RICHELIEU RIVER BASIN
RUTLAND, VERMONT

UPPER EDDY POND DAM
VT 00231

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

APRIL 1981

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# DAMS, INSPECTION, DAM SAFETY

Richelieu River Basin
Rutland, VT.
Mussey Brook

The dam is an earth embankment with a concrete core wall. The dam is 180 ft. long with a maximum height of 13 ft. The dam is small in size with a significant hazard potential. A major breach of the dam could cause appreciable property damage and the loss of a few lives in the area about 3500 ft. downstream of the damsite. A number of recommendations are given for implementation by the owner.
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Honorable Richard A. Snelling  
Governor of the State of Vermont  
State Capitol  
Montpelier, VT 05602

Dear Governor Snelling:

Inclosed is a copy of the Upper Eddy Pond Dam (VT-00231) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is vitally important.

Copies of this report have been forwarded to the Department of Environmental Management and to the owner, Eddy Ice Company, North Clarendon, VT. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Management for your cooperation in this program.

Sincerely,

C. E. Edgar, LII  
Colonel, Corps of Engineers  
Commander and Division Engineer
UPPER EDDY POND DAM
VT 00231

RICHELIEU RIVER BASIN
RUTLAND, VERMONT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
Upper Eddy Pond Dam is an earth embankment dam with a concrete core wall. The dam has a length of 160 feet and a height of 13 feet. There is an overflow spillway with a crest length of 12 feet. The concrete crest is approximately 2.3 feet below the top of dam. At present there is about 3 inches of flashboard exposed above the concrete crest. There is a pond drain about 18 inches in diameter which is reported to be inoperative. The top of dam storage is estimated to be 51 acre-feet. The dam was originally constructed in the early 1900's for the purpose of forming an ice pond. Upper Eddy Pond now serves as a recreational water body. The dam appears to have had little maintenance in recent years. The portion of dam to the west of the spillway is covered by a rubbish dump. Based on the results of the visual inspection the condition of the dam is judged to be poor.

The dam has a small size and a significant hazard classification. The selected test flood is a of the Probable Maximum Flood (PMF). The PMF is considered comparable in magnitude to the 100-year flood. The test flood inflow from the 1.0 square mile drainage area was estimated to be 550 cfs. Effects of reservoir storage would reduce the test flood inflow to a routed test flood outflow of 480 cfs which would overtop the dam by about 0.7 feet.

The capacity of the spillway with water at the top of dam is estimated to be 130 cfs which is 27% of the routed test flood outflow.

A major breach of the dam could cause appreciable property damage and loss of a few lives in the area about 3500 feet downstream of the damsite.

A number of recommendations are given for implementation by the owner. These recommendations should be implemented within 12 months of receipt of this Phase I Inspection Report.

Recommendations in general are as follows:

Retain a qualified Registered Professional Engineer to:

- Design procedures and supervise removal of trees from the dam and for at least 25 feet downstream of the embankment toes. The rubbish dump should be completely removed. This work should include design for regrading and vegetation of the embankment slopes.

- Design repairs to the pond drain and its access platform.
- Investigate conditions at the westerly embankment and westerly abutment and investigate and monitor seepage flows.

- Perform a detailed hydrologic and hydraulic analysis to determine the need for and methods to increase project discharge capacity.

- Design methods to protect the upstream slope against erosion.

- Design methods to protect the embankments and sides of the discharge channel against erosion by flows from the spillway.

The owner should carry out all the recommendations made by the engineer. Work should be done under the engineer's supervision.

In addition, the owner should also implement the recommended remedial program including the establishment of a formal program for operation and maintenance, including the operating mechanism for the pond drain and control of woody vegetation on the embankments; and establishment of a formal surveillance and downstream warning program. A qualified Registered Professional Engineer should also be engaged to make a comprehensive technical inspection of the dam once a year. Immediately upon receipt of this report, the owner should remove the existing flashboard in order to maximize the hydraulic capacity of the spillway.

Upper Eddy Pond Dam
This Phase I Inspection Report on Upper Eddy Pond Dam (VT-00231) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

CARNEY M. TERZIAN
MEMBER
Design Branch
Engineering Division

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTEZIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

JOSE B. Fuktar
Chief, Engineering Division
This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.
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OVERVIEW OF UPPER EDDY POND DAM
NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
UPPER EDDY POND DAM
SECTION I - PROJECT INFORMATION

1.1 GENERAL

a. Authority
Public Law 92-367, August 8, 1972, authorized the Secretary of the
Army, through the Corps of Engineers, to initiate a national program of dam in-
spction throughout the United States. The New England Division of the Corps
of Engineers has been assigned the responsibility of supervising Inspection of
Dams within the New England region. Robert G. Brown & Associates, Inc. has been
retained by the New England Division to inspect and report on selected dams in
the Commonwealth of Massachusetts and State of Vermont. Authorization and notice
to proceed were issued to Robert G. Brown & Associates, Inc. under a letter of
23 October 1980 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Con-
tract Number DACH33-81-C-0004 has been assigned by the Corps of Engineers for
this work.

b. Purpose of Inspection
(1) To perform technical inspection and evaluation of
non-Federal dams to identify conditions which
threaten public safety and thus permit correction
in a timely manner by non-Federal interests.

(2) To encourage and prepare the states to initiate
quickly effective dam safety programs for non-
Federal dams.

(3) To update, verify and complete the National Inven-
tory of Dams.

1.2 DESCRIPTION OF PROJECT

a. Location
Upper Eddy Pond Dam is located in the Town of Rutland, Vermont. A small
portion of the pond is located in the City of Rutland. The dam is on Mussey Brook
approximately 2.3 miles upstream from the brook's confluence with Otter Creek.
The dam impounds Upper Eddy Pond which is used for recreation. Upper Eddy Pond
Dam is shown on the USGS Rutland, Vermont quadrangle at latitude 43° 35.5' and
longitude 72° 56.9'. Access to the damsite is from Stratton Road.

b. Description of Dam and Appurtenances
Upper Eddy Pond Dam is an earth fill dam, approximately 160 feet long,
with a maximum hydraulic height of about 13 feet, measured from the top of the
dam to the bottom of the stream channel at the toe of the dam. The dam has a top
width of about 10 feet. The axis of the dam is oriented in a general east/west
direction. The downstream slope is approximately 2H to 1V with localized areas
being slightly steeper. The upstream slope above the level of the pond is irreg-
ular and has a general slope of 2H to 1V.
There is an overflow spillway located to the west of the dam center. The spillway is 12 feet long and has a concrete crest elevation about 2.3 feet below the top of dam. There are concrete walls on each end of the spillway which have slots for flashboards (see Photograph 2, Appendix C). The concrete spillway walls and crest are formed by a 4-foot wide concrete core wall in the center of the embankment (see Appendix B). It is reported by the owner that the core wall extends to each abutment. The owner also reports that there is a second concrete core wall in the upstream slope of the dam, but this could not be confirmed during the visual inspection.

