Report of:

2012 Inspection Report
Lake Lemon Dam
Unionville, Indiana

Prepared for:

Lake Lemon Conservancy District
7599 North Tunnel Road
Unionville, Indiana 47468

DLZ Ohio, Inc.

6121 Huntley Road
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DLZ Job No. 1263-0837.70

December, 2012

Prepared by:

DLZ

INSPECTION REPORT

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Unionville, Indiana

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Columbus, Ohio 43229

December 2012

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2012 INSPECTION REPORT
LAKE LEMON DAM
UNIONVILLE, INDIANA

INTRODUCTION

As requested by the Lake Lemon Conservancy District and the City of Bloomington Utilities, DLZ Ohio, Inc. (DLZ) performed a field inspection of Lake Lemon Dam on September 26, 2012. Mr. Eric Tse, a geotechnical engineer with DLZ, completed the surficial inspection of the dam. During the inspection, color photographs were taken of pertinent features of the dam. Representative photographs are included in this report in Appendix I.

This report presents the observations and recommendations resulting from the 2012 inspection. The completed IDNR Dam Inspection Report Form is presented in Appendix II. As part of the inspection, previous inspection reports for the project were reviewed.

On September 26, 2012, representatives of Commercial Diving Services (CDS) were on-site for the inspection work of the interior of the dam outlet works, including the sluice gate, the gatewell, and the intake conduit. Additionally, CDS replaced the ladder at the gatewell and the trash rack at the intake conduit on October 11, 2012. A copy of the field reports from CDS are presented in Appendix III.

PROJECT INFORMATION

General

Lake Lemon dam was originally constructed in the early 1950's. For years the project was used for water supply to the City of Bloomington, but is now used for recreation. The drainage area is approximately 71 square miles and the pool area is approximately 1,700 acres. The earth embankment is roughly 50 feet high with a crest length of approximately 660 feet. The crest width is approximately 13 feet, and the upstream and downstream slopes are approximately 1V:3.5H.

The outlet works consist of a reinforced concrete pipe near the left abutment. From its inlet to the gatewell, the pipe is 42 inches in diameter while the portion of the pipe between the gatewell and the stilling basin is 30 inches in diameter. Flow through the pipe is controlled by a sluice gate, and the pipe discharges into a stilling basin.

The principal spillway is a 329-foot long, concrete ogee-type structure. The spillway is located in a valley northeast of the embankment. A picture of the embankment and spillway is included in Appendix IV.

It is understood from the Lake Manager that when the pool rises to the spillway crest the majority of the water tends to spill over the southwest end of the spillway. According to the

Lake Manager, it is suspected that the southwest end of the spillway may have settled slightly (about 3 inches) over the years.

Approximately one-half inch of rain was reported in Bloomington, Indiana, the day before this inspection. Weather conditions during the inspection were rainy with temperatures ranging from a low of 60°F to a high of 70°F. Rainfall data, measured in Bloomington, Indiana, between September 23 and 29, 2012, are included in Appendix V. At the time of the inspection, the pool level was at approximately a foot below the top of the principal spillway.

Recent Repairs

In the 2010 Inspection Report, recommendations were made for additional monitoring and maintenance. It is understood that Tasks #1, 2, 8, and 9, as recommended in the 2010 Inspection Report, were completed. Details of these tasks are as follows.

Task #1: Remove isolated small trees along the shore.
Task #2: Fill an animal borrow on the right side of the upstream embankment with competent, well compacted material.
Task #8: Replace or repair the ladder at the gatewell.
Task #9: Replace or repair the trash rack at the intake conduit.

Security

Access to the embankment is along a private drive with a locked gate. The Lake Manager as well as the City of Bloomington Utilities have access to this lock.

FIELD INSPECTION

Embankment

The inspection disclosed no serious problem areas in the physical condition of the embankment. The slopes were relatively uniform; no significant bulges or depressions were noted. Grass and vegetation on the embankment slopes and crest was low and had been mowed recently (Photographs 1, 2 and 3). It is understood from the Lake Manager that the embankment is typically mowed twice a year: once in the spring and once in the fall.

Isolated small trees were observed along the shore of the upstream embankment slope during the 2010 inspection, but these small trees had since been removed (Photograph 4). An animal burrow was observed on the right side of the upstream slope during the 2010 inspection. This animal burrow appeared to have been filled. However, several animal burrows, varying from approximately 0.5 to 2.0 inches in diameter, were observed near the central portion and the right side of the upstream slope during this inspection (Photograph 5). The locations of these animal burrows were marked and the Lake Manager was informed of the existence of the animal burrows.

During the inspections prior to 2008, an area of possible seepage was observed along the downstream toe, near the midpoint of the embankment. This area appears to be the location of the original stream channel. During this inspection, this old channel was dry (Photograph 6) and no seepage was noted along the downstream toe (Photograph 7).

Ponded water was observed immediately downstream of the right groin in the inspections prior to 2008. Runoff from the embankment and right abutment tends to pond in this area. During this inspection, standing water was not observed immediately downstream of the right groin. However, a pile of brush was observed at the right groin area near the toe of the downstream embankment (Photograph 8).

Outlet Works

Internal Inspection

In the 2010 inspection, the steel bars of the trash rack that keeps logs and debris from entering the gatewell were found to have rusted almost half-way through and the ladder at the gatewell was found to be in poor condition. It is understood that replacement of the trash rack and the ladder was to be completed as part of this inspection.

As part of this inspection, the gatewell and the upstream portion of the outlet works, between the inlet of the 42-inch diameter pipe and the gatewell, were inspected under water. A diver from CDS performed the inspections (Photographs 9 and 10). No obvious distress and blockages inside the 42-inch diameter pipe were noted in the inspection report from CDS. However, some large sized fallen trees and debris were reportedly present near the inlet of the intake pipe during the inspection. Additionally, a ¼" by 3" rubber seating strip on the right side of the sluice gate had reportedly become loose. The gate stem was inspected, and all of the frame bolts and adjusting bolts were checked for tightness. No distress was noted. The sluice gate was raised for approximately 15 minutes, and the gate was found to operate well, and no problems were noted. Copies of the inspection reports by CDS are included in Appendix III.

