents and perimeter points) prior to collecting a LFG sample in accordance with guidance for landfill gas monitoring from the [California Integrated Waste Management Board \(2008\)](#).

2.2.2. Sample Collection for Laboratory Analysis

LFG samples from gas vents and perimeter points for laboratory analysis will be collected immediately following the collection of field readings, but before opening the ball valve. This sample will be collected in an evacuated SUMMA canister, or similar, in accordance with EPA standards outlined in SW-846 ([EPA, 2008b](#)). The sample will be submitted to a California-certified laboratory under chain of custody (COC) for analysis under EPA method TO-15 for VOCs ([EPA, 1999](#)), ASTM D-1946 for Permanent and Fixed Gases ([ASTM International, 1990](#)), and ASTM D-5504 for Sulfur Compounds ([ASTM International, 2008](#)).

2.3. MAINTENANCE ACTIVITIES

The need for maintenance will be assessed following each inspection and documented on the field inspection forms ([Attachment H1](#)). If required, recommended maintenance actions will be summarized and approved by the Forest Service prior to completing the work.

Maintenance of the cap may include cover repairs, including placement of additional material and recompaction, if any signs of erosion are noted during inspections; slope stability repairs, if local areas of unstable slope are noted during inspections; revegetation of any areas where the vegetative cover appears inadequate; and berm repairs, including placement of additional material and compaction, if any signs of erosion are noted (e.g., if geogrid materials are exposed).

Burrowing animals can cause damage to the geosynthetic membranes in the multilayer cap. One method of warding off these animals is to use devices such as the Molecontrol®. The device sends out sound waves about every 15 seconds that are irritating to burrowing animals. Each device has an effective area of up to 9,000 square feet. The device and the batteries to operate it are housed in a waterproof, tubular

container (about 2 inches in diameter and 17.5 inches long). If burrowing animals compromise the integrity of the cap, installation of these devices may be warranted. If used, the devices should be marked using stakes or flags, so they can be easily located during future inspections. Inspections of these devices should be performed as part of the general inspections, as appropriate.

Maintenance of the drainage system may include removing debris from the culverts and drainage channels; replacing the rock lining in the outfall areas and at the check dams if a significant loss in volume occurs; or repairing areas where flow has been obstructed. Maintenance of the French drain may include a video inspection of the underground pipes if pipe damage is suspected. If flow has been obstructed by a blockage, the blockage will be removed. If pipe integrity has been compromised, the pipe will be repaired or replaced.

Results of the vegetative cover inspection will be used to identify whether reseeding or further management of cap vegetation is necessary. Unvegetated areas on the cap should not exceed 5 percent of the total cap area. Bare spots on the cap and in areas adjacent to the cap that exceed 20 square feet will be reseeded to establish growth. Reseeding will be performed using the original seed mix and fertilizer or other mix prescribed by the Forest Service.

To protect the integrity of the geosynthetic membranes, trees, shrubs, and herbaceous plants with deep taproots will be identified and removed from the cap. If any noxious weeds or NNIS are found, a remedial strategy will be developed in consultation with appropriate Forest Service personnel to establish the best and safest approach for the removal of these species.

Personnel conducting maintenance activities must comply with the following requirements:

- Complete the 40-hour health and safety training course or be trained in accordance with the hazardous waste training requirements specified in Title 29 of the Code of Federal Regulations, § 1910.120³
- Maintain up-to-date records that demonstrate compliance with Occupational Safety and Health Administration requirements; examples include 8-hour refresher training records and site health and safety officer certificates
- Follow all site safety protocols

2.4. REPORTING

LFG sampling results will be reported to the Forest Service following each sampling event. Reports will include a summary of both field and laboratory data. Reports will include inspection logs, field sampling logs, photographic logs, and copies of COCs for samples collected and copies of laboratory analytical reports. Reports will be submitted no later than the last day of the month, following the month in which the sampling event took place. Following the 12 months or four quarters of sampling, depending on the required sampling interval, an annual report containing data from all sampling events will be prepared and

