ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER DIVISION – INDUSTRIAL SECTION

CONSTRUCTION GUIDELINES FOR INDUSTRIAL SURFACE IMPOUNDMENTS

(Revised 03/00)

I. Applicability: All surface impoundments which are to contain process and/or sanitary wastewaters or liquids are subject to these guidelines. 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.

II. Registration Requirements:

A. Registered Professional Engineer. 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.

B. Professional Geologist. 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 the State of Alabama.

III. Construction Review Procedures: The following procedures should be followed in surface impoundment construction. The applicant should submit to the Department an engineering report to include the following information:

A. The proposed use of the impoundment, including a description of the liquids to be introduced into the impoundment. Waste or liquid should be characterized as to being hazardous or non-hazardous, as defined by the regulations associated with the Resource Conservation and Recovery Act (RCRA) and/or those promulgated by the Department;

B. The impoundment, location, configuration and orientation, transposed on a U.S.G.S. 7.5 minute series topographic or similar small-scale map; Latitude and longitude should be determined in degrees/minutes/seconds.

C. Plot and plan drawings of the impoundment, including dike, bottom and liquid level elevations, dikes cross section, and if required, plans and description of the proposed leak detection or collection and removal system;

D. Proposed liner material and thickness. If a compacted clay earthen liner is proposed, compaction tests showing that the required permeability can be obtained, proof of compatibility of the liner material with the intended impoundment contents, intended compaction methods, and any other information required to show that the material is suitable as a liner should be submitted. If a synthetic liner is proposed, the liner type, liner thickness, installation plan showing underlayment, leak detection, gas relief, etc., and proof of liner compatibility with the intended impoundment contents;

E. Soil boring logs for the impoundment site or other information concerning the site hydrogeology.

F. An on-site hydrogeologic review should be performed in accordance with the Groundwater Branch Guidelines for Hydrogeologic Site Evaluation. (contact ADEM Groundwater Branch Hydrogeological Unit);

IV. Design and Construction Guidelines: The following guidelines should be used as minimum criteria in design and construction of an industrial surface impoundment unless alternate methods have been found by the Department to be acceptable:

A. The crest elevation of the impoundment should be greater than the elevation of the 100-year flood. Impoundments which are partially below the 100-year flood elevation should have all surfaces subject to submergence protected by rip-rap or other slope stabilizing materials.

B. Areas determined to be prone to sinkhole development should be avoided in locating impoundments. In cases where impoundments must be constructed in areas prone to karst on other hazardous geologic environments extra engineering design must be used to mitigate potential releases or failures;

C. A minimum of three feet freeboard, at maximum design conditions, should be provided;

D. The dike width should be engineered to take into account the side slopes, dike height and soil type;

E. If a compacted clay liner is used and turbulence will be present in the basin, rip-rap or concrete should be used for dike and/or bottom protection;

F. Due to possibility of cracking and loss of integrity of earthen liners, liquid level variations should be maintained within a range to prevent liner dry out. Intermittent use impoundments, which result in liner dry out, should be lined with synthetic liners, unless it can be demonstrated that loss of integrity will not occur.

G. Inner and outer dike slopes should be no steeper than 3:1 (horizontal:vertical). Steeper slopes will be considered if faces are stabilized with concrete, asphalt, or a similar material or if engineering studies show a steeper slope can be stabilized;

H. The impoundment bottom should be located at an elevation above the annual high groundwater level;

I. Minimum compacted clay liner thickness should be two feet. The liner should be constructed in layers with the compaction and thickness of each layer to be determined by the engineer;

J. If a compacted clay liner is used, 95% Proctor Density and a Constant Head Permeability less than or equal to 10^{-7} cm/sec should be achieved on the dike and bottom of the impoundment. If the impoundment is to be used for storage only, the Falling Head permeability test should be used;

K. Cover should be established on earthen dikes to prevent erosion, and should be seeded with cover vegetation immediately upon construction, with hay or other materials used to minimize erosion prior to establishment of the vegetation. If vegetative growth is not possible, other means of cover should be used. The dike should be kept free of perennial woody plants with root systems which could displace earthen material;

L. Rainwater run-on should in all cases be diverted away from the impoundment dike toe and faces, and away from the impoundment influent unless the design specifically calls for inclusion of such runoff water;

M. Impoundment influent flow should have a control device such that flow could be immediately shut off in the event of liner failure or overtopping. Influent flow measurement facilities should be provided;

N. In impoundments where leak detection or collection and removal systems are specified, underdrain systems are recommended in lieu of wells;

O. If a synthetic liner is to be used, the liner material should be compatible with liquids to be introduced into the impoundment. A compacted substrate is recommended. The liner should be installed by an experienced contractor in a manner so as to ensure proper seam adhesion, prevention of puncture from rocks, roots, etc., with particular attention given to inlet and outlet pipes and the prevention of seepage between the liner and substrate. The liner should extend a minimum of 18 inches onto the top of the dike and should be securely fastened by burial of the edge of the liner. If PVC liners are used, the liner should be covered by a minimum of 12 inches of soil to prevent premature deterioration by sunlight;

P. For all impoundments which will contain hazardous liquids, or other wastes as defined by the regulations associated with the Resource Conservation and Recovery Act (RCRA) and/or those of the Department, the impoundments should be constructed so as to meet criteria of these regulations;

Q. For impoundments located near residential or non-controlled access areas, fencing is strongly recommended.

V. Construction Certification Requirements:

A. A professional engineer should supervise construction and verify that engineering requirements, and best engineering construction practices, are met during construction;

B. After construction is complete, a professional engineer should submit a letter of certification stating that the impoundment was built in conformity with the engineering requirements listed above or alternate requirements determined acceptable by the Department, any stipulations specified by the Department, and the initial submittal. If the impoundment differs from the initial submittal, ‘as built’ drawings should be submitted.