

SEED REPORT
ON
RICKS ESTATE DAM
NATIONAL PARK SERVICE
HOT SPRINGS NATIONAL PARK, ARKANSAS
SOUTHWEST REGION

AUG 1984

Prepared by
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C. Historical Events

- 1901 (Approximate) - Completed construction of the dam by the Fordyce Family.
- 1932 (Approximate) - Dam acquired by the Ricks Family.
- 1972 - Dam acquired by NPS.
- 1982, June 10 - Bureau onsite SEED examination.

D. Emergency Preparedness

1. Access to the Site

The dam is located in Hot Springs National Park, immediately adjacent to the city of Hot Springs, Arkansas (fig. CE-1). Access to the dam from Hot Springs National Park Headquarters is via Central Avenue 2.6 miles north-northeast to Stonebridge Road, and 0.1 mile north to the dam. This route crosses the Gulpha Creek tributary on which the dam is located, below the dam. Should it become necessary, the dam can be accessed via Central Avenue to Mountain Valley to Stonebridge Road, and to the dam from upstream.

The above-noted roads are located in an urban area and continuously maintained.

Commercial air service is available in Hot Springs. Access to the site is considered adequate.

2. Communications

There are no communications facilities at the damsite. Telephone communications are available at park headquarters, and, as the dam is in an urban area, telephones would be available at nearby residences and businesses.

Backup communication is provided by the NPS radio system, through which NPS personnel can communicate, including NPS police, and local law enforcement agencies can be contacted.

Communications are considered adequate.

3. Warning System

There are no automated systems at the dam to warn responsible personnel of adverse conditions at the damsite. The dam is located in a patrolled national park and is accessed approximately once a day. As discussed in No. 8 below, an SOP for the dam should be developed. Required attendance under adverse conditions (high water, earthquake, etc.) would be included in these instructions. The warning system is considered satisfactory.

G. Structural Features

1. Seepage

During the June 10, 1982 onsite examination, the reservoir water surface was at the top of the overflow section of the dam (photo CE-2). Seepage was appearing along the downstream face of the dam (photo CE-2).

Seepage was primarily present in a 20-foot-wide area beginning approximately 30 feet from the left end of the crest and a 30-foot-wide area at the right end of the dam (photos CE-3 and -4).

The majority of the seepage apparently originates within approximately 1 to 2 feet of the depressed overflow sections of the crest. This area is constructed of smaller material than the lower portion of the dam and has deteriorated to a greater extent than the lower portion of the structure (see subsection G.2).

Seepage transmitted through the lower portions of the structure, the structure foundation contact, or through the foundation may be masked by the large flows existing at the higher elevations on the dam and running down the face and groins. Seepage is not monitored.

Existing seepage is not considered a threat to the safety of the dam. Due to the nature of the dam and foundation, a seepage-monitoring program is not considered warranted.

2. Dam

a. Description. - The dam is an ashlar stone gravity structure with a slight curvature. Crest length of the dam is approximately 122 feet at approximate elevation 613.2 near the maximum section. Crest elevation varies being 2 feet higher at the left abutment than at the center of the dam. Crest width varies from approximately 2 feet at the abutments to approximately 2.5 feet at the maximum section. The crest is a castellated overflow section and contains 16 depressed sections which are approximately 1.25 feet deep (photos CE-5 and -6). Width of the depressed areas totals approximately 31.5 feet.

The dam is about 16 feet in height above the streambed. The downstream face at the maximum section is vertical for 6.5 feet below the crest, with about a 1:1 slope below this elevation to the foundation (photo CE-7).

The upstream face is reported by NPS personnel to be vertical to the depth which can be seen above reservoir silt (approximately 9 feet). The dam is constructed of varying size blocks, with the larger units at the base, and the size decreasing to the crest (photo CE-7). The maximum size blocks noted in the lower courses were approximately 2.5 by 2.0 feet. Rock exposed in the downstream face appears to be of local origin, probably composed of cherty novaculite.

The composition of the interior of the structure is unknown, and may be of uniform rectangular masonry block construction throughout or rubble ashlar construction.

The spillway cap blocks are constructed of rubble masonry, with approximately 8-inch maximum size stones. The crest, including depressed sections, is surfaced and the cap blocks are faced with a thin concrete paving (photo CE-8).

b. Review of design. - No design data are available. As discussed in subsection a. above, composition of the interior of the dam is unknown.

The dam normally impounds water to the overflow level of the crest. There was no record of historical problems or instability in the limited written or verbal information available for the dam. Nor was there any indication of inadequate design in regard to "normal" loading conditions noted during the onsite examination. Based on these factors, design of the dam in regard to static stability under normal conditions is considered adequate.

There are additional considerations for which the stability of the dam should be evaluated, either analytically or qualitatively.