Overflow from the spillway discharges onto a rockfill slope (see Photographs 1 and 6, Appendix C) and then to a natural channel in the wooded area below the dam. There is more recent concrete slope pavement at the approach to spillway. There is a pond drain which passes through the embankment just to the west of the spillway. The conduit appears to be about 18 inches in diameter upstream of the core wall and 21 inches in diameter downstream of the core wall. There is a gate valve with a Tee-bar handle near the upstream end of the conduit (see Photograph 9, Appendix C). Previously there was a footbridge extending from the embankment out into the pond to the Tee-bar handle. There is no footbridge at present.

c. Size Classification
The size classification of this dam is small according to the criteria set forth in the Recommended Guidelines for Safety Inspection of Dams by the Corps of Engineers. The impoundment storage at the top of the dam is 51 acre-feet (within the range of 50 to 1000 acre-feet) and the maximum hydraulic height of the dam is 13 feet (less than 40 feet). The size classification is based on the storage and height criteria.

d. Hazard Classification
The dam is in a significant hazard category because a major breach of the dam would be likely to cause appreciable property damage and the loss of a few lives. (See Section 5.5.)

e. Ownership
The dam was built for and previously owned by Eddy Ice Company, according to the current owner, Mr. Norman Spafford, Cold River Road, North Clarendon, VT 05759. Tel.: (802) 773-6289.

f. Operator
There is no operation presently associated with the dam. The owner performs any work required.

g. Purpose of Dam
Upper Eddy Pond Dam impounds Upper Eddy Pond which is presently used for recreation by the owner. The pond was originally constructed for use in ice harvesting by the Eddy Ice Company.

h. Design and Construction History
According to the current owner, Mr. Norman Spafford, the dam was built about 1900. It was built for the Eddy Ice Company and may have been constructed by the company itself. No plans, specifications or construction records were available. There are no available records of any post-construction changes or repairs available from the owner, the Town or City of Rutland, or the Vermont Department of Water Resources.

Upper Eddy Pond Dam
1. Normal Operation Procedures
There are presently no operation procedures associated with the dam. In the past, flashboards were inserted in the spillway to regulate the water level. This is no longer done according to the owner. The pond drain was last operated about ten years ago. Mr. Spafford stated that the gate is no longer operable. The Tee-bar handle gate key is still in-place in the pond. The footbridge to reach the gate key is rotted out.

There are no established maintenance procedures for the dam. The embankment is overgrown with trees. The downstream face of the dam near the west abutment has been used as a trash dump in the past.

1.3 PERTINENT DATA

a. Drainage Area
The drainage area contributing to Upper Eddy Pond is 1.0 square mile. The drainage area is oriented with its long axis in an east/west direction and has a length of 1.7 miles and an average width of 0.6 mile. Approximately 30% of the watershed lies in the Town of Rutland with the remaining 70% lying in the Town of Mendon. Discharge from Upper Eddy Pond is to Mussey Brook.

Approximately 80% of the drainage area is wooded. The remaining 20 percent is pasture and scattered residential development. Several rural roads and a power line transect the area. The topography varies from low rolling terrain in the lower one-half of the watershed to moderate and steep slopes in the upper half. Elevations vary from 655 at Upper Eddy Pond to 2090 on Bald Mountain.

There are no other significant water bodies in the watershed. The pond area plus surrounding wetland areas comprise about 3 percent of the total drainage area.

b. Discharge at Damsite
Discharges at the damsite are over the concrete overflow spillway and through the pond drain (reported to be inoperable). There is one flashboard 3" high in the spillway with slots for additional flashboards.

The elevation datum used in this report is National Geodetic Vertical Datum of 1929 (NGVD), based on an interpolated water level elevation of 655 on the USGS quadrangle.

(1) Outlet Works - 18" diameter pond drain upstream of core wall, invert elevation unknown; 21" diameter downstream of core wall, invert elevation of outlet 644, gate valve on upstream end of pond drain is reported inoperable.

(2) Maximum Flood at Damsite - Flood of Record, November 1927, according to state records.

(3) Ungated Spillway Capacity at Top of Dam (without flashboards) - 130 cfs at 657.3 NGVD.

(4) Ungated Spillway Capacity at Test Flood Elevation (without flashboards) - 193 cfs at 658.0 NGVD.

Upper Eddy Pond Dam
(5) Gated Spillway Capacity at Normal Pool Elevation - not applicable.

(6) Gated Spillway Capacity at Test Flood Elevation - not applicable.

(7) Total Spillway Capacity at Test Flood Elevation (without flashboards) - 193 cfs at 658.0 NGVD.

(8) Total Project Discharge at Top of Dam - 130 cfs at 657.3 NGVD.

(9) Total Project Discharge at Test Flood Elevation - 480 cfs at 658.0 NGVD.

c. Elevation (feet above NGVD)
   (1) Streambed at Toe of Dam - 644±.
   (2) Bottom of Cutoff - unknown.
   (3) Maximum Tailwater - unknown.
   (4) Normal Pool - 655.0 (interpolated from USGS quadrangle).
   (5) Full Flood Control Pool - not applicable.
   (6) Spillway Crest - 655.0.
   (7) Design Surcharge (Original Design) - unknown.
   (8) Top of Dam - 657.3.
   (9) Test Flood Surcharge - 658.0.

d. Reservoir (length in feet)
   (1) Normal Pool - 850'.
   (2) Flood Control Pool - not applicable.
   (3) Spillway Crest Pool - 850'.
   (4) Top of Dam - 1000'.
   (5) Test Flood Pool - 1100'.

e. Storage (acre-feet)
   (2) Flood Control Pool - not applicable.
   (3) Spillway Crest Pool - 26.
   (4) Top of Dam - 51.
   (5) Test Flood Pool - 59.

Upper Eddy Pond Dam
f. **Reservoir Surface (acres)**
   (1) Normal Pool - 6.
   (2) Flood Control Pool - not applicable.
   (3) Spillway Crest - 6.
   (4) Top of Dam - 10.
   (5) Test Flood Pool - 11.

g. **Dam**
   (1) Type - earth embankment, gravity.
   (2) Length - 160 feet.
   (3) Height - 13 feet.
   (4) Top Width - 10 feet.
   (5) Side Slopes - 2H:1V.
   (6) Zoning - unknown.
   (7) Impervious Core - concrete core wall on centerline of dam reported to extend entire length; a second concrete core wall is reported to be located approximately 20' upstream.
   (8) Cutoff - unknown.
   (9) Grout Curtain - unknown.
   (10) Other - the westerly abutment is formed of a broad, gently sloping fill area.

h. **Diversion and Regulating Tunnel** - not applicable.

i. **Spillway**
   (1) Type - concrete overflow.
   (2) Length of Weir - 12 feet.
   (3) Crest Elevation - 655.0 NGVD without flashboards, 655.2 NGVD with one flashboard.
   (4) Gates - none.
   (5) U/S Channel - concrete paved approach channel from pond, 7 feet long.

*Upper Eddy Pond Dam*
(6) D/S Channel - concrete paved chute for 10' downstream sloped about 2H:1V, dumped rock fill slope about 7½ feet high to about 20' downstream to stream channel.

(7) General - discharge flows through and behind rock fill of spillway channel.

j. Regulating Outlets
   (1) Invert - 644±.
   (2) Size - 18" diameter upstream of the core wall and 21" diameter downstream of the core wall.
   (3) Description - riveted steel (boiler tube).
   (4) Control Mechanism - Tee-bar handle gate key for sluice gate, reported to be inoperable.
SECTION 2
ENGINEERING DATA

2.1 DESIGN DATA
No design data for the original construction or for any subsequent repairs were available.

2.2 CONSTRUCTION DATA
No construction records for the original construction or for any subsequent repairs were available.

2.3 OPERATION DATA
No written records of operation or maintenance were available. A Vermont Dam Inspection Report dated May 1952 is available from the Department of Water Resources.

2.4 EVALUATION OF DATA
a. Availability
No engineering data were available from the owner, the Town, City and County of Rutland, or from the State, except for a 1952 inspection report. The construction and operation information included in this report was derived from interviews of the current owner.

b. Adequacy
The lack of in-depth engineering data does not allow a definitive review. Therefore, the condition of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based on the visual inspection, the dam's past performance, and sound engineering judgment.

c. Validity
No engineering data for the original construction were available to validate.
SECTION 3
VISUAL INSPECTION

3.1 FINDINGS

a. General
Upper Eddy Pond Dam was inspected on December 5, 1960. The weather
was clear, temperature around 30°F. At the time of inspection, there was a
3-inch high flashboard in-place at the spillway crest. Water was flowing about
1 inch over the flashboard. The upstream slope could therefore only be observed
above this level.