External Inspection

The visible portions of the outlet works appeared in satisfactory condition. The condition of the stilling basin appeared unchanged from previous inspections (Photographs 11 and 12). In previous inspections, a large crack was observed in the left wall near the end of the stilling basin. This crack appeared to be about ½ inch wide and extended from the top of the wall to the bottom (Photograph 13). This crack appeared old and unchanged from the 2010 inspection.

During the 2008 inspection, the stilling basin was dewatered as part of the inspection. An area of scour beneath the channel bottom was noted immediately downstream of the end of the stilling basin concrete pad. This scoured area was repaired by placement of riprap in the fall of 2009. However, it is understood that the rip rap was washed away during winter drawdown in the same year. The scoured area has not yet been backfilled with riprap (Photograph 14).

The banks of the outlet channel downstream of the stilling basin were showing signs of erosion and instability (Photograph 15). However, this condition appeared to be unchanged from the 2010 inspection. Some debris and fallen tree branches were observed in the channel which did not appear to block the outflow of water at the time of this inspection.

Principal Spillway

The principal spillway was in acceptable condition (Photographs 16, 17, 18, and 19). There had been some horizontal displacements, approximately ½ to ¾ inches, in the joints of the training walls over the years (Photograph 20). However, a wider joint, slightly over an inch, was found in the upper end of the right training wall (Photograph 21). This joint widening was probably the result of water penetration and repeated freeze-thaw attacks over time. Generally, there appeared to be no significant changes in the joint displacements since the 2010 inspection.

A small tree and what appeared to be wasp nests ("mud dauber's nests") were observed on the lower end of the right training wall during the 2010 inspection. In this inspection, the "mud dauber nest" was found to be in the same location as observed in the 2010 inspection. However, the small tree appeared to have been cut off and only a small remnant of the tree remained embedded in the concrete wall (Photograph 22).

In the 2010 inspection, large masses of a brown "sticky" gelatinous substance were observed at the outlet pipes near the midpoint of the spillway's end sill. This brown substance appeared to be iron bacteria, which could plug the outlet pipes if they grow excessively. During this inspection, the brown "sticky" gelatinous substance was observed at several outlet pipe locations, primarily near the midpoint of the spillway's end sill (Photograph 23). It appeared that the brown substance had not been removed or cleared out of the pipes since the 2010 inspection.

There was minor erosion immediately downstream of the end sill (Photograph 24). Generally, there appeared to be no significant changes in the erosion condition since the 2010 inspection.

CONCLUSIONS

Based on our observations, it appears that the project condition has not changed significantly since the 2010 inspection, where the overall surficial condition of the project was determined to be "Satisfactory."

RECOMMENDATIONS

1. Several animal burrows, varying from approximately 0.5 to 2.0 inches in diameter, were observed near the central portion and the right side of the upstream slope during this inspection. Reportedly, these burrows had since been filled with compacted soil (Photographs 25 and 26). It is recommended that the embankment be monitored for animal activities on a regular basis. If deemed necessary, a rodent control program may be needed to prevent the propagation of the burrowing animal population and to prevent future damage to the dam.

2. Runoff from the embankment and right abutment tends to pond in the area downstream of the right abutment groin. This area should be monitored for standing water, particularly following high pool events and after periods of heavy rain. If necessary, the area may be needed to be re-graded to allow for proper water drainage.

3. The pile of brush observed near the toe of the downstream slope, at the right groin area, should be removed. Any excessive vegetation should also be removed from the area.

4. The area along the downstream toe near the midpoint of the embankment should be monitored for possible seepage. Because of the high hazard associated with the project, it is recommended that this area be monitored on a monthly basis and following significant rainfall events. Any appearance of seepage and subsequent changes in seepage quantity in this area should be brought to the attention of a dam engineer immediately.

5. The scoured areas in the channel bottom immediately downstream of the end of the stilling basin concrete slab should be repaired and replenished with additional riprap. The design velocities for the outflow will need to be evaluated to properly size the riprap.

6. The stability and erosion condition of the banks of the outlet channel downstream of the stilling basin concrete slab should be monitored. Excessive debris and fallen tree branches, which could block the water flow in the outlet channel, should be removed regularly.

7. Large fallen trees and debris were observed near the inlet of the intake pipe during the CDS inspection. These fallen trees and debris could potentially block water from flowing into the intake structure and should be removed regularly.

8. According to the Lake Manager, the outflow of water from the sluice gate had increased even when the gate was closed. Based on the inspection report from CDS, a ¼" by 3" rubber seating strip on right side of the sluice gate had become loose, which might have prevented the sluice gate from closing properly. This loose seating strip should be replaced or repaired.

9. It is recommended that the sluice gate be exercised to its full limit at least once per year.

10. The remnant of a small tree and what appeared to be "mud dauber nests" on the lower end of the right training of the principal spillway should be removed and the concrete surface at this area should be repaired, if necessary.

11. All joints and cracks in the training walls of the principal spillway should be properly sealed. The principal spillway should be visually monitored for any additional settlement or displacement monthly.

12. The brown gel substance at the downstream toe of the spillway should be removed and cleared out of the outlet pipes to provide proper drainage. All outlet pipes at the spillway should be monitored for proper drainage.

13. The outlet channel downstream of the ogee's end concrete sill should be monitored for additional erosion, especially after significant spillway discharges. If the erosion condition worsens, the end slab could be endangered as the erosion progresses upstream beneath the slab. Additional riprap may then be needed immediately downstream of the end sill to armor the area.

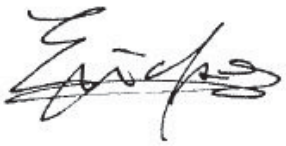
14. A recent file review indicates that an Emergency Action Plan (EAP) has not yet been prepared as recommended in the 2010 Inspection Report. It is recommended that an EAP be prepared as soon as possible.

CLOSING REMARKS

We appreciate having the opportunity to be of service to you on this inspection. If you have any questions, please do not hesitate to call.

Sincerely,

DLZ OHIO, INC.



