



**DAM SAFETY INSPECTION REPORT  
LIBERTY LAKE DAM  
OKLAHOMA INVENTORY ID: OK02122  
FOR  
THE CITY OF GUTHRIE  
LOGAN COUNTY, OKLAHOMA  
DECEMBER 2014  
MECE 211135.104**



*12/9/2014*



**Dam Safety Inspection Report  
Liberty Lake Dam  
For  
City of Guthrie  
Logan County, Oklahoma  
December 2014**

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## **SECTION 1 - SUMMARY OF FINDINGS**

On December 1<sup>st</sup>, 2014 a visual inspection of the Liberty Lake Dam was performed by Myers Engineering, Consulting Engineers, Inc. Myers Engineering is a civil engineering firm with its office in Oklahoma City, Oklahoma.

Photographs taken during the inspection can be found in Appendix A of this report.

The overall condition of the dam was fair.

The upstream side of the dam was in fair condition. There was no evidence of erosion. The upstream slope had some small brush and a number of small trees, mainly on the east end of the dam that had been recently cleared. The root system should be pulled to prevent further growth. The shoreline is armored with riprap and adequately protected from erosion and wave action.

The crest of the dam was in satisfactory condition. There were no signs of cracking, depressions, arching, settlement, erosion, or livestock or animal burrows.

The downstream slope was in poor condition. There is inadequate grass cover and numerous bare spots were observed. No severe erosion was observed on the slopes of the dam. This area was recently mowed and clear of tree growth. There was evidence of seepage at the downstream toe of the dam. It was not possible to determine the rate of seepage or the amount of sediment that the seepage is carrying with it. This seepage has made the ground at the toe very soggy. Additional investigation into this seepage is required to determine if remediation action should be taken. The turbidity in the wetland at the toe of the dam should be monitored and any increase in turbidity should be reported. The toe of the dam should be monitored for increases in saturated soil areas and for boils. During the inspection only the portion of the toe in proximity to the marsh was saturated. This location should be monitored weekly and immediately following seismic events. Several depressions were noted during the inspection along the downstream side of the dam. No seepage was noted in the depressions and the crest was not sagging; therefore the depressions along the dam were likely constructed that way.

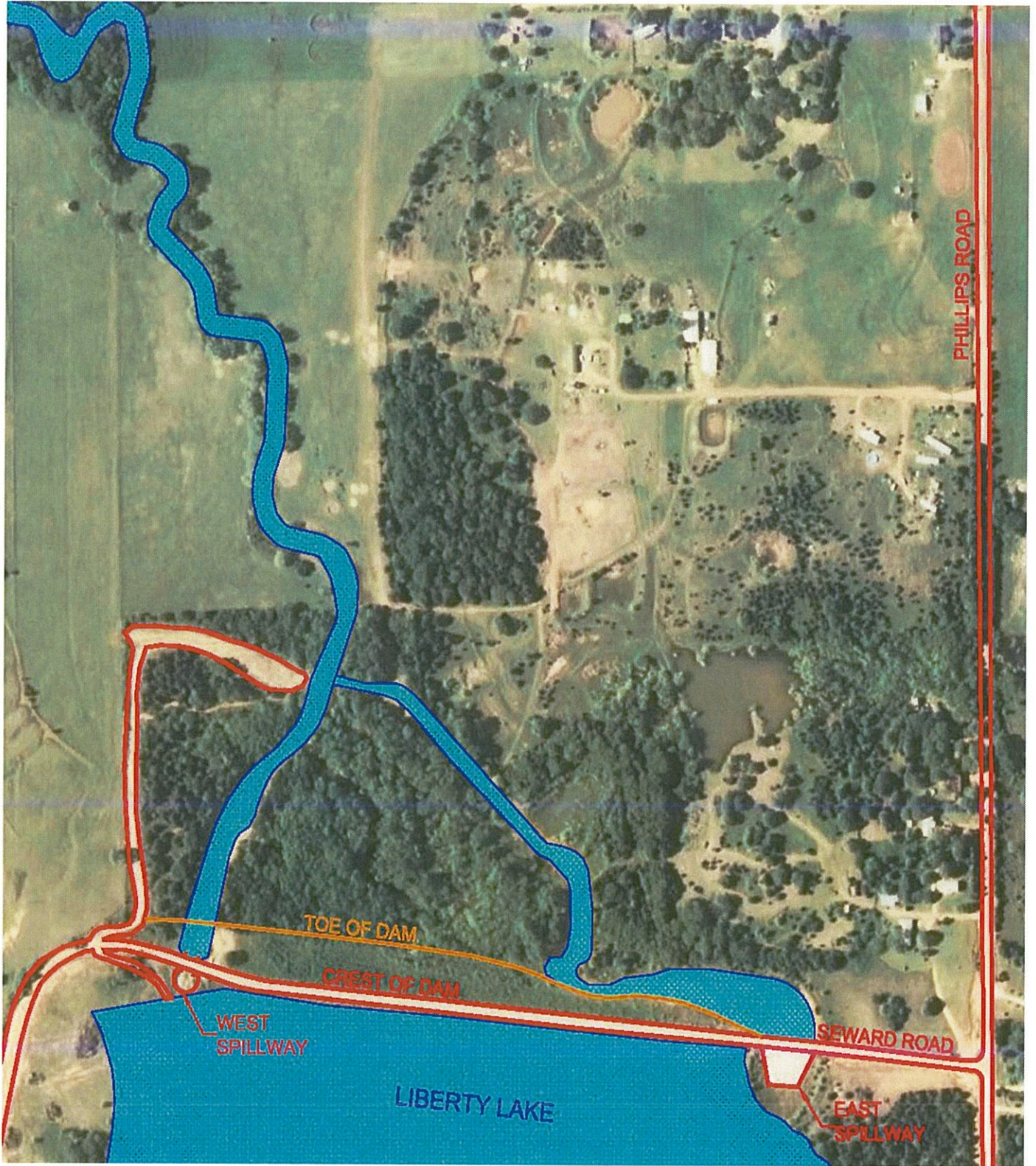
The abutment contacts were in fair condition. The east abutment on the downstream side of the dam showed signs of erosion. No seepage was noted. The area of erosion should be filled with compacted soil and lined with rip rap to prevent further scour.

The intake structure was not inspected due to low lake levels. The locations of the pipe penetrations through the embankment were inspected and did not show signs of seepage or leaking.

The concrete spillway (west spillway) was in fair condition. Some spalling at joints and minor cracking was noted during the inspection. The leakage at the joints does not appear to have increased since last year's inspection. This leakage should be reevaluated once the reservoir pool reaches the normal operating pool.

The emergency spillway (east spillway) was in good condition. Riprap lining downstream of the discharge is recommended to prevent erosion along the toe of the abutment.

Maintenance on the dam is performed regularly by the City of Guthrie employees. The maintenance includes mowing the grass and removing brush and saplings from the embankment slopes on the upstream and downstream sides of the dam.



