

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER DIVISION- INDUSTRIAL SECTION

CLOSURE GUIDELINES FOR INDUSTRIAL WASTEWATER IMPOUNDMENTS
(Revised: 03/00)

I. Applicability and Certification Requirements:

- A. Closures of surface impoundments which are not regulated by CERCLA or RCRA and which contain or have contained in the past process and/or sanitary wastewaters should use these guidelines for preparations of the closure plan. Some modifications may be acceptable when no significant risk of pollution of groundwater exists or when a substitute method is shown to provide equal or better groundwater protection.
- B. Any submittal, which involves the “practice of engineering” as defined by Code of Alabama 1975, Title 34, Chapter 11, Section 3 and rules adopted thereunder, shall have affixed thereto the seal or registration number and the signature of a professional engineer registered to practice in the State of Alabama. The presence of such seal and signature indicates that the professional engineer accepts full responsibility for the submittal and in the case of certifications, has determined that construction was in accordance with applicable requirements.
- C. Any submittal, which involves the “public practice of geology” as defined by Code of Alabama 1975, Title 34-41-1 to 34-41-24 should be certified by a Professional Geologist licensed in Alabama.

II. General Closure Plan Contents:

The following information should be provided in the plan:

- A. Cap Design (needed only for in place closures);
- B. History of the impoundment operation and maintenance;
- C. Impoundment latitude and longitude specified to a 100th of a second;
- D. Soil sampling procedures (needed only for clean closures);
- E. Wastewater characterization (including analysis results);
- F. Sludge sampling and analysis procedures (needed only for in place closures);
- G. Groundwater monitoring evaluation;
- H. Groundwater monitoring plan, if required to include:
 - 1. Groundwater detection monitoring;
 - 2. Groundwater assessment;
 - 3. Groundwater risk based corrective action.

III. Specific Closure Plan Contents:

- A. Closure Design

1. A cap design (in place closures only)
 - a. The design should include measures to minimize infiltration and erosion. For further guidance refer to the ADEM Solid Waste Rule 335-13-4-.20(2);
 - b. If flexible membrane liner (FML) exists in the lagoon then a FML must be included in the cap design to prevent a bath tub effect;
 - c. A minimum slope of 5% should be provided for the cap.
2. A plan for sludge de-watering or stabilization should be developed, if applicable;
3. Once closed, the impoundment area should be covered with a layer of topsoil and grassed;
4. A long-term maintenance plan should be developed.

B. Soil Sampling (clean closures only)

1. A hazardous waste determination must be made for waste materials which will be excavated and transported to an approved disposal site;
2. A grid system should be established for soils sampling following impoundment excavation. The size and number of grids should be sufficient to characterize the remaining soil;
3. Soil samples equally spaced within the grid should be collected at depth intervals of 0–6” and 6–12”. The samples from each interval should then be composited to represent that interval in the grid;
4. Composite samples should be analyzed for constituents of concern based on the sludge and wastewater analysis. If contaminants are detected, a risk analysis should be conducted to determine if there is a threat to groundwater or other receptors. If a threat is determined to be present, then groundwater monitoring and/or corrective action plans as described below should be implemented.

C. Sludge Sampling (in place closures only)

1. A sludge sampling plan may be needed depending upon the impoundment constituents to determine the volume of sludge to be closed in place and leachable constituents that could migrate to groundwater. The sampling should be representative of the impoundment and take into consideration the following:
 - a. Sampling locations should take into account the operational history such as wastewater flow and solid deposition;
 - b. Using the following guidance sampling locations should be designated for each impoundment:
 - (1) Samples should be taken at the area of thickest sludge accumulation;
 - (2) Samples should be taken at areas of weakness such as corners;
 - (3) Samples should be taken at the surface and at intervals of depth.

2. Analytical testing may be conducted using one of the following:
 - a. Field analytical test methods, if Department approved;
 - b. Synthetic Precipitation Leaching Procedure (SPLP);
 - c. Toxic Characteristic Leaching Procedure (TCLP);
 - d. Specific parameter testing, dependent upon site history.

D. Groundwater Monitoring Evaluation

1. A risk-based evaluation of the need for groundwater monitoring should include the following:
 - a. Wastewater head prior to closure;
 - b. Liner type and permeability;
 - c. Underlying soil type (Unified Soil Classification System) and permeability;
 - d. Site Hydrogeology (i.e., geologic formation, geological structure, depth to groundwater (first saturated zone) and bedrock, uppermost aquifer, and groundwater quality information);
 - e. Wastewater and liner compatibility;
 - f. Distance to and type of receptor (i.e., well water inventory).
2. Depending upon the results of the evaluation submitted in 4a. above the facility may be required to submit the following additional information:
 - a. Waste travel time to groundwater;
 - b. Waste fate and transport modeling.
3. If it is determined that groundwater monitoring is necessary based upon the above risk-based analysis, the following additional plans should be developed:
 - a. Detection Monitoring Plan consisting of:
 - (1) A minimum of one up-gradient and three down-gradient monitoring wells;
 - (2) A map showing proposed monitoring well locations;
 - (3) Well survey to mean sea level elevation;
 - (4) Monitoring well construction diagrams;
 - (5) Hydrogeologic logs of wells after installation;
 - (6) Sampling for impoundment specific parameters. The detection limit should be equal to or below the practical quantitative limit (PQL) as established in SW 846 for that method. The PQL must be below the MCL, if one is established for a specific compound. In addition, unless otherwise approved by the Department, the laboratory analysis should be

conducted utilizing an analytical method that is capable of achieving the lowest possible PQL for the individual constituents of concern;

- (7) Sampling and analysis procedures should be included in the detection monitoring plan;
 - (8) Alternate groundwater monitoring techniques such as dye tracing and subsequent spring discharge monitoring can be proposed.
- b. Groundwater Assessment Plan (in the event a release is detected) consisting of assessment of the vertical and horizontal extent of groundwater contamination. The Department will make a corrective action determination based on the submission of a completed assessment plan. The plan should include an analysis of groundwater flow, contaminant transport and potential to affect receptors.
 - c. Risk-Based Corrective Action Plan consisting of use of ASTM and/or ADEM Risk-Based Correction Action methods would be acceptable.

**INDUSTRIAL IMPOUNDMENT CLOSURE PLAN
DEVELOPMENT CHART**

