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NATIONAL DAM INSPECTION PROGRAM. VALLEY-HI EAGLE LAKE DAM (NDS --ETC(U)
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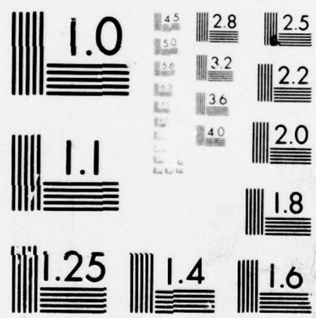

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SUSQUEHANNA RIVER BASIN

OREGON CREEK, FULTON COUNTY

PENNSYLVANIA

VALLEY–HI EAGLE LAKE DAM

NDS I.D. No. PA - 00186

PENNDER I.D. No. 29 - 33

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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PREPARED FOR

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

PREPARED BY

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SEPTEMBER 1979

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

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Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

(6) National Dam Inspection Program. Valley-Hi Eagle Lake Dam (NDS I.D. Number PA-00186, PennDer I.D. Number 29-33), Susquehanna River Basin, Oregon Creek, Fulton County, Pennsylvania. Phase I Inspection Report,

(10) Bernard M. Mihalcin

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

ABSTRACT

Valley-Hi Eagle Lake Dam: NDI I.D. No. PA-00186

Owner:	Valley-Hi Development Association, Inc.
State Located:	Pennsylvania (PennDER I. D. No. 29-32)
County Located:	Fulton
Stream:	Oregon Creek
Inspection Date:	9 August 1979
Inspection Team:	GAI Consultants, Inc. 570 Beatty Road Monroeville, Pennsylvania 15146

Based on a visual inspection and hydrologic/hydraulic analysis the overall condition of the facility is considered to be fair.

The size classification of the facility is small and the hazard classification is considered to be high. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) ranges between the 1/2 PMF (Probable Maximum Flood) and the PMF. Results of the hydrologic/hydraulic analysis indicate the facility will discharge and/or store only 24 percent of the PMF prior to overtopping of the embankment. Overtopping is expected to cause embankment failure, with the breaching analysis indicating that failure will probably result in an increase to potential for loss of life downstream of the facility. Therefore, the spillway system is considered to be seriously inadequate, and the facility unsafe, non-emergency.

Deficiencies noted by the inspection team included seepage and swamp-like conditions immediately downstream of the embankment toe and around the outlet conduit, heavily overgrown outlet and spillway discharge channels, an erosion ditch extending from the right abutment hillside to the downstream embankment toe along the embankment-abutment contact, deteriorated spillway concrete, several unvegetated areas along the embankment and adjoining spillway dike, and a submerged outlet conduit riser and control valve.

Due to the seriously inadequate spillway classification, it is recommended that the owner immediately develop and implement a warning system for the notification of downstream residents should emergency conditions develop. Included in the plan should be provisions for around-the-clock surveillance of the facility during periods of unusually heavy precipitation.

In addition, it is recommended that the owner:

a. Have the facility studied by a registered professional engineer, experienced in the hydraulics and hydrology of dams, and implement measures necessary to make the facility hydraulically adequate.

b. Remove the logs from the spillway approach and clear the downstream discharge channel of all obstructions to permit unimpeded flow.

c. Take positive measures to collect and channel the seepage from the area immediately downstream of the embankment toe into the outlet discharge channel, and clear the channel to eliminate ponding.

d. Visually assess the seepage during future inspections to ensure that it is not encroaching on the embankment toe.

e. Seed those areas of the embankment and spillway dike which are unprotected and subject to erosion.

f. Provide protection for the erosion ditch being developed along the right abutment-embankment contact.

g. Provide a more durable roadway surface along the crest (particularly near the right abutment) to curtail rutting of the crest by vehicular traffic.

h. Develop manuals of maintenance and operation to ensure continued care and proper maintenance of the facility. Included in the manuals should be provisions for operating the drawdown mechanism.

GAI Consultants, Inc.

Bernard M. Mihalcin

Bernard M. Mihalcin, P.E.

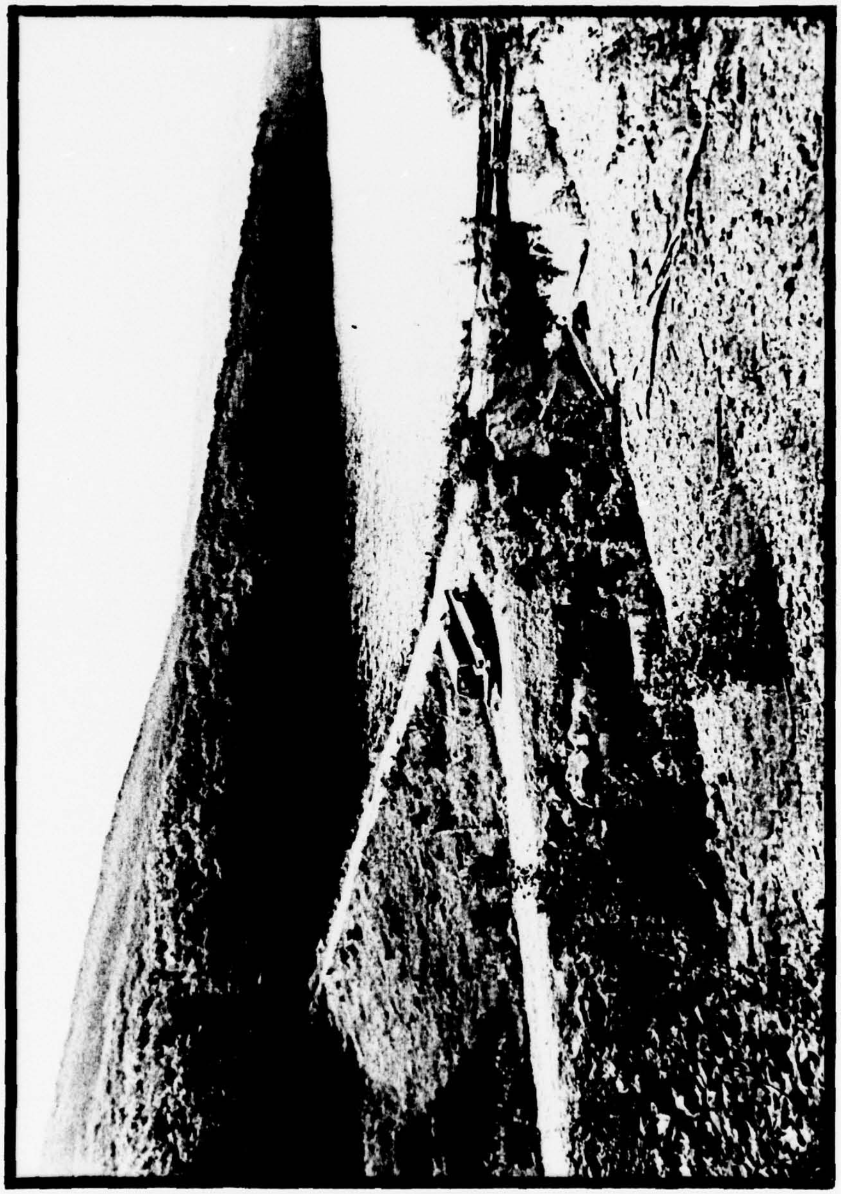
COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
BERNARD M. MIHALCIN
ENGINEER
20371-E