**GENERAL LAYOUT MAP – Liberty Lake Dam**

## **SECTION 2 - DAM AND WATERSHED INFORMATION**

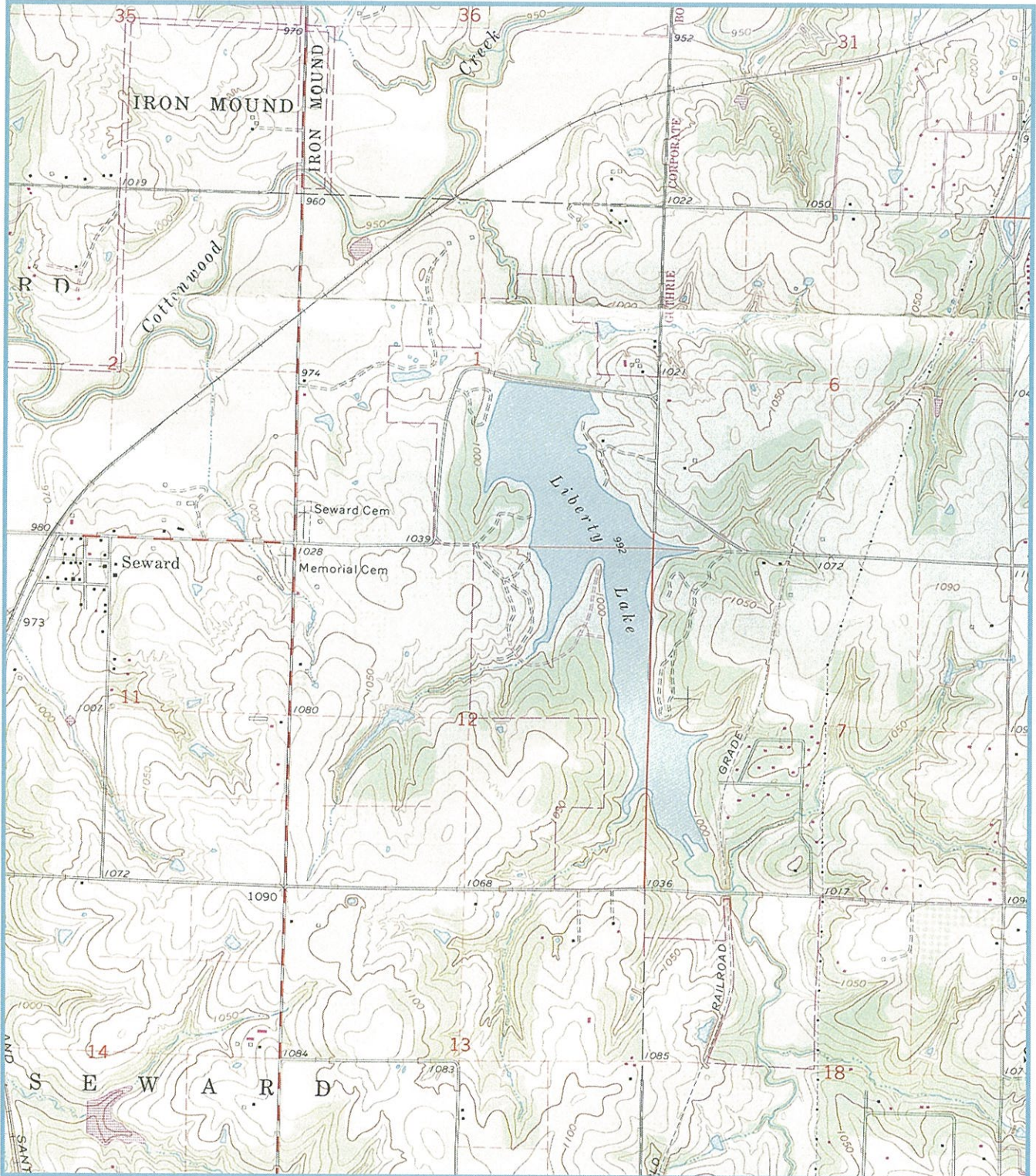
### **2.1 General Information**

- A. Purpose of this report and inspection: This dam is required to be inspected for safety issues in accordance with the Oklahoma Administrative Code 785:25-9. It is the purpose of this report to document any evidence of potentially hazardous conditions that could result in loss of property or life.
- B. Owner of Facility: This dam and lake are owned and maintained by the City of Guthrie.
- C. Hazard Classification: This dam is currently rated as a high hazard dam by the OWRB. This classification is due to the fact that the reservoir has a significant amount of storage, and there is development downstream of the dam. The combination of these factors increases the possibility of loss of life and/or property in the event of a dam failure.

### **2.2 Specific Dam Information**

- A. Location: The dam and lake are located approximately 6 miles southwest of the City of Guthrie. The dam is located in the SE ¼ of Section 1, T15N, R3W, I.M., Logan County, Oklahoma. The dam is on a tributary of Cottonwood Creek.
- B. Size and Classification of Dam: This dam has a maximum height of 47 feet. The dam was constructed in 1948. This is a high hazard dam due to downstream conditions, dam size, and storage capacity.
- C. Description of Dam: The dam is of earthen construction and is 1,700 feet long with a concrete spillway on the west abutment. The spillway consists of a semicircular concrete weir approximately 141 feet long with a crest elevation of 994.00. The spillway discharges to a concrete trapezoidal channel. There is an uncontrolled spillway at the east abutment.
- D. Description of Lake and Watershed: The Lake encompasses 167 surface acres at normal pool elevation. The storage capacity at conservation pool elevation is 2,740 acre-ft. The maximum pool storage capacity is 4,670 acre-ft. The lake has a drainage area of approximately 11.4 square miles.
- E. Intake Structure or Level Control: The lake level is controlled by the set level of the uncontrolled spillways. There is an intake structure that is in use for water supply to the City of Guthrie. There is a 16-inch pipe that runs through the dam to the outlet structure. The intake structure is equipped with hand operated gates. Two of the three valves were recently rebuilt with new components as shown in Figures 21 through 24.

- F. Discharge Channel: The primary spillway at the west abutment is an uncontrolled concrete semicircular weir shown in the General Layout Map on page 2 and Figure 27. The secondary spillway is on the east end of the dam with a much larger trapezoidal weir as shown in Figures 33 and 34. The east spillway acts as an emergency spillway, as it is several feet higher and is only utilized during periods of heavy rainfall. Both concrete channels discharge into natural creeks downstream from the dam.
- G. Design and Construction History: The dam was constructed in 1948. The design engineer was C.H. Guernsey & Company. The construction company is not known.



**TOPOGRAPHY MAP – Liberty Lake**



### **SECTION 3 - VISUAL INSPECTION**

On December 1, 2014 a visual inspection of the Liberty Lake Dam was performed by Myers Engineering, Consulting Engineers, Inc. Myers Engineering is a civil engineering firm with its office in Oklahoma City, Oklahoma.

Photographs taken during the inspection can be found in Appendix A of this report.

The upstream slope of the dam was in overall fair condition. During the inspection no signs of erosion, slides, depressions, cracking, settlement, or bulges were observed. A few animal burrows were noted on the upstream slope. Most of the burrows observed were on the east end of the dam. No evidence of livestock on the upstream slope of the dam was noted. The upstream slope had some small brush and a number of small trees, mainly on the east end of the dam that had been recently cleared. It is recommended that the city remove the roots of the trees and fill the voids with flowable fill or properly compacted soil. The shoreline is armored with riprap and adequately protected from erosion and wave action. Figures 1 through 7 show the upstream slope of the dam.

The crest of the dam was in overall satisfactory condition. The crest has a dirt road that stretches the length of the dam. During the inspection, no cracking, arching, bowing, erosion, ruts, low areas, vegetation, or evidence of livestock were observed. Figures 8 and 9 show the crest of the dam.

The downstream slope of the dam was in overall poor condition. The downstream slope of the dam was recently mowed. There is inadequate grass cover and numerous bare spots were observed. No severe erosion was observed on the slopes of the dam. Several large trees and shrubs are growing just past the toe. A few rodent holes were observed. Seepage and standing water were observed at the toe of the dam. Figures 16 and 17 are aerial images that show the location of the observed standing water at the toe of the dam. The area near the standing water was saturated. The water did not appear to be flowing, nor did it appear to be excessively cloudy; however, further investigation is necessary to ensure that the seepage is not eroding the embankment. The turbidity in the wetland at the toe of the dam should be monitored and any increase in turbidity should be reported. The toe of the dam should be monitored for increases in saturated soil areas and for boils. It is recommended that piezometers be installed on the upstream and downstream slopes of the dam at a spacing of approximately 150 to 200 feet. Several depressions were noted during the inspection along the downstream side of the dam. No seepage was noted in the depressions and the crest was not sagging; therefore the depressions along the dam were likely constructed that way. Figures 10 through 17 show the downstream slope of the dam.

