MEMORANDUM

To: **Larry Fitch, Director, Facilities Engineering Division**

From: **Edward Leonard, P.E., Dam Safety Engineer**

Date: **August 21, 2003**

Subject: **Inspection of Shadow Lake Dam, Glover**

On August 13, 2003, Edward Leonard and Andrea Morse made a routine inspection of Shadow Lake Dam in Glover, Vermont. A number of photographs were taken. The dam is owned by the Town of Glover. The State Identification Number is 81.02. The inspection was carried out under the provisions of 10 VSA 1105.

OVERALL CONDITION:

The overall condition of the dam is poor.

RECOMMENDATIONS FOR THE OWNER:

1. A long-term capital construction project should be planned to regrade the earth embankment section.

2. Brushing should be extended along the embankment including 10 feet past the toe of the dam. Large trees/brush (4 inches diameter) may cause root cavities and lead to piping (internal erosion) through the dam. Thus removal of stumps of large trees/brush and backfilling must be done under engineering supervision. This will also allow for a more thorough inspection.

3. The spillway channel should be cleared of debris.

4. The wood of the trash rack and bridge is rotten and should be replaced.

5. The stop logs should be monitored for rotting and replaced as needed.

6. The areas of erosion near the gatehouse should be filled in and stabilized.

7. The leak located approximately six feet to the left of the principle spillway should be observed and investigated to find the location of the exit of this flow and examine whether any soils are being transported by this flow.

BACKGROUND AND DESCRIPTION:

The dam is an earthen embankment with granite block masonry walls. The structure is 129 feet long and 11.5 feet high at maximum height. The crest is an average of 16 feet wide. There is an emergency spillway at the left end of the embankment and the principle spillway is located at the right end of the structure. The concrete emergency spillway is 33.5 feet long and 15 feet wide and has a date of 1929 cast into the left spillway wall. The principle spillway has a gatehouse with stop logs and a three-foot diameter pipe.

The actual date of construction is unknown but the dam was in place during the flood of 1927. After the flood in 1927 much of the embankment section was washed out but the granite block wall remained in place.

The last inspection of Shadow Lake Dam was done in 1984.

INSPECTION:

The inspection of the dam was conducted on August 13, 2003 at 10:00 AM. The weather was partly cloudy and in the 60s. The ground was wet. The water level in the pond was 4.8 feet below the block wall to the right of the principle spillway. The following was observed:

1. Principle Spillway.
   a) Approach.
      The approach was clear of obstructions and debris. The wooden trash rack and the bridge planks above the inlet have rotted.
   b) Control Section.
      There was a crack in the left side of the concrete gatehouse foundation.
   c) Outlet.
      The discharge channel was rocky with some debris.

2. Embankment Section.
   The embankment is a vertical stone-faced earth fill structure. There were large trees and brush growing on both the up and downstream slopes of the embankment.
   a) Abutments.
      The left abutment was dry and firm with heavy tree and brush growth. The right abutment also had tree and brush growth and was soft around a pipe running from the neighboring cabin.
   b) Crest.

There are areas of erosion on both sides of the gatehouse and one hole behind the upstream wall on the right side.

3. Emergency Spillway.
   The spillway is an uncontrolled concrete ogee crest type structure. There were some cracks in the concrete training walls with efflorescence.

HYDROLOGY AND HYDRAULICS:

The drainage area at this site is about 3328 acres. The lake surface area, at normal pool, is about 188 acres with storage of about 1432 acre-feet. At the dam crest, the pool stores 2283 acre-feet. The maximum discharge capacity for the unobstructed spillway is 107 cubic feet per second. The emergency spillway has a maximum hydraulic capacity of 346 cubic feet per second.

DOWNSTREAM HAZARD CLASSIFICATION:

The dam is a Class 2, “significant hazard” dam based on a Dam-Break Flood Analysis done in April 1991.

JURISDICTION:

Since the dam impounds more than 500,000 cubic feet any alteration, reconstruction or breaching would require prior approval from the Department under provisions of Title 10 of the Vermont Statutes Annotated, Chapter 43.