Silt has accumulated to within approximately 9 feet of the dam crest and may continue to accumulate. This additional loading condition will tend to reduce inherent stability. As subsequently discussed in subsection d., the dam has undergone some deterioration and reduction in structural integrity as indicated by seepage through the upper courses and loose cap blocks. A record of historical outflow depths was not included in information obtained for review, so the history of surcharge loading is unknown.

Additionally, due to the apparent reduction in integrity, the upper portion of the dam may not be presently stable under historical loading.

Depending on the IDF selected, IDF flow over the dam may be greater than any known or unknown historical loading. As noted in subsection F.2.b.(3), some erosion of the foundation may occur during high overflow conditions. There is a potential for a similar erosional problem with the dam considering its construction and existing condition, in addition to the question of rigid body stability under this loading condition.

A dynamic stability analysis of the dam was obviously not performed. As noted in subsection F.4.a., the dam is in an area of low seismicity. However, due to the type of construction and conditions of the top portion of the dam, an assessment of the probable response of the dam to seismic loading would be appropriate.

The extent of any of the above-noted evaluations should be based on the hazard potential classification selected, recognize the limited impoundment capability of the structure, and the apparently sound condition of the lower part of the structure.



Photo EG-1. Ricks Estate Dam - View of overflow crest.
6-10-82



Photo EG-2. Ricks Estate Dam - View of upstream left
abutment.
6-10-82



Photo EG-3. Ricks Estate Dam - View of downstream
left abutment. 6-10-82



Photo EG-4. Ricks Estate Dam - View of upstream right
abutment. 6-10-82



Photo EG-5. Ricks Estate Dam - View of downstream
right abutment. .6-10-82



Photo EG-6. Ricks Estate Dam - View of outlet works
gate and 8-inch cast iron discharge pipe. 6-10-82



Photo EG-7. Ricks Estate Dam - View of reservoir from
crest of dam. 6-10-82



Photo EG-8. Ricks Estate Dam - View of reservoir from
head end. 6-10-82



Photo CE-1. Ricks Estate Dam - View of dam from downstream
left abutment. 6-10-82

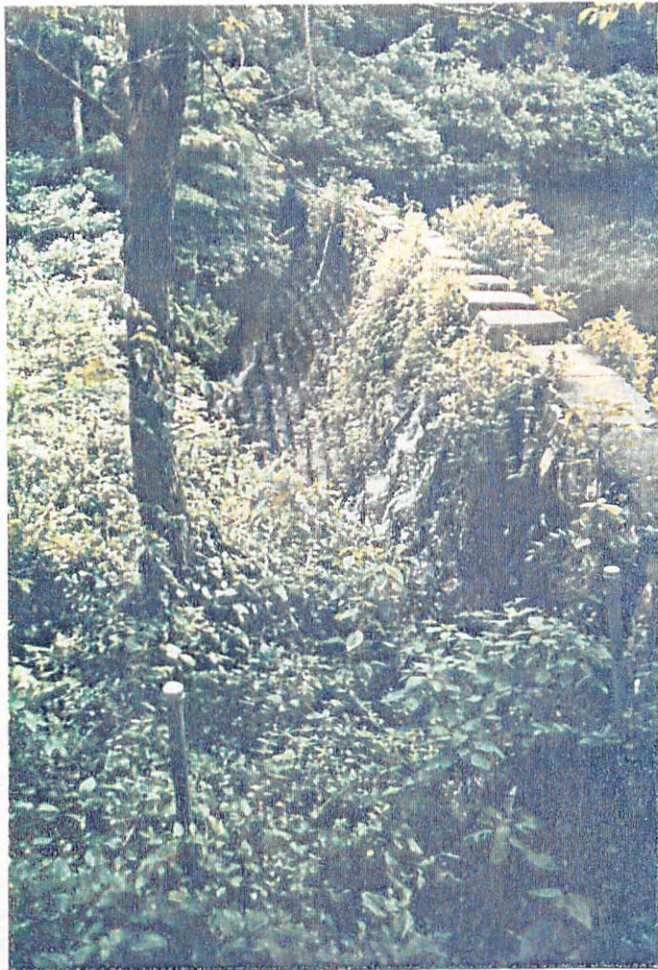


Photo CE-2. Ricks Estate Dam - Weir
along downstream face showing seepage
near right and left abutments. 6-10-82



Photo CE-3. Ricks Estate Dam - View of right portion of downstream face and groin from toe of dam. 6-10-82

Photo CE-4. Ricks Estate Dam - View of left portion of downstream face and groin. 6-10-82