The east abutment contact was in fair condition due to erosion of the soil on the downstream slope (Figure 18 and 19). The west abutment appears to be in good condition; however, seepage was observed under the spillway immediately upstream of the stilling basin (Figure 28 and 29).

The inlet structure was in satisfactory condition during the 2013 inspection but was not inspected due to inadequate water levels to launch a boat. The location of the conduit penetrations through the dam were inspected and did not show signs of leaking or excessive seepage. Water was present in the valve riser but did not appear to be flowing. Figures 22 and 23 show the location where the raw water line comes out from under the embankment.

The discharge piping from the Cottonwood Creek into Liberty Lake was visually inspected. The concrete pipe was in satisfactory condition, and the natural channel from the discharge piping to the lake was functioning properly. Figures 7 and 24 show the discharge from the Cottonwood Creek to Liberty Lake.

The concrete spillway (west spillway) was in fair condition. There was some spalling noted at the joints and some minor cracking throughout the spillway. Minor seepage was observed through the joints near the outfall. The spillway joints also have vegetation growing through them, which indicates lost joint material. Figures 25 through 30 show the west spillway.

The emergency spillway (east spillway) was in fair condition. No evidence of livestock, animal burrows, or erosion were noted. Riprap lining downstream of the discharge is recommended to prevent erosion along the toe of the abutment.

The stilling basin was in satisfactory condition. There was some minor scaling noted on the concrete, but no exposed reinforcement, offset joints, leaking joints, or excessive vegetation were observed. See Figure 34 for the stilling basin.

**The dam is in overall fair condition.**

## **SECTION 4 - DAM OPERATION AND MAINTENANCE REPORT**

### **4.1 Day to Day Operations:**

- A. Lake water level: The water level is controlled by the set spillway elevations.
- B. Dam Maintenance: The City of Guthrie maintains all aspects of this dam and lake.
- C. Emergency Action Plan / Warning System: The City of Guthrie currently has an Emergency Action Plan in effect. The EAP includes an inundation map, and the emergency services contacts are up-to-date.

## SECTION 5 - DAM EVALUATION AND RECOMMENDATIONS

### 5.1 Dam Evaluation

- A. Dam Structural Evaluation: After a visual inspection of the dam it was determined that the overall condition of the dam structure is fair. All appurtenances appeared to be functioning properly.
- B. Recommendations:
1. Plant grass seed mix along downstream dam slope.
  2. Continue repair of areas of erosion and riprap as needed after root system removal on upstream slope of dam.
  3. Keep detailed maintenance records.
  4. Prevent all trees and shrubs from growing on slopes.
  5. Prevent rodent activity in the embankment.
  6. Fill areas of erosion on the east embankment and place riprap to prevent future erosion.
  7. Annually review and update the Emergency Action Plan. Send copies of updates to the Oklahoma Water Resources Board.
  8. All areas of seepage, especially at the toe of the dam, would require additional, in-depth investigation to determine the amount of seepage, the amount of soil eroding due to the seepage, and possible remedial actions. Continue to monitor seepage for signs of increasing seepage rates.
  9. Remove all vegetation from joints in concrete and seal joints.

**OKLAHOMA WATER RESOURCES BOARD  
PLANNING & MANAGEMENT DIVISION - DAM SAFETY PROGRAM**

**DAM INSPECTION CHECKLIST**

Name of Dam: <u>LIBERTY LAKE DAM</u>	State Inventory ID: <u>OK02122</u>
Owner of Dam: <u>CITY OF GUTHRIE</u>	Purpose of Dam: <u>WATER SUPPLY &amp; RECREATION</u>
Address: <u>P.O. BOX 908</u>	Hazard Classification: <u>HIGH</u>
City/State/ZIP: <u>GUTHRIE, OK 73044</u>	
County: <u>LOGAN</u>	Inspected By: <u>MATTHEW A. COE, P.E.</u>
Legal Location: <u>SE ¼ S1 T15-N R3-W</u>	Date of Inspection: <u>DECEMBER 1, 2014</u>
Latitude: <u>35° 48' 18" N</u>	Estimated Lake Level: <u>8-FT BELOW NORMAL</u>
Longitude: <u>97° 27' 56" W</u>	Weather Conditions: <u>OVERCAST, 32°</u>

**Note: Latitude-Longitude should be measured using a GPS and taken on the crest of the dam at the center.**

	Item	Yes	No	N/A	Condition (Satisfactory- Fair-Poor- Unsatisfactory)	Remarks
<b>1</b>	<b>General Conditions of Dam</b>				<b>FAIR</b>	
A	Alterations to the dam?		X			
B	Development in downstream floodplain?	X				
C	Grass cover adequate?		X			BARE SPOTS ON DOWNSTREAM SLOPE
D	Settlements, misalignments, or cracks?	X				ALONG DOWNSTREAM SLOPE
E	Recent high water marks?		X			N/A
<b>2</b>	<b>Upstream Slope of Dam</b>				<b>SATISFACTORY</b>	
A	Erosion, slides, or depressions?		X			
B	Trees or excessive vegetation?	X				PULL TREE ROOTS
C	Animal burrows or holes?		X			
D	Evidence of livestock on dam?		X			
E	Cracks, settlement, or bulges?		X			
F	Evidence of slides or scarps?		X			
G	Adequate and sound slope protection (rip-rap)?	X				
<b>3</b>	<b>Crest of Dam</b>				<b>SATISFACTORY</b>	
A	Longitudinal or transverse cracking?		X			
B	Trees or excessive vegetation?	X				PULL TREE ROOTS
C	Crest arching or bowing?		X			
D	Erosion or ruts?		X			
E	Low areas or depressions?		X			
F	Evidence of livestock on crest?		X			
G	Road on crest?	X				
<b>4</b>	<b>Downstream Slope of Dam</b>				<b>POOR</b>	
A	Erosion, slides, or depressions?	X				DEPRESSION- LIKELY FROM INSUFFICEINT FILL VOLUME DURING CONSTRUCTION
B	Trees or excessive vegetation?		X			
C	Animal burrows or holes?	X				
D	Evidence of livestock on embankment?		X			
E	Cracks, settlement, or bulges?		X			
F	Drains or wells flowing?			X		Estimated gpm clear or cloudy?
G	Seepage or boils?	X				FLOW: UNKNOWN, SLIGHTLY MURKY
<b>5</b>	<b>Abutment Contacts</b>				<b>SATISFACTORY</b>	
A	Erosion, cracks, or slides?	X				EROSION: EMERGENCY SPILLWAY
B	Seepage or boils?	X				Estimated gpm <10 clear
<b>6</b>	<b>Inlet Structure</b>				<b>NOT ACCESSIBLE</b>	
A	Concrete? <input checked="" type="checkbox"/> Metal? <input type="checkbox"/>					
B	Spalling, cracking, or scaling?					

