



DAM SAFETY INSPECTION REPORT



Margaret Creek Structure No. 4

File Number: 9220-003

Class II

Athens County, Alexander Township

Inspection Date: 5/23/2007



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 Water 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.

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www.dnr.state.oh.us/water*

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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. 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 Water 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 II dams is 50 percent of the Probable Maximum Flood or the critical flood. The classification of this dam could change due to downstream development; you may want to increase the discharge/storage capacity to pass the full PMF. See the Flood Routing Summary section of this report for additional information.

Required Remedial Measures

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

- No owner repairs for this report.
- Brush is not permitted on embankment surfaces or earthen spillways. Remove brush from the shoreline on the upstream slope.
- The embankment crest must have a uniform elevation. Repair the low area on/near...
- Rodent burrows weaken dam embankments and must be repaired. Rodent activity must be controlled.
Repair the muskrat damage to the upstream slope.
Fill the rodent burrows on (*entire embankment, crest, upstream slope, downstream slope*).
- The embankment and spillways must be protected from erosion.
Replenish riprap (*along the shoreline, at the principal spillway outlet*).
Repair ruts and/or erosion gullies...
A healthy grass cover should be present on embankments and earthen spillways. Establish a grass cover on ...
- A satisfactory trashrack and/or antivortex plate must be present at the inlet of the principal spillway.
(*Install/Repair*) the trashrack and/or antivortex plate.
- Spillways must be able to flow at their full capacities.
Remove debris from the inlet of principal spillway.
Remove trees/brush from the emergency spillway.
- The lake drain must be operable and accessible. Routine maintenance of the lake drain should be performed annually and should include operation and lubrication of the valve/sluice gate in accordance with the manufacturer's specifications. Use caution if the operability is unknown. If the drain no longer functions contact the Division of Water to discuss repair or replacement.
- Embankment drains and spillway drains must be periodically maintained to ease monitoring and functionality. Pipe outlets should be marked and cleared regularly to allow the owner to quickly identify changing seepage conditions in the dam. Remove the rocks covering the toe drain outlets.
- A spillway must convey flow without excessive leakage. Repair the (*cracks/joints/deterioration*) of the...
- The Emergency Action Plan (EAP) must be updated. Also, this dam must have an operation, maintenance, and inspection manual (OMI). Prepare and submit an OMI manual. In general, your current procedures and checklists are acceptable. Guidelines for the preparation of these documents are included with this report.
- Flow through a deteriorated spillway subjects it to further deterioration and potentially failure. Repair...
- Mow the embankment and emergency spillway at least twice per year.

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 identifies 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 OMI.

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 Water 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. Dams must have emergency preparedness procedures documented in an EAP.

The following references regarding dam safety and lake management are provided for your use and information:

- (1) OMI and EAP guidelines
- (2) Common Problems for Small Dams, including five fact sheets
- (3) "Agencies Associated with Dams and Lakes"
- (4) "Ohio Pond Management Handbook"

Val A. Zampedro 7/25/07
Val A. Zampedro, P.E. Date
Project Engineer
Dam Safety Engineering Program
Division of Water

Keith R. Banachowski July 25, 2007
Keith R. Banachowski, P.E. Date
Program Manager
On behalf of Deborah F. Hoffman, Chief
Division of Water

This inspection was performed pursuant to the authority granted to the Chief of the Division of Water in ORC Section 1521.062.



Photograph No. 1: The upstream slope of the dam. Arrow indicates approximate area of minor depression on the slope.



Photograph No. 2: The upstream slope and the principal spillway inlet. Note the brush along the shoreline.



Photograph No. 3: The crest and the downstream slope of the dam.



Photograph No. 4: The low-flow inlet of the principal spillway riser.



Photograph No. 5: The impact basin at the principal spillway outlet.



Photograph No. 6: The impact basin at the principal spillway outlet.



Photograph No. 7: The toe drain outlet.
Note the rocks covering the outlet.



Photograph No. 8: The inlet of the
emergency spillway channel.



Photograph No. 9: The emergency
spillway channel looking downstream.

Dam Classification Checklist

Name of Dam: Margaret Creek Structure No. 4 File Number: 9220-003
 County: Athens Date: 5/23/2007 Engineer: VAZ

The classification of a dam is based on three factors: the dam's height, storage capacity, and potential downstream hazard. The height of the dam is the vertical distance from the crest to the downstream toe. The storage capacity is the volume of water that the dam can impound at the top of dam (crest) elevation. The downstream hazard consists of roads, buildings, homes, and other structures that would be damaged in the event of a dam failure. Potential for loss of life is also evaluated. Various dam failure scenarios must be considered, and they include failures when the dam is at normal pool level and failures during significant flood events. Each of the three factors is evaluated, and the final classification of the dam is based on the highest individual factor. Class I is the highest and Class IV is the lowest. The classification of a dam can change based on future development along the downstream channel.