Eric W. Tse, P.E.
Senior Geotechnical Engineer

Victoria B. Person, P.E.
Senior Project Manager

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APPENDIX I

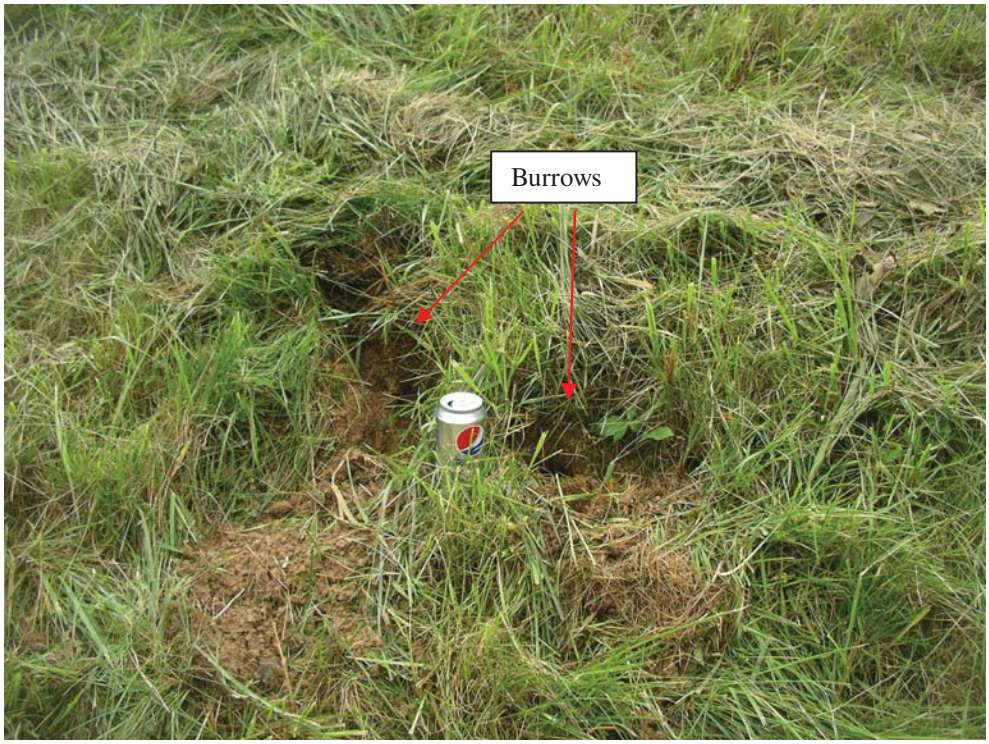
Photographs

Photograph 1: Embankment crest; view is towards left abutment.

Photograph 2: Upstream embankment slope; view is towards right abutment.

Photograph 3: Downstream embankment slope; view is towards right abutment.

Photograph 4: View of upstream slope along the shore.



Photograph 5: Burrows were observed on the upstream slope.

Photograph 6: Original stream channel downstream from midpoint of embankment.

Photograph 7: Downstream toe near midpoint of embankment.

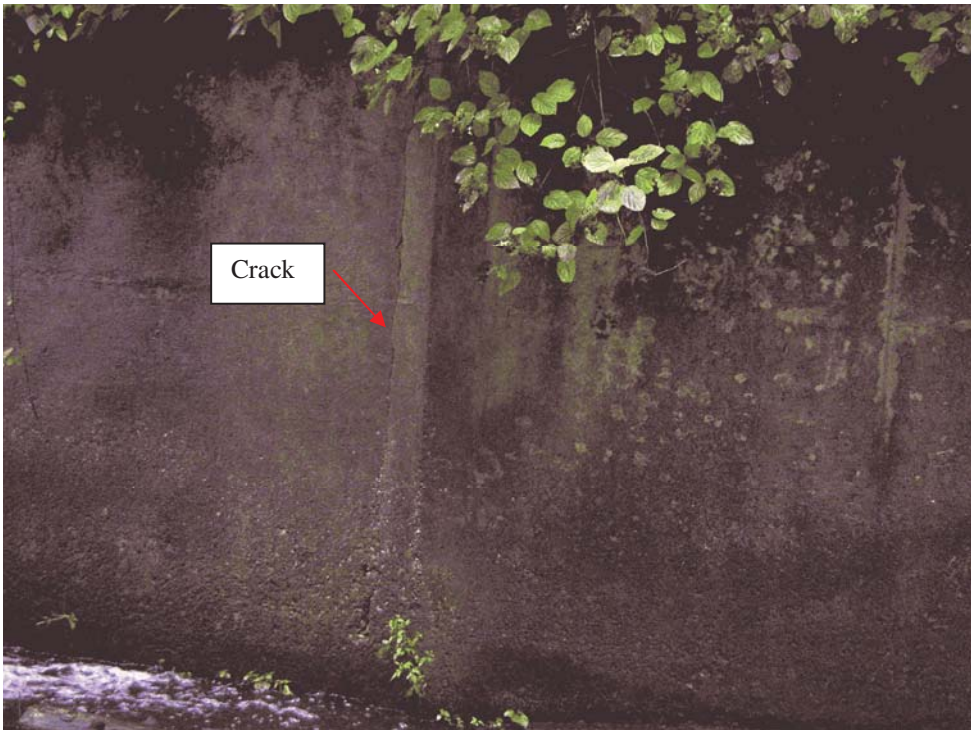
Photograph 8: A pile of brush at the right groin area of the downstream embankment.

Photograph 9: Gatewell structure.

Photograph 10: Diver inspecting the drain pipe.

Photograph 11: Stilling basin; view is towards upstream.

Photograph 12: Stilling basin; view is towards downstream.



Photograph 13: A crack in left stilling basin wall.

Photograph 14: Scoured area immediately downstream of stilling basin concrete pad.

Photograph 15: Outlet channel downstream of stilling basin.

Photograph 16: Crest of ogee spillway.

Photograph 17: Left training wall of spillway.

Photograph 18: Right training wall of spillway.

Photograph 19: Sloping ground surface behind right training wall spillway.

Photograph 20: View of a typical joint displacement in upper end of left training wall of spillway.

Photograph 21: View of joint displacement in upper end of right training wall of spillway.

Photograph 22: The remnant of a small tree and “mud dauber nests” on lower end of right training wall of spillway.

Photograph 23: Brown “sticky” gelatinous substance (iron bacteria) at an outlet pipe of spillway.

Photograph 24: Minor erosion along end sill of spillway.

Photograph 25: View of a typical burrow before filling.

Photograph 26: View of a typical burrow location after filling.