	Item	Yes	No	N/A	<sup>1</sup> Condition (Satisfactory- Fair-Poor- Unsatisfactory)	Remarks
C	Exposed reinforcement?					
D	Corrosion present?					
E	Coating adequate?					
F	Leakage?					Estimated gpm
G	Trash rack adequate?					
H	Obstacles to inlet?					
I	Drawdown operative?      Opened & closed					
<b>7</b>	<b>Conduit &amp; Outlet</b>					
A	Concrete?      Metal? X				Intake and piping are submerged in the lake and buried outside the lake.	
B	Spalling, cracking, or scaling?					
C	Exposed reinforcement?					
D	Joints displaced or offset?					
E	Joint material lost?					
F	Leakage of valve or gates?	X				Estimated gpm<1 GATE VALVE BEYOND TOE OF DAM
G	Other leakage?				Inspection capability is limited.	Estimated gpm      clear or cloudy?
H	Conduit misaligned?					
I	Outlet or channel obstructed?					
J	Outlet channel eroding?					
<b>8</b>	<b>Concrete Spillway</b>					
A	Spalling, cracking, or scaling?	X				MINOR CRACKING
B	Exposed reinforcement or deterioration?		X			
C	Joints displaced or offset?		X			
D	Joint material lost?	X				RE-SEAL JOINTS
E	Leakage (joints, cracks, other)?	X				Estimated gpm <1GPM, CLEAR, THROUGH JOINTS NEAR STILLING BASIN ON SPILLWAY
F	Wall displaced?		X			
G	Dissipater deteriorating?			X		
H	Dissipaters clean of debris or vegetation?			X		
I	Erosion at toe of spillway?		X			
J	Spillway undercutting?		X			
<b>9</b>	<b>Auxiliary (Emergency) Spillway</b>				SATISFACTORY	
A	Obstructions, debris, trees?		X			
B	Erosion or sinkholes?		X			
C	Animal burrows or holes?		X			
D	Evidence of livestock on spillway?		X			
<b>10</b>	<b>Stilling Basin</b>				SATISFACTORY	
A	Spalling, cracking, or scaling?	X			STILLING BASIN SUBMURGED	
B	Exposed reinforcement?		X			
C	Joints displaced or offset?		X			
D	Joint material lost?		X			
E	Joints leak?		X		INSPECTION LIMITED	Estimated gpm      clear or cloudy?
F	Rock adequate?			X		
G	Excessive vegetation or debris in basin?			X		
H	Dissipater deteriorating?			X		
I	Dissipaters clean of debris or vegetation?			X		
<b>11</b>	<b>Gates</b>				N/A	
A	Floodgates broken or bent?					
B	Floodgates eroded or rusted?					
C	Floodgates operational?					
D	Floodgates leaking?					Estimated gpm
<b>12</b>	<b>Instruments</b>				N/A	
A	Structure instrumented?					
B	Monitoring performed?					
C	Instruments operational?					
<b>13</b>	<b>Development Below Dam (Low or Significant Hazard Dams)</b>			X	N/A	
A	Are there homes, businesses, or habitable					

	Item	Yes	No	N/A	<sup>1</sup> Condition (Satisfactory- Fair-Poor- Unsatisfactory)	Remarks
	structures located down-stream of the dam?					
<b>14</b>	<b>Emergency Action Plan (High Hazard Potential Dams Only)</b>				SATISFACTORY	
A	Emergency action plan?	X				
B	Emergency services contacts up-to-date?	X				
C	Dam breach inundation map?	X				

**Remarks:**

Trees have been cut off at roots. Willow trees will need to be pulled by roots to prevent growth.

Rate of seepage at toe of dam cannot be estimated in field because seepage is into marsh. Saturated soil was observed between toe of dam and marsh. Slightly cloudy areas were observed in marsh but could have been from waterfowl observed onsite. Seepage should be observed periodically and immediately following seismic events as areas around Liberty Lake have been experiencing frequent low magnitude earthquakes.

Downstream slope of dam should be re-vegetated.

Intake structure was not observed during this inspection as lake levels were to low and boat ramp is inaccessible.

**For High and Significant Hazard-Potential Dams Only**

**Name of Engineer:** Matthew A. Coe, P.E.  
**Date:** 12/9/2014  
**Engineering Firm:** Myers Engineering, Consulting Engineers, Inc.  
**Address:** 13911 Quail Pointe Dr.  
**City, State, ZIP:** Oklahoma City, OK 73134  
**Telephone Number:** (405) 755-5325

Professional Engineer Seal



12/9/2014

**Signature:**

*[Handwritten Signature]*

<sup>1</sup>**Condition:** Please rate the condition of Sections 1 – 11 on inspection form either: Satisfactory, Fair, Poor or Unsatisfactory.

**Satisfactory** - No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.

**Fair** - No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.

**Poor** - A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. Poor may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.

**Unsatisfactory** - A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.

## **APPENDIX A - PHOTOGRAPHS**



**Figure 1: Upstream Slope of Dam – Photo Facing WNW**



**Figure 2: Upstream Slope of Dam – Photo Facing ENE**





**Figure 3: West-Upstream Abutment**



**Figure 4: West End of Upstream Slope – Photo Facing NE**



**Figure 5: Willow Root on E Upstream Slope – Photo Facing SSW**



**Figure 6: East Abutment– Photo Facing ENE**



**Figure 7: Cottonwood Creek Influent Pipe West End of Upstream Slope**



**Figure 8: Crest of Dam – Photo Facing East from West Spillway**



**Figure 9: Crest of Dam – Photo Facing West**



**Figure 10: Downstream Slope - Facing West**



**Figure 11: Downstream Slope - Facing East**



**Figure 12: Whitetail Deer Tracks on Downstream Slope at East End of Dam**



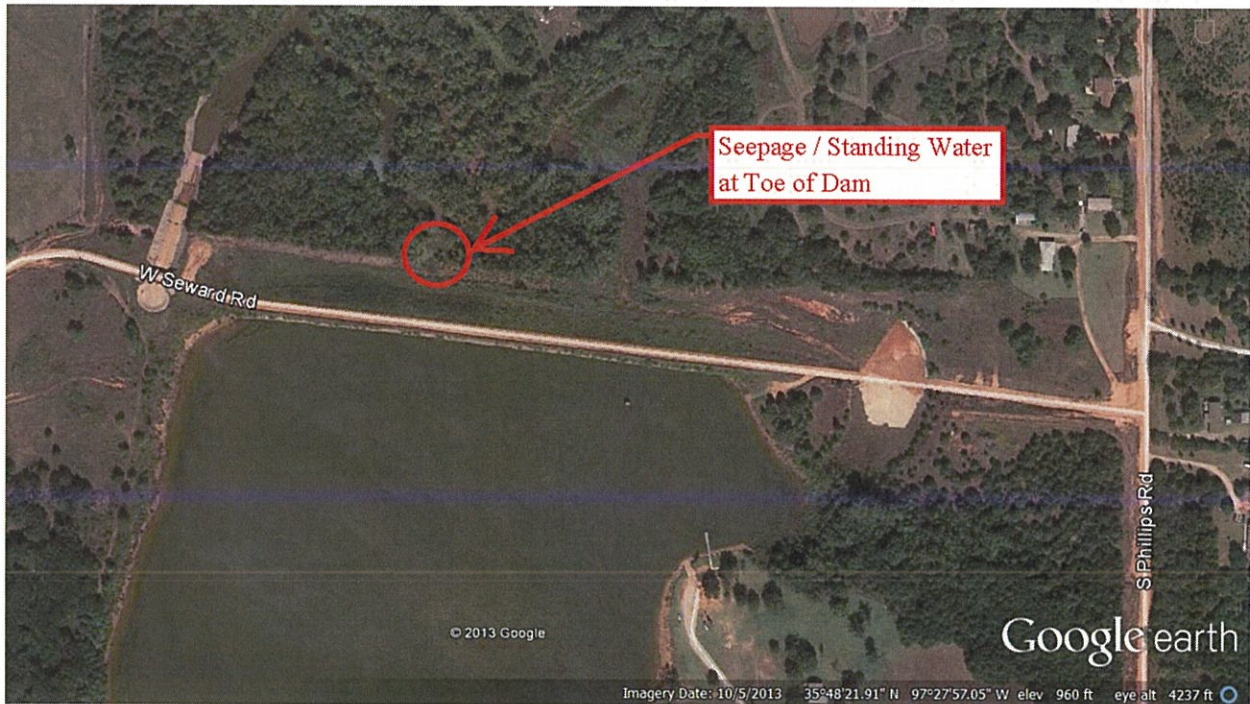
**Figure 13: Inadequate Growth on Downstream Slope– Photo Facing SE**



