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DEPT. OF NATURAL RESOURCES

George E. Meyer
Secretary

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June 9, 1995 IN REPLY REFER TO 67.27

Mrs. Margaret Zerwekh
500 Mill Road
Delafield, Wl 53018

SUBJECT; Nemahbin Roller Mill Dam, Field File *#67.27,* Follow-up to Dam Safety Inspection Report Dated April 8, 1994.

Dear Margaret:

I'm writing to check on the progress you are making toward completing the repairs required by the Inspection report sent to you last April.

In the report we identified the need for the following items to be addressed;

1. Dam Failure Analysis/Emergency Action Plan (EAP).
2. Signing.
3. Embankment Repairs.
4. Seepage Repair.
5. Outlet Structure.
6. Concrete Dam Repairs.
7. Operation, Inspection and Maintenance Plan (OIM).
8. Water Levels.

By now, items 1, 2, 7 and 8 were to have been completed. What success have you had in completing these items? We haven't heard from you or a consultant regarding any of these items. Did you get a start on the required EAP or OIM? Have the signs been put up on the dam? Are you maintaining the required water level elevations?

Please get back to, in writing, with the answers to my questions by July 1, 1995.
If the signing or any other physical repairs have been made, please provide photos the areas involved.

Thank you for the cooperation.

Sincerely,

William D. Sturtevant, P.E. Assistant State
Dam Safety Engineer Bureau of Water
Regulation & Zoning 608-266-8033

cc. Mary Ellen Vollbrecht - SED
Marty Johnson - SED

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WISCONSIN
DEPT. OF NATURAL RESOURCES

George E. Meyer
Secretary

April 8, 1994 IN REPLY REFER TO: 67.27

Mrs. Margaret Zerwekh
500 Mill Road,
Delafield, WI 53018

SUBJECT: Nemahbin Roller Mill Dam, Field File #67.27, Dam Safety Inspection Report, Waukesha County.

Dear Mrs. Zerwekh:

Before the business part of this report, I want to express our appreciation for your concern regarding the safety issues involved with your dam. We do not see such deep understanding of safety issues among dam owners very often. I also want to thank you for your hospitality. It was great.

This is the Department of Natural Resources' Dam Safety Report based on our inspection of the Nemahbin Roller Mill Dam on March 29, 1994. This report identifies work that needs to be done on the dam and a schedule for when that work is to be completed. Please contact me if you have questions about the needed repairs or are uncertain how to proceed.

ESTIMATES OF THE DAM HAZARD RATING AND SPILLWAY CAPACITY & FLOOD FLOWS

Our estimate of the Dam Hazard Rating for the Nemahbin Roller Mill Dam is Class III or High Hazard and is based on preliminary flood flow estimates and map surveillance. This is only an estimate of the Hazard Rating required by Wisconsin Administrative Code NR 333.04. Hazard ratings reflect downstream development that could be affected by a failure of the dam, and floodplain zoning in place below the dam. A dam failure analysis performed by an engineer will verify our estimate.

The design hydraulic capacity of the dam is established in NR 333.07(2) by hazard classification. It is dependent upon: 1) the size of the dam, 2) existing land use downstream of the dam and, 3) existing land use control downstream of the dam.

The size of the dam is divided into classifications of "minor" and "major" dams. A major dam has structural height of greater than or equal to 15 feet and/or greater than or equal to 300 acre feet of maximum storage capacity. All other structures not meeting this criteria are classified as minor. The Nemahbin Roller Mill Dam has a structural height of approximately 14 feet, and stores a maximum of approximately 69 acre feet. This puts the dam in the Minor dam classification.

Existing land use is divided into land use classifications low, significant and high. These are based on the current land use downstream of the dam. Because at least one house is situated in the estimated failure floodplain downstream of the Nemahbin Roller Mill Dam, the dam would be classified as High Hazard for existing land use.