The general layout of Upper Eddy Pond Dam is shown in Appendix B.
Photographs showing features and conditions at the dam are included in Appendix C.

b. Dam
(1) Crest - There are several low areas (6") in the crest.
The embankment upstream of the core wall east of the
spillway is approximately 4 inches lower than the top
of the core wall. There is a footpath along the
crest of the easterly embankment. The core wall is
exposed for about 12 feet east of the spillway and
for about 30 feet west of the spillway. There are
12-inch deep cracks in the crest at the westerly
abutment (see Photograph 7, Appendix C). These
cracks appear related to the debris dump visible on
the downstream slope at this location.

(2) Upstream Slope - There is a heavy growth of brush
and small trees on the upstream slope of the embank-
ment east of the spillway. There are irregularities
in the upstream slope, particularly on the westerly
embankment which appear to be caused by undercutting
of the embankment at the normal water level. The
depth of undercutting is presently about 6 inches.

The upstream slope at the entrance to the spillway
is paved with concrete. There is about a 1-inch
separation between the concrete slope pavement and
the exposed core wall at the sides of the spillway
(see Photographs 2 and 3, Appendix C).

The owner reports that there is another concrete core wall
in the upstream slope of the dam. This could not be
confirmed during the visual inspection.

(3) Downstream Slope - The easterly embankment has small
and large trees on the downstream slope. There is
minor rust color seepage (1 gpm estimated) from the
east side of the discharge channel downstream of the
spillway.

There is a rubbish dump which includes vehicle bodies
(see Photographs 4 & 5, Appendix C) on the downstream slope
of the westerly embankment. There are also 2 large
trees growing out of the westerly embankment, down-
stream slope. There are large voids in the rubbish
fill and there is an area of rust colored seepage (about 5 gpm) at the base of the dump (see Photograph 8, Appendix C). Cracks in the embankment crest at the westerly abutment may be related to lateral movement and/or settlement of the rubbish fill.

c. Appurtenant Structures

(1) Spillway - The concrete sidewalls of the spillway are a part of the concrete core wall. The core wall also appears to be continuous under the spillway (see Photograph 2, Appendix C). There is spalling of the concrete at the corners where the concrete sides join the concrete crest. There is about 3 inches of exposed flashboard above the concrete crest. Small trees growing on the upstream slope of the easterly embankment overhang the approach to the spillway. There is a barbed wire fence just upstream of the spillway crest (see Photographs 2 and 6, Appendix C).

Immediately downstream of the spillway crest, the discharge flows over a rock fill slope. The rock fill has been covered with concrete for about 10 feet downstream of the spillway crest to form a chute. There is dislocation of the rock fill downstream of the spillway where the rock fill ties into the easterly and westerly embankments. There is an accumulation of timbers and other heavy debris at the base of the rock fill about 20 feet downstream of the spillway crest (see Photograph 1, Appendix C).

(2) Pond Drain - The pond drain is reported to be inoperable at present. The Tee-bar handle for the gate valve is located in the pond about 20 feet out into the water. There is no footbridge extending out to the valve handle. The drain conduit appears to be about 18 inches in diameter upstream of the concrete core wall. No flow was observed from this section of the drain conduit. At the core wall the conduit size changes to 21 inches in diameter. The 21-inch conduit butts up to the core wall. There is about 10 gpm of leakage into the easterly side of the 21-inch conduit approximately 10 to 15 feet upstream of the outlet. The conduit projects from toe of the embankment west of the spillway (see Photograph 1, Appendix C).

d. Reservoir Area

The shore of the pond is primarily wooded. There are no structures located on the shore other than a cottage beyond the west abutment of the dam. This structure is about 3 feet above the top of the dam. There is a wetland area of about 3 acres at the northerly end of the pond (see Photograph 9, Appendix C).

e. Downstream Channel

Discharge from the spillway and the pond drain is to a natural channel which flows through a wooded area downstream of the dam. There is an accumulation of timbers and other heavy debris about 20 feet downstream of the spillway.

Upper Eddy Pond Dam
crest. There are several trees overhanging the channel downstream of the dam, but these would not affect the discharge capacity of the spillway. The valley section downstream of the dam is generally U-shaped, about 150 feet wide. The stream channel drops about 15 feet within 800 feet from the toe of the dam.

3.2 EVALUATION

Based on the visual inspection, Upper Eddy Pond Dam is judged to be in poor condition. Several deficiencies were noted, which if not remedied could lead to serious problems.

Major areas of concern are:

(1) The rubbish dump on the downstream slope of the westerly embankment obscures the embankment and precludes a detailed inspection. The cracks in embankment crest at the westerly abutment may be related to lateral movements and/or settlement of the rubbish fill. The dumped material should be removed and the embankment regraded. The seepage area at the toe of the westerly embankment requires further investigation after the embankment is exposed. The seepage at the base of the easterly embankment appears to be minor at present and may be related to surface drainage, but this should be investigated further and monitored.

(2) The growth of trees on the embankment slopes are a threat to the dam because they weaken the embankment and can cause cracking and other distress in the concrete core wall or cause blockage of the spillway. The barb wire fence across the spillway should also be removed to minimize potential spillway blockage.

(3) The pond drain should be repaired and made operable in order to provide a means of draining the pond in the event of an emergency. A means of access to the operating mechanism for the drain should be provided.

(4) Low areas in the embankment crest require grading in order to allow surface water to drain from the embankment.

(5) The upstream slope of the dam should be restored to a uniform alignment and protected against erosion and loss of embankment material.

(6) The sides of the channel for a distance downstream of the spillway crest and toe of the dam should be protected against erosion by the spillway discharge.

A complete listing of Recommendations and Remedial Measures are given in Section 7.

Upper Eddy Pond Dam
SECTION 4
OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 OPERATIONAL PROCEDURES

a. General
Operational procedures for the project are not established. The dam appears to receive little maintenance.

b. Description of any Warning System in Effect
There is no surveillance or warning system in effect for this dam.

4.2 MAINTENANCE PROCEDURES

a. General
There is no formal maintenance plan for the project. The only regular maintenance carried out is mowing of the westerly embankment crest. The concrete slope pavement at the approach to the spillway appears to have been constructed within the past 10 years. The pond was last drained about 10 years ago.

b. Operating Facilities
There are no established maintenance procedures for the operating facilities. The pond drain valve is reported to be inoperable.

4.3 EVALUATION

A formal written operational and maintenance plan, including an annual comprehensive technical inspection by a qualified Registered Professional Engineer, should be developed to insure that problems that are encountered can be remedied within a reasonable period of time. A formal written surveillance and downstream warning (emergency preparedness) plan should be established for this structure.

The pond drain should be made operational so that the pond could be drained in the event of an emergency.
SECTION 5
EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 GENERAL

The drainage area contributing to Upper Eddy Pond is 1.0 square mile. The drainage area is oriented with its long axis in an east/west direction and has a length of 1.7 miles and an average width of 0.6 mile. Approximately 30% of the watershed lies in the Town of Rutland with the remaining 70% lying in the Town of Mendon. Discharge from Upper Eddy Pond is to Mussey Brook.

Approximately 80% of the drainage area is wooded. The remaining 20 percent is pasture and scattered residential development. Several rural roads and a power line transect the area. The topography varies from low rolling terrain in the lower one-half of the watershed to moderate and steep slopes in the upper half. Elevations vary from 655 at Upper Eddy Pond to 2090 on Bald Mountain.

