Ohio Department of Natural Resources

TED STRICKLAND, GOVERNOR SEAN D. LOGAN, DIRECTOR

David Hanselmann • Chief

Division of Soil & Water Resources

August 10, 2010

City of Massillon
Kenneth Kaminski, Director Parks & Recreation
505 Erie St. North
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
File Number: 0614-012
Stark County

Dear Mr. Kaminski:

Thank you for allowing Tina Griffin and Matt Hook of the Division of Soil & Water Resources to conduct a safety inspection of Sippo Creek Reservoir Dam on May 25, 2010. This inspection was conducted by representatives of the Chief of the Division of Soil & Water Resources under the provisions of Ohio Revised Code (ORC) Section 1521.062 to evaluate the condition of the dam and its appurtenances. The Chief has the responsibility to ensure that human life, health, and property are protected from dam failures. Conducting periodic safety inspections and working with dam owners to maintain and improve the overall condition of Ohio dams are vital aspects of achieving this purpose. A copy of the laws and administrative rules for dam safety is available on the division's web site or by request. I have enclosed guidelines for preparing an operation, maintenance, and inspection manual and guidelines for preparing an emergency action plan.

The enclosed inspection report was generated based on available information and is hereby provided for your use and study. Listed in the report are several repair, maintenance, and monitoring items that as a dam owner you are required by law to perform. Completion of these required items will improve the safety and overall condition of the dam. The Chief must approve any plans for modifications or repairs to the dam. Following approval of the engineered plans, all necessary repairs must be implemented by the owner under the supervision of a registered professional engineer. Failure to complete the repair, maintenance, and monitoring items may result in legal enforcement of these requirements in the form of an order from the Chief of the Division.

Please be advised that you may qualify for a loan to make required repairs from the Ohio Dam Safety Loan Program administered by the Ohio Water Development Authority (OWDA). To find out more about the program, please contact OWDA's Loan Officer at 614/466-5822.

To gain information that will help improve the inspection program, a short survey has been developed and is enclosed. Please complete the survey and return it in the self-addressed envelope provided. Your feedback is important.

It is the Division's understanding that you are the owner of this dam. Under Ohio's dam safety regulations, "owners" are "those who own, or propose to construct a dam or levee." OAC Rule 1501:21-3-01(V). A "dam" is defined as "any artificial barrier together with any appurtenant works, which either does or may impound water or other liquefied material ..." OAC Rule 1501:21-3-01(F). "Appurtenant works" include but are not limited to outlet works and spillway channels.

If you are not an owner of this dam, or believe that there are additional owners of the dam not addressed in this communication, please contact Tina Griffin. Please note that ORC Section 1521.062 requires a dam owner to notify the Chief of the Division of Soil & Water Resources in writing of a change in ownership of a dam prior to the exchange of the property.

Your cooperation in improving the overall condition of this dam is appreciated. Please contact Tina Griffin at 614/265-6634 if you have any questions.

Sincerely,

Keith R. Banachowski, P.E.
Program Manager
Dam Safety Engineering Program
Division of Soil & Water Resources

KRB:tmg

Enclosures

P.S. In July 2009, the Ohio Department of Natural Resources, Division of Water, merged with the Division of Soil & Water Conservation to become the Division of Soil & Water Resources.

DAM SAFETY INSPECTION REPORT

Sippo Creek Reservoir Dam
File Number: 0614-012
Class I
Stark County, Perry Township
Inspection Date: May 25, 2010

In accordance with Ohio Revised Code Section 1521.062, the owners of dams must monitor, maintain, and operate their dams safely. Negligence of owners in fulfilling these responsibilities can lead to the development of extremely hazardous conditions to downstream residents and properties. In the event of a dam failure, owners can be subject to liability claims.

The Chief of the Division of Soil & Water Resources has the responsibility to ensure that human life, health, and property are protected from the failure of dams. Conducting periodic safety inspections and working with dam owners to maintain and improve the overall condition of Ohio dams are vital aspects of achieving this purpose.

Representatives of the Chief conducted this inspection to evaluate the condition of the dam and its appurtenances under authority of Ohio Revised Code Section 1521.062. In accordance with Ohio Administrative Code Rule 1501:21-21-03, the owners of dams must implement all remedial measures listed in the enclosed report.

