GUIDELINES FOR PERMIT APPLICATION, DESIGN, AND CONSTRUCTION OF WASTE STORAGE/DISPOSAL FACILITIES

(Revised 11-90)

NEW MEXICO OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
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PREFACE

The following specifications shall be used as a guide to the preparation of a permit application for waste storage/disposal facilities to be used to contain those wastes regulated by the Oil Conservation Division. (Individual districts may have additional restrictions or requirements.) All plans and specifications shall be submitted to and approved by the Oil Conservation Division prior to construction. Designs may deviate from the following specifications if it can be shown that the design integrity is such that the construction of impoundments will not affect any present or future sources of protectable ground water, and the facility is protective of public health and the environment. Please note that this guide does not take precedence over any specifications outlined in the Oil Conservation Commission's Order No. 3221-C for centralized surface waste storage/disposal facilities. It does take precedence for commercial surface waste disposal facilities. These specifications do not apply to well-site produced water or reserve pits.

If any levee to be constructed is more than ten feet (10') in height from ground level, or if a pit volume is more than 10 acre-feet, the State Engineer Office must also review and issue a permit for construction of the pit.

GUIDELINES FOR APPLICATION FOR WASTE STORAGE/DISPOSAL FACILITY PERMITS

I. Type of Operation

Indicate the major purpose(s) of the facility (e.g., produced water evaporation pit, disposal of oil field solids, etc.) and briefly describe the processes occurring at the facility.

II. Operator

Name of owner or legally responsible party, include address and telephone number.

III. Location of Disposal Pit

Give a legal description of the location (i.e., 1/4 1/4 Section, Township, Range, and County). Use state coordinates or latitude/longitude on unsurveyed land. Submit a large scale topographic map, site plan, or detailed aerial photograph for use in conjunction with the written material. It should depict highways or roads giving access to the facility site.

IV. Expansion Request

If the application is for an expansion of an existing facility, include the original OCD order or approval authorization for the facility.

V. Land Ownership

Include a topographic map, plot map or aerial photograph delineating land ownership boundaries.

VI. Storage/Disposal Facilities Description

A. Describe what types of liquids, solids, and/or soils are proposed to be accepted for disposal (e.g. produced water, drilling muds, completion fluids, tank bottoms, hydrocarbon contaminated solids, etc.)

B. Describe proposed on-site facilities to be used for effluent storage/disposal of process/produced water, drilling mud, sludges, waste oils, etc., including

surface impoundments, disposal pits, below grade tanks, etc. Locate the various storage/disposal areas on the facility site plan or topographic map. If materials or effluent other than produced water are proposed to be discharged at the site, describe in detail and provide expected volumes.

VII. Engineering Design

A. Provide technical data on the design elements of each disposal method. Engineering designs must be submitted to OCD for approval prior to construction.

1. Surface impoundments - Type and volume of effluent stored, area, volume, depth, slope of pond sides, sub-grade description, liner type and thickness, compatibility of liner and effluent, installation methods, leak detection methods, freeboard, runoff/runon protection.

2. Solids and semi-solids treatment and disposal - Describe in detail how petroleum waste solids, semi-solids or sludges will be handled including proposals for recycling, reclaiming and/or disposal. Provide disposal pit(s) location, size, volume, liner (if required), and type of solids. Facilities reclaiming oil are subject to OCD Rule 312.

3. Landfarming - Describe how contaminated solids (including soils and/or tank bottoms) will be landfarmed. Include information on proposed spreading rates, lift thickness, discing frequency, use of nutrients or chemicals to enhance degradation and proposed testing to monitor effectiveness.

B. General Construction Requirements

1. Location

Liquid and solids disposal pits and ponds shall not be located in any watercourse, lakebed, sink-hole, or other depression. Pits and ponds adjacent to any such watercourse or depression shall be located safely above the high-water level of such watercourse or depression.