There are no other significant water bodies in the watershed. The pond area plus surrounding wetland areas comprise about 3 percent of the total drainage area.

5.2 DESIGN DATA

No hydraulic or hydrologic design data or criteria were available.

5.3 EXPERIENCE DATA

There is no evidence of recent overtopping of the dam; however, the low areas in the crest could have been caused by past overtopping. 1927 is the maximum flood of record in this watershed; however, there are no flow records for this location. According to the present owner, higher flashboards were once used at this dam. These flashboards reportedly were designed to yield.

5.4 TEST FLOOD ANALYSIS

Upper Eddy Pond Dam is classified as small size having a hydraulic height of 13 feet and a top of dam storage of 51 acre-feet. Using the Recommended Guidelines for Safety Inspection of Dams, the test flood range is 100-year to 50% of the Probable Maximum Flood (½ PMF). Because of the dam's small height and small impoundment the ½ PMF was chosen as the test flood. For the purpose of this analysis the ½ PMF is considered comparable in magnitude to the 100-year flood. The analysis assumes that the dam remains intact during the test flood. The Probable Maximum Flood was estimated using methods contained in "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations" issued by the New England Division Corps of Engineers. A curve value 1/3 between mountainous and rolling terrain was used in this estimate.

The ½ PMF test flood inflow from the 1.0 square mile drainage area was estimated to be 550 cfs. Storage effects would reduce the test flood inflow to a routed test flood outflow of approximately 480 cfs.

Upper Eddy Pond Dam
During test flood conditions, water would rise to elevation 658.0 which is about 0.7 feet above the top of dam. Water would be passing over the spillway crest at a depth of approximately 3 feet. In this analysis it was assumed that the pond level at the start of the test flood routing was at the concrete spillway crest and the existing 3" flashboard was removed.

The capacity of the spillway with water at the top of dam elevation is 130 cfs which is 27% of the routed test flood outflow. Overtopping of the dam could lead to a breach by erosion.

5.5 DAM FAILURE ANALYSIS

The impact of failure of the dam was assessed using Corps of Engineers "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs". The estimate assumes:

a. the reservoir surface is at the top of the dam at the time of the breach, and

b. a breach of 40% of the dam length at mid-height occurs (36 feet).

The estimated discharge resulting from the breach would be approximately 2840 cfs, which when added to the antecedent flow of approximately 130 cfs gives a total downstream breach flow of 2970 cfs.

Approximately 800 feet downstream of the damsite, Mussey Brook crosses under Cold River Road/Stratton Road in a 7.5-foot diameter CMP culvert. Water from the breach would cause water to flow over the low point in the road at a depth of about 2 feet. Storage in the valley section upstream of this road would cause about a 15% reduction in the breach flow. There are presently no structures in this area.

About 3000 feet downstream of the damsite there is a small private bridge with an opening about 12 feet wide and 7 feet high. There is a house at this location. Water from the breach could cause 1 or 2 feet of flooding around the house but water would probably not reach the first floor level. Prior to the breach water would be about 10 feet below the house sill.

Approximately 3500 feet downstream of the damsite Mussey Brook crosses under Cold River Road in a concrete box culvert having an opening about 10 feet wide and 8 feet high. Water from the breach would cause water to flow over the road at a depth of about 1.5 feet. There is one home in this area at the road level and one home which has a sill about 2 feet below the road. These homes could be damaged by impact and flooding. Loss of a few lives could be possible. Prior to the breach, water would be at a level about 7 feet below the road.

Below this area Mussey Brook enters Lower Eddy Pond (VT 00230). Because of the potential for damage to downstream property and the potential for loss of a few lives, the dam was classified Significant Hazard.
SECTION 6
EVALUATION OF STRUCTURAL STABILITY

6.1 VISUAL OBSERVATION
The downstream slope of the westerly embankment and the westerly abutment are covered by a rubbish dump. There are cracks in the embankment crest at the westerly abutment which may be related to lateral movements and/or settlements in the rubbish fill. Rust colored seepage approximately 5 gpm is emanating from the base of the rubbish. The condition of the westerly embankment should be evaluated after removal of the rubbish which now precludes a detailed inspection.

The growth of trees on the upstream and downstream embankment slopes are a threat to the dam because uprooting of large trees could lead to a breach of the dam. Also the root systems could cause cracking and other distress in the concrete core wall.

6.2 DESIGN AND CONSTRUCTION DATA
No design or construction records for the original construction (early 1900's) were available through present or previous owners, local or state sources.

6.3 POST-CONSTRUCTION CHANGES
There is concrete slope pavement on the upstream slopes at the approach to the spillway. This work appears to have been done within the last 10 years. The owner reports that yielding type flashboards were once used to control the level of the pond. At present, there is 3 inches of exposed flashboard above the concrete spillway crest.

6.4 SEISMIC STABILITY
The dam is located in Seismic Zone No. 2 and in accordance with the recommended Phase I guidelines, does not warrant seismic analysis.
SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition

The Phase I visual inspection of Upper Eddy Pond Dam indicates that the dam is in poor condition. A number of deficiencies were observed which, if not remedied, could develop into hazardous conditions.

The adequacy of the spillway was tested and it was determined that the dam cannot pass the test flood without overtopping.

b. Adequacy of Information

The condition of this dam was assessed based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency

The recommendations and remedial measures described in Paragraphs 7.2 and 7.3 should be implemented by the owner within 12 months after receipt of this Phase I Inspection Report.

7.2 RECOMMENDATIONS

The owner should retain a qualified Registered Professional Engineer to:

(1) Design procedures and supervise the removal of trees from the dam and for at least 25 feet downstream of the embankment toes. Resulting depressions should be backfilled with appropriate materials. The rubbish dump should be completely removed. The design should include regrading of the embankment slopes and crest and establishment of an erosion resistant vegetation. Cracks in the embankment crest at the westerly abutment should be investigated and repairs designed.

(2) Design repairs to the pond drain and its access platform.

(3) Investigate the seepage through the downstream face of the embankments both under the existing dump to the west of the spillway and at the toe of the easterly embankment at the spillway discharge channel. A monitoring program should be established. A toe drainage system should be designed and constructed if necessary. The limits of the concrete core wall should be determined as part of this investigation.

(4) Perform a detailed hydrologic and hydraulic analysis to determine the need for and methods to increase project discharge capacity. The feasibility of constructing an emergency spillway should be evaluated.

Upper Eddy Pond Dam
(5) Design methods to protect the upstream slope against erosion and loss of embankment material. The existence, location and condition of the second core wall should be investigated.

(6) Design methods to protect the embankments and sides of the discharge channel against erosion by flows from the spillway.

The owner should carry out all the recommendations made by the engineer. Work should be done under the engineer's supervision.

7.3 REMEDIAL MEASURES

a. Operation and Maintenance Procedures
   The owner should implement the following remedial measures:
   (1) Establish a formal written program for operation and maintenance including exercising and servicing of the pond drain operating mechanism and monitoring of seepage flows. Also a program for control of woody vegetation on the embankments should be established.

   (2) Provide round-the-clock surveillance during periods of unusually heavy precipitation.

   (3) Develop a formal written program for warning downstream residents in case of emergency (emergency preparedness program).

   (4) Engage a qualified Registered Professional Engineer to make a comprehensive technical inspection once a year.

   (5) Clear the spillway discharge channel of accumulated heavy debris.

   (6) Repair areas of spalled concrete on the spillway walls.

   (7) Remove the barbed wire fence that spans the spillway because the wire could cause debris to accumulate and obstruct flow through the spillway.

   (8) Remove the existing flashboards in order to maximize the hydraulic capacity of the spillway. This should be done immediately upon receipt of this Phase I Inspection Report.