Date 17 Sept. 1979

Approved by:

James Peck

Date 25 Sep 79



OVERVIEW PHOTOGRAPH

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
VALLEY-HI EAGLE LAKE DAM
NDI# PA-186, PENNDER# 29-33

SECTION 1
GENERAL INFORMATION

1.0 Authority.

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

1.1 Purpose.

The purpose is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Valley-Hi Eagle Lake Dam is a zoned earth embankment approximately 25 feet high and 450 feet long (including spillway). The facility is provided with a trapezoidal-shaped spillway cut in rock and located at the left abutment. The spillway is equipped with a concrete trapezoidal-shaped overflow weir situated along the dam centerline. The outlet works consists of a 15-inch diameter steel pond drain that discharges at the downstream embankment toe. Flow through the pond drain is regulated via a 15-inch diameter gate valve located at the inlet.

b. Location. Valley-Hi Eagle Lake Dam is located on Oregon Creek in Brush Creek and Wells Townships, Fulton County, Pennsylvania about 1-mile north of U. S. Route 30 and about 5 miles northeast of Pennsylvania Turnpike Interchange 12 at Breezewood, Pennsylvania. The dam, reservoir, and watershed are contained within the Wells Tannery, Pennsylvania, 7.5 minute U.S.G.S. topographic quadrangle. The coordinates of the dam are N 40° 2.1' and W 78° 11.0' (see Appendix G).

c. Size Classification. Small (25 feet high; 555 acre-feet storage capacity at top of dam).

d. Hazard Classification. High (see Section 3.1.e).

e. Ownership. Valley-Hi Development Association, Inc.

P. O. Box 42
Breezewood, PA 15533
Jack Gothie - President

f. Purpose. Private recreation.

g. Historical Data. Application to construct Valley-Hi Eagle Lake Dam was originally made by Jack F. Gothie in June 1962 and subsequently approved by the State of Pennsylvania in September 1962. The facility was designed by Albert M. Larsen of McConnellsburg, Pennsylvania. Construction did not begin until September 1963 and was completed in August 1964. Construction of the facility was performed by K. G. Richards of McConnellsburg, Pennsylvania. Records of construction progress are limited to several memoranda prepared by state inspectors subsequent to periodic inspections. No monthly construction progress reports were prepared as required. Engineering supervision and control of construction appears to have been minimal; however, available correspondence indicates the facility was inspected by the state upon completion and all construction was approved. No major modifications have been made to the structure since its completion.

Valley-Hi Eagle Lake Dam is now an integral part of a private real estate development under the direction of the Valley-Hi Development Association, Inc. Jack Gothie serves as president of the Association which consists of private investors who either own or lease tracts of land in the area surrounding Valley-Hi Eagle Lake.

1.3 Pertinent Data.

a. Drainage Area (square miles). 2.2

b. Discharge at Dam Site. No records of reservoir levels or spillway discharges are kept. Discussions with the owner's representative indicated that the highest flow to date occurred during the flood of June 1972, when flow over the weir was estimated at approximately 8 inches.

Discharge Capacity of the Outlet Conduit - Discharge curves are not available.

Discharge Capacity of Spillway at Maximum Pool ≈ 1050 (see Appendix C, Sheet 9).

c. Elevations (feet above mean sea level). The following elevations were obtained from field measurements that were based on the elevation of the normal pool at 1327 feet (as per U.S.G.S.).

Top of Dam	1332.2 (design) 1331.9 (field)
Maximum Design Pool	Not known
Maximum Pool of Record	1327.7 (estimated)
Normal Pool	1327
Spillway Crest	1327
Upstream Inlet Invert	1312.5
Downstream Outlet Invert	1307.2
Streambed at Dam Centerline	1309
Maximum Tailwater	Not known

d. Reservoir Length (feet).

Top of Dam	3300
Normal Pool	2900

e. Storage (acre-feet).

Top of Dam	555
Normal Pool	296
Design Surcharge	Unknown

f. Reservoir Surface (acres).

Top of Dam	62
Normal Pool	44
Maximum Design Pool	Not known

g. Dam.

Type	Zoned earth.
Length	450 feet (including spillway).
Height	25 feet (field measured: crest to invert of outlet conduit).
Top Width	11 feet
Upstream Slope	2H:1V
Downstream Slope	2-1/2H:1V
Zoning	Impervious clay core flanked by semi-impervious zones com-

		prised of a mixture of clay and shale (see Figure 3).
	Impervious Core	See "Zoning" above.
	Cutoff	Core trench 10 feet wide at the base with 1H:1V side slopes is reportedly provided along the embankment centerline (see Figure 3).
	Grout Curtain	None indicated.
h.	Diversion Canal and Regulating Tunnels.	None.
i.	Spillway.	
	Type	Trapezoidal-shaped channel cut in rock at the left abutment and equipped with a concrete trapezoidal-shaped overflow weir (See Appendix C, Sheet 5).
	Crest Elevation	1327 feet
	Crest Length	30 feet
j.	Outlet Conduit.	
	Type	15-inch diameter steel pipe placed on a concrete cradle.
	Conduit Length	130 feet (inlet to outlet).
	Closure and/or Regulating Facilities	Flow through the conduit is reportedly controlled via a 15-inch diameter gate valve located at the inlet end.
	Access	Under normal pool conditions, the gate

valve control mechanism is submerged under several feet of water and accessible only by boat

SECTION 2
ENGINEERING DATA

2.1 Design.

a. Design Data Availability and Sources. No design data, calculations, or reports are available concerning any aspect of this facility. Design features, presented below, are derived from information and correspondence contained in PennDER files. Included in the files are design drawings, dated photographs, and state inspection memoranda and reports.

b. Design Features.

1. Embankment. Details of the design features are based on available correspondence and the field inspection. The actual as-built configuration of the facility is shown on Figure 1. Figures 2 through 4 are design drawings, but have not been revised to show as-built conditions.

The embankment is a zoned earth structure comprised of an impervious clay core flanked by semi-impervious zones composed of a mixture of clay and shale on both the upstream and downstream slopes. The upstream slope is set at 2H:1V and is protected by a layer of sandstone riprap that projects about 3 feet above normal pool. A 5-foot wide berm is reportedly provided along the upstream face at elevation 1292. The downstream slope is set at 2-1/2H:1V while the crest is 11 feet wide.

Available design drawings indicate that a 10-foot wide cutoff is provided along the embankment centerline (see Figure 2). Contract specifications state that all fill was to be placed in 8-inch loose layers and compacted with a sheep's foot roller to a density of 95 percent of maximum dry weight.

2. Appurtenant Structures.

a) Spillway. The spillway is a trapezoidal-shaped channel cut in rock at the left abutment. It is equipped with a trapezoidal-shaped overflow weir positioned along the embankment centerline within a portion of the channel that is lined with concrete. Figures 3 and 4 detail several different spillways in plan and cross-section, none of which accurately depict the one observed by the field team. A plan and cross-section of the actual spillway, based on field measurements, are shown on sheet 5, Appendix C. The presence of a cutoff beneath the spillway is not known.

b. Outlet Conduit. The outlet conduit consists of a 15-inch diameter steel pipe placed on a concrete cradle. Flow through the conduit is controlled via a 15-inch diameter solid brass gate valve located at the inlet. The control mechanism for the gate valve is submerged, by design, by several feet of water under normal pool conditions and is accessible only by boat. Concrete anti-seep collars are reportedly provided at 20-foot intervals along the conduit. A small concrete headwall supports and protects the discharge end.

c. Specific Design Data and Criteria. No specific design data are available for any aspect of the facility.