The land use control classifications can be established by either 1) restrictive covenants, easements or legal arrangements or, 2) a floodplain zoning ordinance adopted in accordance with NR 116. A floodplain zoning ordinance was adopted

by Waukesha County for establishing land use control downstream of the dam within the 100 year floodplain.

Because the Nemahbin Roller Mill Dam is probably a High Hazard dam, and it is a Minor dam, it is required by NR 333 to pass the 500 year flood flow (Q_{500}). We have estimated that the Q_{500} for Baric River in the Waukesha County is approximately 2,100 cubic feet per second (cfs). The spillway capacity was estimated at 1045 cfs in this report. This flow was calculated at one foot freeboard with the stop logs out in all four bays. The flow rate of 1045 cfs corresponds to less then the 50 year flood (Q_{50}). The spillway is not designed to pass the 500 year flood.

These estimates appear in this report for comparison purposes only and are not intended for use in the design of hydraulic structures of any kind.

Note: Right and left are referenced while standing on the dam looking downstream.

ITEM	WORK TO BE COMPLETED BY

1) DAM FAILURE ANALYSIS / EMERGENCY ACTION PLAN — April 1, 1995

Our rough estimate shows at least one house located immediately downstream of the Nemahbin Roller Mill Dam is probably in the hydraulic shadow (dam failure floodplain) of the dam. In order to determine the extent of the hydraulic shadow for the dam, you will have to hire an engineer registered in the state of Wisconsin to perform a dam failure analysis. The analysis is to be completed by the date shown.

It will be beneficial to have the failure analysis done before any reconstruction or repairs, as it gives you the best basis for making decisions concerning the dam.

An Emergency Action Plan (EAP) is also required for the area downstream of the Nemahbin Roller Mill Dam and should be based on the dam failure analysis. Please have the engineer contact me before he or she begins work.

2) SIGNING — June 1, 1994

No signs were present on the dam the day of the inspection. Signing is required around dams in the State in accordance with Wisconsin Administrative Code NR 330. You must place a "Dam* warning sign and establish a signed portage. Please send pictures of the signs when they are in place on the dam.

3) EMBANKMENT REPAIRS — April 1, 1996

The downstream right embankment is heavily vegetated with trees and brush. Old stumps still remain on the left embankment. Remove old stumps, all trees and brush from the entire embankment to a distance of 20 feet of the toe.

Tree removal is important for a number of reasons. Trees can topple over in a severe storm taking with them a portion of the earthen embankment. The root systems provide a path for seepage waters to follow through the embankments. Trees grow old, die and topple over and/or leave their root system in the embankment to rot and provide a path for seepage. The leak on the downstream left embankment, right across the old stump, is probably, the best proof for this. Trees also shade the embankment and make it difficult for grass to become established. Grass has proven to be the best method for controlling erosion on earthen embankments. Tree roots have also proven to be attractive to burrowing animals for use as homes. Root systems have been known to penetrate concrete and masonry structures causing damage. All of these things lead to the same end, a risk of failure. By eliminating the trees from the embankment you reduce the risk of failure caused by tree growth.

Tree removal is to include the complete removal of the stumps and the roots, filling of the holes created with firmly compacted tight soils, adding topsoil and grass seed to establish grass growth. The embankment should

then be mowed on a regular basis so that the growth does not exceed 6 inches at any time.

Beaching along the entire length of the upstream slope, resulting in slumped riprap, was noted during the inspection. Fill the area with compacted tight soils and then protect it by establishing grass growth along the crest and using riprap and filter fabric toward the water. The embankment should be inspected at least annually for erosion.

The downstream slope of the right portion of the embankment appears to be too steep. Improper alignment along the crest of the right embankment was also noted during the inspection. The right embankment must be reshaped to at least 4:1 downstream slope and properly aligned along the crest. This should be performed in conjunction with the tree removal.

Several rodent burrows were noticed on the right embankment. Animal burrows result in a loss of earth material, and can provide seepage paths. Fill the holes with tight soils and monitor the borrowing animals activity on a regular basis.