Table of Contents

Required Remedial Measures

The requirements listed below are based on observations made during inspection, calculations performed, and requirements of the Ohio Administrative Code (OAC). A checklist noting all observations made during the inspection has been enclosed in Section 3. References to right and left in this report are oriented as if you were standing on the dam crest and looking downstream.

Engineer Repairs and Investigations: The owner must retain the services of a professional engineer to address the following items. Plans, specifications, investigative reports, and other supporting documentation, as necessary, must be submitted to the Division of Soil & Water Resources for review and approval prior to construction. *These items have been noted previously and the appropriate time period for completion has already been exceeded.* A record of all repairs should be included in the operation, maintenance, and inspection manual.

1. The dam's discharge/storage capacity must be sufficient to safely pass the required design flood. Perform a hydrologic and hydraulic study to determine the adequacy of the dam's discharge/storage capacity to safely pass the required design flood. Prepare plans and specifications as necessary to increase the discharge/storage capacity to pass the required design flood. In accordance with OAC Rule 1501:21-13-02, the minimum design flood for Class I dams is 100 percent of the Probable Maximum Flood or the critical flood. See the Flood Routing Summary section of this report for additional information.

2. The spillway system must perform properly without endangering the safety of the dam. Investigate the deterioration, deformation, structural integrity, and undermining of the entire spillway system, and prepare plans and specifications for the repair or replacement off the entire spillway system. Regardless of the results of the investigation, the condition of the entire spillway system must be monitored weekly. This item should be completed in coordination with Item 1 above.

3. The erosion on the upstream slope of the embankment must be repaired and the upstream slope must be protected from erosion. Prepare plans and specifications for repairing the erosion and installing erosion protection.

4. The embankment crest alignment must be uniform. Investigate the vertical alignment of the crest near the principal spillway sidewalls and prepare plans and specifications for the correction of any problems. Regardless of the results of the investigation, the alignment of the crest must be monitored weekly. This item should be completed in coordination with Item 1 above.

5. The cut-off wall along the crest must be repaired. Prepare plans and specifications for the repair or replacement of the wall. This item should be completed in coordination with Item 3 above.

6. The extremely steep downstream slope to the right of the principal spillway must be regraded. Prepare plans and specification to flatten the slope. The steepness and overall stability of the embankment must be monitored weekly until repairs can be made.

Owner Repairs: The owner must address the following items. The owner may hire a contractor or perform the work him or herself. Repair activities should be documented in the operation, maintenance, and inspection manual.

1. The lake drain valve must operate properly. Investigate the integrity of the valve/sluice gate. If the valve does not work, you must hire an engineer to prepare plans and specifications for repair or replacement of the drain. See the "Lake Drains" fact sheet included in this section for additional information.

2. Remove the brush from the upstream slope shoreline and around the principal spillway sidewalls. Seed all disturbed areas to establish a proper grass cover. See the "Trees and Brush" fact sheet included in this section for additional information.

3. Repair the erosion gullies on the downstream slope, adjacent to the spillway. See the "Earth Dam Failures" fact sheet included in this section for additional information.

4. Repair the rodent burrows on the upstream slope. See the "Rodent Control" fact sheet included in this section for additional information.

5. Remove or grind down all the tree stumps on the embankment. Seed the all bare and sparse areas on the embankment to establish a proper grass cover. See the "Trees and Brush" and "Ground Cover" fact sheets included in this section for additional information.

6. Remove the planters on the downstream slope.

Owner Dam Safety Program: In accordance with Ohio Revised Code (ORC) Section 1521.062, the owner of a dam shall maintain a safe structure and appurtenances through inspection, maintenance, and operation. A dam, like any other part of the infrastructure, will change and deteriorate over time. Appurtenances such as gates and valves must be routinely exercised to ensure their operability. Inspection and monitoring of the dam identify changing conditions and problems as they develop, and maintenance prevents minor problems from developing into major ones. Dams must have these procedures documented in an operation, maintenance, and inspection manual.

Despite efforts to provide sufficient structural integrity and to perform inspection and maintenance, dams can develop problems that can lead to failure. Early detection and appropriate response are crucial for maintaining the safety of the dam and downstream people and property. The ORC requires the owner to fully and promptly notify the Division of Soil & Water Resources of any condition which threatens the safety of the structure. A rapidly changing condition may be an indication of a potentially dangerous problem. The Dam Safety Engineering Program can be contacted at 614/265-6731 during business hours or at 614/799-9538 after business hours. Dam owners must have emergency preparedness procedures documented in an emergency action plan.

Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 93–26

Dam Safety: Lake Drains

A lake drain is a device to permit draining a reservoir, lake or pond. Division of Water Administrative Rule 1501:21-13-06 requires that all Class I, Class II and Class III dams include a lake drain.

Types of Drains

Common types of drains include the following:

- A valve located in the spillway riser.
- A conduit through the dam with a valve at either the upstream or downstream end of the conduit.
- A siphon system (Often used to retrofit existing dams).
- A gate, valve or stoplogs located in a drain control tower.

Uses of Drains

The following situations make up the primary uses of lake drains:

Emergencies: Should serious problems ever occur to threaten the immediate safety of the dam, drains may be used to lower the lake level to reduce the likelihood of dam failure. Examples of such emergencies are as follows: clogging of the spillway pipe which may lead to high lake levels and eventually dam overtopping, development of slides or cracks in the dam, severe seepage through the dam which may lead to a piping failure of the dam, and partial or total collapse of the spillway system.

Maintenance: Some repair items around the lake and dam can only be completed or are much easier to perform with a lower than normal lake level. Some examples are: slope protection repair, spillway repairs, repair and/or installation of docks and other structures along the shoreline, and dredging the lake.

Winter Drawdown: Some dam owners prefer to lower the lake level during the winter months to reduce ice damage to structures along the shoreline and to provide additional flood storage for upcoming spring rains. Several repair items are often performed during this winter drawdown period. Periodic fluctuations in the lake level also discourage muskrat and beaver habitation along the shoreline. Muskrat burrows in earthen dams can lead to costly repairs.

Common Maintenance Problems

Common problems often associated with the maintenance and operation of lake drains include the following:

- Deteriorated and bent control stems and stem guides.
- Deteriorated and separated conduit joints.
- Leaky and rusted control valves and sluice gates.
- Deteriorated ladders in control towers.
- Deteriorated control towers.
- Clogging of the drain conduit inlet with sediment and debris.
- Inaccessibility of the control mechanism to operate the drain.
- Seepage along the drain conduit.
- Erosion and undermining of the conduit discharge area because the conduit outlets significantly above the elevation of the streambed.
- Vandalism.
- Development of slides along the upstream slope of the dam and the shoreline caused by lowering the lake level too quickly.

Operation and Maintenance Tips

A. All gates, valves, stems and other mechanisms should be lubricated according to the manufacturer's specifications. If you do not have a copy of the specifications and the manufacturing company can not be determined, then a local valve distributor may be able to provide assistance.

B. The lake drain should be operated at least twice a year to prevent the inlet from clogging with sediment and debris, and to keep all movable parts working easily. Most manufacturers recommend that gates and valves be operated at least four times per year. Frequent operation will help to ensure that the drain will be operable when it is needed. All valves and gates should be fully opened and closed at least twice to help flush out debris and to obtain a proper seal. If the gate gets stuck in a partially opened position, gradually work the gate in

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Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 94-28

Dam Safety: Trees and Brush

The establishment and control of proper vegetation is an important part of dam maintenance. Properly maintained vegetation can help prevent erosion of embankment and earth channel surfaces, and aid in the control of groundhogs and muskrats. The uncontrolled growth of vegetation can damage embankments and concrete structures and make close inspection difficult.

Trees and Brush

Trees and brush should not be permitted on embankment surfaces or in vegetated earth spillways. Extensive root systems can provide seepage paths for water. Trees that blow down or fall over can leave large holes in the embankment surface that will weaken the embankment and can lead to increased erosion. Brush obscures the surface limiting visual inspection, provides a haven for burrowing animals, and retards growth of grass vegetation. Tree and brush growth adjacent to concrete walls and structures may eventually cause damage to the concrete and should be removed.

Stump Removal & Sprout Prevention

Stumps of cut trees should be removed so vegetation can be established and the surface mowed. Stumps can be removed either by pulling or with machines that grind them down. All woody material should be removed to about 6 inches below the ground surface. The cavity should be filled with well-compacted soil and grass vegetation established.