2.2 Construction Records.

Construction data is limited to PennDER memoranda and several construction photographs obtained during periodic state inspections. The lack of information and reliable as-built drawings suggests limited engineering supervision or control during construction. State inspectors, however, found the construction acceptable and eventually recommended the approval of the project.

2.3 Operating Records.

No records of operation are available.

2.4 Other Investigations.

No formal investigations have been performed on this facility subsequent to its completion.

2.5 Evaluation.

Engineering data are limited to design drawings (not as-built), PennDER correspondence, and a few construction photographs. No formal design calculations are available; however, the available data are considered sufficient to make a reasonable Phase I assessment of the facility.

SECTION 3
VISUAL INSPECTION

3.1 Observations.

a. General. The general appearance of the dam and its appurtenances suggests that they are currently in fair condition.

b. Embankment. Observations made during the visual inspection reveal the embankment to be in fair condition. Seepage was observed immediately below the downstream embankment toe to the left and right of the outlet conduit. Both areas were draining freely into the outlet conduit discharge channel at rates estimated at less than 1 gpm for the area to the right of the conduit and between 3 to 4 gpm for the area to the left of the conduit (see Photograph 10). Some wet areas were observed along the lower portion of the downstream embankment face, particularly around the outlet conduit; however, no measurable seepage was noted. A small erosion ditch was observed along the embankment-right abutment contact that extends from the crest to the downstream toe. The ditch apparently carries drainage from the adjacent hillside and is not a design feature. The embankment, for the most part, appears reasonably maintained. Both the upstream and downstream slopes are covered with grass and high weeds; however, care appears to be taken to cut trees which have taken root. The embankment crest and adjacent spillway dike are completely void of any protective vegetation (see Photographs 1, 2 and 8). This has resulted in local areas of minor erosion and some rutting of the crest from vehicular use.

c. Appurtenant Structures.

1. Spillway. The spillway, as observed during the visual inspection, appears to be in fair condition. A log bridge has been placed across the approach channel (see Photograph 4) and serves as a potential obstruction to unimpeded spillway discharge as does heavy overgrowth and boulders observed within the discharge channel (see Photograph 6). The concrete overflow weir and sidewalls show signs of cracking, scaling, and overall minor deterioration (see Photograph 4). Water was observed seeping through a crack located near the middle of the left side of the overflow weir (see Photograph 5).

2. Outlet Conduit. The only visible portion of the outlet conduit is its discharge end shown in Photograph 9. It is impossible to visually assess the overall condition of the conduit; however, discussions with representatives of

the owner indicate it was last operated in the fall of 1978, and, at that time, was considered to be in good condition.

d. Reservoir Area. The general area surrounding the reservoir is characterized by steep slopes that are heavily forested (see Photographs 1 and 3). Valley-Hi Eagle Lake Dam is part of a private real estate development known as Valley-Hi Eagle Lake. Thus, the complexion of the surrounding area is subject to change although the present owners contend they have no plans for mass development of the area.

e. Downstream Channel. The channel downstream of Valley-Hi Eagle Lake Dam is characterized as a narrow, heavily wooded valley with generally steep confining slopes (see Photograph 11). Oregon Creek merges with Sideling Hill Creek approximately 4 miles downstream of the dam. Within the next mile, in the vicinity of PA Route 915, the creek passes 5 residences which are considered sufficiently close to the stream to be potentially affected by a breach of the embankment (estimated population: 15-20). Thus, the hazard classification of the facility is considered to be high.

3.2 Evaluation.

The overall condition of the facility is considered fair. Positive steps should be taken to identify the origin of the seepage causing ponding at the downstream toe and subsequently monitor their respective flow rates. The remaining deficiencies are considered, for the most part, maintenance related and can be alleviated with proper remedial measures.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Normal Operating Procedure.

Valley-Hi Eagle Lake Dam is essentially a self-regulating facility. Excess inflow passes through the spillway and is discharged into the stream below. The 15-inch diameter steel outlet conduit has historically been used only for the purpose of drawing down the reservoir and is operated via a 15-inch diameter gate valve located at the inlet end of the conduit. Under normal pool conditions, the gate valve is submerged and accessible by boat only. There are no formal operating procedures associated with the facility and no operating manual is available.

4.2 Maintenance of Dam.

Maintenance of the facility is currently performed on an informal basis. No formal maintenance procedures are adhered to and no maintenance manual is available.

4.3 Maintenance of Operating Facilities

The only operating mechanism associated with the facility is the 15-inch diameter gate valve located on inlet end of the outlet conduit. The valve was last operated in the fall of 1978 when the reservoir was partially drawn down. The valve was reported to have opened and closed very easily. Nevertheless, no formal maintenance procedures are adhered to and no maintenance manual is available.

4.4 Warning System.

There are no formal warning systems in effect.

4.5 Evaluation.

The facility is designed to be essentially self-regulating. The dam is equipped with only one operable mechanism, that being a 15-inch diameter gate valve controlling flow through the outlet conduit. Procedures for operating the mechanism are not formalized.

Maintenance of the facility is performed on an as-needed basis. No formal maintenance procedures are adhered to and no maintenance manual is available. In addition, there are no formal warning systems in effect.

SECTION 5
HYDROLOGIC/HYDRAULIC EVALUATION

5.1 Design Data.

No design data, calculations or formal reports are available. Available data is limited to design drawings and correspondence contained in PennDER files.

5.2 Experience Data.

No records of spillway discharge are available. Discussions with representatives of the owner, present during the inspection, indicated that, to date, the highest flow through the spillway was approximately 8 inches over the weir during the flood of June 1972.

5.3 Visual Observations.

The visual inspection revealed several conditions which are considered to be potential impediments to the unrestricted and efficient discharge of the spillway. The log bridge at the entrance to the approach channel is an obstruction prior to flow reaching the weir while the heavy overgrowth and boulders observed within the spillway channel may serve to increase the discharge retarding effects of tailwater. In addition, the concrete portion of the spillway, including the overflow weir, shows signs of deterioration. The observed structural cracking may be sufficiently extensive to make the concrete vulnerable to the high pressures developed under large flows. However, due to the fact that the spillway is cut in rock at the left abutment, removal of the concrete portion will likely serve only to further obstruct flow, but, is not considered a major structural hazard.

5.4 Method of Analysis.

The facility has been analyzed in accordance with procedures and guidelines established by the U. S. Army, Corps of Engineers, Baltimore District, for Phase I hydrologic and hydraulic evaluations. The analysis has been performed utilizing a modified version of the HEC-1 program developed by the U. S. Army, Corps of Engineers, Hydrologic Engineering Center, Davis, California. Analytical capabilities of the program are briefly outlined in the preface contained in Appendix C.