APPENDIX II

Completed IDNR Dam Inspection Form

IDNR DAM INSPECTION REPORT FORM (Refer to pages 5 and 6 for instructions.)

Name of Professional Conducting Inspection	Professional License No. (Indiana)
Eric Tse	PE10606244
Business Address	**Phone: (day) 614 - 888 - 0040**
6121 Huntley Rd., Columbus, OH 43219	(evening) 614 - 987 - 0440

Company Name: DLZ Ohio, Inc.

INSPECTION PREPARATION: Reviewed all pertinent technical documentation related to this dam and site in the State's and the Owner's files: Yes ☒ No ☐ Comment Last inspection report was reviewed prior to inspection. IDNR's file on the project was also reviewed, including the original construction documents.

MULTIDISCIPINARY:I am experienced in the technical disciplines or I am working with other professionals experienced in the technical disciplines to properly inspect this dam and appurtenant works. Technical disciplines, in additional to the general civil engineering, may include geotechnical, geological, hydrologic, structural, and mechanical. Yes ☒ No ☐ Comment

Dam Name	Quad.	Date of Inspection
Lake Lemon Dam	Hindustan	09 / 26 / 2012

State Dam ID	Permit (if unaproved see pg. 6)	County	Sec. T. R.	Last Inspection
58-1	State Approved on Construction Completed in 1952	Monroe	28 , 10 N, 1 E	10 / 5 / 2010

Owners Name	Owner's Phone
City of Bloomington Utilities	(812) 349-3655

Address/Zip Code: P.O. Box 1216, Bloomington, IN 47401

Contact's Name	Contact's Phone	Spillway Width	Ft. FBD.
Lake Lemon Conservancy District Bob Madden, Manager	(day) 812 - 334 - 0233 (evening) - -	Top Bot. ~330	~16

Hazard	Drainage Area	Surface Area	Height	Crest Length	Crest Width	Inlet Below Crest	Slope: Up / Down
High	~71 MI^2	~1700 AC	~50 FT	~660 FT	~13 FT	~16 FT	3 1/2: 1 / 3 1/2: 1

FIELD CONDITIONS OBSERVED

Water Level - Below Dam Crest ~17 Ft.

Ground Moisture Condition: Dry ____ Wet X Snowcover ____ Other Rainy

DRAWDOWN STRUCTURE

☒ Yes ☐ None

Comment A 42-in. diameter R.C. pipe with a gatewell and stilling basin.

MONITORING ☐ Yes ☒ None [☐ Gage Rod ☐ Piezometers ☐ Seepage Weirs ☐ Survey Monuments ☐ Other]

Comments

A UPSTREAM SLOPE

GOOD	X
ACCEPTABLE	
DEFICIENT	
POOR	

PROBLEMS NOTED: ☐ (A-1) None ☐ (A-2) Riprap - Missing, Sparse, Displaced, Weathered ☐ (A-3) Wave Erosion-with Scarps ☐ (A-4) Cracks-with Displacement ☐ (A-5) Sinkhole ☐ (A-6) Appears Too Steep ☐ (A-7) Depressions or Bulges ☐ (A-8) Slides ☒ (A-9) Animal Burrows ☐ (A-10) Trees, Brush, Briars ☐ (A-11) Other

Comments: Animal burrows were observed on the upstream slope of the embankment.

B CREST

GOOD	X
ACCEPTABLE	
DEFICIENT	
POOR	

PROBLEMS NOTED: ☒ (B-1) None ☐ (B-2) Ruts or Puddles ☐ (B-3) Erosion ☐ (B-4) Cracks with Displacement ☐ (B-5) Sinkholes ☐ (B-6) Not Wide Enough ☐ (B-7) Low Area ☐ (B-8) Misalignment ☐ (B-9) Inadequate Surface Drainage ☐ (B-10) Trees, Brush, Briars ☐ (B-11) Other

Comments: None

Spillway Width refers to the open channel (typically the emergency or auxiliary spillway) at the control section.
Ft. FBD. refers to the vertical distance from the emergency (auxiliary) spillway control section to the lowest point of the crest of the dam.
Inlet Below Crest refers to the vertical distance from the inlet of the principal spillway to the crest of the dam.

C DOWNSTREAM SLOPE

GOOD	X
ACCEPTABLE	
DEFICIENT	
POOR	

PROBLEMS NOTED: ☒ (C-1) None ☐ (C-2) Livestock Damage ☐ (C-3) Erosion or Gullies ☐ (C-4) Cracks with Displacement ☐ (C-5) Sinkholes ☐ (C-6) Appears too Steep ☐ (C-7) Depression or Bulges ☐ (C-8) Slide ☐ (C-9) Soft Areas ☒ (C-10) Trees, Brush, Briars ☐ (C-11) Animal Burrows ☐ (C-12)Other_____

Comments: Brush piles were observed at downstream end of the right groin.

D SEEPAGE

GOOD (NONE)	X
ACCEPTABLE	
DEFICIENT	
POOR	

PROBLEMS NOTED: ☒ (D-1) None ☐ (D-2) Saturated Embankment Area ☐ (D-3) Seepage Exits on Embankment ☐ (D-4) Seepage Exits at Point Source ☐ (D-5) Seepage Area at Toe ☐ (D-6) Flow Adjacent to Outlet ☐ (D-7) Seepage Clear/Muddy

[**DRAIN OUTFALLS SEEN** X No ___ Yes ☐ (D-8) Flow Clear/Muddy ☐ (D-9) Dry/Obstructed]

☐ (D-10) Other_____Describe location of drains and indicate amount and quality of discharge.

Comments: None

E PRINCIPAL SPILLWAY

GOOD	
ACCEPTABLE	X
DEFICIENT	
POOR	

DESCRIPTION: A 329-foot long concrete ogee-type (curved crest) structure located in a valley northeast of the dam.

PROBLEMS NOTED: ☐ (E-1) None ☒ (E-2) Deterioration ☐ (E-3) Separation ☒ (E-4) Cracking ☐ (E-5) Inlet, Outlet Deficiency ☐ (E-6) Stilling Basin Inadequacies ☐ (E-7) Trash Rack ☐ (E-8) Other_____

Comments: The concrete ogee section and training walls appeared unchanged since the 2010 inspection. Minor erosion occurred immediately downstream of the end sill of the spillway. Some joints offset 1/2" to 3/4" and joint filler was squeezed out. However, a joint in the upper end of the right training wall had widened slightly over an inch. These conditions were old and the spillway appeared to be in satisfactory condition. The remnant of a small tree and "mud dauber nests" were on the lower end of the right training wall. Iron bacteria were present at outlet pipes at downstream toe, near midpoint of spillway.