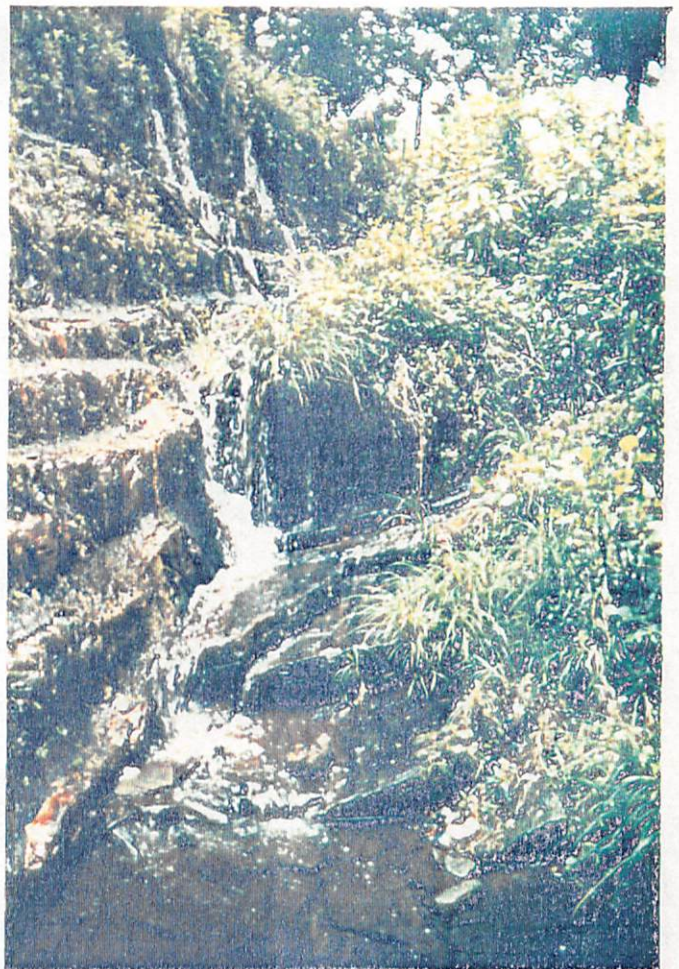




Photo CE-5. Ricks Estate Dam - View along crest of dam from left abutment. 6-10-82



Photo CE-6. Ricks Estate Dam - View along crest of dam from right abutment. 6-10-82

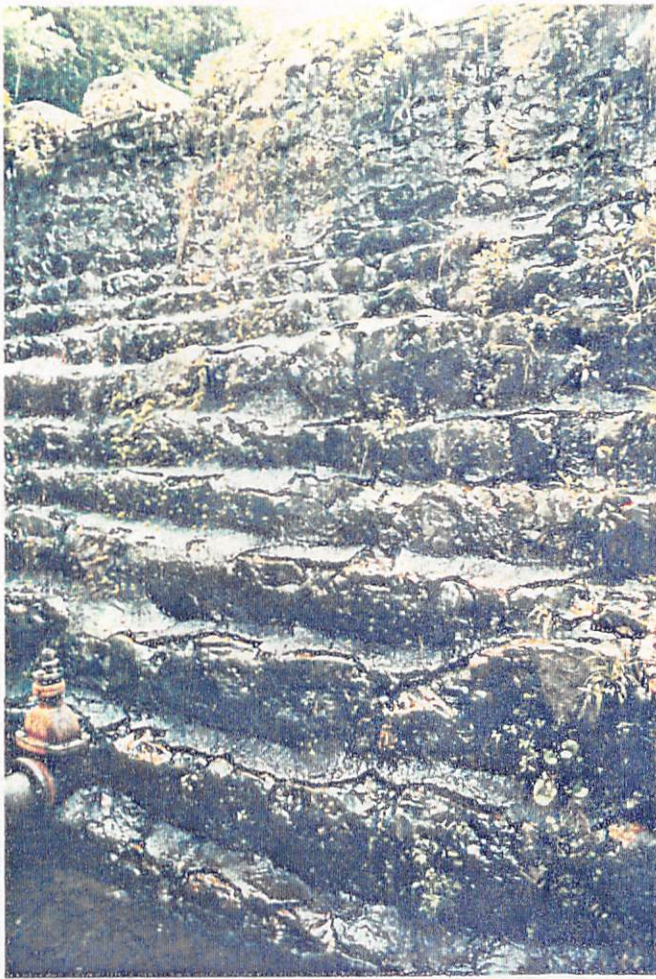


Photo CE-7. Ricks Estate Dam - View of maximum section of dam from downstream toe.
6-10-82



Photo CE-8. Ricks Estate Dam - Closeup view of section of crest.
6-10-82



Photo CE-9. Ricks Estate Dam - Closeup of downstream face near left abutment. 6-10-82



Photo CE-10. Ricks Estate Dam - Closeup of area on crest where stone has been lost from rubble masonry matrix. 6-10-82



Photo CE-11. Ricks Estate Dam - Downstream face of dam. 6-10-82



Photo CE-12. Ricks Estate Dam - Outlet works components exposed at downstream toe of dam. 6-10-82