**Figure 14: Standing Water at Toe of Dam**



**Figure 15: Standing Water at Toe of Dam – Photo Facing North from Crest**



**Figure 16: Aerial Image of Location of Seepage at Toe**

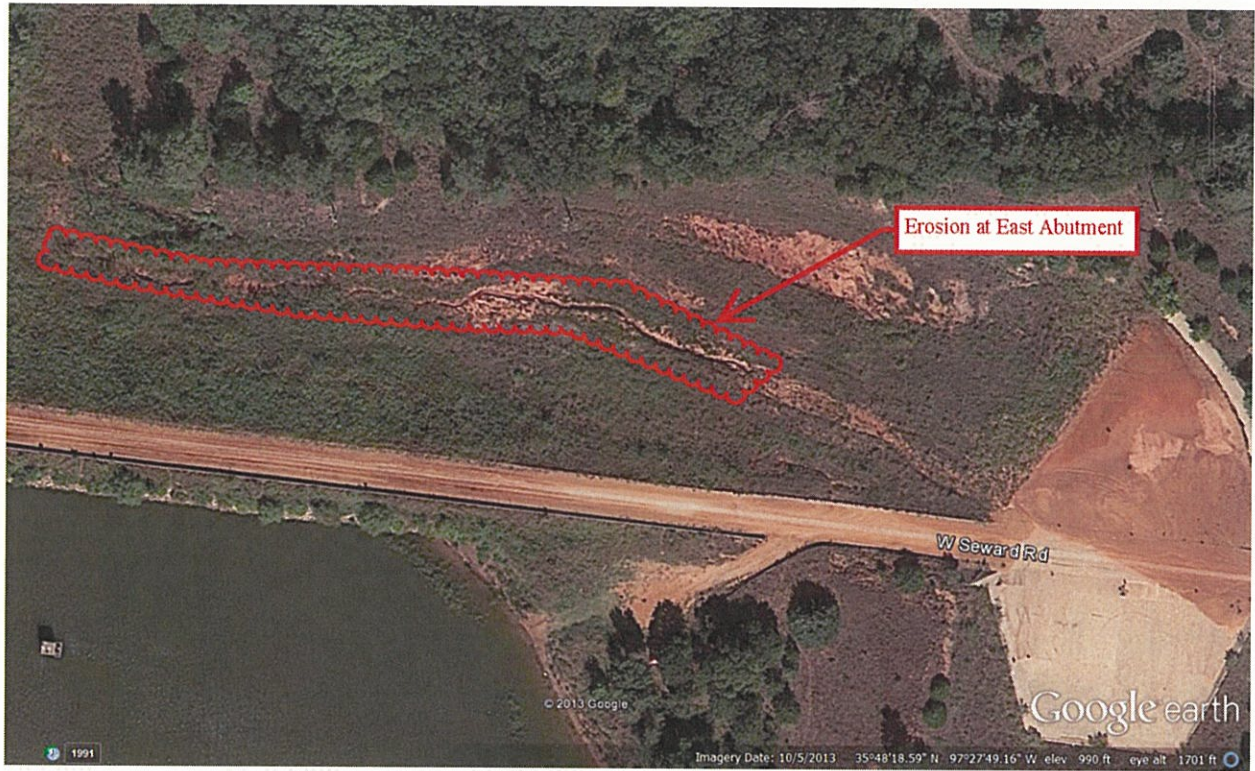


**Figure 17: Aerial Image of Seepage at Toe**

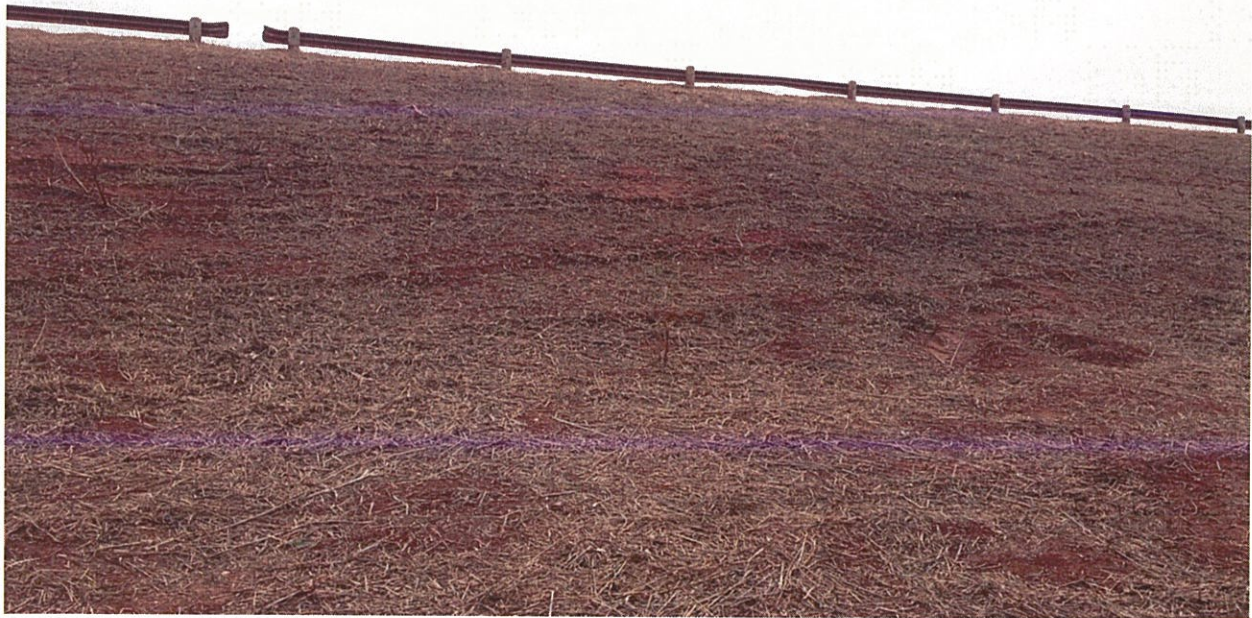


**Figure 18: Erosion on East Abutment – Photo Facing East**





**Figure 19: Aerial Image of Erosion on East Abutment**



**Figure 20: West Abutment Contact**



**Figure 21: Inlet Structure – Photo Facing SW**



**Figure 222: Raw Water Line Valves Facing N**



**Figure 233: Water in Valve Riser**



**Figure 24: Discharge from Cottonwood Creek to Liberty Lake – Photo Facing WNW**



**Figure 245: West Spillway – Photo Facing N**



**Figure 256: West Spillway – Photo Facing E**



**Figure 267: West Spillway Channel**



**Figure 2827: Seepage through Joint on West Side of the West Spillway Channel**



**Figure 29: Seepage and Vegetation through Joints in West Spillway Channel**



**Figure 28: Spalling at Joint in West Spillway Channel**



**Figure 29: Emergency (East) Spillway - Photo Facing E**



**Figure 30: Emergency (East) Spillway - Photo Facing NE**



**Figure 31: Emergency Spillway Abutment - Photo Facing W**





**Figure 32: Stilling Basin - Photo Facing NNE**

## **APPENDIX B – 2013 INSPECTION CHECKLIST**

**OKLAHOMA WATER RESOURCES BOARD  
PLANNING & MANAGEMENT DIVISION - DAM SAFETY PROGRAM**

**DAM INSPECTION CHECKLIST**

Name of Dam: Liberty Lake Dam  
 Owner of Dam: City of Guthrie  
 Address: P.O. Box 908  
 City/State/ZIP: Guthrie, Oklahoma 73044  
 County: Logan  
 Legal Location: SE 1/4, Section 1, T-15-N, R-3-W  
 Latitude: 35° 48' 18" N  
 Longitude: 97° 27' 56" W

State Inventory ID: OK02122  
 Purpose of Dam: Water Supply & Recreation  
 Hazard Classification: High  
 Inspected By: Patrick J. Barnas  
 Date of Inspection: December 3, 2013  
 Estimated Lake Level: Approximately 3.2 ft below spillway  
 Weather Conditions: Sunny, 10 mph SE wind, 56°

Note: Latitude-Longitude should be measured using a GPS and taken on the crest of the dam at the center.

