



## Saylorville Lake Frequently Asked Questions March 27, 2010

### 1. Why was Saylorville Lake built?

RESPONSE: Saylorville Lake, built and maintained by the U.S. Army Corps of Engineers, Rock Island District, and put into operation in 1977, is operated as a multi-purpose reservoir. The primary purpose authorized by Congress is flood control for areas below the lake. However, the lake must also be operated to ensure its flood-control pool does not impact areas above the lake. Other project purposes include water supply, low flow augmentation, fish and wildlife, and recreation.

Saylorville Lake also operates to provide water supply for the State of Iowa which serves City of Des Moines and down stream utility needs and maintains a conservation pool to augment low Des Moines River flows during times of drought. The lake provides fish and wildlife benefits and also implements a fall pool raise to accommodate migrating bird species, but the lake level is dropped to the authorized conservation pool level before entering the winter period.

### 2. Are there any benefits for operating Saylorville Lake?

RESPONSE: Since placed in operation in 1977, it is estimated that by reducing the flows of the Des Moines River below the lake, the reservoir has prevented approximately \$181,932,300 in additional flood damages.

### 3. How do you operate Saylorville Lake?

RESPONSE: Saylorville Lake's pool is maintained at an elevation of 836' throughout the year, with the exception of a fall pool raise that varies from 836' to 840'. At 836', Saylorville Lake has 5,520 surface acres and stores 73,600 acre-feet of water for a distance of 24 miles upstream from the dam. The conservation pool occupies approximately 11.5 % of Saylorville's total storage capacity, leaving 88.5% strictly for flood storage capacity.

### 4. Why do you operate Saylorville Lake the way you do?

RESPONSE: The Lake is operated to conform to a strict, standard Regulation Plan that is coordinated by the Corps of Engineers with local, state and federal agencies with water resources responsibilities. This standard includes regulation of releases during fall, spring summer, winter and flood events. Pool levels must be maintained for authorized project purposes. Project purposes include flood control, water supply, low flow augmentation, fish/wildlife management and recreation.

### 5. How was the Regulation Plan developed?

RESPONSE: Federal reservoirs such as Saylorville Lake operate under Congressionally approved water Regulation Plans that are developed through analysis of all the authorized uses of the project. These plans were coordinated and developed with other federal agencies, state agencies, stakeholders, and input from the public.

Because large reservoirs like Saylorville Lake have significant impacts to both the public and the environment, modifications of the Regulation Plan is performed only when necessary and is a very expensive and time consuming process. Environmental Assessments (EA) or Environmental Impact Statements (EIS) are generally required as a part of the process

## **6. Have you modified the Regulation Plan and why?**

RESPONSE: Three minor changes have occurred since the Regulation Plan went into affect. Revisions occurred in September 1983, September 1999 and May 2001.

The first change in 1983, initiated a water supply contract with the state of Iowa that increased the conservation pool from 833' to 836' to guarantee 99% reliability of water supply needs while maintaining a steady pool at 836'.

Additional changes allowed us to increase the maximum release to 16,000 cfs during the growing season as long as Lake Red Rock was below elevation 758' and allowed flexibility in raising the pool by as much as 4' for the fall pool raise.

## **7. Why do we maintain the pool at 836'?**

RESPONSE: The 836' conservation pool is a balance that tries to maximize all of the reservoir benefits and authorized purposes and allows the lake to store an additional 54' of water on top of that if needed. Failure to keep the required levels for water supply would violate the contract with the State of Iowa and could be detrimental to meeting water demands in areas below the lake. Drought operation is part of the water regulation plan.

The lake's 836' conservation pool level is maintained to allow for snowmelt runoff, and for predicted and actual rainfall, to minimize downstream flooding. The pool level is also maintained to ensure minimal bank erosion which contributes to sedimentation on the lake floor, flood control, water supply, low flow augmentation, fish and wildlife, and recreation.

## **8. Why don't we lower the pool to the bottom of the lake?**

RESPONSE: Reducing the lake's conservation pool does not provide significant flood storage capacity because the Des Moines River Basin is shaped much like a V and the lower few feet of water have very little volume. The 73,600 acre feet in the conservation pool would fill in 12 to 18 hours at the maximum inflow rates experienced in 2008. Additionally, drastically lowering the pool in the spring would result in bank sloughing and increase the risk for fish kills and significant ice jams at the controlling works which could prevent the efficient release of flood waters and cause the pool to rise more rapidly.

## **9. What are your different pool levels?**

RESPONSE: Saylorville Lake's conservation pool level of 836' National Geodetic Vertical Datum 29 (NGVD29) occupies approximately 11.5% of the lake's total storage capacity. The conservation pool consists of approximately 73,600 acre feet of water (23.982 billion gallons) that must be maintained for authorized project purposes to include providing state-contracted water supply.

Flood storage above the conservation pool to the full 890' flood storage pool elevation occupies 88.5% of the Lake's total storage capacity. At full flood-pool elevation of 890', Saylorville Lake has 16,100 surface acres and stores approximately 641,000 acre-feet of water (208.870 billion gallons) for a distance of 54 miles upstream from the dam.

In the fall, at the request of the Department of Natural Resources, we may vary the pool between 836' to 840' for wildlife conservation purposes. Over the years, this pool raise has typically been 2'.