7.4 ALTERNATIVES

There are no practical alternatives to the above recommendations.
VISUAL INSPECTION PARTY ORGANIZATION
NATIONAL DAM INSPECTION PROGRAM

DAM: Upper Eddy Pond Dam VT 00231

DATE: 5 December 1980

TIME: 1:00 p.m.

WEATHER: Clear, 25°F

W.S. ELEV. 655.2 U.S. 644 DN.S.

ELEV. DATUM: NGVD interpolated from water surface elevation of 655 on USGS quadrangle.

INSPECTION PARTY:
1. J. F. Cysz, P.E. (Hydrology/Hydraulics)
2. J. E. Walsh, P.E. (Baystate Environmental Consultants, Inc.) (Geotechnical)
3. R. E. Hoogs (Measurements)
4. 
5. 
6. 

OTHERS PRESENT DURING INSPECTION:
1. Norman Spafford (during interview at site on 74 November 1980)
2. 
3. 
4. 

A - 1
## VISUAL INSPECTION CHECKLIST

**DAM:** Upper Eddy Pond Dam  **VT 00231**  **DATE:** December 5, 1980

<table>
<thead>
<tr>
<th>AREA EVALUATED</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DAM EMBANKMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Crest Elevation</td>
<td>657.3±.</td>
</tr>
<tr>
<td>Current Pool Elevation</td>
<td>655.2 interpolated from USGS quadrangle.</td>
</tr>
<tr>
<td>Maximum Impoundment to Date</td>
<td>Unknown.</td>
</tr>
<tr>
<td>Surface Cracks</td>
<td>Yes, at westerly abutment (see photo).</td>
</tr>
<tr>
<td>Pavement Condition</td>
<td>No pavements.</td>
</tr>
<tr>
<td>Movement or Settlement of Crest</td>
<td>Several low areas - 0.5'±.</td>
</tr>
<tr>
<td>Lateral Movement</td>
<td>Lateral movement of westerly downstream slope at old dump.</td>
</tr>
<tr>
<td>Vertical Alignment</td>
<td>Varies within 0.5'±.</td>
</tr>
<tr>
<td>Horizontal Alignment</td>
<td>Minor variations on upstream slope of easterly embankment. Concavity on upstream slope of westerly embankment (see Appendix B).</td>
</tr>
<tr>
<td>Condition at Abutment and at Concrete Structures</td>
<td>Concrete core wall extends from spillway sides into embankments. 4&quot; settlement and voiding on upstream side of easterly core wall.</td>
</tr>
<tr>
<td>Indications of Movement of Structural Items on Slopes</td>
<td>1&quot; space between spillway walls and concrete surfaced slopes at entrance to spillway.</td>
</tr>
<tr>
<td>Trespassing on Slopes</td>
<td>Dump on downstream slope at westerly end of dam. Footpath on crest of easterly embankment.</td>
</tr>
<tr>
<td>Vegetation on Slopes</td>
<td>Heavily treed.</td>
</tr>
<tr>
<td>Sloughing or Erosion of Slopes or Abutments</td>
<td>Dump obscures inspection of westerly embankment. Erosion on 2 areas of upstream slope of easterly embankment. (cont'd. next page)</td>
</tr>
<tr>
<td>AREA EVALUATED</td>
<td>CONDITION</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>DAM EMBANKMENT</strong> (cont'd.)</td>
<td></td>
</tr>
<tr>
<td>Sloughing or Erosion of Slopes or Abutments (cont'd.)</td>
<td>Erosion and settlement in boulder areas on downstream slope on both sides of spillway. Possible sloughing (6&quot; undercut) of embankment at normal pool. Concave area upstream slope of westerly embankment (see Appendix B).</td>
</tr>
<tr>
<td>Rock Slope Protection - Riprap Failures</td>
<td>No riprap observed. Randomly dumped boulders on both sides of spillway on downstream face.</td>
</tr>
<tr>
<td>Unusual Movement or Cracking at or near Toes</td>
<td>None observed on easterly embankment. Westerly embankment obscured by dump.</td>
</tr>
<tr>
<td>Unusual Embankment or Downstream Seepage</td>
<td>Rust color seepage from debris in dump at westerly embankment (5 gpm estimated). Minor rust color seepage from east side of channel downstream of spillway.</td>
</tr>
<tr>
<td>Piping or Boils</td>
<td>None observed.</td>
</tr>
<tr>
<td>Foundation Drainage Features</td>
<td>None.</td>
</tr>
<tr>
<td>Toe Drains</td>
<td>None.</td>
</tr>
<tr>
<td>Instrumentation System</td>
<td>None.</td>
</tr>
</tbody>
</table>
## VISUAL INSPECTION CHECKLIST

**DAM:** Upper Eddy Pond Dam  
**VT 00231**  
**DATE:** December 5, 1980

<table>
<thead>
<tr>
<th>AREA EVALUATED</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</strong></td>
<td>Intake channel and intake structure are not visible.</td>
</tr>
<tr>
<td>a. Approach Channel</td>
<td></td>
</tr>
<tr>
<td>Slope Conditions</td>
<td></td>
</tr>
<tr>
<td>Bottom Conditions</td>
<td></td>
</tr>
<tr>
<td>Rock Slides or Falls</td>
<td></td>
</tr>
<tr>
<td>Log Boom</td>
<td></td>
</tr>
<tr>
<td>Debris</td>
<td></td>
</tr>
<tr>
<td>Condition of Concrete Lining</td>
<td></td>
</tr>
<tr>
<td>Drains or Weep Holes</td>
<td></td>
</tr>
<tr>
<td>b. Intake Structure</td>
<td></td>
</tr>
<tr>
<td>Condition of Concrete</td>
<td></td>
</tr>
<tr>
<td>Stop Logs and Slots</td>
<td></td>
</tr>
<tr>
<td>AREA EVALUATED</td>
<td>CONDITION</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>OUTLET WORKS - CONTROL TOWER</td>
<td>No control tower. Gate valve has T-bar handle 20' upstream of face of dam.</td>
</tr>
<tr>
<td>a. Concrete and Structural</td>
<td>Access bridge for gate operator is destroyed. Gate valve reported by owner to be inoperable.</td>
</tr>
<tr>
<td>General Condition</td>
<td>Gate is in closed position at present. Inspection through outlet pipe indicates gate is not leaking.</td>
</tr>
<tr>
<td>Condition of Joints</td>
<td></td>
</tr>
<tr>
<td>Spalling</td>
<td></td>
</tr>
<tr>
<td>Visible Reinforcing</td>
<td></td>
</tr>
<tr>
<td>Rusting or Staining of Concrete</td>
<td></td>
</tr>
<tr>
<td>Any Seepage or Efflorescence</td>
<td></td>
</tr>
<tr>
<td>Joint Alignment</td>
<td></td>
</tr>
<tr>
<td>Unusual Seepage or Leaks in</td>
<td></td>
</tr>
<tr>
<td>Gate Chamber</td>
<td></td>
</tr>
<tr>
<td>Cracks</td>
<td></td>
</tr>
<tr>
<td>Rusting or Corrosion of Steel</td>
<td></td>
</tr>
<tr>
<td>b. Mechanical and Electrical</td>
<td></td>
</tr>
<tr>
<td>Air Vents</td>
<td></td>
</tr>
<tr>
<td>Float Wells</td>
<td></td>
</tr>
<tr>
<td>Crane Hoist</td>
<td></td>
</tr>
<tr>
<td>Elevator</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td></td>
</tr>
<tr>
<td>Service Gates</td>
<td></td>
</tr>
<tr>
<td>Emergency Gates</td>
<td></td>
</tr>
<tr>
<td>Lightning Protection System</td>
<td></td>
</tr>
<tr>
<td>Emergency Power System</td>
<td></td>
</tr>
<tr>
<td>Wiring and Lighting System in Gate</td>
<td></td>
</tr>
<tr>
<td>Chamber</td>
<td></td>
</tr>
</tbody>
</table>