5.5 Summary of Analysis.

a. Spillway Design Flood (SDF). In accordance with the procedures and guidelines contained in the National Guidelines for Safety Inspection of Dams for Phase I Investigations, the Spillway Design Flood (SDF) for Valley-Hi Eagle Lake Dam ranges between the 1/2 PMF (Probable Maximum Flood) and the PMF. This classification is based on the relative size (small), and the potential hazard of dam failure to downstream developments (high). Due to the high potential for downstream damage, and to the rather large storage volume behind the dam at maximum pool (≈ 555 acre-feet), the SDF for this facility is considered to be the PMF.

b. Results of Analysis. Valley-Hi Eagle Lake Dam was evaluated under normal operating conditions. That is, the reservoir was initially at its assumed normal pool or spillway elevation of 1327 feet (MSL), with the low level blowoff line closed, and the spillway discharging freely. The spillway is a free overfall, concrete, trapezoidal-shaped weir structure which discharges into a gently sloped open channel. Since the weir is only about 4 feet above the discharge channel invert, and due to the gentle channel slope, a backwater curve was computed via the HEC-2 computer program so that the effects of tailwater on the weir outflows could be ascertained. Finally, the necessary downstream channel routing was done under the assumption that the stream was dry prior to the inflow of the dam outflow. All pertinent engineering calculations relative to the evaluation of this facility are provided in Appendix C.

Overtopping analysis (using the Modified HEC-1 Computer Program) indicated that the discharge/storage capacity of Valley-Hi Eagle Lake Dam can accommodate only about 24 percent of the PMF (SDF) prior to the overtopping of the embankment (Appendix C, Summary Input/Output Sheets, Sheet E). The low top of dam was inundated by depths of water of 1.6 and 3.0 feet under the 1/2 PMF and PMF events, respectively (Summary Input/Output Sheets, Sheet I). Therefore, since the SDF for this facility is the PMF, Valley-Hi Eagle Lake Dam has a high potential for overtopping, and thus, for breaching under floods of less than PMF magnitude.

Since Valley-Hi Eagle Lake Dam cannot safely handle a flood of at least 1/2 PMF magnitude, the possibility of embankment failure under floods of 1/2 PMF intensity or less was investigated (in accordance with ETL-1110-2-234). Several feasible alternatives were analyzed since it is difficult, if not impossible, to determine exactly how or if a specific dam will fail. The major concern of the breaching evaluations is with the impact of the various breach discharges on increasing downstream water surface elevations above those to be expected if breaching did not occur.

The Modified HEC-1 Computer Program was used for the breaching analysis with the assumption that the breaching of an earth dam would begin once its reservoir's water level reached the low top of dam elevation.

Two sets of breach geometry were evaluated for the Valley-Hi Eagle Lake Dam for each of two failure times, a rapid time (0.5 hrs.) and a prolonged time (4.0 hrs.), (total time for each breach section to reach its final dimensions) so that a range of this most sensitive variable might be examined. In addition, an average or more probable set of breach conditions was analyzed, with a failure time of 2.0 hours.

The peak breach outflows (resulting from a 0.26 PMF overtopping) ranged from about 2,190 cfs for the minimum section--maximum fail time scheme to about 20,210 cfs for the maximum section--minimum fail time scheme (Appendix C, Sheet 23). The outflow from the average breach scheme was about 6,920 cfs, compared to the non-breach 0.26 PMF peak outflow of about 1200 cfs (Summary Input/Output Sheets, Sheets L and E). The water surface elevation corresponding to the non-breach 0.26 PMF peak discharge at a section (Section 4) located about 13,700 feet downstream from the dam was approximately 1,165.8 feet (MSL); and approximately 1,063.0 feet (MSL) at a section (Section 6) located about 23,500 feet downstream from the dam (Summary Output/Input Sheets, Sheet J). The water surface elevations corresponding to the average condition peak breach outflows at the two above-mentioned downstream sections were 1,171.3 feet (MSL) and 1,070.3 feet (MSL), respectively (Appendix C, Sheet 24). The approximate elevation of the structures (forest ranger offices) located at Section 4 is about 1,186 feet (MSL); while the approximate elevations of the four residences located at Section 6 are 1,067 feet (MSL), 1,070 feet (MSL); 1,071 feet (MSL), and 1,072 feet (MSL). Therefore, the increase in the water surface at Section 4, caused by the failure of Valley-Hi Eagle Lake Dam, was about 5.5 feet; however, the breach water surface is well below the damage level of the office structures. The increase in the water surface at Section 6, caused by the failure of the dam, was about 7.3 feet, with the breach water surface at about the damage levels of two of the residences, and just below the damage level of another. It can further be surmised that embankment failure under somewhat larger base flood conditions could possibly damage all four residences at Section 6.

The consequences of dam failure can be better envisioned if not only the increase in the height of the floodwave is considered, but also the great increase in the momentum of the larger and probably swifter moving volume of water. Therefore, the failure of Valley-Hi Eagle Lake Dam is quite possible, and will most probably lead to increased property damage and possibly to increased loss of life in the downstream regions.

5.6 Spillway Adequacy.

As presented previously, under existing conditions Valley-Hi Eagle Lake Dam can accommodate only about 24 percent of the PMF (the SDF) prior to embankment overtopping. Should a 0.26 PMF or larger event occur, the dam could be overtopped and could possibly fail, endangering the residences in the downstream regions. Therefore, the spillway of Valley-Hi Eagle Lake Dam is considered to be seriously inadequate.

SECTION 6
EVALUATION OF STRUCTURAL INTEGRITY

6.1 Visual Observations.

a. Embankment. The conditions observed at the time of the inspection indicate the embankment is in fair condition. Two large wet areas are located immediately below the downstream embankment toe to the left and right of the outlet conduit. Drainage from the area left of the conduit was estimated at 3 to 4 gpm while drainage from the area to the right was minimal and estimated at less than 1 gpm. The origin of the seepage in these areas could not be ascertained; however, no seepage was observed through the downstream embankment face except for a minor area around the outlet conduit headwall. Presently, the seepage is not considered a threat to the stability of the embankment; however, measures should be taken to identify its source and monitor it if necessary.

The erosion ditch observed at the interface of the downstream slope and right abutment has begun to cut into the embankment. Since the ditch is an apparent frequent drainage path for runoff from the adjoining hillside, positive measures should be taken to protect it from further erosion by possibly lining it with rock or concrete.

Both the embankment crest and right spillway dike lack adequate protective vegetation. As a result, several areas of minor erosion were noted. The embankment crest is not restricted to vehicular use and some minor rutting was also observed.

b. Appurtenant Structures.

1. Spillway. The spillway channel is cut in a formation of sandstone located at the left abutment. For the most part, its structural condition appears stable although the exposed rock surfaces exhibit extensive fracturing and/or jointing. The concrete portion is in a deteriorated condition that includes some spalling, scaling, and structural cracking. Failure of the concrete, if it were to occur under high flows, would likely not affect the structural stability of the spillway due to the fact that it is cut in rock.

2. Outlet Conduit. Based on design drawings and discussions pertaining to its past performance, the outlet conduit is considered to be in good condition.

6.2 Design and Construction Techniques.

No data are available relative to the design of the facility. Detailed construction data are not available; however, inspection memoranda and photographs contained in PennDER files imply that the embankment was reasonably well constructed despite the inference that engineering supervision and control was minimal.

6.3 Past Performance.

Discussions during the inspection, with representatives of the owner, indicated the facility has functioned adequately since its completion. No formal investigations or state inspections have been performed.