2. Design and Construction

a. Evaporation ponds shall be designed and constructed to provide the minimum evaporative surface area needed for the maximum yearly volume of liquid to be discharged to the pond. This design parameter shall be based upon local climatological data. Such data and calculations used for the pond design shall be

submitted with any proposed plans and specifications. Special care should be taken when calculating the pond volume to account for the decrease in the evaporation rate during the winter months.

b. The design freeboard allowance shall take wave action into account to prevent overtopping due to wave action. A determination of the wave type (breaking or nonbreaking) shall be made to determine the forces acting upon the levee. Such calculations shall be submitted with the details for pond construction. Liner markings or some other device shall be installed to accurately measure freeboard.

c. The pond is to be constructed so that the inside grade of the levee is no steeper than 2:1. Levees shall have an outside grade no steeper than 3:1 (see Figure 1).

d. The top of the levees shall be level and shall be at least eighteen inches (18") wide.

e. An aeration system may be required to be constructed to prevent anaerobic conditions from forming in a pond. The necessity for this requirement will be determined individually based on pond design specifications submitted.

f. Upon completion of construction "as-built" completion diagrams certified by a registered professional engineer shall be submitted including locations and top-of-pipe elevation of monitor wells, if required.

3. Synthetically Lined Evaporation Ponds

a. Materials

(1) Synthetic materials used for lining evaporation ponds shall be impermeable and may be rigid, semi-rigid, or flexible.

(2) If rigid or semi-rigid materials are used, leak proof expansion joints shall be provided, or the material shall be of sufficient thickness and strength to withstand (without cracking) expansion, contraction, and settling movements in the underlying earth.

(3) If flexible membrane materials are used, they shall be of at least 30 mil thickness and shall have good resistance to tears or punctures.

(4) All materials used for lining evaporation ponds shall be resistant to hydrocarbons, salts, and acidic and alkaline solutions. The liners shall also be resistant to ultraviolet light or provision made to protect the material from the sun, as specified in Section c.(6).

(5) Synthetically lined pits shall incorporate a double liner system with a leak detection system installed between the primary (top) and secondary (bottom) liner.

b. Leak Detection System

(1) A leak detection system of an approved design shall be installed between the primary and secondary liner. The appropriate OCD district office should be notified at least 24 hours in advance of the scheduled installation of the primary liner to afford the opportunity for a Division representative to inspect the leak detection system.

(2) Leak detection systems may consist of, but are not necessarily limited to, approved fail-safe electric detection system or drainage and sump systems.

(3) If an electric grid detection system is used, provision must be made for adequately testing all components to ensure the system remains functional.

(4) If the drainage and sump system is to be used, a network of slotted or perforated drainage pipes shall be installed between the primary and secondary liners. The network shall be of sufficient density so that no point in the pond bed is more than twenty feet (20') from such drainage pipe or lateral thereof. The material placed between the pipes and laterals shall be sufficiently permeable to allow transport of the fluids to the drainage pipe. The slope for all drainage lines and laterals shall be at least six inches (6") per fifty feet (50'). The slope of the pond bed shall also conform to these values to assure fluid flow towards the leak detection system. The drainage

pipe shall convey any fluids to a corrosion-proof sump located outside the perimeter of the pond (see Figure 2).

c. Preparation of Pond Bed for Installation of Liners

(1) The bed of the pond and inside grade of the levee shall be smooth and compacted, free of holes, rocks, stumps, clods, or any other debris which may rupture the liner. In extremely rocky areas, it will probably be necessary to cover the pond bed with a compacted layer of sand or other suitable materials.

(2) A trench shall be excavated on the top of the levee the entire perimeter of the pond for the purpose of anchoring flexible liners. This trench shall be located a minimum of nine inches (9") from the slope break and shall be a minimum of twelve inches (12") deep. (See Figure 3).

(3) The liner shall rest smoothly on the pond bed and the inner face of the levees, and shall be of sufficient size to extend down to the bottom of the anchor trench and come back out a minimum of two inches (2") from the trench on the side furthest from the pond. (See Figure 3). In locations where temperature variations are significant, wrinkles or folds shall be placed at each corner of the pond to allow for the contraction and expansion of the membrane due to temperature variations. The membrane manufacturer should be consulted on this matter.

(4) Certain conditions require the venting of gas that may accumulate beneath a liner. If organic matter exists in the soils under the liner, or if natural gas is present in the region, gas production is likely. When a fluctuating water table is present immediately below the pond bottom, pockets of are may also accumulate below the liner. The net result of gas or air accumulation below the liner may be the "floating" of the liner to the pond surface. Two possible vent designs are illustrated in Figure 4. The need to vent this accumulated gas can be accomplished by providing a uniform layer of sand (which less than 5% will pass the 200 sieve) or a geotextile beneath the liners. To achieve the best results

from either of these media, the slope from the lowest point of the pond to the toe of the dike must be at least 2%. The venting medium is carried across the entire bottom and up the side slopes. Vents should be located approximately one foot (1') down from the crown of the dike. (See Figure 3)

(5) An anchor of used pipe or other similar material shall be placed over the liner in the anchor trench and the trench back-filled. The anchor trench shall extend the entire perimeter of the pond.