DAM: Upper Eddy Pond Dam VT 00231
DATE: December 5, 1980
### Area Evaluated: Outlet Works - Transition and Conduit

<table>
<thead>
<tr>
<th>Area Evaluated</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Condition</td>
<td>Conduit is about 18&quot; diameter upstream of and through core wall. Then changes to 21&quot; CIP from core wall (butt joint) to outlet. There is no flow from 18&quot; conduit, leakage into easterly side of 21&quot; conduit 10' to 15' upstream of outlet. Top of 21&quot; pipe dented. Outlet of 21&quot; conduit is submerged 6&quot;.</td>
</tr>
<tr>
<td>Rust or Staining on Concrete</td>
<td></td>
</tr>
<tr>
<td>Spalling</td>
<td></td>
</tr>
<tr>
<td>Erosion or Cavitation</td>
<td></td>
</tr>
<tr>
<td>Cracking</td>
<td></td>
</tr>
<tr>
<td>Alignment of Monoliths</td>
<td></td>
</tr>
<tr>
<td>Alignment of Joints</td>
<td></td>
</tr>
<tr>
<td>Numbering of Monoliths</td>
<td></td>
</tr>
</tbody>
</table>
**VISUAL INSPECTION CHECKLIST**

**DAM:** Upper Eddy Pond Dam  
**VT 00231**  
**DATE:** December 5, 1980

<table>
<thead>
<tr>
<th>AREA EVALUATED</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</strong></td>
<td>Note: 21&quot; conduit projects from toe of slope west of spillway and discharges into spillway discharge channel. No headwall for outlet.</td>
</tr>
<tr>
<td>General Condition of Concrete</td>
<td></td>
</tr>
<tr>
<td>Rust or Staining</td>
<td></td>
</tr>
<tr>
<td>Spalling</td>
<td></td>
</tr>
<tr>
<td>Erosion or Cavitation</td>
<td>Outlet of 21&quot; conduit is submerged about 6&quot;.</td>
</tr>
<tr>
<td>Visible Reinforcing</td>
<td></td>
</tr>
<tr>
<td>Any Seepage or Efflorescence</td>
<td></td>
</tr>
<tr>
<td>Condition at Joints</td>
<td></td>
</tr>
<tr>
<td>Drain Holes</td>
<td></td>
</tr>
<tr>
<td>Channel</td>
<td></td>
</tr>
<tr>
<td>Loose Rock or Trees Overhanging</td>
<td>Yes, trees, dump debris west of channel.</td>
</tr>
<tr>
<td>Channel</td>
<td></td>
</tr>
<tr>
<td>Condition of Discharge Channel</td>
<td>Broad U-shaped valley section. General condition is satisfactory.</td>
</tr>
</tbody>
</table>
# VISUAL INSPECTION CHECKLIST

**DAM:** Upper Eddy Pond Dam  
**VT 00231**  
**DATE:** December 5, 1980

## AREA EVALUATED

### OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS

#### a. Approach Channel

<table>
<thead>
<tr>
<th>Condition</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Condition</td>
<td>OK - pond. Barb wire fence should be removed.</td>
</tr>
<tr>
<td>Loose Rock Overhanging</td>
<td>None observed.</td>
</tr>
<tr>
<td>Channel</td>
<td></td>
</tr>
<tr>
<td>Trees Overhanging Channel</td>
<td>None observed.</td>
</tr>
<tr>
<td>Floor of Approach Channel</td>
<td>None observed.</td>
</tr>
</tbody>
</table>

#### b. Weir and Training Walls

<table>
<thead>
<tr>
<th>Condition</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Condition of Concrete</td>
<td>Fair</td>
</tr>
<tr>
<td>Rust or Staining</td>
<td>Minor</td>
</tr>
<tr>
<td>Spalling</td>
<td>Yes, on east side, especially where spillway walls meet floor of chute.</td>
</tr>
<tr>
<td>Any Visible Reinforcing</td>
<td>None.</td>
</tr>
<tr>
<td>Any Seepage or Efflorescence</td>
<td>None.</td>
</tr>
<tr>
<td>Drain Holes</td>
<td>None.</td>
</tr>
</tbody>
</table>

#### c. Discharge Channel

<table>
<thead>
<tr>
<th>Condition</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Condition</td>
<td>Satisfactory - minor erosion to east at end of spillway.</td>
</tr>
<tr>
<td>Loose Rock Overhanging</td>
<td>None.</td>
</tr>
<tr>
<td>Channel</td>
<td></td>
</tr>
<tr>
<td>Trees Overhanging Channel</td>
<td>Yes.</td>
</tr>
<tr>
<td>Floor of Channel</td>
<td>U-shaped valley - natural conditions.</td>
</tr>
<tr>
<td>Other Obstructions</td>
<td>Heavy timbers, boulders and other debris at end of spillway chute.</td>
</tr>
</tbody>
</table>

**Note:** Spillway has slots for stop logs - 3" high stop log in place.
# VISUAL INSPECTION CHECKLIST

**DAM:** Upper Eddy Pond Dam VT 00231  
**DATE:** December 5, 1980

<table>
<thead>
<tr>
<th>AREA EVALUATED</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OUTLET WORKS - SERVICE BRIDGE</strong></td>
<td>There is no service bridge for gate valve for outlet works. Bridge is destroyed - couple of wood post piers remain. No spillway bridge.</td>
</tr>
<tr>
<td>a. Super Structure</td>
<td></td>
</tr>
<tr>
<td>Bearsings</td>
<td></td>
</tr>
<tr>
<td>Anchor Bolts</td>
<td></td>
</tr>
<tr>
<td>Bridge Seat</td>
<td></td>
</tr>
<tr>
<td>Longitudinal Members</td>
<td></td>
</tr>
<tr>
<td>Under Side of Deck</td>
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<tr>
<td>Secondary Bracing</td>
<td></td>
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<tr>
<td>Deck</td>
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<tr>
<td>Drainage System</td>
<td></td>
</tr>
<tr>
<td>Railings</td>
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</tr>
<tr>
<td>Expansion Joints</td>
<td></td>
</tr>
<tr>
<td>Paint</td>
<td></td>
</tr>
<tr>
<td>b. Abutment &amp; Piers</td>
<td></td>
</tr>
<tr>
<td>General Condition of Concrete</td>
<td></td>
</tr>
<tr>
<td>Alignment of Abutment</td>
<td></td>
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<tr>
<td>Approach to Bridge</td>
<td></td>
</tr>
<tr>
<td>Condition of Seat &amp; Backwall</td>
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APPENDIX B

ENGINEERING DATA

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>LIST OF AVAILABLE DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS</td>
<td>B-1</td>
</tr>
<tr>
<td>PREVIOUS INSPECTION REPORTS</td>
<td>B-2 to B-3</td>
</tr>
<tr>
<td>PLANS, SECTIONS AND PROFILES</td>
<td>B-4 to B-5</td>
</tr>
<tr>
<td>BORING LOGS</td>
<td>None</td>
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</table>

Upper Eddy Pond Dam
LIST OF AVAILABLE DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS

A. PLANS AND SPECIFICATIONS:
   None.

B. DESIGN RECORDS:
   None

C. CONSTRUCTION RECORDS:
   None.

D. MAINTENANCE:
   None.

Upper Eddy Pond Dam
PREVIOUS INSPECTION REPORTS

An inspection of the dam was performed by the Vermont Department of Water Resources on May 22, 1952, and is on file at the offices of the Water Quality Division, Montpelier, VT 05602. Copy attached.