This checklist is intended to establish or verify the appropriate classification in accordance with the Ohio Administrative Code – it does not necessarily show all potential hazards or the full extent of inundation. In addition, elevations and dimensions are estimated.

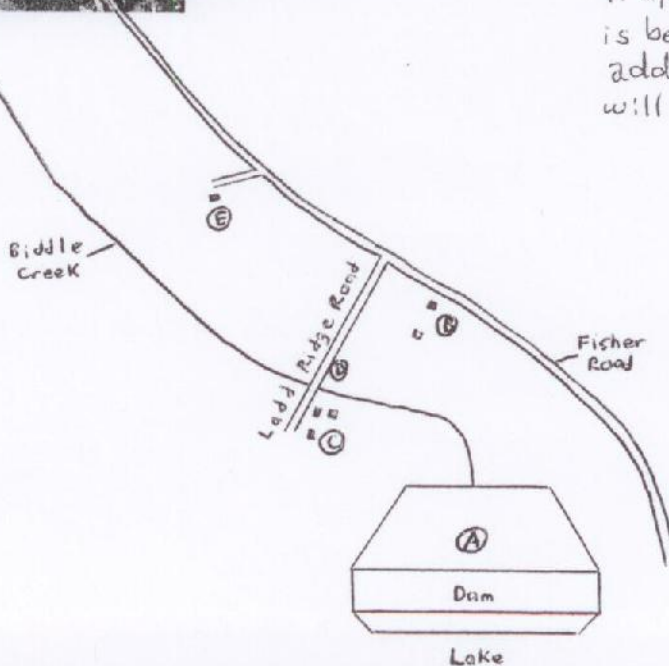
HEIGHT CLASSIFICATION	STORAGE CLASSIFICATION	EXEMPT-NON-REGULATED
Dam Height = 34.2 feet	Stor. Capacity (top of dam) = 1413.6 acre-feet	
<input type="checkbox"/> > 60' - Class I	<input type="checkbox"/> > 5000 acre-feet - Class I	<input type="checkbox"/> Height ≤ 6 feet
<input type="checkbox"/> > 40' - Class II	<input checked="" type="checkbox"/> > 500 acre-feet - Class II	<input type="checkbox"/> Storage ≤ 15 acre-feet
<input checked="" type="checkbox"/> > 25' - Class III	<input type="checkbox"/> > 50 acre-feet - Class III	<input type="checkbox"/> 6 ft. < Height < 10 ft. &
<input type="checkbox"/> ≤ 25' - Class IV	<input type="checkbox"/> ≤ 50 acre-feet - Class IV	<input type="checkbox"/> Stor. ≤ 50 ac-ft
Height Class:	<u>III</u>	
Storage Class:	<u>II</u>	
Hazard Class (see next page):	<u>II</u>	Estimated Population at Risk: (<u>none</u> 1-5 6-15 16+)
Final Class:	<u>II</u>	
		Class Changed (Yes, <u>No</u>)

Potential Downstream Hazard

I	II			III	IV	-	-						
Probable loss of human life	Loss of public water supply or wastewater treatment facility, release of health hazardous waste	Flooding of structure or high-value property	Damage to high-value or Class I, II, III dam or levee	Damage to major road (US or state route), disruption of only access to residential or critical facility area	Damage to railroad or public utility	Damage to rural building, not otherwise high-valued property, or Class IV dam or levee	Damage to local road (county and township)	Loss restricted mainly to the dam or agricultural /rural land	No hazard to structure noted	No hazard assessment, further investigation needed	Distance downstream of dam to affected structure (feet)	Vertical distance from streambed to base of affected structure (feet)	Horizontal distance from stream to affected structure (feet)
								A			-	-	-
									B		1500	20	800
									C		1750	15	200
							D				1900	6	-
									E		6000	15	400
		F									10,000	10-15	200

This checklist is intended to establish or verify the appropriate classification in accordance with the OAC - it does not necessarily show all potential hazards or the full extent of inundation.

Sketch of Developments Downstream of Dam



B = Home & Garage
 C = Home & Garage
 D = Local Road
 E = Home & Garage
 F = Various Development

It appears that this area is being developed and additional structures will be constructed.