(6) If the lining material used for the primary liner is not sun-resistant, at least one inch (1") of sand or other suitable material shall be spread uniformly to cover the liner over the floor of the pit. Gravel or other wave-resistant material with sufficient angle of repose to remain in place shall be used to cover the sloping inner wall of the levee. A geotextile liner shall be placed beneath any gravel layer to provide protection for the membranae liner. Any gravel or sand layers used to protect the membranae liner from the sun shall extend to the anchor trench.

(7) Any sand or gravel layers placed on top of a membranae liner shall be done in such a manner that the risk of tearing the liner is minimized.

(8) At any point of discharge into the pond, no fluid force shall be directed toward the liner.

4. Clay Lined Ponds

a. Materials

Clay liners will be constructed of compacted clay soils or a mixture of bentonite and soil such that a maximum permeability of 1.0×10^{-7} cm/s is achieved. The application rate for bentonite to soil should be based on laboratory tests. In the absence of laboratory data, a minimum of 6 lbs. of bentonite must be thoroughly mixed with each cubic feet of soil prior to compaction.

b. Design and Construction

In addition to requirements of Part VII.2.b above, the following requirements shall also be observed for clay-lined pits:

(1) All vegetation, trash, stones, and other objects large enough to interfere with compaction will be removed from the pit site prior to compaction.

(2) Compacted clay liners shall be a minimum of three feet (3') thick uniformly throughout the bottom and sides of the pit, with a extra two feet (2') of clay liner at the toes of sidewall slopes and under aerators, if used.

(3) Clay materials shall be compacted by a sheep's foot roller in lifts not exceeding nine inches (9") in loose thickness to a minimum of 95% of the standard proctor density (ASTM D-698), with soil at optimum moisture content.

(4) Fluid used to compact lifts of clay lining materials will be similar to fluids to be placed in ponds, without hydrocarbons.

(5) A registered professional engineer shall certify correct placement, thickness, and compaction of the pond liner.

(6) At any point of discharge into the pond, no fluid force shall be directed to the clay liner. Splash pads to prevent erosion under aerators or on levees may include rip-rap or concrete aprons, synthetic materials, discharge tubes with upward facing outlets, or various weirs.

c. Unless otherwise approved by the OCD, ground water monitoring will be required to detect an fluids released from clay lined facilities.

5. Unlined Evaporation Ponds

a. Unlined disposal ponds will not be approved in areas where fresh water (as defined by OCD rules) underlies the site unless the constituent quality of the produced water is better than then underlying ground water.

b. Sufficient geologic and hydrologic information will be required to be provided to demonstrate that water disposal in unlined evaporation ponds will not migrate to areas of protectable fresh water.

6. Spray Evaporation Systems

a. Sprayer systems may be approved to enhance natural evaporation.

b. Engineering designs for the sprayer system must be submitted for approval prior to installation.

c. Spray systems shall be operated such that spray-borne salt does not leave the bermed area.

7. Skimmer Ponds/Tanks

a. Required Use

A skimmer pond or tank shall be used to separate any oil from the water prior to allowing the water to discharge into the evaporation pond, except for the following cases:

(1) It can be shown that the water being discharged into the pond contains no oil or grease.

(2) The discharge into the pond is from an oil or natural gas processing facility where the discharge has already clarifier passed through a skimmer basin, skimmer tank, decanter, or API Separator.

b. Design Criteria

The skimmer pond shall be designed to allow or oil/water separation only; oil shall be removed in a timely manner and stored in tanks. Per OCD Rule 310, oil shall not be stored or retained in earthen reservoirs or in open receptacles.

(1) If a skimmer pond is to be used, the pond shall conform to the same design criteria as the evaporation pond.

(2) If a skimmer tank is to be used, the material of construction and/or design shall provide for corrosion resistance.