F AUXILIARY SPILLWAY

GOOD	
ACCEPTABLE	
DEFICIENT	
POOR	

DESCRIPTION:_____

PROBLEMS NOTED: ☐ (F-1) None ☒ (F-2) No Auxiliary Spillway Found ☐ (F-3) Erosion-with Backcutting ☐ (F-4) Crack with Displacement ☐ (F-5) Appears to be Structurally Inadequate ☐ (F-6) Appears too Small ☐ (F-7) Inadequate Freeboard ☐ (F-8) Flow Obstructed ☐ (F-9) Concrete Deteriorated/Undermined ☐ (F-10) Other _____

Comments:

G MAINTENANCE AND REPAIRS

GOOD	
ACCEPTABLE	
DEFICIENT	
POOR	

PROBLEMS NOTED: ☐ (G-1) None ☐ (G-2) Access Road Needs Maintenance ☐ (G-3) Cattle Damage ☐ (G-4) Spillway Obstruction ☐ (G-5) Brush, Weeds, Tall Grass, on Upstream Slope, Crest, Downstream Slope, Toe ☐ (G-6) Trees on Upstream Slope, Crest, Downstream Slope ☐ (G-7) Rodent Activity on Upstream Slope, Crest, Downstream Slope, Toe ☐ (G-8) Deteriorated Concrete-Facing, Outlet, Spillway ☐ (G-9) Gate and/or Drawdown Need Repair ☐ (G-10) Other _____

Comments: Refer to page 3 of 6.

H OVERALL CONDITIONS

Based on this inspection and recent file review, the overall surficial condition is determined to be: ☒ (H-1) Satisfactory ☐ (H-2) fair ☐ (H-3) Conditionally Poor ☐ (H-4) Poor ☐ (H-5) Unsatisfactory

IMPORTANT: IF THIS RATING IS DIFFERENT THAN PREVIOUS IDNR RATING, PLEASE ATTACH EXPLANATION AND REASONS FOR CHANGE ON PAGE 4.

DAM NAME Lake Lemon Dam STATE DAM I.D. 58-1 DATE 10 / 29 / 12

x

RECOMMENDATIONS AND ITEMS REQUIRING ACTION BY OWNER TO IMPROVE THE SAFETY OF THE DAM

MAINTENANCE-MINOR REPAIR-MONITORING

☐ (1) Provide Additional Erosion Protection: _____

☐ (2) Mow: _____

☐ (3) Clear Trees and/or Brush From: Remove the pile of brush and excessive vegetation near the toe of downstream slope, near right groin; remove fallen tree and debris near inlet of the intake structure.

☐ (4) Initiate Rodent Control Program and Properly Backfill Existing Holes: _____

☒ (5) Repair: See below*

☐ (6) Provide Surface Drainage For: _____

☒ (7) Monitor: possible seep along downstream toe of embankment; following high pools, monitor for channel erosion in area downstream of spillway's end sill and monitor for water/seeps in area downstream of right groin of downstream embankment; monitor animal activities on the embankment; monitor stability and erosion condition of the banks downstream of stilling basin; monitor any movement of the spillway.

☒ (8) Other: _____

☒ (9) Other: _____

ENGINEERING-EMPLOY AN ENGINEER EXPERIENCED IN DESIGN AND CONSTRUCTION OF DAMS TO:

(Plans & Specifications must be approved by State prior to construction.)

☐ (10) Prepare Plans and Specifications for the Rehabilitation of the Dam: _____

☐ (11) Prepare As-Built Drawings of: _____

☐ (12) Perform a Geotechnical Investigation to Evaluate the Stability of the Dam: _____

☐ (13) Perform a Hydrologic Study to Determine Required Spillway Size: _____

☐ (14) Prepare Plans and Specifications for an Adequate Spillway: _____

☐ (15) Set up a Monitoring Program: _____

☐ (16) Refer to Unapproved Status of Dam: _____

☒ (17) Develop an Emergency Action Plan: for this high-hazard project.

☐ (18) Other: _____

☐ (19) Other: _____

*(5) Repair: repair scoured area downstream of end of stilling basin; remove the remnant of a small tree and mud dauber nests from right training wall of spillway; seal all joints and cracks in training walls of spillway; remove iron bacteria from outlet pipes of spillway; replace or repair loose seating strip on the right side of the sluice gate.

Recommended schedule for upgrades/comments (Please prioritize and note importance of each item.) _____

Photographs ☐ Attachments ☐

ENGINEER'S INSTRUCTION Instructed owner on the safety concerns with the structure and how to monitor and inspect the dam and appurtenant works in the interim period between the regulatory two-year inspections. Yes ☒ No ☐

Comment Recommended that lake manager continue to visually monitor possible seep on a regular basis and after significant rainfall events. Contact a qualified engineering firm if any changes are noted.

Professional Engineer's Signature _____ Date 10/29/12

Reviewed By Robert E Madden, LLCD DISTRICT MANAGER Date 12/28/12

Owner/Owner's Representative

EXPLANATION FOR CHANGE IN RATINGS (Describe all repairs, upgrades or improvements made if dam conditions and rating have improved since the last inspection. Describe deteriorating conditions if ratings have worsened.)

REASONS FOR RATING CHANGE:

PREVIOUS RECOMMENDATIONS FOR MAINTENANCE, REPAIRS, AND UPGRADES:

HAVE THEY BEEN PERFORMED ☒ YES ☐ NO (If no, please explain:)

* An emergency action plan still needs to be prepared.

Supporting Documentation

Photographs ☒ Attachments ☐ Calculations ☐ Drawings ☐ Other ☐

Comments:

INSTRUCTIONS FOR COMPLETING DAM VISUAL INSPECTION REPORT

1. Complete all items that are applicable; if not applicable, write in "N/A". For concrete dams, complete all applicable items and use "comments" section to cover items not included in the check boxes. Also indicate that the dam is concrete in the comments section.