Stumps of trees in riprap cannot usually be pulled or ground down, but can be chemically treated so they will not continually form new sprouts. Certain herbicides are effective for this purpose and can even be used at water supply reservoirs if applied by licensed personnel. For product information and information on how to obtain a license, contact the Ohio Department of Agriculture at the following address:

Ohio Department of Agriculture
Pesticide Regulation
8995 E. Main Street
Reynoldsburg, Ohio 43068
Telephone Number (614) 728-6987

These products should be painted, not sprayed, on the stumps. Other instructions found on the label should be strictly followed when handling and applying these materials. Only a few commercially available chemicals can be used along shorelines or near water.

Embankment Maintenance

Embankments, areas adjacent to spillway structures, vegetated channels, and other areas associated with a dam require continual maintenance of the vegetal cover. Grass mowing, brush cutting, and removal of woody vegetation (including trees) are necessary for the proper maintenance of a dam, dike, or levee. All embankment slopes and vegetated earth spillways should be mowed at least twice per year. Aesthetics, unobstructed viewing during inspections, maintenance of a non-erodible surface, and discouragement of groundhog habitation are reasons for proper maintenance of the vegetal cover.

Methods used in the past for control of vegetation, but are now considered unacceptable, include chemical spraying, and burning. More acceptable methods include the use of weed whips or power brush-cutters and mowers. Chemical spraying to first kill small trees and brush is acceptable if precautions are taken to protect the local environment.

It is important to remember not to mow when the embankment is wet. It is also important to use proper equipment for the slope and type of vegetation to be cut. Also, always follow the manufacturer's recommended safe operation procedures.

Any other questions, comments, concerns, or fact sheet requests, should be directed to the Division of Water at the following address:

Ohio Department of Natural Resources
Division of Water
Dam Safety Engineering Program
2045 Morse Road
Columbus, Ohio 43229-6693
Voice: (614) 265-6731 Fax: (614) 447-9503
Website: http://www.dnr.state.oh.us/water

Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 94–30

Dam Safety: Earth Dam Failures

Owners of dams and operating and maintenance personnel must be knowledgeable of the potential problems which can lead to failure of a dam. These people regularly view the structure and, therefore, need to be able to recognize potential problems so that failure can be avoided. If a problem is noted early enough, an engineer experienced in dam design, construction, and inspection can be contacted to recommend corrective measures, and such measures can be implemented.

IF THERE IS ANY QUESTION AS TO THE SERIOUSNESS OF AN OBSERVATION, AN ENGINEER EXPERIENCED WITH DAMS SHOULD BE CONTACTED.

Acting promptly may avoid possible dam failure and the resulting catastrophic effect on downstream areas. Engineers from the Division of Water, Engineering Group of the Department of Natural Resources are available at any time to inspect a dam if a serious problem is detected or if failure may be imminent. Contact the division at the following address and telephone number:

Ohio Department of Natural Resources
Division of Water, Engineering Group
1939 Fountain Square, Building E-3
Columbus, Ohio 43224

In an emergency, call 614/265-6731 or 614/265-7006.

Since only superficial inspections of a dam can usually be made, it is imperative that owners and maintenance personnel be aware of the prominent types of failure and their telltale signs. Earth dam failures can be grouped into three general categories: overtopping failures, seepage failures, and structural failures. A brief discussion of each type follows.

Overtopping Failures

Overtopping failures result from the erosive action of water on the embankment. Erosion is due to uncontrolled flow of water over, around, and adjacent to the dam. Earth embankments are not designed to be overtopped and therefore are particularly susceptible to erosion. Once erosion has begun during overtopping, it is almost impossible to stop. A well vegetated earth embankment may withstand limited overtopping if its top is level and water flows over the top and down the face as an evenly distributed sheet without becoming concentrated. The owner should closely monitor the reservoir pool level during severe storms.

Seepage Failures

All earth dams have seepage resulting from water percolating slowly through the dam and its foundation. Seepage must, however, be controlled in both velocity and quantity. If uncontrolled, it can progressively erode soil from the embankment or its foundation, resulting in rapid failure of the dam. Erosion of the soil begins at the downstream side of the embankment, either in the dam proper or the foundation, progressively works toward the reservoir, and eventually develops a "pipe" or direct conduit to the reservoir. This phenomenon is known as "piping." Piping action can be recognized by an increased seepage flow rate, the discharge of muddy or discolored water, sinkholes on or near the embankment, and a whirlpool in the reservoir. Once a whirlpool (eddy) is observed on the reservoir surface, complete failure of the dam will probably follow in a matter of minutes. As with overtopping, fully developed piping is virtually impossible to control and will likely cause failure.