(3) If a skimmer pond is to be used, siphons or other suitable means shall be employed to draw water from oil/water interface for transfer to the evaporation pond. The siphon shall be located as far as possible from the inlet to the skimmer pond.

(4) The skimmer pond/tank shall at all times be kept free of appreciable oil buildup to prevent oil flow into the evaporation pond.

(5) Figures 5 - a and b illustrate general design criteria for skimmer ponds and tanks, respectively. All skimmer pond shall be lined unless specifically exempted.

8. Fences, Signs and Netting

a. Unless otherwise permitted by the OCD, a fence shall be constructed and maintained in good condition around the facility perimeter. Adequate space will be provided between the fence and levees for passage of maintenance vehicles. The fences shall be constructed so as to prevent livestock from entering the facility area. Fences shall not be constructed on levees.

b. A sign not less than 12" x 24" with lettering of not less than two inches (2") shall be posted in a conspicuous place on the fence surrounding the facility. The sign shall be maintained in legible condition and shall identify the operator of the disposal system, the location of the facility by quarter-quarter section, township, and range; and emergency telephone numbers.

c. To protect migratory birds, all tanks exceeding 16 feet in diameter, and exposed pits and ponds shall be screened, netted or covered. Upon written application by the operator, an exception to screening, netting or covering of a facility may be granted by the district supervisor upon a showing that an alternative method will protect migratory birds or that the facility is not hazardous to migratory birds.

VIII. Spill/Leak Prevention and Reporting Procedures (Contingency Plans)

It is necessary to include in the discharge plan submittal a contingency plan that anticipates where any leaks or spills might occur. It must describe how the discharger proposes to guard against such accidents and detect them when they have

occurred. The contingency plan also must describe the steps proposed to contain and remove the spilled substance or mitigate the damage caused by the discharge such that ground water is protected, or movement into surface waters is prevented. The discharger will be required to notify the OCD Director of significant leaks and spills, and this commitment and proposed notification threshold levels must be included in the contingency plan.

A. Describe measures to be taken in the event of pond or pit failure as determined by the leak detection sumps or by ground water monitoring. Outline a procedure for analyses of fluids found, proposed schedule for OCD notification, removal of fluids from the leak detection system, repairs to the pond, and cleanup of contaminated water.

B. Describe proposed procedures addressing containment, cleanup and reporting in case of major and minor spills at the facility. Include information as to whether areas are curbed, paved and drained to sumps; final disposition of spill material; proposed schedule for OCD notification of spills; etc.

C. If an injection well is used for on-site effluent disposal, describe the procedures to be followed to prevent unauthorized discharges to the surface or subsurface in the event the disposal well or disposal line is shut-in for workover or repairs (e.g. extra storage tanks, emergency pond, shipment offsite, etc.). Address actions to be taken in the event of disposal pipeline failure, extended disposal well downtime, etc.

IX. Operation and Maintenance

A. Leak detection sumps shall be inspected for fluids at least weekly; monitor wells, if required, shall be checked at least monthly and sampled if fluids are present. Analyses will be furnished to the OCD. Records of dates, inspector and status of the leak detection system or ground water monitoring wells shall be maintained.

B. Outside walls of all levees shall be maintained in such a manner to prevent erosion. Inspections of the outside walls of the levees shall be made after any rainfall of consequence.

C. Pond freeboard levels shall not be less than approved by OCD.

D. All surface waste disposal facility operators shall file forms C-117-A, C-118, and C-120-A as required by OCD rules.

E. No produced water shall be received at the facility from motor vehicles unless the transporter has a valid Form C-133 (Authorization to Move Produced Water) on file with the Division.

F. Only liquids and solids that are non-hazardous by RCRA Subtitle C exemption or by characteristic testing will be accepted at the facility. Liquids and solids from operations not currently exempt under RCRA Subtitle C will be tested for appropriate hazardous constituents prior to disposal.

G. Each operator of a commercial surface disposal facility shall keep and make available for inspection records for each calendar month on the source, location, volume and type of waste (produced water, acids, completion fluids, drilling mud, etc.), analysis for hazardous constituents (if required), date of disposal, and hauling company that disposes of fluids or material in their facility. Such records shall be maintained for a period of two (2) years from the date of disposal.

H. Disposal at a surface facility shall occur only when an attendant is on duty. The facility shall be secured when no attendant is present. When loads can be monitored or otherwise isolated for inspection before disposal, no attendant is required.