Upper Eddy Pond Dam
INSPECTION REPORT
ON
Eddy Pond (Upper) Dam

1. Date of inspection 5/22/52  2. Water conditions normal

GENERAL DATA:
3. Location of dam Mussey Br., Rutland town
4. Owner and operator Eddy Ice Co.
5. Characteristic features of dam earth dam with core wall about 150' long - 20' high - spillway notch in center on rockfill
6. Other related data Pond area = 6 acres, Volume = 1,500,000 cu. ft. DA = 3 sq. mi. Use - formerly ice now recreation

OBSERVATIONS:
7. Condition of structure seepage at maximum section in a few places spillway end walls & slab are cracked.
    Rock fill supporting channel appears stable.

8. Condition of equipment poor

9. Operation maximum pond for recreation

10. Maintenance poor

REMARKS:
Dam on brook discharging thru Rutland City

Inspected by 12/16/54
A. SKETCHES COMPILLED DURING PHASE I INSPECTION SHOWING
GENERAL LAYOUT OF DAM, TYPICAL SECTIONS AND DETAILS
OF SIGNIFICANT FEATURES:
Figure 1. General Plan of Damsite and Typical Sections

B. RECORD PLANS:
None.
### APPENDIX C

### PHOTOGRAPHS

<table>
<thead>
<tr>
<th>Photograph Index</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photograph Index</td>
<td>C-1</td>
</tr>
<tr>
<td>Photographs</td>
<td>C-2 to C-7</td>
</tr>
</tbody>
</table>

Upper Eddy Pond Dam
Photograph 1 - Spillway looking upstream. Note accumulated debris in spillway channel. Also note 21-inch conduit in lower left.

Photograph 2 - Crest looking east showing spillway and exposed sections of concrete core wall. Note slope pavement on upstream slope at approach to spillway. There is 3" of exposed flashboard above the concrete spillway crest.

C - 2

Upper Eddy Pond Dam
Photograph 3 - Crest looking west showing spillway and exposed sections of concrete core wall.

Photograph 4 - View of rubbish dump on the downstream slope of westerly embankment. Note large trees growing in embankment. The electrical work mounted on the tree in the foreground is not appurtenant to the dam.
Photograph 5 - Close up view of rubbish dump at downstream slope of westerly embankment and westerly abutment.

Photograph 6 - View of the downstream channel showing rubbish dump at right. Note concrete pavement downstream of spillway crest.
Photograph 7 - One foot deep cracks in the embankment crest, at the westerly abutment.

Photograph 8 - Area of rust color seepage at the toe of the westerly embankment in the area of the rubbish dump.
Photograph 9 - View of Upper Eddy Pond looking upstream of the dam. Note Tee-bar handle for pond drain.

Photograph 10 - Culvert crossing at Cold River Road/Stratton Road about 800 feet downstream of the damsite.
Photograph 11 - Concrete box culvert crossing at Cold River Road, 3500 feet downstream of the damsite. There is also a residential structure to the left of the photograph.
APPENDIX D

HYDRAULIC AND HYDROLOGIC COMPUTATIONS

Page Number
DRAINAGE AREA MAP
D-1
COMPUTATIONS
D-2 to D-11

Upper Eddy Pond Dam
Drainage Area: 1.0 sq. mi.

Size: Small
Hazard: Significant
Test Flood Range: 100 yr. to 1/2 PMF
Test Flood: 100 yr. because Vol. at low end of Storage range

Note: The 100yr. flood will be considered as comparable in magnitude to 1/2 PMF


Use curve value about 1/3 distance between curves for Rolling Terrain and Mountainous Terrain

GSM prep = 2250
PMF = 2250 cfs x 1 sq mi = 2250 cfs

1/2 PMF = 2250/2 = 1125 cfs

1/4 PMF = 2250/4 = 562 cfs (say 550 cfs)
Stage v Discharge Data

Using \( Q = \frac{4}{3}H^3/2 \) - weir flow through spillway and over claim
- outlet conduit assumed closed.
- 3" flashboard assumed removed.

<table>
<thead>
<tr>
<th>Elevation</th>
<th>Flow Through Spillway</th>
<th>Flow Over Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEV. C</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>656</td>
<td>3.1</td>
<td>12'</td>
</tr>
<tr>
<td>654</td>
<td>1'</td>
<td>37'</td>
</tr>
<tr>
<td>652</td>
<td>2.3'</td>
<td>130'</td>
</tr>
<tr>
<td>648</td>
<td>3'</td>
<td>193'</td>
</tr>
<tr>
<td>649</td>
<td>4'</td>
<td>298'</td>
</tr>
</tbody>
</table>

Stage v Storage Data

<table>
<thead>
<tr>
<th>Elev</th>
<th>Surf. Area (Ac)</th>
<th>ΔStorage</th>
<th>ΔStorage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elev</td>
<td>Surf. Area (Ac)</td>
<td>ΔStorage</td>
<td>ΔStorage</td>
</tr>
<tr>
<td>455</td>
<td>6'</td>
<td>26.4'</td>
<td></td>
</tr>
<tr>
<td>460</td>
<td>15'</td>
<td>53'</td>
<td>79.4'</td>
</tr>
</tbody>
</table>

Normal Storage est based:
on ave. depth = 0.4 m X
ave. depth = 0.4 x 11 = 4.4'
Stor. = 4.4' x 6 Ac = 26.4 Ac:ft
1/4 PMF Test Flood  =  550 cfs  =  \( Q_p \times 658.1 \text{ NGVD} \times 60 \text{ ft}^2 \)

\[ Q_p = Q_p \times \left(1 - \frac{\text{STRE}}{144}\right) \]

Storage at 655 NGVD = 26 Ac-ft

\[ \text{Storage} = 60 - 26 = 34 \text{ Ac-ft} \]

\[ \text{STRE 1} = 34 \text{ Ac-ft} \times \frac{1}{1 \text{ sq Mi} / \text{53.3 Ac-ft}} \]

\[ Q_p = 550 \left(1 - \frac{0.64}{144}\right) = 476 \text{ cfs} \rightarrow 658.0 \rightarrow 584 \text{ ft}^2 \]

\[ \Delta \text{Storage} = 32 \text{ Ac-ft} \]

\[ \text{STOR 2} = 32 \times \frac{1}{1 \text{ sq Mi} / \text{53.3 Ac-ft}} \]

\[ \text{STOR ANF + STOR 1 + STOR 2} = \frac{0.62 + 0.62 + 0.62}{2} \]

\[ 0.62' \times 1 \text{ sq Mi} / \text{53.3 Ac-ft} = 33 \text{ Ac-ft} \]

\( (26 + 33 \text{ Ac-ft}) \rightarrow 59 \text{ Ac-ft} \rightarrow 658.0 \rightarrow 480 \text{ cfs} \)

Summary:

- Test Flood -
  - Inflow: 1/4 PMF 550 cfs
  - Routed Outflow: 480 cfs
  - Test Flood Elev: 658.0 NGVD
  - Storage at Test Flood El: 59 Ac-ft

- Spillway Cap:
  - Top of Dam El: 657.5 NGVD

- Spillway Cap at Test Flood Elev: 193 cfs @ 3’ head

- Overtopping: 0.7’
Breach Analysis

\[ W_0 \text{ @ } 40\% \text{ length at mid ht } = \]
\[ 0.4 \times 90' = 36' \]

Assume breach when water is at top of dam

\[ Q_0 = \frac{8/37}{W_0 \sqrt{y_0}} y_0^{3/2} \]

\[ y_0 = 13' \]

\[ Q_0 = \frac{(8/37)}{36 \times 32.2^{1/2} (13)^{1/2}} \approx 2837 \text{ cfs} \]