Flood Routing Summary

A dam must be able to safely pass severe flood events. A dam uses a combination of spillway discharge capacity and reservoir storage capacity, known as discharge/storage capacity, to prevent floodwater from overtopping the embankment crest and destabilizing the dam. When a dam has inadequate discharge/storage capacity, floodwater will overtop and erode the embankment. This can cause severe damage and dam failure.



Dam embankment prior to severe flood.



Erosion caused by floodwater overtopping the dam – a result of inadequate discharge/storage capacity.



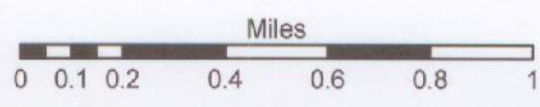
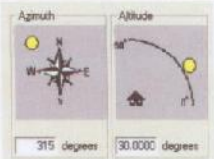
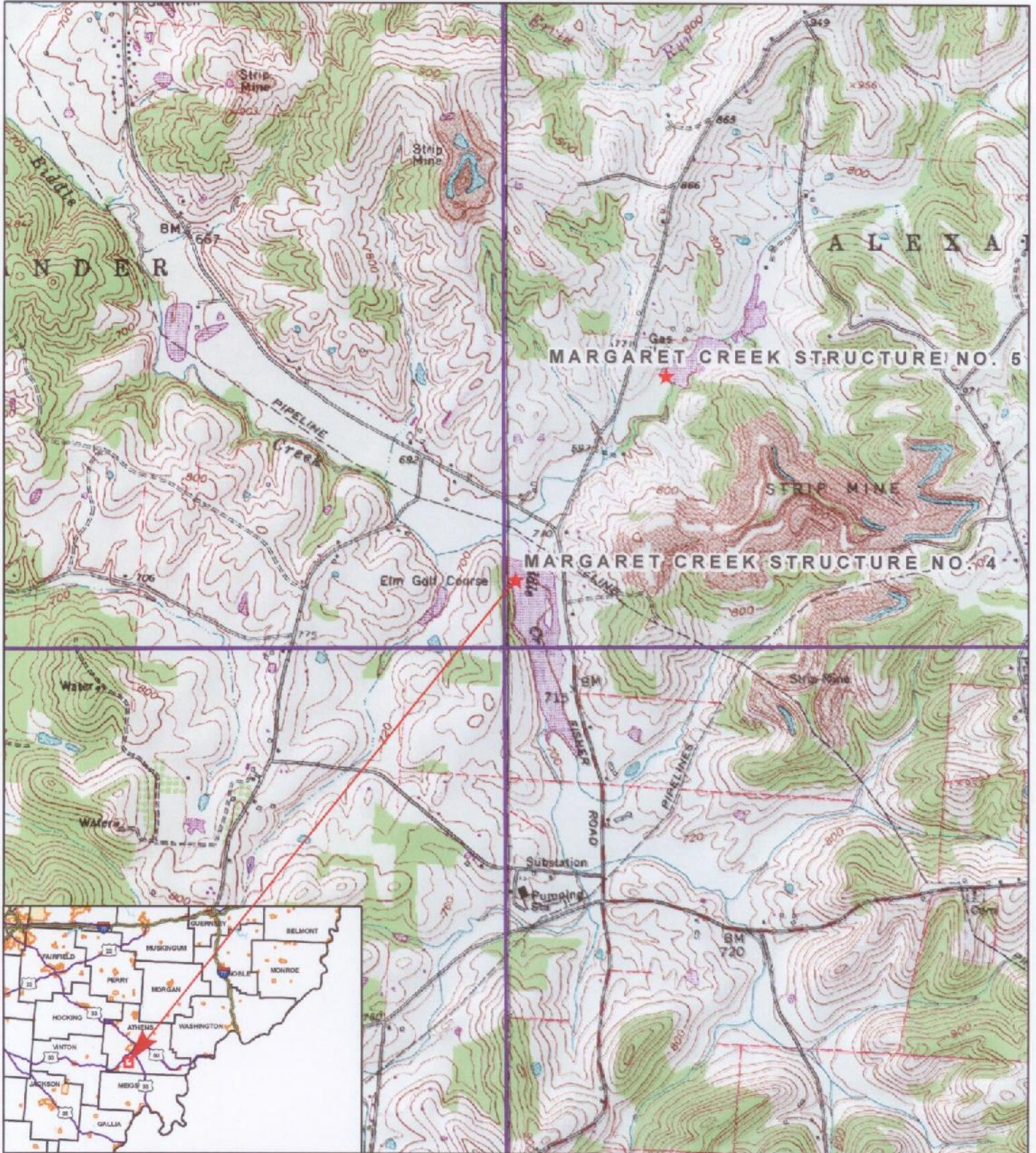
Erosion caused by floodwater overtopping the dam – a result of inadequate discharge/storage capacity and debris obstructing the 5-foot-diameter spillway pipe.