X. Closure Plan

A. Provide a facility closure plan detailing plans as necessary for removal of all fluids and/or wastes, back-filling, grading and mounding of pits, cleanup of contaminated soils, and if necessary, aquifer restoration.

B. OCD shall be notified when operation of the facility is discontinued for a period in excess of six months or when the facility is to be dismantled.

XI. Site Characteristics - Fresh Water Protection Demonstration

A. The following hydrologic/geologic information is required to be submitted with all applications. Some information already may be on file with OCD and can be provided to the applicant on request.

1. Hydrologic Features

a. Provide the name, description, and location of any bodies of water, streams (indicate perennial or intermittent), or other watercourses (arroyos, canals, drains, etc.); and ground water discharge sites (water wells, seeps, springs, marshes, swamps)

within one (1) mile of the outside perimeter of the facility. For water wells, specify use of water (e.g., public supply, domestic, stock, etc.)

b. Provide the total dissolved (TDS) concentration (in mg/l) of the ground water most likely to be affected by any discharge. Include the source of the information and how it was determined.

c. Provide the flow direction of the ground water most likely to be affected by any leaks. Include the source of the information and how it was determined.

d. It is suggested that you provide a recent water quality analysis of the ground water, if available, including the name of the analyzing laboratory, sample location, and data the sample was taken. This suggestion is made so that background information is available in case of leaks or charges of neighboring groundwater contamination.

2. Geologic Description of Pond Site

Provide the following information and attach or reference source information, as available, (e.g., driller's logs):

a. Soil type(s) (sand, clay, loam, caliche);

b. Name and depth to water to most shallow aquifer(s);

c. Composition of aquifer material (e.g., alluvium, sandstone, basalt, etc.); and

d. Depth to rock at base of alluvium.

3. Flood Protection

Provide information on:

a. The flooding potential at the facility with respect to major precipitation and/or runoff events; and

b. Flood protection measures (berms, drainage channels, etc.), if applicable, for at least a 100-year flood.

c. Proposed schedule for OCD notification in case of flooding or washout.

B. Provide any additional information necessary to demonstrate that approval of the application will not result adversely affect fresh water protected for present or reasonably foreseeable future use. Depending on the method and location of discharge, detailed technical information on site hydrologic and geologic conditions may be required to be submitted for discharge plan evaluation. This material is most likely to be required for unlined surface impoundments and pits, and leach fields. Check with OCD before providing this information. However, if required it could include but not be limited to:

1. Stratigraphic information including formation and member names, thickness, lithologies, lateral extent, etc.

2. Generalized maps and cross-sections;

3. Potentiometric maps for aquifers potentially affected;

4. Porosity, hydraulic conductivity, storativity and other hydrologic parameters of the aquifer;

5. Specific information on the water quality of the receiving aquifer; and

6. Information on expected alteration of contaminants due to sorption, precipitation or chemical reaction in the unsaturated zone, and expected reactions and/or dilution in the aquifer.

XII. Proof of Notice

Attach proof that the notice requirements of OCD Rule 711 have been met (commercial disposal facilities only).

XIII. H_2S Contingency Plan

A contingency plan in the event of a release of H_2S shall be submitted for approval along with the details for pit construction. The contingency plan will outline a procedure for monitoring for H_2S, notifying the OCD, aeration or treatment of pit fluids for H_2S generation, H_2S monitoring and notification of appropriate authorities.