Seepage can cause slope failure by creating high pressures in the soil pores or by saturating the slope. The pressure of seepage within an embankment is difficult to determine without proper instrumentation. A slope which becomes saturated and develops slides may be showing signs of excessive seepage pressure.

Structural Failures

Structural failures can occur in either the embankment or the appurtenances. Structural failure of a

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Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 94–27

Dam Safety: Rodent Control

Rodents such as the groundhog (woodchuck), muskrat, and beaver are attracted to dams and reservoirs, and can be quite dangerous to the structural integrity and proper performance of the embankment and spillway. Groundhog and muskrat burrows weaken the embankment and can serve as pathways for seepage. Beavers may plug the spillway and raise the pool level. Rodent control is essential in preserving a well-maintained dam.

Groundhog

The groundhog is the largest member of the squirrel family. Its coarse fur is a grizzled grayish brown with a reddish cast. Typical foods include grasses, clover, alfalfa, soybeans, peas, lettuce, and apples. Breeding takes place during early spring (beginning at the age of one year) with an average of four or five young per litter, one litter per year. The average life expectancy is two or three years with a maximum of six years.

Occupied groundhog burrows are easily recognized in the spring due to the groundhog's habit of keeping them "cleaned out." Fresh dirt is generally found at the mouth of active burrows. Half-round mounds, paths leading from the den to nearby fields, and clawed or girdled trees and shrubs also help identify inhabited burrows and dens.

When burrowing into an embankment, groundhogs stay above the phreatic surface (upper surface of seepage or saturation) to stay dry. The burrow is rarely a single tunnel. It is usually forked, with more than one entrance and with several side passages or rooms from 1 to 12 feet long.

Groundhog Control

Control methods should be implemented during early spring when active burrows are easy to find, young groundhogs have not scattered, and there is less likelihood of damage to other wildlife. In later summer, fall, and winter, game animals will scurry into groundhog burrows for brief protection and may even take up permanent abode during the period of groundhog hibernation.

Groundhogs can be controlled by trapping or shooting. Groundhogs will be discouraged from inhabiting the embankment if the vegetal cover is kept mowed.

Muskrat

The muskrat is a stocky rodent with a broad head, short legs, small eyes, and rich dark brown fur. Muskrats are chiefly nocturnal. Their principal food includes stems, roots, bulbs, and foliage of aquatic plants. They also feed on snails, mussels, crustaceans, insects, and fish. Usually three to five litters, averaging six to eight young per litter, are produced each year. Adult muskrats average one foot in length and three pounds in weight. The life expectancy is less than two years, with a maximum of four years. Muskrats can be found wherever there are marshes, swamps, ponds, lakes and streams having calm or very slowly moving water with vegetation in the water and along the banks.

Muskrats make their homes by burrowing into the banks of lakes and streams or by building "houses" of bushes and other plants. Their burrows begin from 6 to 18 inches below the water surface and penetrate the embankment on an upward slant. At distances up to 15 feet from the entrance, a dry chamber is hollowed out above the water level. Once a muskrat den is occupied, a rise in the water level will cause the muskrat to dig farther and higher to excavate a new dry chamber. Damage (and the potential for problems) is compounded where groundhogs or other burrowing animals construct their dens in the embankment opposite muskrat dens.

Muskrat Control

Barriers to prevent burrowing offer the most practical protection to earthen structures. A properly constructed riprap and filter layer will discourage burrowing. The filter and riprap should extend at least 3 feet below the water line. As the muskrat attempts to construct a burrow, the sand and gravel of the filter layer caves in and thus discourages den building. Heavy wire fencing laid flat against the slope and extending above and below the water line can also be effective. Eliminating or reducing aquatic vegetation along the shoreline will discourage muskrat habitation. Where muskrats have inhabited the area, trapping is usually the most practical method of removing them from a pond.

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Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 99–54

Dam Safety: Ground Cover

The establishment and control of proper vegetation are an important part of dam maintenance. Properly maintained vegetation can help prevent erosion of embankment and earth channel surfaces, and aid in the control of groundhogs and muskrats. The uncontrolled growth of vegetation can damage embankments and concrete structures and make close inspection difficult.