³ <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=29:5.1.1.1.8&idno=29>

submitted. This report will compare the results of LFG sampling to applicable state, county, and other standards of air quality to determine if further treatment or evaluation is needed. Specifically, laboratory analytical results for vinyl chloride and hydrogen sulfide will be compared with EPA industrial RSLs for air. Since EPA has not established an RSL for methane, methane concentrations will be compared with appropriate screening levels to ensure that no more than five percent methane by volume in air will migrate off the site, in accordance with CCR Title 27 § 20921 (see [Section 2.2](#)). Any recommendations for treatment methods, including cost analysis of alternatives, will be included in the annual report, as appropriate.

Section 3. Contingency Actions and Public Safety

This section discusses contingency actions to be implemented should public safety become an issue due to unauthorized land use or vandalism or natural disasters (including earthquakes, floods, major storms, or fires or explosions). For any catastrophic event, a landfill inspection should be completed, as soon as possible after the event is identified, to assess the degree of damage and the need for short-term or long-term corrective action. The checklist provided in [Attachment H3](#) includes specific items to be inspected for each type of potential catastrophic event. This supplemental checklist should be used in conjunction with the standard checklist ([Attachment H1](#)) to ensure complete documentation of any damage. The inspection procedures outlined in [Section 2.1.1](#) apply to all inspections (including those following catastrophic events).

3.1. UNAUTHORIZED LAND USE OR VANDALISM

Although the landfill area is officially closed to public access and the Forest Service expects to maintain the closure status on the property, recreational off-highway vehicles, including snowmobiles, dirt bikes, and all-terrain vehicles, are known to use current landfill cap throughout the year and are likely to continue this unauthorized use in the future. The quarterly inspections will be used to determine whether unauthorized land use is affecting the integrity of the cap or LFG control system and monitoring network to the degree that site conditions may become hazardous to individuals who may use the property. In addition, if any specific act of vandalism is reported on the site, an inspection of the areas vandalized should be conducted as soon as possible to determine whether damage has occurred. If inspection results indicate the potential for risks to human health, public access will be further restricted until the problem can be resolved. Potential restrictions include additional signage or imposing fines and increasing law enforcement to ensure public safety.

3.2. EARTHQUAKE

The LTBMU area has a moderate potential for earthquakes. In the event of a 5.0-magnitude or higher earthquake centered within 5 miles of the landfill, a full inspection will take place within 5 days. Post-earthquake inspections will be conducted to ensure the integrity of the impermeable liner, landfill side slopes, and other sensitive landfill components. The earthquake section of the emergency response inspection checklist, included in [Attachment H3](#) will be used to identify any damaged components. Particular attention will be paid to settlement or subsidence, cracks in the landfill cap, or damage to drainage channels, check dams, LFG vents, perimeter monitoring points, groundwater wells, and site security features (protective fencing and signs). Repairs to any damaged portion of the cap, drainage

system, or LFG control system will be repaired as soon as practical. If damage occurs that could pose a threat to public safety, the site will be secured immediately until repairs are made to restore all systems.

3.3. FLOOD OR MAJOR STORM

In the event of a flood or major storm, the systems will be inspected as soon as possible for damage and operational integrity. Any storm greater than or equal to the 20-year 1-hour storm (approximately 1 inch of rainfall per hour) is considered a major storm event ([Tahoe Regional Planning Agency, 1987](#)). The probability of a major storm occurring in a given year is 1 in 20 (or approximately 5 percent). Repairs will be made as soon as practical. If damage occurs that could pose a threat to public safety, the site will be secured immediately until repairs are made to restore all systems.