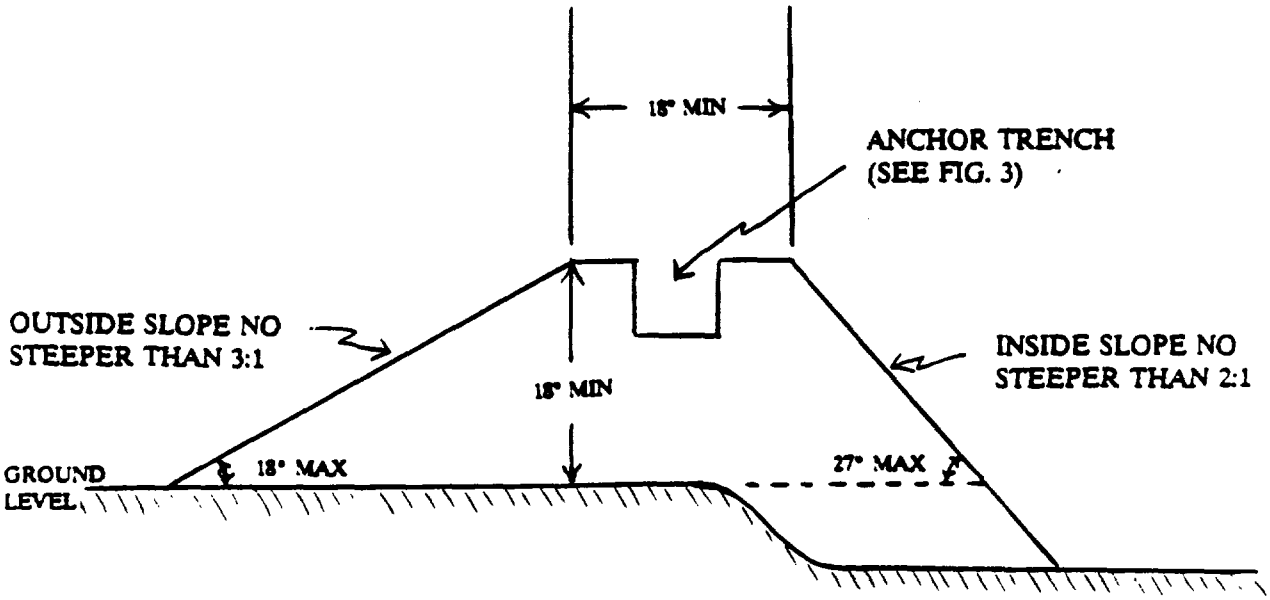
XIV. Additional Information

Provide any additional information necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.

XV. Certification

Include the signature information required on the application form.

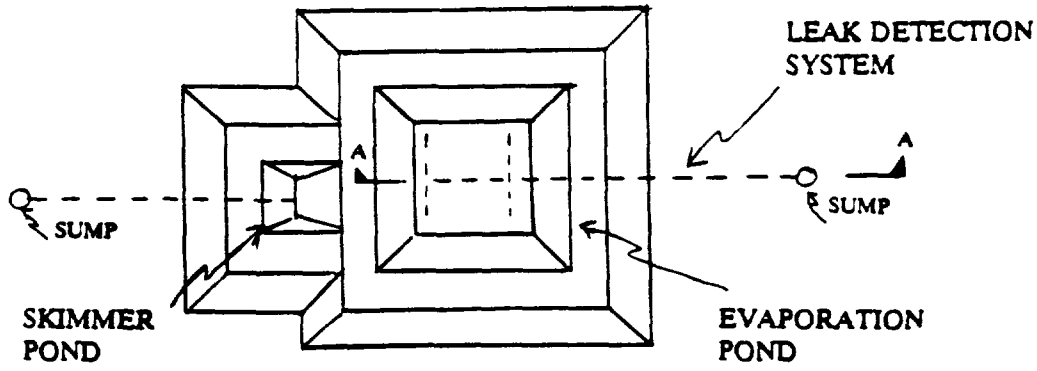
FIGURE 1: PIT CONSTRUCTION



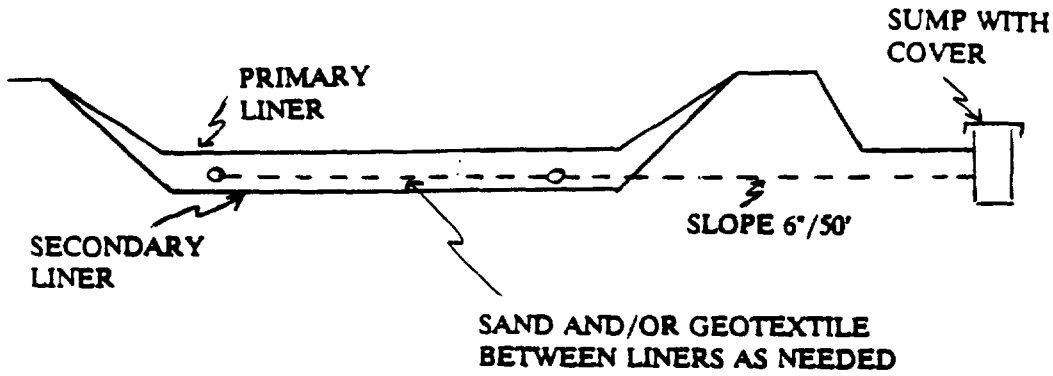
NOTE: LEVEE TO BE CONSTRUCTED IN A MANNER SUCH THAT DESIGN COMPACTION AND DIMENSIONS PROVIDE FOR A MINIMUM SAFETY FACTOR OF TWO FOR FORCES ACTING AGAINST THE LEVEE.