6.4 Seismic Stability.

The dam is located within Seismic Zone No. 1 and may be subject to minor earthquake induced dynamic forces. It is believed that the static stability of the embankment is sufficient to withstand such forces although no calculations or investigations were performed to confirm this opinion.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS FOR REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. Visual observations indicate the structure to be in fair condition. The most significant deficiencies noted were the seepage and ponding at the downstream embankment toe and the obstructions within the spillway channel. None of the observed deficiencies are considered an immediate threat to the safety of the facility. Other minor deficiencies included an erosion ditch along the right abutment-embankment contact, minor deterioration of the spillway concrete, several unprotected areas along the embankment and spillway dike and a submerged outlet conduit valve control.

The size classification of the facility is small and the hazard classification is considered to be high. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) ranges between the 1/2 PMF (Probable Maximum Flood) and the PMF. Results of the hydrologic/ hydraulic analysis indicate the facility will discharge and/or store only 24 percent of the PMF prior to overtopping of the embankment. Overtopping is expected to cause embankment failure, with the breaching analysis indicating that failure will result in an increase to potential for loss of life downstream of the facility. Therefore, the spillway system is considered to be seriously inadequate, and the facility unsafe, non-emergency.

b. Adequacy of Information. The available information is considered sufficient to make a reasonable Phase I assessment of the facility.

c. Urgency. Due to the seriously inadequate spillway system, it is recommended that the owner immediately develop and implement a warning system for the notification of downstream residents in the event emergency conditions develop. Included in the plan should be provisions for around-the-clock surveillance of the facility during periods of unusually heavy precipitation.

Other remedial measures recommended below should be undertaken as soon as possible.

d. Necessity for Additional Investigation. Additional investigations to more accurately assess the hydraulic adequacy of the facility are considered necessary.

7.2 Recommendations/Remedial Measures.

Due to the seriously inadequate spillway classification, it is recommended that the owner immediately develop and implement a warning system for the notification of downstream residents should emergency conditions develop. Included in the plan should be provisions for around-the-clock surveillance of the facility during periods of unusually heavy precipitation.

In addition, it is recommended that the owner:

a. Have the facility studied by a registered professional engineer, experienced in the hydraulics and hydrology of dams, and implement measures necessary to make the facility hydraulically adequate.

b. Remove the logs from the spillway approach and clear the downstream discharge channel of all obstructions to permit unimpeded flow.

c. Take positive measures to collect and channel the seepage from the area immediately downstream of the embankment toe into the outlet discharge channel, and clear the channel to eliminate ponding.

d. Visually assess the seepage during future inspections to ensure that it is not encroaching on the embankment toe.

e. Seed those areas of the embankment and spillway dike which are unprotected and subject to erosion.

f. Provide protection for the erosion ditch being developed along the right abutment-embankment contact.

g. Provide a more durable roadway surface along the crest (particularly near the right abutment) to curtail rutting of the crest by vehicular traffic.

h. Develop manuals of maintenance and operation to ensure continued care and proper maintenance of the facility. Included in the manuals should be provisions for operating the drawdown mechanism.

APPENDIX A

CHECK LIST - ENGINEERING DATA

CHECK LIST
ENGINEERING DATA
PHASE I

NAME OF DAM: Valley-Hi Eagle Lake Dam

NDI#: PA-186 PENNDER#: 29-33

ITEM	REMARKS NDI# PA - 186
PERSONS INTERVIEWED AND TITLE	Jack Gothie (President) - Valley-Hi Development Association, Inc. Nelson Gothie (Secretary-Treasurer) - Valley-Hi Development Association, Inc.
REGIONAL VICINITY MAP	See Appendix G (U.S.G.S. 7.5 minute topographic quadrangle, Wells Tannery, Pennsylvania)
CONSTRUCTION HISTORY	Designed by Albert M. Larsen, P. E. - McConnellsburg, Pennsylvania. Constructed by K. G. Richards (1963-1964), McConnellsburg, Pennsylvania.
AVAILABLE DRAWINGS	Design drawings available from PennDER (not as-built). Owner has no drawings. Field inspection indicates available drawings do not accurately reflect as-built conditions.
TYPICAL DAM SECTIONS	See Appendix F, Figure 3.
OUTLETS: PLAN DETAILS DISCHARGE RATINGS	See Appendix F, Figure 3. (Figure 3 does not accurately represent as-built conditions). Discharge rating curves are not available.

ITEM	REMARKS NDI# PA - 186
SPILLWAY: PLAN SECTION DETAILS	See Appendix F, Figure 3 and 4. (Figures 3 and 4 do not accurately represent as-built conditions).
OPERATING EQUIPMENT PLANS AND DETAILS	None available.
DESIGN REPORTS	None available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS: HYDROLOGY AND HYDRAULICS STABILITY ANALYSES SEEPAGE ANALYSES	None available.
MATERIAL INVESTIGATIONS: BORING RECORDS LABORATORY TESTING FIELD TESTING	See Appendix F, Figure 2.

ITEM	REMARKS NDI# PA - 186
BORROW SOURCES	See Appendix F, Figure 2.
POST CONSTRUCTION DAM SURVEYS	None since construction.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.
HIGH POOL RECORDS	No formal records. Highest pool to date reportedly occurred during flood of June 1972 when flow over the spillway weir was estimated at 8 inches.
MONITORING SYSTEMS	None.
MODIFICATIONS	None. Available drawings do not accurately represent as-built conditions.

ENGINEERING DATA (CONTINUED)

ITEM	REMARKS NDI# PA-186
PRIOR ACCIDENTS OR FAILURES	None.
MAINTENANCE: RECORDS MANUAL	No formal records or manual. Maintenance is performed on an as-needed basis.
OPERATION: RECORDS MANUAL	No formal records or manual. Nelson Gothie is familiar with the operation of the outlet conduit gate valve. Valve was last operated in the fall of 1978 and was reported to be in good condition.
OPERATIONAL PROCEDURES	See "Operation" above.
WARNING SYSTEM AND/OR COMMUNICATION FACILITIES	None.
MISCELLANEOUS	

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

NDI ID # PA-186

PENN DER ID # 29-33

SIZE OF DRAINAGE AREA: 2.2 square miles

ELEVATION TOP NORMAL POOL: 1327 STORAGE CAPACITY: 296 acre-feet

ELEVATION TOP FLOOD CONTROL POOL: -- STORAGE CAPACITY: --

ELEVATION MAXIMUM DESIGN POOL: -- STORAGE CAPACITY: --

ELEVATION TOP DAM: 1331.9 STORAGE CAPACITY: 555 acre-feet

SPILLWAY DATA

CREST ELEVATION: 1327

TYPE: Trapezoidal-shaped concrete spillway with trapezoidal-shaped weir.

CREST LENGTH: 30 feet

CHANNEL LENGTH: approximately 450 feet

SPILLOVER LOCATION: left abutment

NUMBER AND TYPE OF GATES: none

OUTLET WORKS

TYPE: 15-inch diameter steel pipe

LOCATION: near center of dam

ENTRANCE INVERTS: 1312.5 (estimated)

EXIT INVERTS: 1307.2

EMERGENCY DRAWDOWN FACILITIES: 15-inch diameter gate valve at inlet end of outlet conduit.

HYDROMETEOROLOGICAL GAGES

TYPE: None

LOCATION: --

RECORDS: --

MAXIMUM NON-DAMAGING DISCHARGE: About 8-inches of flow over weir during flood of June 1972.

