

STATE ENGINEER GUIDELINES FOR LINING CRITERIA FOR GRAVEL PITS AUGUST 1999

1.0 Design Standard

The intent of the reservoir lining design is to achieve ground water inflow (leakage rate) into the reservoir that is not greater than $0.03 \text{ ft}^3/\text{day}/\text{ft}^2$ ($1 \times 10^{-5} \text{ cm}^3/\text{cm}^2/\text{sec}$) multiplied by the length of the perimeter wall in feet multiplied by the average vertical depth of the perimeter wall as measured from the ground surface to the pit bottom along the toe of the pit side slope, plus $0.0015 \text{ ft}^3/\text{day}/\text{ft}^2$ ($5 \times 10^{-7} \text{ cm}^3/\text{cm}^2/\text{sec}$) multiplied by the area of the bottom of the liner system or natural bedrock bounded by the perimeter wall. Appropriate geotechnical evaluations and analyses should be performed to indicate that the Design Standard could be achieved with the proposed design to a reasonable probability. It is recommended that the applicant submit design and construction plans for review to the State Engineer.

2.0 Construction Standards

The applicant must demonstrate that the constructed liner meets the requirements of the design by performing appropriate quality control observations and tests. The applicant shall provide written documentation of the work performed and results of quality control field and laboratory tests. Tests performed shall meet or exceed the standards established by the American Petroleum Institute (API) and/or the American Society of Testing and Materials (ASTM) as applicable.

3.0 Performance Standards

The Performance Standard shall be three times the Design Standard as described above. The Performance Standard shall be applied to an initial test of competency of the liner, as well as to the ongoing operation of the reservoir.

3.1 Initial Liner Test

For mined pits: The unregulated ground water inflow to the reservoir will be tested by evacuating the contents of the reservoir and observing the inflow of water over a period of ninety days. The start of the test will be under essentially dry conditions.

For unmined pits: The unregulated ground water inflow to the reservoir will be evaluated by constructing a dewatering sump at the lowest portion of the pit and then dewatering until a steady-state condition is achieved. Once a steady-state condition exists, the amount of the unregulated ground water inflow will be determined. This process will generally require the installation of piezometers to be located on the inside and outside of the lined pit in the unmined area in order to determine whether a steady-state condition has been achieved.

A water balance must be done to demonstrate that the balance of the inflows (e.g., precipitation and ground water) and outflows (e.g., evaporation) equals the change in storage volume by a minimum of a 90-day test. Ongoing monitoring of the water balance may also be required as determined by the Division Engineer. The frequency of accounting and monitoring as well as the type and accuracy of the monitoring devices shall be determined after consultation with the Division Engineer.

The applicant shall demonstrate that during a 90-day test period the unregulated ground water inflow to the pit does not exceed the Performance Standard. Demonstration of inflows less than the Performance Standard shall be sufficient cause for a determination that the applicant has constructed a lined reservoir and is entitled to store water. If the unregulated ground water inflow to the reservoir exceeds the Performance Standard, the State Engineer shall require the reservoir to be dewatered until satisfactory changes have been made to the liner to conduct another initial liner test.

4.0 Water Budget Accounting

Monthly accounting shall be required as long as the liner continues to meet the Design Standard. Weekly accounting (or more frequent if required by the Division Engineer) shall be required for liners which do not meet the Design Standard but continue to meet the Performance Standard. Evidence of compliance with the standards shall be established through a mass balance analysis accounting for inflows, outflows, and change in storage.

If the State or Division Engineer determines that the ground water inflow (leakage rate) into the reservoir is greater than the Performance Standard, the applicant shall be required to calculate the inflow to or outflow from the reservoir by means of a mass-balance analysis on a 48-hour basis, and return to the stream system such inflows to the pit within 48 hours, without such water being used by applicant in any manner. This 48-hour accounting shall only be for the entire period specified under the Liner Failure During Operation Section (see below) and shall not be done permanently.

5.0 Liner Failure During Operation

In the event that the average daily unregulated ground water inflow to the reservoir exceeds the Performance Standard for two consecutive months, as evidenced by accounting (see above), the applicant or their successor and the State Engineer's Office shall begin to consult regarding the probable cause of the unregulated ground water inflow, and the appropriate actions to be taken in response thereto. If the State or Division Engineer and the applicant cannot reach an agreement on the appropriate actions to reduce the unregulated ground water inflow to less than the Performance Standard within nine months of the beginning of the consultations, the State or Division Engineer shall provide written notice to the applicant of their determination to correct this problem. The 48-hour accounting shall begin following the two consecutive months that the Performance Standard is exceeded and shall continue until the applicant has demonstrated that the Performance Standard has been met. Applicant shall have two (2) years from the date of such written notice of liner failure to repair the liner to an inflow less than the Performance Standard. If satisfactory repairs are not completed within the two year period, no new water shall be stored in the reservoir until either: 1) the repair is made; 2) the issue is decided by the Water Court under retained jurisdiction, or; 3) the State Engineer's Office otherwise grants permission for storage to continue. The State or Division Engineer may declare the reservoir a well requiring a well permit.

6.0 Legal Storage of Water

Water shall not be impounded in the reservoir except pursuant to lawful diversions allowed by statute or decree. At all other times, all inflow of water into the reservoir from any source, including precipitation and ground water inflows shall be removed by the applicant. The water can be removed by draining, pumping, or other means, and released to the stream system, without use by the applicant in any manner. The applicant shall install the necessary measuring devices, including but not limited to, staff gauges in the reservoir and account on a monthly basis (or more frequently if required) for inflow and outflow, evaporation, precipitation, change in storage and any seepage. Prior to making any storage right absolute, the applicant shall develop and submit to the Division Engineer graphs showing height-storage relationships. Under no circumstance may the applicant withdraw more water from the reservoir than the measured inflow with appropriate evaporation and seepage losses being deducted.

7.0 Retained Jurisdiction

The Water Court shall retain jurisdiction to address injury to water rights caused by failure of the liner that results in ground water inflow exceeding the Performance Standard. Upon a prima facie showing by the State or Division Engineer or the party invoking the retained jurisdiction that such exceedence of the Performance Standard is occurring, and that reasonable efforts to correct the problem have been unsuccessful, and that injury to water rights is being caused thereby, the Water Court will proceed to hear evidence regarding the additional terms and conditions, or limitations and restrictions, that should be imposed upon the operation of the pit.