3.4. FIRE OR EXPLOSION

In the event of a fire or explosion, the fire department will be notified immediately and Forest Service fire suppression programs will be implemented. The Forest Service will share applicable landfill information with local fire officials, as needed. In addition, the Forest Service will dispatch a fire specialist to assist in any fire emergency response. In the event of a landfill fire and if the cap is observed to be damaged, other firefighting methods (such as foam or smothering with dirt) will be considered and used, as appropriate. After the incident, the landfill cap will be thoroughly inspected to ensure that the integrity of the impermeable liner or any other sensitive landfill components has not been comprised. If large burned or charred areas are observed on the cap surface, a subsurface investigation may be required to determine whether damage to the subsurface LFG piping, geosynthetic drainage layer, or LLDPE liner has occurred. In this case, a work plan outlining planned investigation approach (e.g., hand digging into the cap in specific areas to visually inspect geosynthetic materials, and conducting video surveillance of LFG piping) should first be submitted for Forest Service review and approval. If a subsurface investigation is warranted, all work must be conducted by a qualified contractor under the direction of a California-registered professional engineer. If damage to the liner or other critical geosynthetic layers has occurred, the Forest Service will implement corrective actions to repair the cap integrity (e.g., patching portions of the damaged geosynthetic materials) to ensure that contaminants are contained and human health is protected. Any repair work will be conducted by a qualified contractor under the direction of a California-registered professional engineer, repaired sections will be surveyed by a California-licensed professional land surveyor, and all work will be documented in as-built drawings.

Section 4. References

- ASTM International, 1990. ASTM D 1946, “Standard Practice for Analysis of Reformed Gas by Gas Chromatography. March 30.
- ASTM International, 2008. ASTM D 5504, “Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence.” June 15.
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- Forest Service, 2007. “Record of Decision for Meyers Landfill, Operable Unit 1 – Landfill Waste Mass, El Dorado County, California.” November.
- U.S. Environmental Protection Agency, 1999. “Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method TO-15, Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS).” EPA/625/R-96/010b. Center for Environmental Research Information, Office of Research and Development. January. Available Online at: <http://www.epa.gov/ttnamti1/files/ambient/airtox/to-15r.pdf>.
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- EPA, 2008b. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. Third Edition, as updated by Updates I, II, IIA, IIB, III, IIIA, IIIB, IVA and IVB. Available Online at: <http://www.epa.gov/sw-846/main.htm>.
- Tahoe Regional Planning Agency, 1987. “Regional Plan for the Lake Tahoe Basin, Code of Ordinances.” Adopted on May 27, 1987. As amended December 18, 2002. Available Online at: <http://www.trpa.org/documents/docdwnlds/ordinances/COCh25.pdf>
- Weston Solutions, Inc. (Weston), 2007. “Final Supplemental Remedial Investigation and Feasibility Study, Meyers Landfill, El Dorado County, California.” May.

Tables

Table H-1. Operations, Maintenance, and Monitoring Requirements

Item	Action Item	Response
Cap	Cracks, fissures, or other visible damage	Place a bentonite patch to seal the damaged areas
	Spotty vegetative ground cover	Reseed areas with seed blend approved by the Forest Service
	Poor drainage due to ponding	Place soil in area of concern to achieve grade; reseed disturbed area
	Cover modification by recreational land users	Regrade cap to restore original grade; reseed disturbed area
Diversion Ditch	Poor drainage due to ponding	Place soil in area of concern to achieve grade
Culverts	Poor drainage due to blockage of inlet	Clear debris from drainage channel upgradient of culverts
	Erosion or damage to rock protection inlets and outlets	Replace missing rock and fill erosion areas
Check Dams	Erosion or damage to rock face of dam	Rebuild check dam, adding additional rock, as needed
French Drain	Little or no flow from drain outlet	Further investigation of possible cause of pipe clog such as video inspection of pipe integrity, followed by pipe repair or blockage removal, where needed
Standpipe	Damage to the integrity of the standpipe	Repair or replace damaged parts
Turbine	Turbine is not turning properly and landfill gases are building up and not being vented.	Replace or repair turbine or malfunctioning parts
Ball Valve	Valve is not functioning properly	Repair or replace damaged parts
Sample Port	Sample port is not functioning properly	Repair or replace damaged parts
Ground above Conveyance Pipes	Ground above pipes displays depression and soft spots.	Pipes will be inspected using in-pipe video equipment to determine if repairs are needed