Grass vegetation is an effective and inexpensive way to prevent erosion of embankment surfaces. If properly maintained, it also enhances the appearance of the dam and provides a surface that can be easily inspected. Roots and stems tend to trap fine sand and soil particles, forming an erosion-resistant layer once the plants are well established. Grass vegetation may not be effective in areas of concentrated runoff, such as at the contact of the embankment and abutments, or in areas subjected to wave action.

Common Problems

Bare Areas

Bare areas on an embankment are void of protective cover (e.g. grass, asphalt, riprap etc.). They are more susceptible to erosion which can lead to localized stability problems such as small slides and sloughs. Bare areas must be repaired by establishing a proper grass cover or by installing other protective cover. If using grass, the topsoil must be prepared with fertilizer and then scarified before sowing seed. Types of grass vegetation that have been used on dams in Ohio are bluegrass, fescue, ryegrass, alfalfa, clover, and redtop. One suggested seed mixture is 30% Kentucky Bluegrass, 60% Kentucky 31 Fescue, and 10% Perennial Ryegrass. Once the seed is sown, the area should be mulched and watered regularly.

Erosion

Embankment slopes are normally designed and constructed so that the surface drainage will be spread out in a thin layer as "sheet flow" over the grass cover. When the sod is in poor condition or flow is concentrated at one or more locations, the resulting erosion will leave rills and gullies in the embankment slope. The erosion will cause loss of material and make maintenance of the embankment difficult. Prompt repair of the erosion is required to prevent more serious damage to the embankment. If erosion gullies are extensive, a registered professional engineer may be required to design a more rigid repair such as riprap or concrete. Minor rills and gullies can be repaired by filling them with compacted cohesive material. Topsoil should be a minimum of 4 inches deep. The area should then be seeded and mulched. Not only should the eroded areas be repaired, but the cause of the erosion should be addressed to prevent a continued maintenance problem.

Footpaths

Paths from animal and pedestrian traffic are problems common to many embankments. If a path has become established, vegetation in this area will not provide adequate protection and a more durable cover will be required unless the traffic is eliminated. Gravel, asphalt, and concrete have been used effectively to cover footpaths. Embedding railroad ties or other treated wood beams into an embankment slope to form steps is one of the most successful and inexpensive methods used to provide a protected pathway.

Vehicle Ruts

Vehicle ruts can also be a problem on the embankment. Vehicular traffic on the dam should be discouraged especially during wet conditions except when necessary. Water collected in ruts may cause localized saturation, thereby weakening the embankment. Vehicles can also severely damage the vegetation on embankments. Worn areas could lead to erosion and more serious problems. Ruts that develop in the crest should be repaired by grading to direct all surface drainage into the impoundment. Bare and eroded areas should be repaired using the methods mentioned in the above sections. Constructed barriers such as fences and gates are effective ways to limit access of vehicles.

Improper Vegetation

Crown vetch, a perennial plant with small pink flowers, has been used on some dams in Ohio but is not recommended (see Figure 1). It hides the embankment surface, preventing early detection of cracks and erosion. It is not effective in preventing erosion.