FIGURE 2 - LEAK DETECTION SYSTEM

PLAN



SECTION A-A



NOTE: SKIMMER POND TO HAVE SEPARATE LEAK DETECTION SYSTEM AND SUMP.

FIGURE 3 - ANCHOR TRENCH

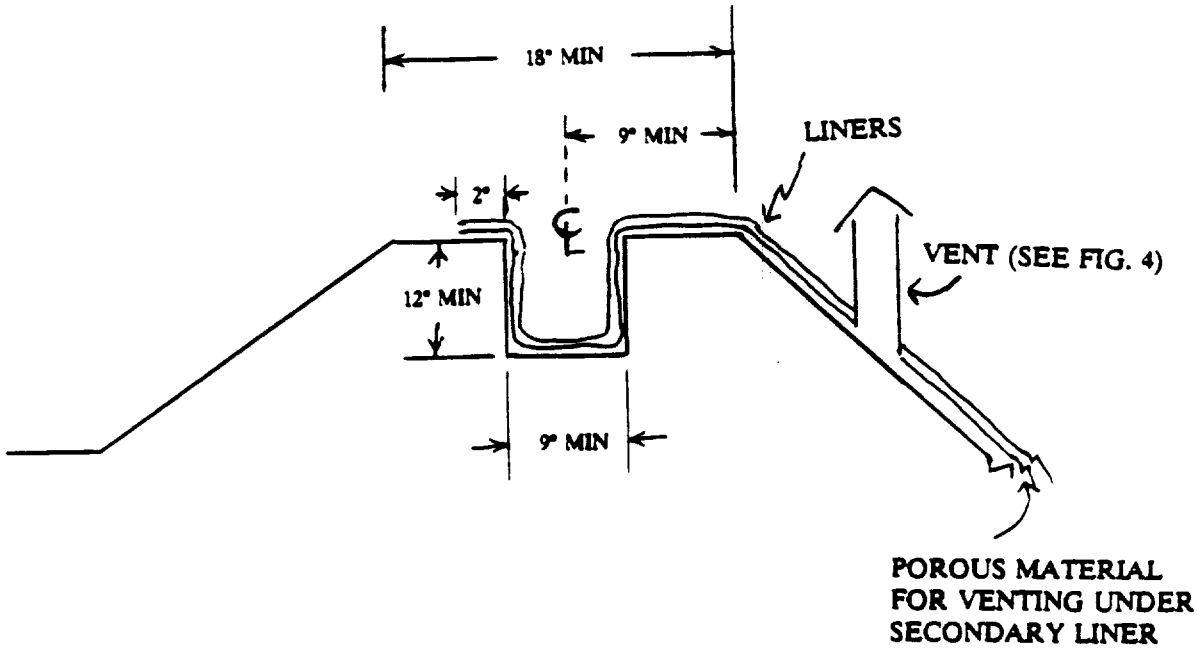
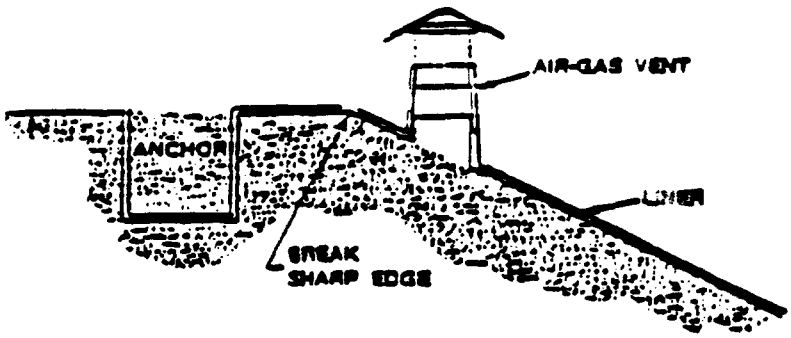