Notes:

Forest Service = U.S. Department of Agriculture Forest Service

Table H-2. Species List

Graminoid	Forb	Shrub ^a
Native Species Approved for Revegetation		
Western needlegrass (<i>Achnatherum occidentale</i>)	Yarrow (<i>Achillea millefolium</i>)	Big sagebrush (<i>Artemisia tridentata</i>)
California brome grass (<i>Bromus carinatus</i>)	Western mountain aster (<i>Aster occidentalis</i>)	Antelope bitterbrush (<i>Purshia tridentata</i>)
Bottlebrush (<i>Elymus elymoides</i>)	Arrowleaf balsamroot (<i>Balsamorhiza sagittata</i>)	Rabbitbrush (<i>Chrysothamnus nauseosus</i>)
Sandberg bluegrass (<i>Poa secunda</i>)	Sulphur flower buckwheat (<i>Eriogonum umbellatum</i>)	
	Naked buckwheat (<i>Eriogonum nudum</i>)	
	Spanish lotus (<i>Lotus purshianus</i>)	
	Brewer's lupine (<i>Lupinus breweri</i>)	
	California greenstipule lupine (<i>Lupinus fulcratus</i>)	
	Silverleaf phacelia (<i>Phacelia hastata</i>)	
	Woolly mule-ears, mountain mule-ears (<i>Wyethia mollis</i>)	
Noxious Weeds to be Removed if Identified on Site		
Perennial broadleaved pepperweed or whitetop (<i>Lepidium latifolium</i>) ^b		
Cheatgrass (<i>Bromus tectorum</i>)		
Russian thistle (<i>Salsola sp.</i>)		
Non-Native Species to be Removed if Identified on Site		
Common (or woolly) mullein (<i>Verbascum thapsus</i>)		
Yellow salsify (<i>Tragopogon dubius</i>)		
Tumble mustard (<i>Sisymbrium sp.</i>)		

Notes:

- a. Shrubs are not recommended for revegetation of the final landfill cap, but are included in the list of native species for completeness. These species may be used within the area of the landfill, outside of the cap footprint.
- b. Almost 1-acre infestation of this species is present near the borrow area. This species must not be spread on site. It should be buried during construction and cannot be used above ground. All equipment entering or leaving the infestation area will require thorough washing.

Attachment H1. General Inspection Form

GENERAL INSPECTION CHECKLIST

Meyers Landfill

1. Are there any signs of sliding or sloughing of the soil layer that might indicate a slope failure?

- Yes*
 No

**If yes, note the location, photograph if possible, and make recommendations for corrective action.*

Comments: _____

2. Are open holes present in the soil that may be caused by burrowing animals?

- Yes*
 No

**If yes, fill up the hole with clean soil, develop a strategy to remove the burrowing animals, and make recommendations for long-term corrective action in consultation with appropriate Forest Service personnel.*

Comments: _____

3. Are depressions or ponding of surface water noticeable on the landfill cover?

- Yes*
 No

**If yes, backfill and regrade the depressions with approved soil type(s) described in the original project specifications or as approved by the Forest Service. Where soil erosion seems excessive and continual, make recommendation for corrective action. In areas that require substantial earthwork, reseeding will be required (refer to checklist item No. 5)*

Comments: _____

4. Are large (more than 2 inches wide) cracks or rills present in the soil cover?

- Yes*
 No

**If yes, note the orientation, location, and frequency of the cracks; photograph areas of concern; and, if possible, make recommendations for corrective action.*

Comments: _____

5. Are areas of stressed or missing vegetation observed on the landfill cover?

- Yes*
 No

**If yes, reestablish vegetative growth by watering or reseeding. Seeding should take place during the season that will optimize establishment of vegetation.*

Comments: _____

6. Are known areas of continual poor growth present despite reseeding efforts?

- Yes*
 No

**If yes, and the areas appear to be affecting the integrity of the soil cover, contact appropriate Forest Service personnel and make recommendations on corrective measures to address the problem.*

Comments: _____

7. Have invasive or deep-rooting species that may penetrate the cap deeper than 18 inches taken root on the cap soil cover?