	Item				Condition (Satisfactory- Fair-Poor- Unsatisfactory)	Remarks
		Yes	No	N/A		
<b>1</b>	<b>General Conditions of Dam</b>				Fair	
A	Alterations to the dam?		X			
B	Development in downstream floodplain?	X				
C	Grass cover adequate?	X				
D	Settlements, misalignments, or cracks?		X			
E	Recent high water marks?		X			elevation
<b>2</b>	<b>Upstream Slope of Dam</b>				Fair	
A	Erosion, slides, or depressions?		X			
B	Trees or excessive vegetation?	X				Willows on slope, mainly on east end
C	Animal burrows or holes?	X				A few burrows found
D	Evidence of livestock on dam?		X			
E	Cracks, settlement, or bulges?		X			
F	Evidence of slides or scarps?		X			
G	Adequate and sound slope protection (rip-rap)?	X				
<b>3</b>	<b>Crest of Dam</b>				Satisfactory	
A	Longitudinal or transverse cracking?		X			
B	Trees or excessive vegetation?		X			
C	Crest arching or bowing?		X			
D	Erosion or ruts?		X			
E	Low areas or depressions?		X			
F	Evidence of livestock on crest?		X			
G	Road on crest?	X				Dirt road with concrete wall
<b>4</b>	<b>Downstream Slope of Dam</b>				Poor	
A	Erosion, slides, or depressions?		X		Seepage /	
B	Trees or excessive vegetation?	X			standing water	Large trees growing at toe of dam
C	Animal burrows or holes?	X			at toe of dam.	A few rodent holes were observed
D	Evidence of livestock on embankment?		X		Water not	
E	Cracks, settlement, or bulges?		X		noticeably	
F	Drains or wells flowing?			X	flowing.	Estimated gpm      clear or cloudy?
G	Seepage or boils?	X			Ground soft.	Estimated gpm: UNK      clear or cloudy?
<b>5</b>	<b>Abutment Contacts</b>				Fair	
A	Erosion, cracks, or slides?	X			Seepage on	Erosion along east abutment
B	Seepage or boils?	X			east abutment	Estimated gpm ?      clear or cloudy?
<b>6</b>	<b>Inlet Structure</b>				Satisfactory	
A	Concrete? <input checked="" type="checkbox"/> Metal? <input type="checkbox"/>					
B	Spalling, cracking, or scaling?		X			
C	Exposed reinforcement?		X			
D	Corrosion present?		X			
E	Coating adequate?			X		

	Item	Yes	No	N/A	1 Condition (Satisfactory- Fair-Poor- Unsatisfactory)	Remarks
F	Leakage?		X			Estimated gpm
G	Trash rack adequate?			X		
H	Obstacles to inlet?		X			
I	Drawdown operative?      Opened & closed	X				
<b>7</b>	<b>Conduit &amp; Outlet</b>				Satisfactory	
A	Concrete?    X    Metal? <input type="checkbox"/>				Intake and piping are submerged in the lake and buried outside the lake. Inspection capability is limited.	
B	Spalling, cracking, or scaling?					
C	Exposed reinforcement?					
D	Joints displaced or offset?					
E	Joint material lost?					
F	Leakage of valve or gates?					Estimated gpm
G	Other leakage?					Estimated gpm      clear or cloudy?
H	Conduit misaligned?					
I	Outlet or channel obstructed?			X		
J	Outlet channel eroding?			X		
<b>8</b>	<b>Concrete Spillway</b>				Fair	
A	Spalling, cracking, or scaling?	X			Fair	Some spalling at joints and minor cracking
B	Exposed reinforcement or deterioration?		X			
C	Joints displaced or offset?		X			
D	Joint material lost?	X				
E	Leakage (joints, cracks, other)?	X				Estimated: 5-10 gpm    clear or cloudy?
F	Wall displaced?		X			
G	Dissipater deteriorating?			X		
H	Dissipaters clean of debris or vegetation?			X		
I	Erosion at toe of spillway?		X			
J	Spillway undercutting?		X			
<b>9</b>	<b>Auxiliary (Emergency) Spillway</b>				Fair	
A	Obstructions, debris, trees?	X			Trees should be removed between spillway and waterline.	
B	Erosion or sinkholes?		X			
C	Animal burrows or holes?		X			
D	Evidence of livestock on spillway?		X			
<b>10</b>	<b>Stilling Basin</b>				Satisfactory	
A	Spalling, cracking, or scaling?	X			Satisfactory	Minor scaling
B	Exposed reinforcement?		X			
C	Joints displaced or offset?		X			
D	Joint material lost?		X			
E	Joints leak?		X			Estimated gpm    clear or cloudy?
F	Rock adequate?	X				
G	Excessive vegetation or debris in basin?		X			
H	Dissipater deteriorating?			X		
I	Dissipaters clean of debris or vegetation?			X		
<b>11</b>	<b>Gates</b>			X	N/A	
A	Floodgates broken or bent?				N/A	
B	Floodgates eroded or rusted?					
C	Floodgates operational?					
D	Floodgates leaking?					Estimated gpm
<b>12</b>	<b>Instruments</b>			X	N/A	
A	Structure instrumented?				N/A	
B	Monitoring performed?					
C	Instruments operational?					
<b>13</b>	<b>Development Below Dam (Low or Significant Hazard Dams)</b>			X	N/A	
A	Are there homes, businesses, or habitable structures located down-stream of the dam?					
<b>14</b>	<b>Emergency Action Plan (High Hazard Potential Dams Only)</b>				Satisfactory	
A	Emergency action plan?	X			Satisfactory	
B	Emergency services contacts up-to-date?	X				
C	Dam breach inundation map?	X				

**Remarks:**

The willows and their root systems on the upstream slope of the dam need to be removed.

The standing water at the toe of the dam is indicative of seepage that could potentially pose a safety threat. Further investigation into the amount of seepage and the amount of soil erosion occurring due to the seepage is necessary. Piezometers should be installed on the upstream and downstream slopes at approximately 150 to 200 foot intervals to gather more information on the seepage rate.

The east abutment is showing signs of erosion where flowing water has cut a trench. The eroded areas of the abutment also had water seepage. The seepage requires additional studies and possible remediation.

The amount of seepage visible in the spillway is significantly higher than it was one year ago. This should be monitored regularly for changes, and further investigation is recommended.

The trees and shrubbery in the emergency spillway (east spillway) need to be cleared to allow for the free flow of water in the event that the spillway is utilized.

For High and Significant Hazard-Potential Dams Only

Name of Engineer: William T. Myers, P.E.

Date: \_\_\_\_\_

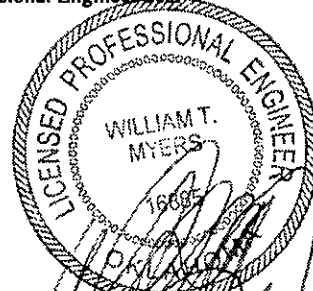
Engineering Firm: Myers Engineering, Consulting Engineers, Inc.

Address: 13911 Quail Pointe Dr.

City, State, ZIP: Oklahoma City, OK 73134

Telephone Number: 405-755-5325

Professional Engineer Seal



Signature: \_\_\_\_\_

*[Handwritten Signature]* 12/12/13

**Condition:** Please rate the condition of Sections 1 – 11 on inspection form either: Satisfactory, Fair, Poor or Unsatisfactory.

**Satisfactory** - No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.

**Fair** - No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.

**Poor** - A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. Poor may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.