APPENDIX B

CHECK LIST - VISUAL INSPECTION

CHECK LIST
VISUAL INSPECTION
PHASE 1

NAME OF DAM Valley-Hi Eagle Lake Dam STATE Pennsylvania COUNTY Fulton

NDI# PA - 186 PENNDER# 29-33

TYPE OF DAM zoned earth SIZE small HAZARD CATAGORY high

DATE(S) INSPECTION 9 & 10 August 1979 WEATHER partly cloudy TEMPERATURE 85° @ 1:00 P.M.

POOL ELEVATION AT TIME OF INSPECTION approximately 1327 M.S.L.

TAILWATER AT TIME OF INSPECTION N/A M.S.L.

INSPECTION PERSONNEL	OWNER REPRESENTATIVES	OTHERS
B. Mihalcin (9/10/79)	Valley-Hi Development Assoc., Inc.	
W. Veon (8/9&10/79)	Jack Gothie - President	
D. Bonk (8/9&10/79)	Nelson Gothie - Secretary-Treasurer	

RECORDED BY D. L. Bonk

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA -186
SURFACE CRACKS	None observed.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Erosion ditch observed along the embankment-right abutment contact extending from the crest to the downstream toe. The left abutment is an unprotected earth and rock cut displaying evidence of minor erosion. Spillway dike between the spillway channel and embankment is void of vegetative cover and subject to erosion as is embankment crest.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Vertical - good condition. Horizontal - good condition.
RIPRAP FAILURES	None observed. Sandstone riprap extends about 2 to 3 feet above normal pool and was reportedly handplaced.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Good.

EMBANKMENT

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 186
DAMP AREAS IRREGULAR VEGETATION (LUSH OR DEAD PLANTS)	Two large damp or wet areas extend across the downstream embankment toe to both the left and right of the outlet conduit. Some ponding of water is evident and the area is generally covered with hydrophilic type vegetation.
ANY NOTICEABLE SEEPAGE	Minor seepage observed around the outlet conduit. Saturated area at and locally above toe (not critical, but should be observed). Drainage from area left of the outlet conduit estimated at 3 to 4 gpm. Source appears to be through spillway dike at left abutment and probably not through embankment (should be controlled and monitored).
STAFF GAGE AND RECORDER	None.
DRAINS	None.

OUTLET WORKS

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 186
INTAKE STRUCTURE	Submerged, not observed.
OUTLET CONDUIT (CRACKING AND SPALLING OF CONCRETE SURFACES)	15-inch diameter steel outlet conduit. Concrete headwall at the downstream toe in good condition.
OUTLET STRUCTURE	N/A
OUTLET CHANNEL	Unlined trapezoidal-shaped channel. The outlet conduit discharge channel merges with the spillway discharge channel approximately 300 feet downstream of the embankment toe. In between, the channel is set on a gentle slope which has resulted in some ponding as well as the partial submergence of the conduit.
GATE(S) AND OPERATIONAL EQUIPMENT	The outlet conduit control valve is submerged below normal pool by design. It is unmarked and could not be observed by the inspection team. Valve last operated in autumn of 1978 and was reported to be in good condition.

EMERGENCY SPILLWAY

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 186
TYPE AND CONDITION	Free overfall, trapezoidal-shaped concrete weir structure. Concrete in poor condition exhibiting structural cracking and extensive scaling.
APPROACH CHANNEL	About a 70-foot long trapezoidal-shaped channel appears founded on rock. Channel opening is obstructed at its entrance by the presence of large logs used to provide access to the embankment crest.
SPILLWAY CHANNEL AND SIDEWALLS	The downstream face of the weir exhibits some concrete scaling and has a large horizontal structural crack located on the left side about half way down the slope. Water is seeping up through the crack. Left sidewall also exhibits some structural cracking. The right sidewall has some surface cracking and has experienced some erosion at its contact with the downstream face of the weir structure.
STILLING BASIN PLUNGE POOL	None observed.
DISCHARGE CHANNEL	Trapezoidal-shaped channel apparently founded on rock. Channel bottom is relatively flat for about 250 feet downstream from the weir. The channel is obstructed by vegetation, as well as rock and soil which has eroded from the sidewalls.
BRIDGE AND PIERS	None.
EMERGENCY GATES	None.

SERVICE SPILLWAY

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 186
TYPE AND CONDITION	N/A
APPROACH CHANNEL	N/A
OUTLET STRUCTURE	N/A
DISCHARGE CHANNEL	N/A

INSTRUMENTATION

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 186
MONUMENTATION SURVEYS	None.
OBSERVATION WELLS	None.
WEIRS	None.
PIEZOMETERS	None.
OTHERS	N/A

RESERVOIR AREA AND DOWNSTREAM CHANNEL

NDI# PA - 186

ITEM	OBSERVATIONS AND/OR REMARKS
SLOPES: RESERVOIR	Steep and heavily forested. No evidence of slope instability.
SEDIMENTATION	None observed.
DOWNSTREAM CHANNEL (OBSTRUCTIONS, DEBRIS, ETC.)	Pennsylvania Route 915 crosses stream at a distance of approximately 4.5 miles downstream.
SLOPES: CHANNEL VALLEY	Steep and heavily forested.
APPROXIMATE NUMBER OF HOMES AND POPULATION	In the vicinity of Pennsylvania Route 915, the creek passes 5 residences which are considered sufficiently close to the stream to be potentially affected by a breach of the embankment. (Estimated population: 15-20)

APPENDIX C

HYDROLOGY AND HYDRAULICS

PREFACE

The modified HEC-1 program is capable of performing two basic types of hydrologic analyses: 1) the evaluation of the overtopping potential of the dam; and 2) the estimation of the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. Briefly, the computational procedures typically used in the dam overtopping analysis are as follows:

a. Development of an inflow hydrograph(s) to the reservoir.

b. Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.

c. Routing of the outflow hydrograph(s) from the reservoir to desired downstream locations. The results provide the peak discharge(s), time(s) of the peak discharge(s), and the maximum stage(s) of each routed hydrograph at the downstream end of each reach.

The evaluation of the hydrologic-hydraulic consequences resulting from an assumed structural failure (breach) of the dam is typically performed as shown below.

a. Development of an inflow hydrograph(s) to the reservoir.

b. Routing of the inflow hydrograph(s) through the reservoir.

c. Development of a failure hydrograph(s) based on specified breach criteria and normal reservoir outflow.

d Routing of the failure hydrograph(s) to desired downstream locations. The results provide estimates of the peak discharge(s), time(s) to peak and maximum water surface elevations of failure hydrographs for each location.

SUBJECT DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM

BY WJV DATE 8/21/79 PROJ. NO. 79-617-186

CHKD. BY DJS DATE 8-27-79 SHEET NO. 1 OF 24

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DAM STATISTICS

HEIGHT OF DAM ≈ 25 FT (FIELD MEASURED)
(MEASURED FROM OUTLET INVERT EL 1307.2
TO LOW TOP OF DAM EL 1331.9)

MAXIMUM POOL STORAGE CAPACITY ≈ 555 AC-FT (FROM HEC-1)
@ TOP OF DAM

NORMAL POOL STORAGE CAPACITY ≈ 126 AC-FT (DESIGN; SEE NOTE 1)
≈ 296 AC-FT (ACTUAL; SEE SHEET 3 AND HEC-1 OUTPUT)

DRAINAGE AREA ≈ 2.2 SQ MI

[PLANIMETERED OFF USGS
7.5 MINUTE WELLS
TANNERY, PA QUAD]

NOTE 1: NORMAL POOL STORAGE VALUE OBTAINED FROM "REPORT UPON THE APPLICATION OF JACK GOTHIE", DATED JULY 26, 1962, AS FOUND IN PENN DER FILES. THE ACTUAL REPORTED VALUE WAS 41 MILLION GALLONS.