- Yes*
 No

**If yes, identify the affected area and the observed plant species and develop a strategy to remove the invasive plants (permanently if possible). One recommended approach is to spot spray the species with an herbicide; this approach may take up to 4 days, depending on the extent of removal. Roots can also be cut out. Inspect the area every 2 weeks following removal to ensure that invasive species have not returned.*

Comments: _____

8. Is vegetation on the landfill cover dry (a possible fire hazard), and if so, is the grass more than 6-inches high?

- Yes*
 No

**If yes, contact appropriate Forest Service personnel to complete a fire hazard evaluation. One recommended solution is to mow dry vegetation to a maximum height of 6 inches, if necessary.*

Comments: _____

9. Are excessive debris, silt, or other harmful materials obstructing flow through the surface water runoff control system?

- Yes*
- No

**If yes, remove the obstruction(s). Where obstructions are continuous or recurring, make recommendations on corrective measures to address the problem.*

Comments: _____

10. Inspect areas that channel water runoff at the site, including ditches and slope edges. Are there signs of excessive erosion from stormwater runoff or other signs of damage to areas that channel water runoff?

- Yes*
- No

**If yes, determine the appropriate course of action for repair in consultation with Forest Service personnel. Recommendations on corrective measures to address the problem should be discussed.*

Comments: _____

11. Inspect landfill gas collection system. Are passive vents and turbines in good working order (e.g., vents are not damaged, valves are open, and turbines are free to spin from wind force)?

- Yes
- No*

**If no, note the location and nature of damage to determine the appropriate course of action for repair in consultation with Forest Service personnel. Recommendations on corrective measures to address the problem should be discussed.*

Comments: _____

12. Inspect any survey monuments. Are they intact and legible?

- Yes
- No*

**If no, notify Forest Service personnel immediately (same business day) and make recommendations on corrective measures to address the problem.*

Comments: _____

13. Inspect the gas vent gates and protection system. Are the existing cages secure and in good condition?

- Yes
- No*

**If no, and the cages are damaged, mark the location of damage and notify Forest Service personnel immediately (same business day) and make recommendations for repairs.*

Comments: _____

Additional Notes (Time, temperature, wind direction, and other observations)

Name of Inspector(s)

Company

Signature of Inspector

Time and Date of Inspection

Attachment H2. Vegetative Cover Inspection Checklist

VEGETATIVE COVER INSPECTION CHECKLIST

Meyers Landfill

1. Are areas larger than 20 square feet of stressed or missing vegetation present at the site (both landfill cover and adjacent areas)?

Yes*
 No

** If yes, reestablish vegetative growth by watering or reseeding with approved seed mix specified in the design, construction documents, or requested by the Forest Service.*

Comments: _____

2. Are there known areas of continual poor growth despite reseeding efforts?

Yes*
 No

** If yes, and poor growth does not seem to be caused by a lack of water, consider testing the soil for pH, heavy metals, or other potential causes. If areas adjacent to the cap have areas of continual poor growth, notify the Forest Service botanist so that reseeding efforts can be made to better establish growth.*

Comments: _____

3. Have invasive or deep-rooting species that may penetrate the cap membrane taken root on the cap soil cover?

Yes*
 No

Species identified as invasive or with taproots potentially able to penetrate membrane are: *Lepidium latifolium* (perennial pepperweed or whitetop), *Verbascum thapsus* (common or woolly mullein), *Tragopogon dubious* (salsify), *Sisymbrium sp.* (tumble mustard), *Bromus tectorum* (cheatgrass), *Salsola sp.* (russian thistle).