As part of this inspection, the Division of Water did not thoroughly investigate this dam's discharge/storage capacity or its ability to safely pass the required design flood. In 1990 the Division of Water performed hydrologic and hydraulic calculations to estimate the size of the design flood and the discharge/storage capacity of the dam. These calculations were used in the flood routings to determine the maximum water surface elevation in the reservoir for various flood events.

Margaret Creek Structure No. 4 is a Class II dam; therefore, in accordance with OAC Rule 1501:21-13-02, the required design flood is 50% of the Probable Maximum Flood (PMF) or the critical flood. This dam and its spillway system must safely pass the design flood without overtopping the embankment crest and destabilizing the dam. Flood routing calculations indicate that the dam can pass approximately 40% of the PMF; Margaret Creek Structure No. 4 does not appear to be able to safely pass the design flood.

LOCATION MAP

MARGARET CREEK STRUCTURE NO. 4 - 9220-003



Legend	
	Dams
	Cities
	County Boundary
	Quad Boundary



Dam Inventory Sheet

Name: MARGARET CREEK STRUCTURE NO. 4 File No: 9220-003
Reservoir: TEXAS EASTERN National #: OH00084
Permit No.: EXEMPT
Class: II

Owner Information
Owner: Hocking Conservancy District Owner Type: Public, C.d.
Address: 560 West Union Street Parcel No.:

City: Athens State: OH Zip: 45701-2331
Contact: Terry Courtney, Exec. Sec-Treas Phone No.: 740/592-1792

Location Information
County: Athens Latitude Deg.: 39 Min.: 15 Sec.: 10
Township: Alexander Longitude Deg.: 82 Min.: 7 Sec.: 28
Stream: Biddle Creek
Nearest Affected Community: Fisher
Community's Distance from Dam (miles): 2.7
USGS Quad.: Athens USGS Basin No.: 05030204

Design/Construction Information
Designed By: Usda, Scs
Constructed By: Unknown
Completed: 1971 Plan Available: YES At: USDA, SCS
Failure/Incident/Breach:

Structure Information
Purpose: Flood Control, C.d.
Type of Impound.: Dam And Spillway
Type of Structure: Earthfill
Drainage Area (sq. miles): 4.21 or (acres): 2696
Embankment Data
Length (ft): 1050 Upstream Slope: 3H:1V
Height (ft): 34.2 Downstream Slope: 2.5H:1V
Top Width (ft): 14 Volume of Fill (cub. yds.): 63200

Spillway Outlet Works Data
Lake Drain: 12-IN CAST IRON PIPE
Principal: 36-IN PIPE W/36-IN X 108-IN RISER
Emergency: 50-FT WIDE EARTH CHANNEL W/3H:1V SIDE SLOPES
Maximum Spillway Discharge (cfs) 9234.1 Design Flood: 0.50 Flood Capacity 0.40

Dam Reservoir Data	Elevation (ft-MSL)*	Area (acres)	Storage (acre-feet)
Top of Dam:	714.2	125	1413.6
Emergency Spillway:	706.5	76.5	645.4
Principal Spillway:	695.5	28.4	89.9
Streambed:	682		
Foundation:	680		

*Elevations are not necessarily related to a USGS benchmark

Inspection Information
Inspection: 05/23/2007 VAZ
History: 02/06/2002 SGH
09/12/1990
Phase I:
Other Visits: 11/13/84 INV

Operation Information/Remarks
PL-566 PROJECT

Emergency Action Plan: Yes Format: ICODS OMI: No
Annual Fee: \$235.00 Last Entry: 07/20/2007

Dam Safety Inspection Checklist

Name of Dam: Margaret Creek Structure No. 4
 Date of Inspection: May 23, 2007
 File Number: 9220-003
 Class: II Design Flood: 0.50 Flood Capacity: 0.40
 Haz.: II, Height: III, Volume: II

Athens County
 Required Action
 None Mon. Maint. Eng.

