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**WASTE MANAGEMENT
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Preparation of Solid Waste Facility Closure and Post-Closure Plans Guidance

Introduction

The Utah Division of Waste Management and Radiation Control (DWMRC) has developed this guidance to provide assistance to landfill owners and operators in preparing closure and post-closure plans. Utah Administrative Code (UAC) R315-302-3 requires closure and post-closure plans and cost estimates. The closure/post-closure plans should, where applicable, contain the information outlined below.

This guidance is not a rule. It has been prepared to give the reader information, in plain language, about how the Division of Waste Management and Radiation Control expects to interpret Rule UAC R315-302-3 and R315-309. In the event questions arise regarding the matters discussed in this guidance, the text of the rule will govern.

NOTE: Closure and post-closure plans, Except plans for Class IIIb, IVb, and VI landfills, must be certified by a Professional Engineer (P. E.) registered in the state of Utah. All closure and post-closure plans must be submitted for approval to the Director of the Division of Waste Management and Radiation Control.

Closure Plan

Owner's/Operator's Closure Strategy

- The plan should describe the methods and schedules for landfill closure. It should indicate whether the landfill will close in phases or all at one time and include the expected site life of the facility and of each phase. If phased closure is used, the plan should provide schedules for closure of each phase.
- Implementation of the closure plan must begin within 30 days of last receipt of waste.
- Closure must be completed within 180 days of implementation of closure activities, unless an extension has been granted by the Director.
- The plan should indicate procedures for notifying the Director when closure activities will be initiated. UAC R315-302-3(4)(a) requires the owner/operator to notify the Director in writing at least 60 days before anticipated last receipt of waste.
- The plan should list the steps for closing the landfill (e.g., cover placement, grading, gas control system installation, final compaction, vegetation establishment). The closure plan should be based on permitted conditions (e.g., engineering features, base grades and final elevations). Any amendment to or deviation from the closure plan requires the approval of the Director and may require modification of the permit.
- The total area requiring final cover and gas control, if required, should be indicated. The plan should also indicate the total area of each phase requiring final cover and gas control, if applicable.
- An estimate of the total quantity of waste to be deposited in the landfill, by weight (tons) and by volume (cubic yards), should be provided.

Final Cover and Vegetation

- The plan should show the final contours, specifications, soil thickness, construction, compaction, and specifications for all final cover materials that will be used. *Please note that UAC R315-303-3(4) requires that for all except Class IIIb, IVb and VI landfills, the cover consist of at least 18 inches of compacted soil, or equivalent, with a permeability of 1×10^{-5} cm/sec or less (but in no case can the cover system be more permeable than the bottom liner system) and 6 inches of soil capable of sustaining vegetative growth placed over the compacted soil. The compacted layer must maintain its permeability characteristics under normal site conditions. Maintenance of the permeability characteristics requires that the compacted soil layer be protected from freeze/thaw cycles and from root penetration. To meet the requirements for protection, the Director may require that the soil layer be significantly increased above the 6 inches required in the rule. Alternative final cover designs may be approved by the Director if they meet the requirements of UAC R315-303-3(4)(c).*
- Plans should describe the methods and procedures for installing the final cover and any geomembranes and drainage layers, if applicable. Quality assurance and quality control (QA/QC) procedures that will be followed in the closure plan should also be described. QA/QC procedures should be described in a separate quality assurance plan, which is submitted to the Director, along with the closure plan, for approval. This QA/QC plan should assure that the permit design requirements are met. Third party testing and quality control are required to demonstrate that the design requirements were met.
- Plans should include a method of visually determining the required soil thickness is present through the post-closure care period. This can be accomplished by placing of erosion control markers at a specified depth below the cover (R315-303-3(4)(b)).
- Specific materials and equipment that will be used; procedures that will be followed to establish vegetation, or other approved methods, to protect the compacted soil layer; and control erosion methods must be indicated in the plan. The plan should include soil testing, seedbed preparation, type of seed, method of seeding, seeding rate, fertilizer rate, soil conditioning, and provisions for mulching. Root penetration and type of vegetation is very important to the preservation of the cover system. To insure that the integrity of the 18 inch compacted soil layer is maintained, plants that will not root into this layer should be chosen. For sites involved with mining operations the Division of Oil Gas and Mining should be contacted for recommended seed mixes. Seed mixes approved by the Division of Oil Gas and Mining should be considered for all closures.

Installation of Environmental Control Systems

- List any environmental control systems that will be installed or completed as part of the closure activities (e.g., run-on/runoff control systems, leachate collection systems, gas control systems, etc.). If the environmental systems and designs are not already included as part of the permit, the installation and construction of these systems may constitute a permit modification and require Director approval prior to installation.