** If yes, identify the affected area and observed plant species, develop a strategy to remove the invasive plants (permanently if possible), and make recommendations to the Forest Service. One recommended approach is to spot spray the species with an herbicide that contains no chemicals of concern; this approach may take up to 4 days, depending on the extent of removal. Roots can also be cut out. Inspect the area every 2 weeks following removal to ensure that invasive species have not returned.*

Comments: _____

Additional Notes (time, temperature, and wind direction, and other observations)

Name of Inspector(s)

Company

Signature of Inspector

Time and Date of Inspection

This plant guide can be used to help identify species that may be of concern. Information in the guide was obtained from multiple online sources.

BRASSICACEAE

Lepidium latifolium

PERENNIAL BROADLEAVED PEPPERWOOD or WHITETOP

Growth habit: Perennial herb

Description: A multi-stemmed herb that grows three to eight feet tall with a heavy, sometimes woody, crown and a spreading underground root system. Stems and leaves are dull gray-green and waxy, sometimes with reddish spots. The tiny white flowers are borne in dense clusters at the tops of the stems. Flowering from May to July, plants produce many small, roundish, light brown fruits. Perennial pepperweed is somewhat similar to whitetop (*Cardaria draba*), but perennial pepperweed is much taller. The upper leaves do not clasp the stem as do those of whitetop (University of California, <http://ucce.ucdavis.edu/datastore/detailreport.cfm?usernumber=58&surveynumber=182>).



Photo by Richard Old, www.xidservices.com

<http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Lepidium&Species=latifolium>



Photo by Richard Old, www.xidservices.com

<http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Lepidium&Species=latifolium>

POACEAE

Bromus tectorum CHEATGRASS

Growth habit: Annual Grass

Description: Typically is a short grass. Seedlings are bright green with conspicuously hairy leaves, which suggests the alternate common name, downy brome. At maturity the foliage and seedheads often become reddish. After maturity the fine herbage is characterized by a light tan reflectance. The nodding open panicles with moderately awned seeds (caryopses) are distinctive. Seeds readily penetrate clothing of passersby (University of California, <http://ucce.ucdavis.edu/datastore/detailreport.cfm?usernumber=58&surveynumber=182>).



Photos from Virginia Tech Weed Identification Guide available online <http://www.ppws.vt.edu/scott/weed_id/brote.htm>

CHENOPODIACEAE

Salsola sp.

RUSSIAN THISTLE

Growth habit: Annual Forb/Herb

Description: Russian-thistle is an exotic, annual, erect forb. It is highly branched and rounded in form, growing from 1 to 3 feet (0.3-1 m) in height and from 1 to 5 feet (0.3-1.5 m) in diameter. The awl-shaped, spiny-tipped leaves bear small, inconspicuous flowers in the leaf axils. The small, winged seed, retained in the leaf axils until after plant death, contains no endosperm tissue, but is instead comprised of a spirally coiled, complete embryo already containing some chlorophyll. The root system consists of a taproot, reaching 0.3 foot (1 m) or more in depth, and extensive lateral roots. Under crowded conditions, roots can be shallow. (USDA Fire Effect Information System, Oct 2008). Available online at <<http://www.fs.fed.us/database/feis/plants/forb/sisalt/all.html>>.



Salsola kali L.

Photos by R.A. Howard @ USDA-NRCS PLANTS Database

USDA, NRCS. 2008. The PLANTS Database (<http://plants.usda.gov>, 30 October 2008). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

SCROPHULARIACEAE

Verbascum thapsus

COMMON (OR WOOLY) MULLEIN

Growth habit: Biannual Forb/Herb

Description: Herb that sends up a large stalk, three to six feet tall, topped with yellow flowers closely attached to the stalk. It spends the first year as a rosette close to the ground. The leaves are large, six to twelve inches, densely woolly, and soft to the touch. Leaves are largest at the base and gradually become smaller up the stalk. Leaves on the stalk occur alternately, and the base of each leaf extends a short way down the stalk. Yellow flowers, three-quarters to one and a half inches in diameter, consist of five circular petals, and occur on the uppermost portion of the stalk (University of California, <http://ucce.ucdavis.edu/datastore/detailreport.cfm?usernumber=58&surveynumber=182>).