2. Use page 6 to determine ratings of each dam component (items A through G) and for Overall Conditions (Item H).

3. Please write legibly and concisely.

4. Inspector must be knowledgeable with the type of dam, materials, and components being inspected. If not, qualified assistance shall be engaged.

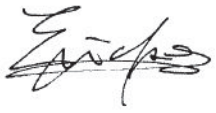
5. The inspector shall review the dam owner's and IDNR project files prior to the inspection. Previous inspection reports shall be closely reviewed for previous problems and deficiencies.

6. If the ratings of the components (items A through G) or the Overall Conditions (item H) of the dam have changed since the last inspection, please complete page 4. If a rating has improved, dam repairs, improvements, analyses, or maintenance must have been performed and documented on page 4.

7. For a dam to have a satisfactory "Overall Conditions" rating, it must have no existing or potential dam safety deficiencies recognized. Safe performance is expected under all anticipated loading conditions, including infrequent hydrologic events (PMP for high hazard dams) and seismic events. The dam owner's project files must contain hydrologic and hydraulic analyses of the dam and its spillways to verify performance. The files must also contain slope stability analyses to verify embankment stability under full reservoir conditions and rapid-draw down conditions. The dam and all of its components must meet current IDNR and design standards. "Normal" deficiencies such as minor erosion, minor seepage, or normal concrete aging may not make a dam unsatisfactory or unacceptable. For a satisfactory "Overall Conditions" rating to be assigned, items A through G generally should all have a "good" rating; however, in some cases an "acceptable" rating may be satisfactory if the "Problems Noted" are minor, or "normal" conditions, such as minor erosion rills, small puddles on crest, or if grass needs mowed, but is in good condition.

8. This inspection report form must be submitted to IDNR along with a formal technical inspection report as described in Chapter 4.0 of Part 3 of the Indiana Dam Safety Inspection Manual.

9. Please sign and date this page in the space below to verify that you have read and understand these instructions.

Inspector's Signature:  Date: 10-29-12

GUIDELINES FOR DETERMINING CONDITIONS

CONDITIONS OBSERVED - APPLIES TO UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, PRINCIPAL SPILLWAY, AUXILIARY SPILLWAY

GOOD	ACCEPTABLE	DEFICIENT	POOR
In general, this part of the structure has a good appearance, and conditions observed in this area do not appear to threaten the safety of the dam.	Although general cross-section is maintained, surfaces may be irregular, eroded, rutted, spalled, or otherwise not in new condition. Conditions in this area do not currently appear to threaten the safety of the dam.	Continued deterioration and/or unusual loading may threaten the safety of the dam.	Conditions observed in this area appear to threaten the safety of the dam. Conditions observed in this area are unacceptable.

CONDITIONS OBSERVED - APPLIES TO SEEPAGE

GOOD (NONE)	ACCEPTABLE	DEFICIENT	POOR
No evidence of uncontrolled seepage. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions do not appear to threaten the safety of the dam.	Some seepage exists at areas other than the drain outfalls, or other designed drains. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions observed do not currently appear to threaten the safety of the dam.	Excessive seepage exists at areas other than drain outfalls and other designed drains. Seepage needs to be evaluated. Increased flow and/or continued deterioration in seepage conditions may threaten the safety of the dam.	Excessive seepage conditions observed appear to threaten the safety of the dam and is unacceptable. Examples: 1) Designed drain or seepage flows have increased without increase in reservoir level. 2) Drain or seepage flows contain sediment. i.e., muddy water or particles in jar samples. 3) Widespread seepage, concentrated seepage or ponding appears to threaten the safety of the dam.

CONDITIONS OBSERVED - APPLIES TO MAINTENANCE AND REPAIR

GOOD	ACCEPTABLE	DEFICIENT	POOR
Dam appears to receive effective on-going maintenance and repair, and only a few minor items may need to be addressed.	Dam appears to receive maintenance, but some maintenance items need to be addressed. No major repairs are required.	Level of maintenance of the dam needs significant improvement. Major repairs may be required. Continued neglect of maintenance may threaten the safety of the dam.	Dam does not receive adequate maintenance. One or more items needing maintenance or repair has begun to threaten the safety of the dam. Level of maintenance is unacceptable.

OVERALL CONDITIONS

SATISFACTORY - No existing or potential dam safety deficiencies recognized. Safe performance is expected under all anticipated loading conditions, including such events as infrequent hydrologic and/or seismic events. Project Files contain necessary hydrologic, and other engineering calculations to verify dam safety and performance.

FAIR - No existing dam safety deficiencies are recognized for normal loading conditions. Infrequent hydrologic and/or seismic events would probably result in a dam safety deficiency.

CONDITIONALLY POOR - A potential safety deficiency is recognized for unusual loading conditions which may realistically occur during the expected life of the structure. CONDITIONALLY 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.

POOR - A potential dam safety deficiency is clearly recognized for normal loading conditions. Immediate actions to resolve the deficiency are recommended; reservoir restrictions may be necessary until problem resolution.

UNSATISFACTORY - A dam safety deficiency exists for normal conditions. Immediate remedial action is required for problem resolution.

HAZARD CLASSIFICATIONS OF DAMS (STRUCTURE)

LOW HAZARD- A structure the failure of which may damage farm buildings, agricultural land, or local roads

SIGNIFICANT HAZARD- A structure the failure of which may damage isolated homes and highways, or cause the temporary interruption of public utility services.

HIGH HAZARD-A structure the failure of which may cause the loss of life and serious damage to homes, industrial and commercial buildings, public utilities, major highways, or railroads.

UNAPPROVED STATUS OF DAM

A dam that has been given an unapproved status (see entry for permit) means that plans, construction specifications, hydraulic analyses, and/or a geotechnical investigation on your dam, proving the safety of the structure, have not been received and approved by the Indiana Department of Natural Resources (IDNR). IDNR records indicate that no progress has been made to secure this approval. The fact that the dam is inspected under the Regulation of Dams Act (IC 14-27-7.5) in no way alters the illegal status of the structures.

If your dam is indicated to be unapproved, it is requested that your engineer contact the Indiana Department of Natural Resources,

APPENDIX III

Outlet Works Inspection Reports By CDS

C.D.S. Construction Co., Inc.