**Unsatisfactory** - A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.

**APPENDIX C – MESONET CLIMATOLOGICAL DATA  
SUMMARY**

MESONET CLIMATOLOGICAL DATA SUMMARY  
 (GUTH) Guthrie  
 Latitude: 35-50-56  
 Longitude: 97-28-47  
 2014  
 October  
 Nearest City: 4.0 WSW Guthrie  
 Longitude: 97-28-47  
 Time Zone: Midnight-Midnight CST  
 County: Logan  
 Elevation: 1083 feet

DAY	TEMPERATURE ( F )		DEG DAYS HDD CDD	HUMIDITY (%)		RAIN (in)	PRESSURE (in)		WIND SPEED (mph)		SOLAR (MJ/m2)		4" SOIL TEMPERATURES							
	MAX	MIN		AVG	DEWPT		MAX	MIN	STN	MSL	DIR	AVG	MAX	SOD	BARE	MAX	MIN			
1	93	71	81.2	65.1	0	17	85	33	61	0.00	28.55	29.70	SSE	12.6	29.9	18.92	75.5	79.8	85	75
2	81	54	71.3	59.9	0	3	86	36	68	0.00	28.65	29.80	NW	12.0	38.7	17.39	75.9	79.4	84	75
3	64	43	55.6	37.9	11	0	93	22	57	0.00	29.01	30.17	NNW	9.5	38.9	20.51	72.1	72.8	78	69
4	79	36	59.6	35.2	8	0	90	21	46	0.00	28.89	30.05	SSW	7.5	25.7	20.30	69.3	69.7	77	63
5	86	54	69.1	44.1	0	5	82	22	43	0.02	28.69	29.84	SSW	5.5	23.0	14.95	70.4	72.2	78	67
6	84	51	68.4	52.2	0	2	99	22	63	0.00	28.68	29.83	S	5.6	17.7	19.02	71.0	72.7	79	67
7	94	62	76.9	62.6	0	13	97	28	66	0.00	28.69	29.84	SSW	5.8	16.0	19.03	73.2	76.2	83	70
8	91	67	77.1	65.1	0	14	98	38	70	0.00	28.78	29.93	SSE	8.3	21.1	16.33	74.5	77.6	83	73
9	90	70	78.0	66.1	0	15	92	40	69	0.00	28.73	29.88	S	9.8	25.5	14.36	75.4	78.0	82	74
10	76	49	61.8	60.2	2	0	100	73	95	1.13	28.80	29.95	NNE	10.2	29.9	3.44	73.1	72.2	78	65
11	59	48	52.9	47.8	12	0	99	60	84	0.04	28.92	30.08	N	7.3	23.8	5.77	68.2	62.9	65	61
12	74	46	60.6	52.9	5	0	99	49	78	0.53	28.61	29.76	SSE	8.7	31.1	16.17	67.0	63.5	68	58
13	60	51	56.5	52.6	9	0	100	65	88	0.66	28.55	29.70	NNW	10.1	34.9	2.91	65.9	62.4	65	58
14	70	47	57.9	41.2	7	0	84	31	56	0.00	28.85	30.01	NW	10.0	29.6	19.23	63.9	59.1	65	54
15	77	41	59.1	43.6	6	0	99	24	63	0.00	28.87	30.03	SSE	3.4	10.6	19.00	63.6	60.8	69	54
16	88	54	67.8	48.5	0	6	82	23	55	0.00	28.65	29.80	S	8.9	29.0	NA	64.8	62.2	68	57
17	77	51	62.6	47.1	1	0	90	28	62	0.00	28.82	29.98	NNE	8.0	22.0	18.04	65.0	63.2	69	58
18	69	49	57.3	46.2	6	0	90	38	69	0.00	29.00	30.16	NNE	5.7	15.6	14.77	64.3	63.1	70	58
19	75	47	60.9	51.4	4	0	97	47	73	0.00	28.93	30.09	SSE	6.5	20.6	16.55	64.2	64.5	72	58
20	82	59	69.1	59.2	0	5	90	46	72	0.00	28.86	30.02	SSW	5.6	17.6	16.07	66.2	68.9	77	63
21	84	59	69.4	58.9	0	6	100	39	73	0.00	28.89	30.04	SE	5.0	14.7	16.41	68.0	71.2	78	66
22	79	57	66.5	58.9	0	3	99	45	79	0.28	28.93	30.09	S	7.1	23.8	13.04	67.8	69.9	75	65
23	78	60	67.3	59.7	0	4	100	52	79	0.08	28.92	30.07	SSE	6.7	18.1	15.24	68.4	69.0	73	65
24	83	58	69.2	60.1	0	6	94	47	75	0.00	28.89	30.05	SSE	7.8	21.3	15.99	68.6	68.3	74	63
25	90	60	72.9	58.9	0	10	96	31	66	0.00	28.86	30.02	S	6.2	13.9	16.51	69.2	70.4	78	64
26	88	64	76.4	53.4	0	11	78	23	48	0.00	28.66	29.81	S	14.3	37.6	16.48	69.0	71.6	78	66
27	83	60	71.4	52.7	0	7	78	40	52	0.04	28.58	29.73	S	13.1	34.0	12.89	68.5	72.3	77	69
28	69	47	57.4	39.7	7	0	85	28	55	0.00	28.95	30.10	NE	5.8	26.1	NA	66.0	66.4	71	62
29	72	38	54.9	37.4	10	0	97	22	58	0.00	29.01	30.17	S	4.1	14.7	16.60	63.1	63.1	70	57
30	75	50	60.3	38.6	3	0	69	22	48	0.00	28.97	30.13	N	8.4	25.1	16.04	62.6	63.7	71	59
31	56	36	47.1	30.9	19	0	85	27	55	0.00	29.21	30.38	N	9.0	28.7	16.01	60.8	60.6	66	56
	78	53	65.0	51.2	<<	<<	Monthly Averages	>>			28.82	29.97	S	8.0	38.9	15.45	68.3	68.6	74	64

Temperature - Highest: 94*	Temperature - Lowest: 36*	Degree Days - Total HDD: 110*	Degree Days - Total CDD: 127*
Rainfall: Monthly Total: 2.78* in.	Rainfall: Greatest 24 Hr: 1.13* in.	Humidity - Highest: 100*	Humidity - Lowest: 21*
Number of Days With:		Rainfall > 0.01 inch: 8*	
Tmax > 90: 5*		Rainfall >= 0.10 inch: 4*	
Tmax < 32: 0*		Avg Wind Speed > 10 mph: 7*	
Tmin < 32: 0*		Max Wind Speed >= 30 mph: 6*	
Tmin <= 0: 0*			

© 1993, 2014 Oklahoma Climatological Survey  
 Monthly data generated on Tuesday, December 09, 2014 at 12:59 UTC  
 \* Denotes incomplete record

MESONET CLIMATOLOGICAL DATA SUMMARY  
 (GUTH) Guthrie  
 Latitude: 35-50-56  
 Longitude: 97-28-47  
 Nearest City: 4.0 WSW Guthrie  
 Elevation: 1083 feet  
 November 2014  
 Time Zone: Midnight-Midnight CST  
 County: Logan