Photos by Brother Alfred Brousseau @ USDA-NRCS PLANTS Database
USDA, NRCS. 2008. The PLANTS Database (<http://plants.usda.gov>, 30 October 2008). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

ASTERACEAE

Tragopogon dubius YELLOW SALSIFY

Growth habit: Annual/Biannual Forb/Herb

Description: Yellow salsify grows as an annual, biennial perennial. Plants grow between 12 and 39 inches (30-100 cm) tall. In its first year(s), yellow salsify produces an erect rosette of grass-like leaves. Plants may remain vegetative for up to 10 years before flowering. After flowering, yellow salsify dies. Yellow salsify produces ascending, leafy, and sometimes branched stems that exude a milky latex sap when broken. Alternate leaves are narrow, measure 0.4 to 12 inches (1-30 cm) long, and are tapered from base to tip. Young leaves can be hairy, but mature leaves are waxy. Head flowers occur at the stem ends on inflated peduncles. Heads measure up to 2.2 inches (5.5 cm) in diameter and are comprised of only ray flowers. Flowers open early in the day and close by early afternoon and may not open during cloudy or rainy days (USDA Fire Effect Information System, Oct 2008). Available online at <<http://www.fs.fed.us/database/feis/plants/forb/sisalt/all.html>>.



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USDA, NRCS. 2008. The PLANTS Database (<http://plants.usda.gov>, 30 October 2008). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

BRASSICACEAE

Sisymbrium sp.

TUMBLE MUSTARD

Growth habit: Annual/Biannual Forb/Herb

Description: Tumble mustard is an exotic winter annual or biennial. It is the tallest species in the genus, reaching 4.9 feet (1.5 m) or more in height. Growth form is rounded and freely branching from a single basal stem. Leaves are 0.4 to 7.9 inches (1-20 cm) long, becoming smaller up the stem. The inflorescence is a raceme of perfect flowers. The fruit is a 2- to 3.9-inch-long (5-10 cm), narrow siliqua with 120 or more small (~1 mm in length), wingless seeds. Tumble mustard has a thick taproot. (USDA Fire Effect Information System, Oct 2008). Available online at <http://www.fs.fed.us/database/feis/plants/forb/sisalt/all.html>.



Sisymbrium altissimum L. (Tall tumble mustard) Al Schneider @ USDA-NRCS PLANTS Database



Photographed by Dan Tenaglia *Sisymbrium loeselii* L. (Small tumbleweed mustard)

Attachment H3. Emergency Response Inspection Checklist

EMERGENCY RESPONSE INSPECTION CHECKLIST

This checklist should be completed in conjunction with the standard inspection checklist following any catastrophic event (e.g., unauthorized land use or vandalism, earthquakes, floods, or fires and explosions) that may adversely affect the integrity of the cap or landfill gas control system and monitoring network at the Meyers Landfill Site.

1. Are there large cracks in the soil cover that are more than 2 inches in width or extend to cap liner?

- Yes*
- No

** If yes, notify the Forest Service or project engineer to assess whether the cracks are caused by desiccation or slope failure.*

Comments: _____

2. Are there notable depressions or ponding of surface water on the landfill cover?

- Yes*
- No

**If yes, backfill and regrade the depressions with approved soil type(s) described in the original project specifications or as approved by the Forest Service. Where soil erosion seems excessive and continual, make recommendations for corrective action. Reseeding will be required in areas that require substantial earthwork; reseed in accordance with design specifications or as approved by the Forest Service.*

Comments: _____

3. Are posted signs in place and in good condition (legible)?

- Yes*
- No

** If no, mark location(s) of damaged or missing signs and notify the Forest Service for repairs or replacements.*

Comments: _____

In addition, for UNAUTHORIZED LAND USE OR VANDALISM:

16. Are open holes present in the cover soil that may be caused by vandalism (i.e., digging into cover to create jumps for off highway vehicles)?