Certification of Closure Procedures and Record keeping

- Confirm that, upon completion of closure activities, a P.E. registered in the state of Utah will submit as-built drawings and report certifying that the landfill was closed in accordance with the closure plan (PE certification may not be required for Class IIIb, IVb, and VI Landfills). Certification shall include:
 - a. As built drawings submitted to the Director within 90 days of completion of closure activities.

- b. Certification that all final cover components were installed according to the closure plan and the QA/QC plan.
- Confirm that the plats and statement concerning the location and amount of waste have been recorded on the site title.

Post-Closure Plan

Owner/Operator's Post- Closure Strategy

- Indicate that post-closure activities will begin when closure has been completed.
- Describe the maintenance and monitoring activities that are included in the 30-year post-closure period. These activities include maintenance of the cover, maintenance of the ground water monitoring and gas monitoring system, maintenance of the gas collection system, maintenance of the leachate collection system, leachate collection and disposal, and monitoring ground water and gas.
- For phased closures, describe specific maintenance and monitoring activities related to each phase and indicate which activities may be separated by phase and which may not (e.g., surface maintenance may be separable, but leachate management, groundwater monitoring, and gas monitoring often cannot be separated by phases).

Post-Closure Inspections and Maintenance

- Final cover vegetation should be inspected and the protective vegetation, or other protective cover, should be maintained. The post-closure care plan should include the following:
 - a. Discuss the site inspection and maintenance timetable.
 - b. Describe the plans for maintaining/repairing the final cover, the vegetation protecting the cover material, control of deep-rooted plants that could damage the compacted cover, and maintaining surface water drainage systems.
 - c. Describe the activities, reports, and checks to be made if any problems are found.
- The groundwater monitoring system, if required for the site, should be maintained and periodic monitoring continued throughout the post-closure care period. The plan should describe the following:
 - a. Discuss the procedures for sampling and testing the groundwater. Indicate who will perform the sampling activities, the frequency of sampling, and the parameters for which testing will be conducted. A ground water monitoring plan should be submitted for Director approval.
 - b. Describe plans for the maintenance and repair of wells.
- Gas monitoring, if required at the site, must be continued through the post-closure period. The gas monitoring portion of the plan should contain the following:
 - a. A discussion of the procedures for sampling and testing gas levels. Indicate who will perform the sampling activities and the frequency of sampling (at least quarterly). A description of the procedures for submittal of monitoring results, and notification procedures if the gas concentration exceeds the applicable regulatory limits.
 - b. A description of plans for maintenance of the gas monitoring system.

- Sites that require a gas control system should:
 - a. Provide a description of the components of the gas control system (e.g., wells, pumps, pump houses, condensate handling equipment, pressure measurement equipment, and safety measures).
 - b. Discuss the operation of the gas control system including any power required for pumping, employee(s) necessary for operation, flaring, or other utilization of the gas generated.
 - c. Discuss maintenance of the gas control system, including repair and replacement of equipment and discuss alternative measures, which may be used during downtime.
- Sites with liners and leachate systems should:
 - a. Describe the means of leachate treatment and/or disposal.
 - b. Describe plans for the maintenance and operation of the leachate collection/treatment/disposal system including alternative measures during downtime.
- Describe the procedures for operating and maintaining any other environmental controls (e.g., procedures for operating and maintaining siltation and runoff retention basins, erosion control features, protective landscaping, and access controls which require maintenance to function during post-closure).

Post-Closure Land Use

- Indicate how the property will be used during and after the post-closure period.

Record Keeping and Reporting Procedures

- Describe the facility's record keeping procedures and indicate where the post-closure monitoring records will be kept, including the inspection reports and maintenance and repair documentation.
- Provide the name, address, and telephone number of the contact person responsible for the facility during the post-closure period.
- Provide for preparation and submittal of the annual report required by UAC R315-302-2(4).

Certification of Waste Stabilization and End of Post-Closure Procedures

Post-closure care activities and monitoring should be conducted with one of the goals being the accumulation of sufficient data to make the demonstration required to end post-closure care. Please review the documents on post-closure care termination and post-closure care procedures for more information.

Additional Information

The initial closure and post-closure plans are submitted as part of a permit application and become part of the approved permit. Subsequent changes due to permit modifications, regulatory changes, operational changes, and unforeseen circumstances (e.g. increase/decrease in fill rate or premature closure with less than the total acreage utilized) which substantially affect the time schedule or costs of closure and post-closure necessitate closure and post-closure plan and cost estimate modifications. These modifications must be submitted to the Director for approval. Adjustments to the cost estimates must be submitted with the annual report and be approved by the Director. Any change in the financial assurance mechanism must be submitted to, and receive Director approval.