FIGURE 4 - VENT DESIGNS

SOURCE: EPA REPORT #SW-870, "LINING OF WASTE IMPOUNDMENT FACILITIES", PG. 260



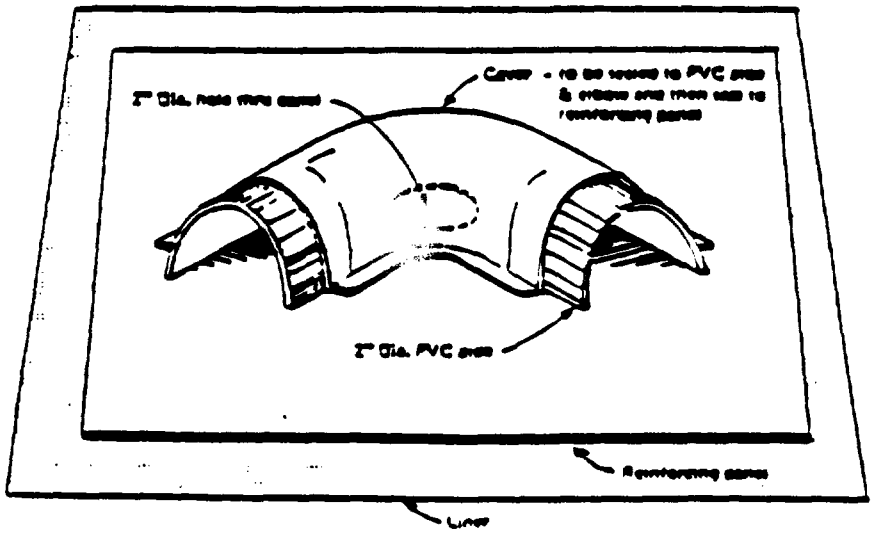
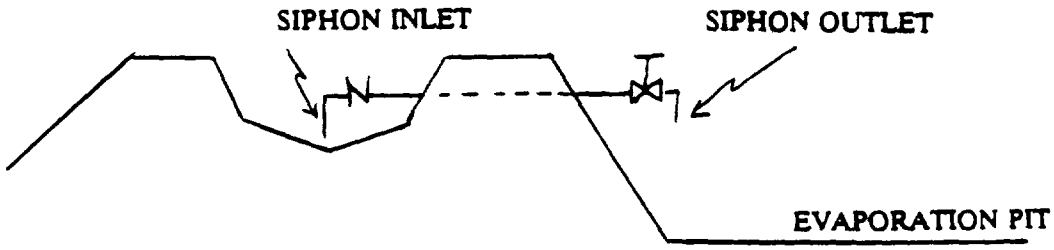
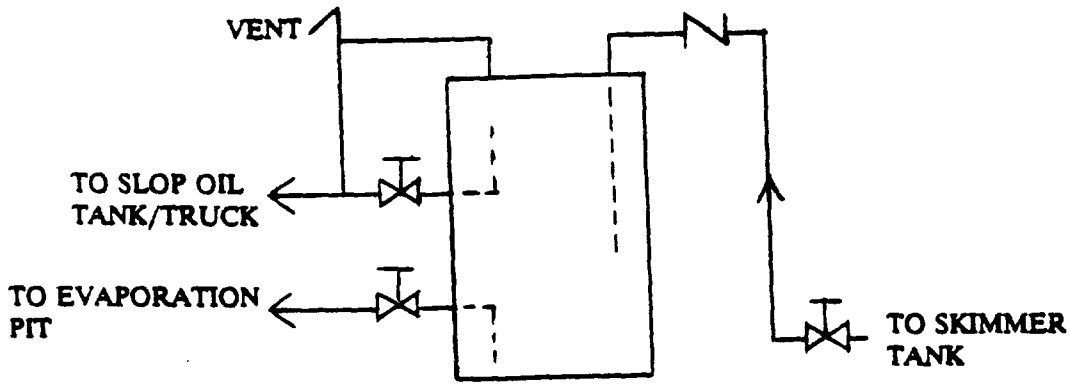


FIGURE 5: SKIMMER POND/TANK

(A) SKIMMER POND



(B) SKIMMER TANK



NOTE: BEFORE BEGINNING DISCHARGES TO SKIMMER POND/TANK, FILL WITH FRESH WATER TO SIPHON INLET.