Interview with Owner (at the site):

Owner/Representative present: Yes No Name(s): Mark Holdcraft
 Owner's Name(s): Hocking Conservancy District
 Address: 560 West Union Street,
 City: Athens State: OH Zip (+4): 45701-2331
 Contact Person: Terry Courtney, Exec. Sec-Treas Telephone: 740/592-1792
 Email Address:
 Purpose of dam: Flood Control, C.d.

Owner Dam Safety Program

Emergency Action Plan Yes ICODS None Mon. Maint. Eng.
 EAP (document): Up-to-date? yes no
 Downstream development: No recent changes.

Operation, Maintenance, and Inspection No None Mon. Maint. Eng.
 OMI (document): Up-to-date? (yes, no)
 All drains operable? yes no

Normal rate of drawdown: 4 to 5 inches overnight Accessibility for operation: From shore
Maintenance
 Frequency of mowing: Twice per year.
 Other maintenance: Woody plants cut annually, rodent burrows filled as needed, toe drains monitored.

Inspection
 Frequency and thoroughness of day-to-day & routine inspections: Monthly walk through.
 Problems found during inspections: None

Field Information

Pool Elevation (during inspection): Normal pool. Time: 12:45 (a.m. p.m.)
 Site Conditions (temp., weather, ground moisture): 85°, sunny, dry.
 Inspection Party: Val Zampedro, Keith Bunachowski

Confirm the Following: Dam Height (ft): 34.2 NP Area (ac): 28.4

Reference Information

Riser has an 18-inch x 24-inch low-flow inlet at 695.5, and two 9-ft weirs at 703;
 Lake drain is cast iron and discharges into riser, valve control from top on upstream side;
 Two toe drains (6-inch CMP) outlet into impact basin through wingwalls on downstream side.

PI-566 Project				
	Elev.	Area (ac)	Stor. (ac-ft)	(in.)
TOD:	714.2	125	1413.6	5.9
Em. S/w:	706.5	76.5	645.4	3.4
Prin. S/w:	695.5	28.4	89.9	
Strmbd:	682			
Basin (ac):	2696			

Impound. Type: Dam And Spillway
 Structure Type: Earthfill
 Township: Alexander
 Stream: Biddle Creek
 Designed By: Usda, Scs
 Constr. By: Unknown
 Year Compl.: 1971 Plans Avail.? Yes At: Usda, Scs
 Fail./Incid.:

Upstream Slope

Gradient: 3H:1V

Typical Problems: shoreline erosion, trees & brush, surface erosion, ruts, rodent burrows, earth slides, cracks

Tall grass on entire slope.

Brush near shoreline.

A few muskrat burrows.

Depression 200 feet left of spillway, 10 feet long, 1 foot deep, may be a collapsed muskrat burrow.

Required Action			
None	Monitor	Repair	Engineer
		X	
		X	
		X	
X			

Crest

Width (ft): 14

Length (ft): 1050

Total Freeboard (ft): 18.70

Typical Problems: low areas, trees & brush, surface erosion, ruts, cracks

No problems noted.

None	Mon.	Rep.	Eng.
X			

Downstream Slope

Gradient: 2.5H:1V

Typical Problems: trees & brush, surface erosion, ruts, rodent burrows, earth slides, cracks, seepage

Tall grass on entire slope.

None	Mon.	Rep.	Eng.
		X	

Principal Spillway

36-in Pipe W/36-in X 108-in Riser

Typical Problems: Inlet obstructed, unsatisfactory trashrack/anti-vortex plate, material deterioration, misalignment, open joints, outlet erosion, outlet overgrown, undermining

No problems noted.

Low-flow inlet located on upstream side of riser

None	Mon.	Rep.	Eng.
X			
X			

Sufficient measurements to perform hydraulics (dimensions, riser depth, outlet elevation)

Required Action

50-ft Wide Earth Channel W/3h:1v Side Slopes
Emergency Spillway Freeboard (to normal pool, feet) 11.00

Typical Problems: Flowpath obstructed, material deterioration, erosion, misalignment, overgrown, undermining

Tall grass in entire channel

None	Monitor	Repair	Engineer
		X	

Sufficient measurements to perform hydraulics (dimensions, breadth, side slopes)

Lake Drain

12-in Cast Iron Pipe

Typical Problems: Poor operating access, inoperable, deteriorated/missing components, outlet erosion

No problems noted. Reported to be functional.

None	Mon.	Rep.	Eng.
X			

Other

No flow in toe drain.
 Rocks covering toe drain outlets

None	Mon.	Rep.	Eng.
	X		
		X	

All Field Data Gathered (inspector's initials): VAZ

Site Sketch

Investigate Downstream Hazard