A Division of ADS & Associates

- MARINE CONTRACTING
- CONSULTING ENGINEERS
- FIBER OPTIC INSTALLATION
- DESIGN & FABRICATION

Keith Elkins, President / CEO
(502) 937-8061 Office
(502) 937-3970
(502) 937-3971 Fax

October 16, 2012

Lake Lemon Conservancy District / City of Bloomington
7599 North Tunnel Rd.
Unionville, Indiana 47468

Attention: Bob Madden
RE: Dive Work 10/11/2012- Bar Screen and Ladder installation

The CDS dive crew arrived onsite October 11th, 2012 at 6:00 am EST, prepped workboat and hung the new replacement bar screen section. The crew waited for first light to set off across the lake. At approximately 9:00 am, the dive crew was onsite over the intake structure. The diver entered the water around 9:15 am and went to work checking the intake structure for any existing debris and finished removing any pre-existing bar screen sections. The diver finished prepping the structure, and the topside crew began lowering the new bar screen section, whilst the diver centered it on the structure. A few minor adjustments were made via a chain com-a-long underwater to achieve square on the structure. The diver then attached the bar screens with six, 6" drop-in wedge anchors drilled into the concrete, and secured down. Upon completion the diver exited the water, and was done working on the intake structure.

*Note: During the inspection, two weeks prior the diver noted a multitude of large, full trees lying on bottom all around the intake structure. This could make for a blockage issue on the bar screens, in the future.

The dive crew then went back to the boat ramp and secured the new replacement ladders, and set up to dive the sluice gate chamber on the dam. The crew drilled and anchored a new supplemental handhold above the chamber to assist in egress in and out of the hole. The diver then entered the water and made an inspection of the chamber and finished removing any remaining ladder material to prep for the new ladder installation. The crew then assembled the three ladder pieces and set in the sluice chamber. The top rungs were anchored into the wall by the topside crew whilst the diver anchored eight more, 4 ¼" drop-in wedge anchors into the wall securing the ladder. The diver, after discussing an increase in water flow with Mr. Madden, also inspected the sluice gate and found that a ¼" by 3" rubber seating strip had become loose on the right side of the gate, however could not remove.

While the diver was in the water anchoring the ladder, one of the crew members went down the backside of the dam to the outfall and removed several trees that had fallen, and were atop the outfall structure, as per the request of the inspection engineer. At this point the CDS crew finished all work, broke down the jobsite, locked up the gate chamber area, and left site at approximately 11:30 pm. The next morning crew returned to site to remove debris and clean site.

Regards,

Frank Nevitt
CDS Diver

C.D.S. Construction Co., Inc.

A Division of ADS & Associates

* MARINE CONTRACTING
* CONSULTING ENGINEERS
* FIBER OPTIC INSTALLATION
* DESIGN & FABRICATION

Keith Elkins, President / CEO
(502) 937-8061 Office
(502) 937-3970
(502) 937-3971 Fax

Lake Lemon Conservancy District/ City of Bloomington
7599 North Tunnel Rd.
Unionville, IN 47468

Attention: Bob Madden
RE: Dive Inspection Fall of 2012- Sluice gate and sluice gate well inspection, and 42" intake conduit inspection.

The CDS crew arrived onsite on September 26, 2012 at 9:51am EST. The Dive crew was onsite to perform bi-annual inspection of intake structure and to remove old ladder and bar screens for this the crew brought a dive boat to assist in removal of bar screens. The crew decided to take advantage of having dive boat on site, to broaden the inspection. At this time the crew launched dive boat and proceeded across lake to structure. From Exterior of intake the crew set up dive station and diver entered water. The diver then inspected the outside of structure and found that just on outside of intake there were some large sized trees and debris that at this time were not impeding the intake structure. The diver then penetrated the 42" intake conduit over halfway making sure there was no debris. The conduit was found to be debris free.

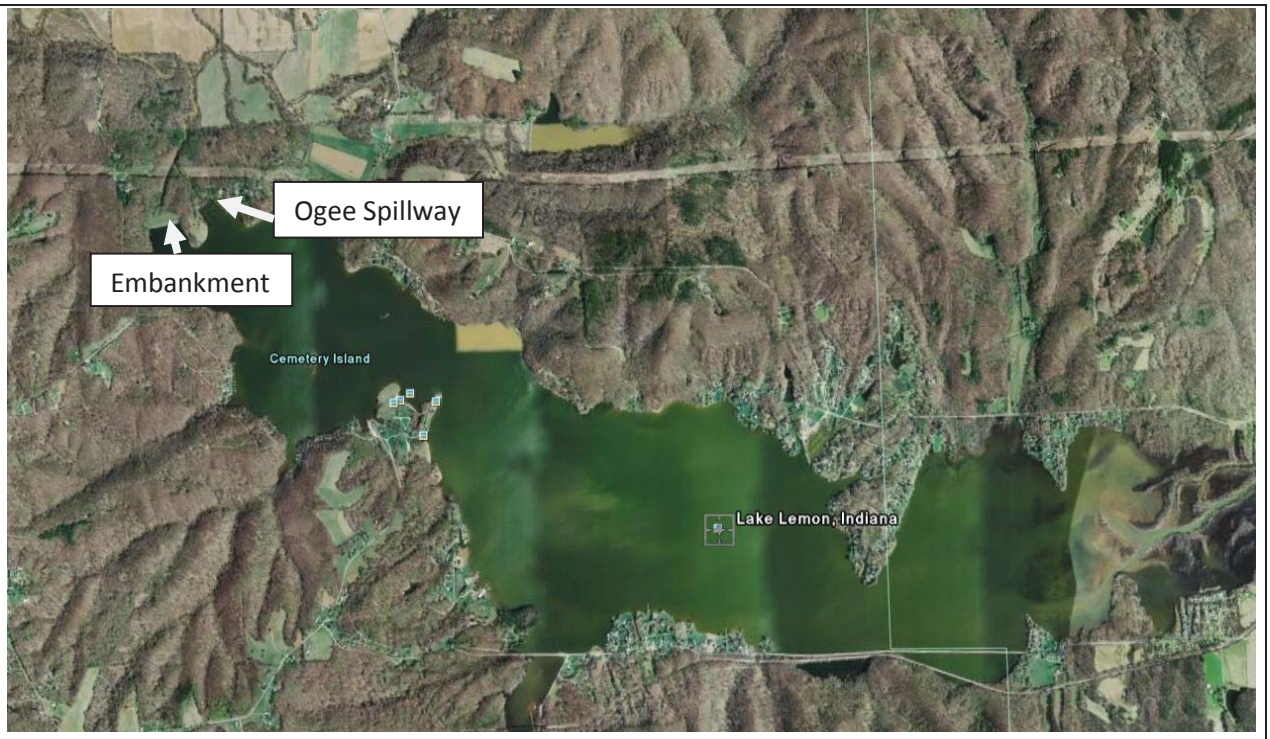
Upon completion crew then went to shore to enter sluice gate structure, at this time gate was in closed position crew operated gate to flush structure for approx. 15 minutes. Gate was then closed before diver entered water. The diver inspected stem, stem guides, and all frame bolts and was found to be all tight. Diver then entered 42" intake conduit to complete inspection. At this time there was no debris in intake conduit. It was brought to the attention of the CDS crew that on the outfall there were a few small trees lying across outfall. Upon return to install new ladders and bar screens the CDS crew agreed to remove debris from outfall. The CDS crew then greased operator and marked stem open and closed position limit. The crew proceeded to clean site and stow away dive gear. Crew then headed back to boat ramp to load boat. The CDS crew departed site at approx. 3:00pm EST.