4) **SEEPAGE REPAIR & MONITORING** April 1. 1996

Several areas of seepage were identified during the inspection:

1. Active seepage is located on the downstream slope of the left embankment and aligned with the old tree stump.

2. Active seepage is also located on the downstream slope of the right embankment approximately 40 feet from the spillway structure.

3. Active seepage was noted at the right abutment along the right spillway wing wall.

4. Inactive seepage through the right portion of the embankment approximately 60 feet to the right from the structure results in a small ponded area at the toe.

Once tree removal is completed and the embankment has been reshaped, the areas of seepage will be re-evaluated to see if additional measures are needed. As additional measures, you may have to hire an engineer registered in the state of Wisconsin to investigate and design repair means for the active areas of seepage. Meanwhile you must monitor these areas at least once every two month and after major floods. If you note a significant increase in the amount of seepage or a change in color or clarity of the seepage water, please notify this office immediately.

5) OUTLET STRUCTURE April 1, 1996

As it appears in this report the Nemahbin Roller Mill Dam does not meet the requirements of NR 333.07 (2) on minimum hydraulic capacity. Upgrading the spillway capacity is required. The additional spillway capacity must be designed by an engineer registered in the State of Wisconsin. There are many possible solutions to this problem. Please contact me if you would like some ideas. Please note that all plans for the repairs must be approved by the Department of Natural Resources prior to performing any repairs.

6) CONCRETE DAM REPAIRS April 1, 1996

Minor cracks, spalling, surface and joints deterioration of the concrete structure were noted during the inspection. Please complete the necessary concrete repairs by the date shown.

7) OPERATION. INSPECTION AND MAINTENANCE PLAN April 1, 1995

The Nemahbin Roller Mill Dam should have a written plan for regular operation, inspection and maintenance.

Maintenance of the dam should include all of those areas identified on the "Dam Inspection Checklists" which are included as part of this report.

Because our inspection program only allows for an inspection of your dam every ten years, I recommend that a registered professional engineer visually inspect the dam at least once every five years and immediately after every major flood. A copy of each report should be sent to this office.

8) WATER LEVELS — Immediately

According to the Permit issued in Docket Number 2-WP-868 you are required to maintain the level of the pond at the minimum and maximum elevations 97.50 and 99.00 feet respectively. The water level of the pond during the inspection was at an elevation 99.53 feet (elevations are referred to the BM 275-B datum).

Reduce the level of the lake by removing boards in the spillway and maintain it within the established range of elevations. Failure to do so may result in the Department issuing you citation until the required levels are being maintained.

SUMMARY OF REQUIRED WORK AND SCHEDULE

ITEM	REQUIRED COMPLETION DATE
1) DAM FAILURE ANALYSIS / EMERGENCY ACTION PLAN	April 1, 1995
2) SIGNING	June 1, 1994
3) EMBANKMENT REPAIRS	April 1, 1996
4) SEEPS REPAIR & MONITORING	April 1, 1996
5) OUTLET STRUCTURE	April 1, 1996
6) CONCRETE DAM REPAIRS	April 1, 1996
7) OPERATION, INSPECTION AND MAINTENANCE PLAN	April 1, 1995
8) WATER LEVELS	Immediately

If the schedule above is not acceptable to you, submit your own schedule, in writing, for completing the above modifications and repairs. In order for us to consider a schedule other than this, you must submit your alternative schedule by May 1, 1994. If we do not hear from you by then, the schedule we have determined will be in affect.

If you have any questions concerning this report, the guidebook or the operation and maintenance of your dam, please call me at 608/266-8033, or Konstantin at 608/264-6047.

Sincerely,

William Sturtevant, P. E. Assistant State
Dam Safety Engineer Bureau of Water
Regulation & Zoning

cc.: Mary Ellen Volbrecht - SED
Marty Johnson - Milwaukee Area Office

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