- Yes*
- No

**If yes, inspect holes for potential damage to structural geogrid. Repair any damaged geogrid in accordance with manufacturer's instructions and backfill hole(s) with clean soil (on-site soil may be appropriate for use in backfilling small holes, as approved by the Forest Service).*

Comments: _____

17. Inspect the gas vent enclosures and padlocks. Are they secure and in good condition?

- Yes
- No*

**If no, and the cages are damaged, mark the location of damage and make recommendations for repairs. If locks are missing or damaged, replace with new locks (with combinations or keys that match old locks, as directed by Forest Service).*

Comments: _____

18. Inspect landfill gas control system and monitoring network. Are passive vents and turbines in good working order (e.g., vents are not damaged, valves are open, and turbines are free to spin from wind force)? Are monitoring points secure (e.g., locking caps locked and standpipes in good working order)?

- Yes
- No*

**If no, note the location and nature of damage and make recommendations on corrective measures to address the problem.*

Comments: _____

In addition, for EARTHQUAKES:

4. Do settlement markers indicate any significant horizontal or vertical movement?

- Yes*
 No

** If yes, arrange resurveying to establish magnitude of movement.*

Comments: _____

5. Are there signs of shifting or sloughing of cover soil?

- Yes*
 No

** If yes, prevent further sloughing, if possible, by constructing temporary barrier, followed by long-term repair of the cover.*

Comments: _____

6. Inspect the lined drainage channels. Are there any cracks or fissures along the channels?

- Yes*
 No

** If yes, patch cracked areas according to manufacturer's specifications.*

Comments: _____

7. Inspect the check dams. Is there significant shifting of rock or loss of check dam height?

- Yes*
 No

** If yes, immediately notify the Forest Service to schedule check dam repair.*

Comments: _____

In addition, for MAJOR STORMS and FLOODS:

12. Are excessive debris, silt, or other harmful materials obstructing flow through the surface water runoff control system?

- Yes*
 No

**If yes, remove the obstruction(s). Where obstructions are continuous or recurring, make recommendations on long-term corrective measures to address the problem.*

Comments: _____

13. Inspect areas where stormwater runoff enters the drainage channels. Are there signs of excessive erosion from stormwater runoff or other signs of damage?

- Yes*
 No

**If yes, determine the appropriate course of action for repair in consultation with Forest Service personnel. Recommend long-term corrective measures to address the problem.*

Comments: _____

14. Inspect sediment and infiltration basins. Is there excessive buildup of silt or debris in the basin?

- Yes*
 No

** If yes, remove the obstruction(s).*

Comments: _____

15. Inspect the perimeter of the sediment and infiltration basins. Are there signs of excessive water exiting the basins?

- Yes*
 No

** If yes, build temporary barrier blocking water flow of the basin. Make recommendations on long-term corrective measures to address the problem.*

Comments: _____

In addition, for FIRES and EXPLOSIONS:

8. Is there evidence suggesting geocomposite drainage layer may have been burnt or compromised? Evidence may include large charred areas or pits on the cap surface or areas of exposed charred or melted geocomposite materials.

Yes*
 No

** If yes, fully investigate and delineate the extent of damage (may require hand digging test pits to evaluate geocomposite integrity). Repair all damaged geocomposite in accordance with the manufacturer's specifications.*

Comments: _____

9. Is there evidence suggesting the integrity of the geomembrane liner may have been compromised (melted or cracked)? Evidence may include large charred areas or pits on the cap surface or areas of exposed charred or melted geomembrane materials.

Yes*
 No

** If yes, fully investigate and delineate the extent of damage (may require hand digging test pits to evaluate liner integrity). Repair all damaged geomembrane in accordance with the manufacturer's specifications.*

Comments: _____

10. Are areas of burnt or missing vegetation observed on the landfill cover?

Yes*
 No

** If yes, reestablish vegetative growth by watering or reseeding in accordance with design specifications or as directed by the Forest Service. Seeding should take place during the season that will optimize establishment of vegetation.*

Comments: _____