DAM CLASSIFICATION

DAM SIZE - SMALL (REF 1, TABLE 1)

HAZARD CLASSIFICATION - HIGH (FIELD OBSERVATION)

REQUIRED SDF - 1/2 PMF TO PMF (REF 1, TABLE 3)

6

SUBJECT DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM

BY WJV DATE 8/21/79 PROJ. NO. 79-617-186

CHKD. BY DJS DATE 8-27-79 SHEET NO. 2 OF 24

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HYDROGRAPH PARAMETERS

LENGTH OF LONGEST WATERCOURSE ≈ 1.8 MI

L_{CA} ≈ 0.4 MI (MEASURED ALONG THE LONGEST WATERCOURSE FROM THE DAM TO THE CENTROID OF THE BASIN)

LENGTH OF RESERVOIR @ NORMAL POOL ≈ 0.5 MI

NOTE 2: VALUES OF L, L_{CA} AND RESERVOIR LENGTH ARE MEASURED FROM THE 7.5 MINUTE USGS WELLS TANNERY, PA. QUAD. ALL VARIABLES ARE DEFINED IN REF 2, IN THE SECTION ENTITLED "SNYDER SYNTHETIC UNIT HYDROGRAPH".

$C_t \approx 1.5$
$C_p \approx 0.55$

[SUPPLIED BY COE; ZONE 21 SUSQUEHANNA RIVER BASIN]

SINCE RESERVOIR LENGTH > L_{CA}

*t_p = SNYDER'S STANDARD LAG = $1.5\,(L')^{0.6}$

WHERE L' = LENGTH ALONG LONGEST WATERCOURSE FROM THE RESERVOIR INLET TO THE DRAINAGE DIVIDE

$$\therefore\ t_p \approx 1.5\,(1.8-0.5)^{0.6} \approx 1.76 \text{ HR}$$

* AS PER BALTIMORE DISTRICT CORPS OF ENGINEERS FOR CASES WHEN THE LENGTH OF RESERVOIR ≥ L_{CA}

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RESERVOIR SURFACE AREAS

SURFACE AREA (SA) @ DESIGN NORMAL POOL EL 1322 ≈ 25 AC

SA @ ACTUAL ASSUMED NORMAL POOL EL 1327 ≈ 44 AC

NOTE 3: ACTUAL ASSUMED NORMAL POOL EL 1327 OBTAINED FROM USGS 7.5 MINUTE WELLS TANNERY, PA QUAD. LAKE AREA @ EL 1327 MEASURED FROM SAME QUAD. ELEVATIONS GIVEN ON DESIGN DRAWINGS (APPENDIX F) MAY BE IN ERROR BY AS MUCH AS 27 FT ⇒ DESIGN NORMAL POOL ELEVATION OF 1295 FT (FIG 3) ≈ 1322 FT. RESERVOIR SA @ EL 1322 FT (1295 FT) MEASURED FROM FIG 2.

SA @ EL 1340 ≈ 92 AC (PLANIMETERED FROM USGS 7.5 MINUTE WELLS TANNERY, PA QUAD)

LOW TOP OF DAM ELEVATION ≈ 1331.9 FT (FIELD MEASURED)

RATE OF SA INCREASE PER FOOT OF RESERVOIR RISE:

$$\Delta SA/\Delta H \approx (92-44)\text{AC}/(1340-1327)\text{FT} \approx 3.7\ \text{AC/FT}$$

$$\therefore\ SA\ @\ EL\ 1331.9\ FT \approx 44\ AC + [(3.7\ AC/FT)\times(1331.9-1327)FT]$$
$$\approx 62\ AC$$

RESERVOIR ELEVATION @ "0" STORAGE

DESIGN NORMAL POOL VOLUME ≈ 1/3 HA ≈ 126 AC-FT (CONIC METHOD)

SA @ DESIGN NORMAL POOL EL 1322 ≈ 25 AC

$$\therefore\ H \approx 3(126\ AC\text{-}FT)/(25\ AC) \approx 15.1\ FT$$

ZERO VOLUME ELEVATION ≈ 1322 FT − 15.1 FT ≈ 1306.9 FT

NOTE 4: THE ABOVE COMPUTED "0" VOLUME ELEVATION IS PROBABLY LOWER THAN THE ACTUAL MINIMUM RESERVOIR ELEVATION; HOWEVER, IN ORDER TO COMPUTE AN ELEVATION - STORAGE RELATIONSHIPS AND STILL MAINTAIN A SA ≈ 25 AC @ EL 1322, THE COMPUTED ZERO VOLUME ELEVATION MUST BE INPUT INTO THE HEC-1 PROGRAM.

RESERVOIR ELEVATION - STORAGE RELATIONSHIP

COMPUTED INTERNALLY BY THE HEC-1 PROGRAM, BASED ON THE GIVEN ELEVATION VS SURFACE AREA INFORMATION AS GIVEN ABOVE (SEE SUMMARY INPUT/OUTPUT SHEETS)

PMP CALCULATIONS

- STANDARD RAINFALL INDEX = 22.2 IN. (REF 9, FIG 2)
  (CORRESPONDING TO A DURATION OF 24 HRS AND AN AREA OF 200 SQ MI)

- GEOLOGIC ADJUSTMENT FACTOR ≈ 105% (REF 9, FIG 1)
  (CORRESPONDING TO A LONGITUDE OF 78° 11' AND A LATITUDE OF 40° 2')

- CORRECTED RAINFALL INDEX = (22.2 IN) × (1.05) ≈ 23.3 IN

- DRAINAGE AREA ≈ 2.2 SQ.MI. ⇒ ASSUME DATA CORRESPONDING TO A 10 SQ MI AREA IS REPRESENTATIVE OF THIS BASIN:

SUBJECT	DAM SAFETY INSPECTION VALLEY HI EAGLE LAKE DAM				
BY	WJV	DATE	8-22-79	PROJ. NO.	73-617-186
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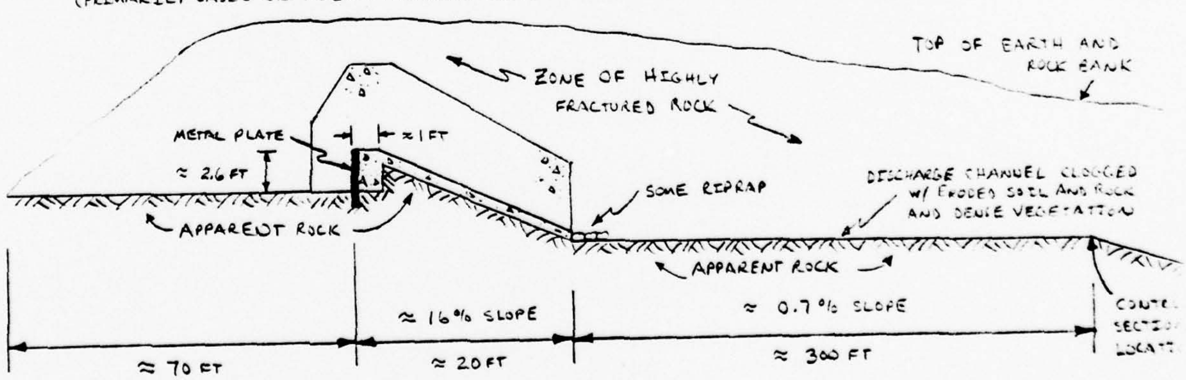
DURATION (HR)	PERCENT OF INDEX RAINFALL (%)
6	117.5
12	127.0
24	136.0
48	142.5
72	145.0