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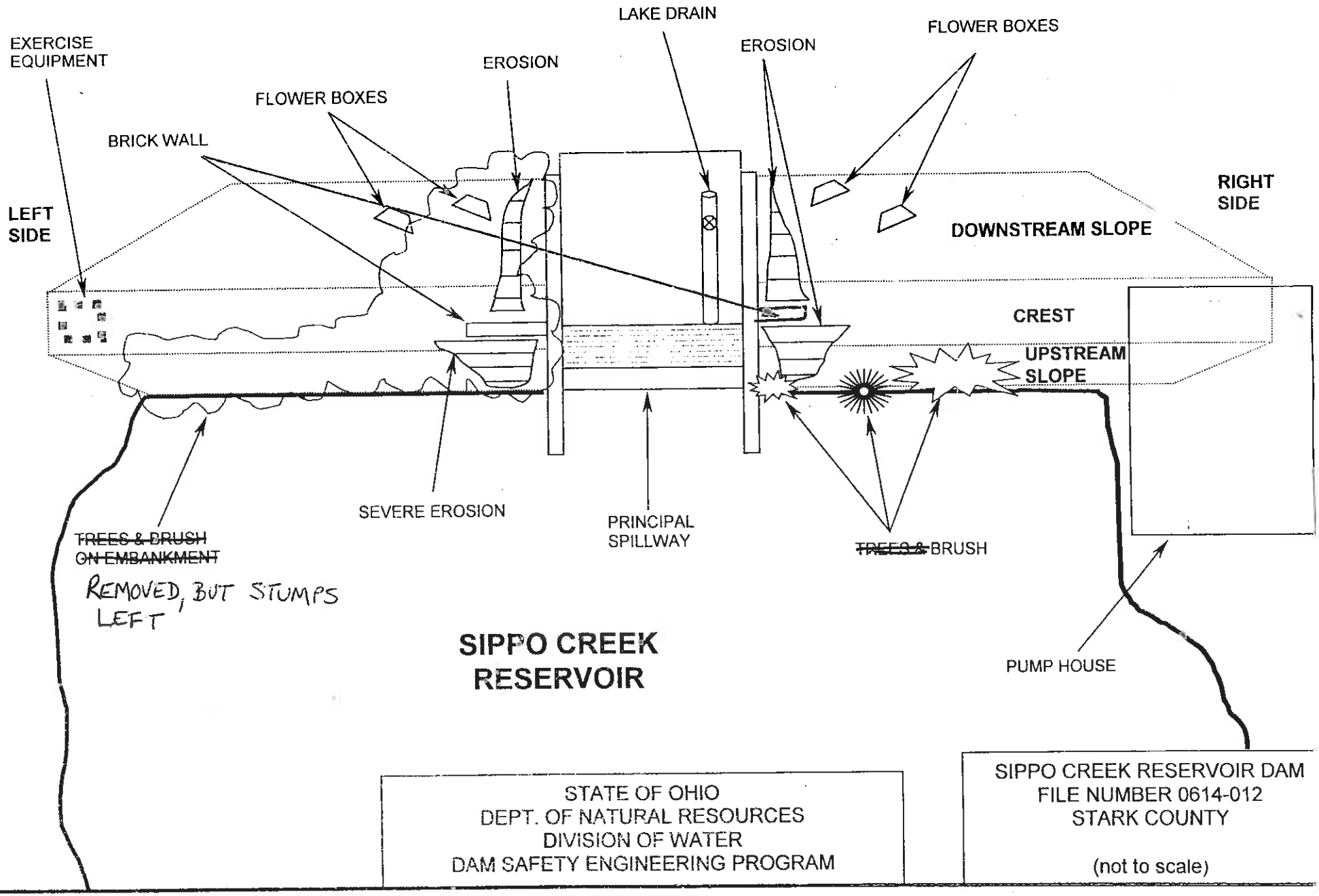
Section 2



STATE OF OHIO
DEPT. OF NATURAL RESOURCES
DIVISION OF WATER
DAM SAFETY ENGINEERING PROGRAM

SIPPO CREEK RESERVOIR DAM
FILE NUMBER 0614-012
STARK COUNTY

(not to scale)

Photograph No. 7:

Erosion at end of slope next to spillway.

Photograph No. 8:

View of four flower planters on the downstream slope. They were so overgrown that they were barely visible.

Photograph No. 9:

View of the upstream slope and crest on the left side of the dam.

Photograph No. 10:

View of the crest on the left half of dam near the spillway. Again note how low the crest is. The crest should be where the red line on the photograph is.

Photograph No. 11:

View of the cut-off wall in the crest on the left half of the dam. Again, note the loss of fill in the area. Red line indicates where the crest height should be.

Photograph No. 12:

Downstream slope of left half of dam. Again note the flower planters buried in the slope.

Photograph No. 13:

Erosion on the downstream slope near the spillway.

Photograph No. 14:

View of the left downstream slope. The red arrow points to erosion and the blue arrow points to a tree stump.

Photograph No. 15:

Principal spillway inlet.

Photograph No. 16:

Principal spillway outlet.

Photograph No. 17:

End sill of the principal spillway stilling basin. Not how weathered and worn the stone appears.

Photograph No. 18:

Right side wall of principal spillway. Note the undermining of the wall and the vegetation growing the cracks of the masonry.