DAY	TEMPERATURE ( F )		DEG DAYS HDD CDD	HUMIDITY (%)		RAIN (in)	PRESSURE (in)		WIND SPEED (mph)		SOLAR (MJ/m2)		4" SOIL TEMPERATURES							
	MAX	MIN		AVG	DEWPT		MAX	MIN	STN	MSL	DIR	AVG	MAX	SOD	BARE	MAX	MIN			
1	61	30	44.9	22.7	20	0	76	19	45	0.00	29.15	30.31	SSE	8.7	21.2	11.88	57.6	55.6	61	51
2	64	45	54.7	37.3	11	0	64	38	52	0.00	28.96	30.12	SSE	16.1	34.0	11.26	57.4	57.6	62	54
3	67	53	60.2	52.5	5	0	97	64	76	0.93	28.88	30.03	S	11.8	30.0	3.56	58.9	59.8	62	57
4	54	45	47.8	45.2	16	0	97	77	91	0.55	29.05	30.21	N	6.2	25.7	3.61	58.2	56.7	61	54
5	61	41	49.0	40.0	14	0	98	37	75	0.00	29.05	30.21	SW	4.4	13.5	10.06	56.8	54.0	58	51
6	65	40	51.4	33.8	13	0	90	21	57	0.00	29.18	30.35	N	6.5	19.3	15.21	55.8	52.6	58	48
7	69	39	55.1	35.8	11	0	87	30	51	0.00	28.90	30.06	SSW	11.7	32.8	15.33	55.3	51.7	57	47
8	60	39	53.3	36.8	16	0	85	33	55	0.00	28.98	30.14	N	9.6	30.2	14.89	56.3	53.7	58	50
9	73	38	56.2	39.2	10	0	85	34	56	0.00	28.72	29.87	S	10.6	29.2	14.34	55.2	52.9	60	47
10	78	36	61.4	43.0	8	0	67	34	52	0.00	28.39	29.53	S	17.7	43.1	14.47	57.1	58.4	65	53
11	39	26	32.3	15.8	33	0	68	36	51	0.00	29.04	30.20	N	14.9	37.7	14.39	53.5	50.9	56	46
12	28	20	24.8	7.5	41	0	71	33	49	0.00	29.33	30.51	N	13.2	27.6	8.38	48.7	42.9	46	40
13	32	20	25.6	7.5	39	0	73	35	47	0.00	29.38	30.55	N	7.6	22.4	12.67	46.6	42.1	47	39
14	38	20	28.2	14.2	36	0	91	31	59	0.00	29.19	30.35	SE	4.1	14.8	11.25	45.8	42.0	47	38
15	50	26	36.5	22.6	27	0	81	40	58	0.00	28.92	30.08	SSE	8.8	30.5	9.88	45.9	43.2	48	40
16	36	21	26.1	19.4	37	0	91	62	76	0.00	29.02	30.18	N	9.5	27.3	3.42	45.1	41.1	43	39
17	33	16	24.5	13.6	41	0	85	42	65	0.02	29.18	30.35	NW	7.1	24.3	14.23	43.6	37.9	41	36
18	54	18	35.5	20.0	29	0	88	25	58	0.03	29.09	30.25	SSW	8.4	25.7	13.92	42.8	38.8	45	35
19	59	31	43.8	24.3	20	0	73	25	49	0.00	28.96	30.12	SSW	6.4	20.1	13.61	44.9	44.0	51	39
20	60	30	44.2	31.0	20	0	82	38	61	0.00	28.92	30.08	E	7.1	16.8	12.81	46.0	45.6	52	40
21	58	38	48.3	42.9	17	0	94	67	82	0.00	28.88	30.04	E	4.1	12.9	5.84	48.2	48.7	53	46
22	61	51	56.2	53.6	9	0	97	86	91	0.08	28.71	29.86	SSE	8.4	27.7	0.95	51.1	52.2	53	51
23	61	39	51.8	46.6	15	0	98	58	83	0.07	28.37	29.51	S	12.0	38.2	5.66	52.2	52.5	55	49
24	57	32	43.2	24.8	21	0	87	22	53	0.00	28.80	29.96	W	8.9	29.3	13.29	49.2	46.6	51	43
25	53	25	39.9	25.6	26	0	91	32	60	0.00	29.00	30.16	SSE	5.4	15.1	13.07	47.3	45.1	50	41
26	56	32	43.8	27.2	21	0	74	31	54	0.00	29.01	30.17	NW	9.9	33.8	11.40	47.5	46.7	52	43
27	53	24	38.1	21.6	27	0	93	23	56	0.00	29.24	30.41	SSE	5.8	18.3	12.66	46.3	45.2	50	41
28	67	43	54.9	34.2	10	0	58	33	46	0.00	28.82	29.97	S	13.0	31.1	12.66	47.5	48.5	54	44
29	74	53	63.9	39.6	2	0	57	26	42	0.00	28.54	29.69	SSW	17.2	36.8	12.76	50.5	53.5	58	50
30	66	27	46.8	30.7	19	0	70	42	53	0.00	28.80	29.96	N	15.7	39.8	12.36	51.7	54.1	57	48
		56	33	44.7	30.3	<- Monthly Averages ->		28.95	30.11	9.7	43.1	10.99	50.7	49.2	54	45				

Temperature - Highest: 78  
 Lowest: 16  
 Degree Days - Total HDD: 610  
 Total CDD: 0  
 Humidity - Highest: 98  
 Lowest: 19  
 Rainfall: Monthly Total: 1.68 in.  
 Greatest 24 Hr: 0.93 in.  
 Number of Days With:  
 Tmax > 90: 0  
 Tmax < 32: 2  
 Tmin < 32: 16  
 Tmin <= 0: 0  
 Rainfall > 0.01 inch: 6  
 Rainfall >= 0.10 inch: 2  
 Avg Wind Speed > 10 mph: 11  
 Max Wind Speed >= 30 mph: 12



MESONET CLIMATOLOGICAL DATA SUMMARY										December 2014				Time Zone: Midnight-Midnight CST							
(GUTH) Guthrie										Nearest City: 4.0 WSW Guthrie				County: Logan							
Latitude: 35-50-56										Longitude: 97-28-47				Elevation: 1083 feet							
DAY	TEMPERATURE ( F )			DEG DAYS HDD CDD	HUMIDITY (%)			RAIN (in)	PRESSURE (in)		WIND SPEED (mph)		SOLAR (MJ/m2)		4" SOIL TEMPERATURES						
	MAX	MIN	AVG		MAX	MIN	AVG		STN	MSL	DIR	AVG	MAX	SOD	BARE	MAX	MIN				
1	28	22	25.4	7.8	40	0	53	39	47	0.00	29.31	30.48	NNE	11.0	28.6	46.7	44.5	48	43		
2	45	22	33.6	14.7	32	0	70	26	47	0.00	29.06	30.22	SSW	6.5	20.2	45.3	43.6	47	40		
3	49	34	41.0	34.5	24	0	97	65	78	0.00	29.01	30.17	E	6.3	17.4	45.7	44.8	47	42		
4	54	41	45.6	45.3	18	0	100	97	99	0.11	28.94	30.09	ENE	3.5	9.8	47.5	47.4	49	46		
5	59	41	52.4	51.6	15	0	99	90	97	0.04	28.90	30.06	NNW	6.5	17.9	50.4	51.3	53	49		
6	44	38	41.6	41.5	24	0	100	99	100	0.01	29.26	30.43	NNE	5.2	14.0	49.0	47.6	49	47		
7	47	39	42.8	42.4	22	0	100	93	98	0.00	29.17	30.34	SSE	5.8	18.0	48.6	47.1	49	46		
8	61	40	49.3	44.0	15	0	99	51	84	0.00	29.12	30.29	W	4.7	17.7	49.8	49.8	55	47		
9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
23	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
48* 35* 41.5* 35.2*										<- Monthly Averages ->		29.10* 30.26*		NA 6.2* 28.6*		4.75*		47.9* 47.0* 50* 45*			
Temperature - Highest: 61* Lowest: 22*										Degree Days - Total HDD: 189* Total CDD: 0*		Number of Days With: Tmax > 90: 0* Tmax < 32: 1* Tmin < 32: 2* Tmin < 0: 0*		Rainfall > 0.01 inch: 3* Rainfall >= 0.10 inch: 1* Avg Wind Speed > 10 mph: 1* Max Wind Speed >= 30 mph: 0*							
Rainfall: Monthly Total: 0.16* in. Greatest 24 Hr: 0.11* in.										Humidity - Highest: 100* Lowest: 26*											

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 Monthly data generated on Tuesday, December 09, 2014 at 09:42 UTC  
 \* Denotes incomplete record