Sincerely,

Keith Elkins
President/CEO

APPENDIX IV

Picture of Dam Embankment and Spillway



Picture of Dam Embankment

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Name of Dam	Inspector	Date
Lake Lemon	Eric W. Tse	September 26, 2012

APPENDIX V

Precipitation Records for Bloomington, Indiana

History for Bloomington, IN

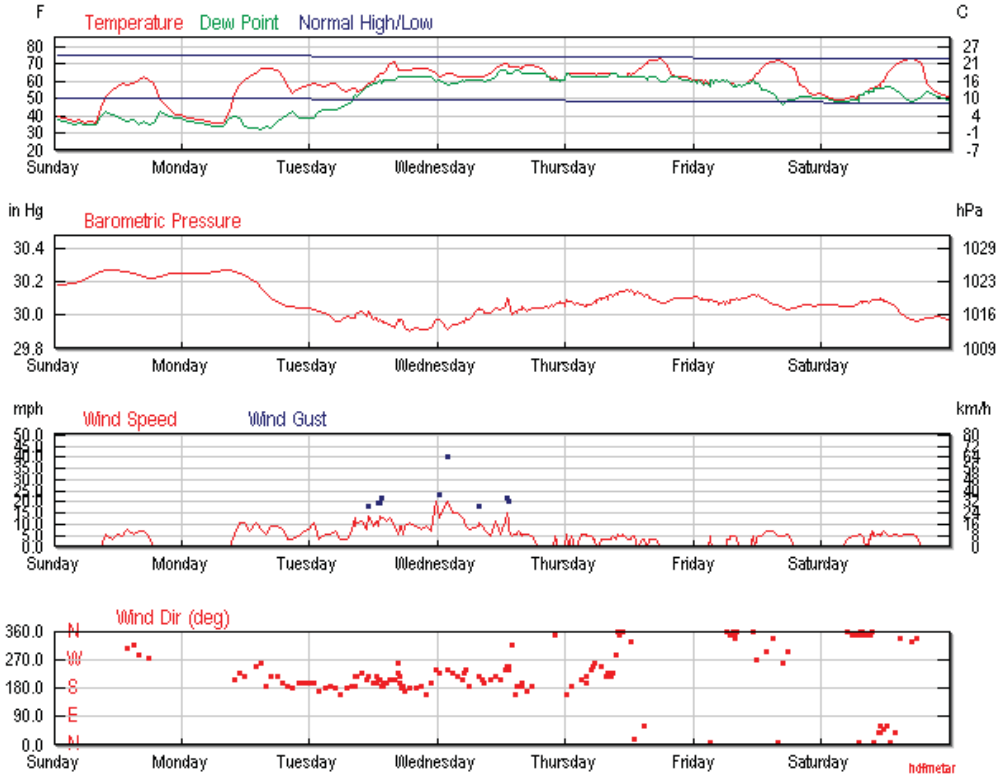
Week of September 23, 2012 through September 29, 2012

Week of September 23, 2012 through September 29, 2012

« Previous Week | September 26 2012 View | Next Week »

Daily | **Weekly** | Monthly | Custom

	Max	Avg	Min	Sum
Temperature				
Max Temperature	**74** °F	**70** °F	**63** °F	
Mean Temperature	**67** °F	**60** °F	**49** °F	
Min Temperature	**60** °F	**49** °F	**35** °F	
Degree Days				
Heating Degree Days (base 65)	16	5	0	38
Cooling Degree Days (base 65)	2	0	0	2
Growing Degree Days (base 50)	18	10	0	68
Dew Point				
Dew Point	**66** °F	**52** °F	**32** °F	
Precipitation				
Precipitation	**0.71** in	**0.19** in	**0.00** in	**1.35** in
Snowdepth	-	-	-	-
Wind				
Wind	**32** mph	**4** mph	**0** mph	
Gust Wind	**44** mph	**20** mph	**16** mph	
Sea Level Pressure				
Sea Level Pressure	**30.27** in	**30.09** in	**29.90** in	



Certify This Report

Daily Observations

2012	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
Sep	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	high	sum	
23	63	49	35	42	38	35	100	70	39	30.27	30.23	30.18	10	10	10	13	2	17	0.00	
24	68	52	35	42	37	32	92	60	28	30.27	30.18	30.04	10	10	10	14	5	17	0.00	
25	71	63	54	63	56	39	97	72	47	30.03	29.97	29.90	10	8	2	21	9	32	0.50	Rain , Thunderstorm
26	70	65	60	66	62	58	100	92	84	30.10	30.03	29.91	10	6	0	32	7	44	0.71	Fog , Rain , Thunderstorm
27	73	67	60	64	63	60	100	82	64	30.15	30.10	30.05	10	4	0	8	2	12	0.13	Fog , Rain , Thunderstorm
28	72	62	51	61	57	46	100	71	41	30.12	30.08	30.03	10	4	0	9	2	14	0.01	Fog , Rain
29	74	61	48	57	52	48	100	71	41	30.10	30.05	29.96	10	6	0	8	3	13	0.00	Fog

Comma Delimited File