## **10. Is Saylorville dam safe?**

RESPONSE: Saylorville dam was built to stringent engineering standards to ensure it will withstand record flood events. The dam is under observation to ensure its structural integrity and safety. During normal operating conditions, the Corps evaluates pressure on the dam on a regular basis. The dam is visually inspected on a regular basis under normal operating conditions and is visually inspected several times a day during flood events.

### **11. How do you monitor Saylorville dam's safety?**

RESPONSE: Piezometers, permanently located at different elevations within the dam, are used at some locations. A piezometer measures internal hydrostatic pressures of the dam. During flood events, piezometers are evaluated at varying frequencies based on the pool level. The dam is designed to withstand enormous pressures and water levels. Minor erosion adjacent to the outlet works can occur during major flood events but does not impair the structural integrity of the dam.

### **12. How does the dam work (during non-flood situations)?**

RESPONSE: Under non-flood conditions, the dam releases water through its outlet channel located at the base of the dam. The outlet channel is a single circular concrete conduit, 22' in diameter, located at the bottom of the west bluff. The control structure is located at the upstream end of the conduit and houses three gates, which have the capability of releasing a maximum outflow of 21,000 cubic feet of water per second (cfs); approximately 157,500 gallons of water. A stilling basin is provided to dissipate the energy of the discharge from the outlet conduit.

### **13. How does the dam work (during flood situations)?**

RESPONSE: During abnormal or extensive snowmelt and rainfall occurrences, the pool level will rise as releases are kept low to minimize downstream flooding. As the pool rises, the water level will eventually reach the lake's flood-storage pool level. When the lake pool level exceeds full flood storage level, Saylorville Lake will release water through its conduit pipe and over the spillway.

Under normal conditions, the dam releases water through a gated 22' diameter-conduit located at the base of the dam. The conduit's maximum outflow is 21,000 cfs when the reservoir is nearly full and all the head pressure from the high lake level is pushing water out the conduit. Since the 1993 flood, the Corps has incorporated an inflatable dam (pneumatic crest gates) that, when inflated, provides an additional 6 feet of spillway elevation to 890'. However, if the pool level is forecast to rise above 890', the inflatable dam will be lowered as we do not have the legal authority to maintain the pool above 890' and structures were built to accommodate the designed flood storage requirements.

### **14. Have you done anything differently during this flood?**

RESPONSE: We are required by law to follow the water Regulation Plan. Small deviations may be permitted by our higher headquarters if an official request comes from the state or major municipality.

This year we made two minor changes to the way we operate the Lake when we received requests from the City of Des Moines in an effort to keep the pool from overtopping the spillway.

On Monday, March 8, working with the City of Des Moines, the Corps implemented a deviation to operate the lake to control for a stage of 26 feet at the S.E. 6th Street gage in Des Moines, an increase of two feet above the authorized control stage of 24 feet. The deviation caused some minor flooding impacts to the City of Des Moines, but allowed higher outflows between March 8 and April 20 to keep the lake at its lowest possible level without causing additional flood damages downstream.

To address the revised Lake elevation estimates, the Corps, working with the City, approved a second deviation in an effort to prevent an overtopping event. The new deviation, put into affect on Saturday, 13 March, abandoned the constraint at the S.E. 6th Street gage sooner than the current plan dictated, allowing as much as 21,000 cfs of water to be released from Saylorville Lake. This translates to river levels about 10 feet below the top of the Central Place and Birdland Park levees in downtown Des Moines. The conduit gates were completely opened on 13 March 2010 at about 10:30am.

By adjusting the Lake's Regulation Plan and increasing releases to 21,000 cfs one week earlier than the S.E. 6th Street gage constraint allows, the Lake may be able to keep flood waters from overtopping the

spillway's pneumatic crest gates. Operation of the lake at this level was to stave off the projected peak inflow of approximately 48,000 cfs.

**15. What does the spillway do?**

RESPONSE: The spillway is designed to pass excessive inflows when the lake exceeds its flood-control pools. Without a spillway, the lake could not be operated to release large inflows and the water levels would continue to rise. High lake water levels could cause overtopping of the dam and possibly cause erosion of the downstream side of the structure. High lake water levels can also raise hydrostatic pressures behind the dam to unsafe levels.

**16. What do you do differently during flood situations?**

RESPONSE: During flood control operations, weather parameters are evaluated on an hourly basis to consider rainfall in the drainage area above the lake; rainfall below the lake; and National Weather Service rainfall predictions over a 24-hour period. This information is used by the Corps to anticipate inflows to the lake and make adjustments to release rates to conserve flood storage capacity and minimize both up-river and down-river flooding.

The Corps has purchased flowage easements or fee title rights from private land owners adjacent to the lake to operate the pool up to 890'. When the lake approaches that level, the Corps must release water to ensure property above that elevation is not flooded, if at all possible.

**17. Where is Saylorville Lake located?**

RESPONSE: Saylorville Lake is located 11 miles upstream from Des Moines on the Des Moines River.

**18. How big is Saylorville Lake?**

RESPONSE: The dam is an earth-filled structure, 6,750' long, 105' high, and 44' wide at the top. The dam has a 430'-wide concrete spillway at an elevation of 884' National Geodetic Vertical Datum (NGVD) 29. A 5,823 square-mile watershed flows into Saylorville Lake.

**19. What are the record levels for Saylorville Lake?**

RESPONSE: The record high pool elevation at Saylorville Lake was 892.03' on July 11, 1993. Since the dam was completed in 1977, the pool has reached the spillway five times in 1984, 1991, in April and July 1993, and in June 2008.