Plus spillway flow

\[ Q_{sp} = 132 \text{ cfs} \]

Total breach \[ Q = 2967 \text{ cfs} \]

\[ S = \text{ Vol of Storage at Top of Dam} = 51.1 \text{ Aft} \]
**Downstream Analysis**

Culvert Crossing 800' Downstream at Cold River Rd / Storrowton Rd

\[ Q_p = 2967 \text{ cfs} \]

<table>
<thead>
<tr>
<th>Elev.</th>
<th>h</th>
<th>h_w</th>
<th>A</th>
<th>C</th>
<th>I</th>
<th>H</th>
<th>Q</th>
<th>Q_total</th>
</tr>
</thead>
<tbody>
<tr>
<td>638</td>
<td>8'</td>
<td>1.1'</td>
<td>425'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>425'</td>
</tr>
<tr>
<td>640</td>
<td>10'</td>
<td>1.3'</td>
<td>475'</td>
<td>30</td>
<td>175</td>
<td>1.5</td>
<td>964'</td>
<td>1439</td>
</tr>
<tr>
<td>642</td>
<td>12'</td>
<td>1.6'</td>
<td>550'</td>
<td></td>
<td></td>
<td></td>
<td>3.5</td>
<td>3435</td>
</tr>
</tbody>
</table>

**Discharge**

\[ V_1 = 9 \text{ ga. ft}^2 \text{ (645kno)} \]

\[ \frac{Q_p}{\sqrt{2g}} = 2967 \left(1 - \frac{9}{8.3}\right) = 2484 \text{ cfs} \]

\[ V_2 = 76 \text{ cfs} \]

\[ \frac{Q_p}{V_2} = 2967 \left(1 - \frac{8.3}{8.3}\right) = 2484 \text{ cfs} \]

About 2' flooding over road, no houses
Analyze Section 2000' Downstream of Dam

Using

\[ Q = \frac{1.49 \times A R^{0.67} S^{0.4} }{n} \]

\[ A = 600 \]

\[ R = 650' \]

\[ S = 0.03 \]

\[ n = 0.03 \]

\[ S_{0.4} = 0.977 \]

\[ Q_{p1} = 2484 \text{ cfs} \]

Section Looking US

(1200' DS of culvert CWR Rd.)

<table>
<thead>
<tr>
<th>Elev</th>
<th>Area</th>
<th>Wd</th>
<th>Bw</th>
<th>Q</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>620</td>
<td>120'</td>
<td>30'</td>
<td>4.0'</td>
<td>1318</td>
<td>6'</td>
</tr>
<tr>
<td>622</td>
<td>250'</td>
<td>250'</td>
<td>1.85'</td>
<td>1590</td>
<td>8'</td>
</tr>
<tr>
<td>623</td>
<td>350'</td>
<td>350'</td>
<td>1.8'</td>
<td>3541</td>
<td>9'</td>
</tr>
</tbody>
</table>

Note: Assume uniform section from CWR Rd to this Point.

\[ V_{1} = \frac{290 \text{ ft.usta}}{43560 \text{ ft.}^{2}} = 6.7 \text{ ft.} \]

\[ Q_{p2} = Q_{p1} \left(1 - \frac{V_{1}}{V_{m}}\right) = 2484 \left(1 - \frac{6.7}{12.4}\right) = 2049 \text{ cfs} \]

\[ V_{2} = \frac{2049 \text{ ft.usta}}{43560 \text{ ft.}^{2}} = 4.7 \text{ ft.} \]

\[ V_{ave} = \frac{5.5 + 8 + 6.7}{3} = 6.7 \text{ ft.} \]

\[ Q_{p3} = 2484 \left(1 - 6.7/12.4\right) = 2153 \text{ cfs} \]

\[ Q_{p4} = 2153 \times 0.75 \text{ NED} \]

\[ 9.5' \text{ Depth} \]

No houses at this location.

Note: Could be some backwater from R.S. bridge if bridge open. Controls out water. Site about same.
Analyze private bridge crossing 3000' Downstream of Damsite.

\[ Q_{p1} = 2158 \text{ cfs} \]

**Section Looking U.S.**

Rate Bridge as Box Culv w/ Inlet Control (Orifice)

<table>
<thead>
<tr>
<th>Elev</th>
<th>h</th>
<th>w/D</th>
<th>Q</th>
<th>c</th>
<th>L</th>
<th>H</th>
<th>Q</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>620</td>
<td>8</td>
<td>1.1</td>
<td>720</td>
<td>2.9</td>
<td>150</td>
<td>0</td>
<td>-</td>
<td>720</td>
</tr>
<tr>
<td>622</td>
<td>10</td>
<td>1.4</td>
<td>910</td>
<td></td>
<td></td>
<td>2</td>
<td>1230</td>
<td>2460</td>
</tr>
<tr>
<td>623</td>
<td>11</td>
<td>1.6</td>
<td>1030</td>
<td></td>
<td></td>
<td>3</td>
<td>2260</td>
<td>3290</td>
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</tbody>
</table>

Discharge in 1000 cfs

\[ V_1 = \frac{293}{4360} \times 1000 = 66.4 \text{ ft}^3 \] 
\[ Q_{p} = Q_{p1} (1 - V_1) = 2158(1 - 0.015) = 1878 \text{ cfs} \] 
\[ V_2 = \frac{230}{4360} = 5.3 \text{ ft} \] 
\[ V_{ave} = \frac{5.3 + 6.6 + 6.0}{3} = 6.0 \text{ ft} \] 
\[ Q_{p1} = 2158(1 - 0.015) = 1909 \text{ cfs} \] 

Shallow flooding up to 2' around house at this location. Probably wouldn't reach sill elev.

**Note:** Use value from graph.
### Analyze Bridge Opening at Cold River Rd  
3500' Downstream of Dam  
Qp = 1904 cfs

![Diagram of bridge opening with dimensions and calculations]

<table>
<thead>
<tr>
<th>Elev</th>
<th>h</th>
<th>hw/d</th>
<th>Q</th>
<th>C</th>
<th>l</th>
<th>H</th>
<th>Q</th>
<th>Q_Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>616</td>
<td>9</td>
<td>1.1</td>
<td>750</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>750</td>
</tr>
<tr>
<td>617</td>
<td>10</td>
<td>1.3</td>
<td>900</td>
<td>29</td>
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<td>1</td>
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<tr>
<td>618</td>
<td>11</td>
<td>1.4</td>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>820</td>
</tr>
<tr>
<td>618.5</td>
<td></td>
<td></td>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td>25</td>
<td>1146</td>
</tr>
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</table>

1 house could be flooded by about 1.5' above first floor and 1 house could be flooded by about 3.5' above first floor. Other houses are more than 2' above the road level.

Below this area, brook crosses Cold River Road again in a 7'x10' CMP Arch Culvert before entering Lower Edith Pond - Vt 230.
Notes regarding downstream hazard

1. Road crossing 800' downstream of claim would probably be damaged by washout.

2. A private bridge about 3000' downstream could be damaged. There is a home at this location. There could be flooding around this home but water would probably not reach the first floor unless the bridge opening became blocked.

3. At a point 3500' downstream of the claim the breach flow would be attenuated by approximately 35%. A house could be flooded by about 1.5' above first floor and a house could be flooded by about 3½' above first floor. Other houses are more than 2' above the road level. Because of the potential for property damage and because of the potential for loss of a few lives in the Cold River Road area, the claim has been classified Significant Hazard.

4. Mussey Brook enters Lower Eddy Pond 4500' downstream at the claim site.
APPENDIX E

INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS
NOT AVAILABLE AT THIS TIME