FROM COE DURATION VS INDEX CURVES

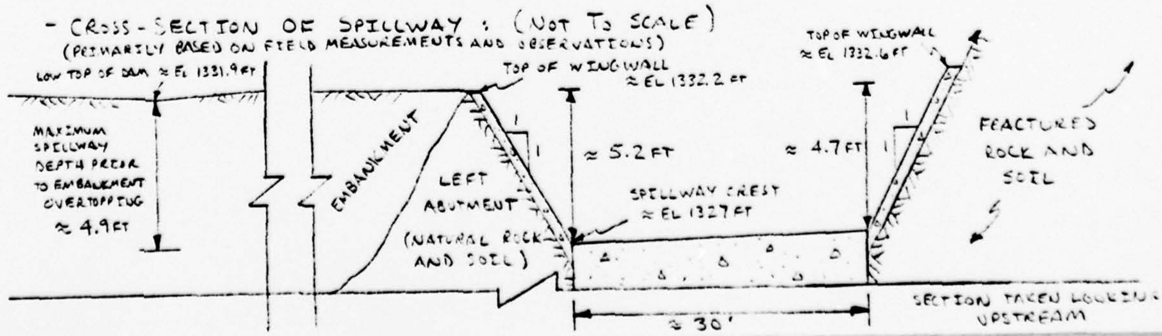
- HOP BROOK FACTOR (ADJUSTMENT FOR BASIN SHAPE AS WELL AS FOR THE LESSER LIKELIHOOD OF A SEVERE STORM CENTERING OVER A SMALLER BASIN) CORRESPONDING TO A DA ≈ 2.2 SQ MI (< 10 SQ MI) ⇒ 0.90 (REF 4, PG 48)

SPILLWAY CAPACITY

- PROFILE OF SPILLWAY: (NOT TO SCALE)
(PRIMARILY BASED ON FIELD MEASUREMENTS AND OBSERVATIONS)



- CROSS-SECTION OF SPILLWAY: (NOT TO SCALE)
(PRIMARILY BASED ON FIELD MEASUREMENTS AND OBSERVATIONS)



SUBJECT DAM SAFETY INSPECTION

VALLEY HI EAGLE LAKE DAM

BY WJV DATE 8-23-79 PROJ. NO. 73-617-186

CHKD. BY DJS DATE 8-27-79 SHEET NO. 6 OF 24

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- SPILLWAY IS A FREE OVERFALL, CONCRETE, TRAPEZOIDAL-SHAPED WEIR STRUCTURE WHICH DISCHARGES INTO A RELATIVELY FLAT OPEN CHANNEL. THE DISCHARGE CHANNEL IS PRESENTLY CLOGGED WITH FALLEN ROCK AND SOIL FROM THE UNPROTECTED SIDEWALLS, AND BY DENSE VEGETATION GROWING WITHIN THE CHANNEL. THUS, THE CHANNEL HAS LESS OF A CONVEYANCE CAPACITY, WHICH WHEN COUPLED WITH THE RELATIVELY FLAT CHANNEL SLOPE CAN LEAD TO ADVERSE TAILWATER CONDITIONS ON THE WEIR OUTFLOWS. WEIR DISCHARGES CAN BE DEFINED BY THE RELATIONSHIP:

$$Q_w = CLH^{3/2} \qquad \text{(REF 5, PG 5-3)}$$

WHERE Q = DISCHARGE, IN CFS;

L = LENGTH OF WEIR CREST ≈ 30 FT;

H = HEIGHT OF RESERVOIR ABOVE WEIR CREST ≈ 4.7 FT (CONSIDERING THE UNEVEN CREST) PRIOR TO EMBANKMENT OVERTOPPING; AND

C = DISCHARGE COEFFICIENT ≈ 3.1 @ H ≈ 4.7 FT (@ ASSUMED DESIGN HEAD) ACCORDING TO INFORMATION CONTAINED ON PGS 5-41 TO 5-44 OF REF 5.

NOTE 5: THE ABOVE RELATIONSHIP IS REPRESENTATIVE FOR WEIRS WITH RECTANGULAR OPENINGS. THEREFORE, IT WILL BE APPLICABLE TO A 30 FT WIDE RECTANGULAR OPENING ABOVE THE WEIR. FLOW ALONG THE INCLINED PORTIONS OF THE WEIR SECTION WILL BE ASSUMED TO OCCUR AT THE SAME VELOCITY AS THE DISCHARGE OVER THE WEIR ⇒ WINGWALL FLOW WILL BE DEFINED BY THE CONTINUITY EQUATION:

$$Q_{ww} = v_w A_{ww} = (Q_w / A_w) \times A_{ww} \qquad \text{(REF 5, PG 3-}$$

SUBJECT DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM

BY WJV DATE 8-23-79 PROJ. NO. 78-617-136

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WHERE Q_{WW} = DISCHARGE OVER THE INCLINED WINGWALL, IN CFS;

v_W = VELOCITY OF WEIR DISCHARGE, IN FPS;

A_{WW} = FLOW AREA ABOVE BOTH WINGWALLS, IN FT^2; AND

A_W = FLOW AREA ABOVE WEIR, IN FT^2.

- APPROACH CHANNEL LOSSES @ DESIGN FLOW:

a) APPROXIMATE APPROACH CHANNEL WIDTH ≈ 30 FT;
RIGHT SIDE OF APPROACH CHANNEL VARIES FROM 0 FT HEIGHT @ ENTRANCE OF CHANNEL TO ABOUT 7.6 FT @ THE WEIR, W/ ABOUT A 1 TO 1 SIDESLOPE;
LEFT SIDE OF APPROACH CHANNEL VARIES FROM 0 FT HEIGHT @ ENTRANCE OF CHANNEL TO ABOUT 13 FT @ THE WEIR, W/ ABOUT A 1 TO 1 SIDESLOPE.

∴ @ RESERVOIR EL 1331.9 (LOW TOP OF DAM) THE MAXIMUM APPROACH CHANNEL DEPTH = FOREBAY DEPTH + HEAD OVER WEIR CREST ≈ 2.6 FT + 4.7 FT ≈ 7.3 FT

⇒ APPROACH CHANNEL FLOW AREA = A_a

$$A_a \approx (30\,FT \times 7.3\,FT) + 2\left[\tfrac{1}{2}(7.3\,FT \times 7.3\,FT)\right]$$
$$A_a \approx 272\ FT^2$$

b) INITIAL ESTIMATE OF DISCHARGE @ EL 1331.9 FT

$$Q_W \approx (3.1)(30\,FT)(4.7\,FT)^{3/2} \approx 950\ CFS$$

$$A_W \approx 4.7\,FT \times 30\,FT \approx 141\ FT^2$$

SUBJECT DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM
BY WJV DATE 8-23-79 PROJ. NO. 78-617-136
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$$\therefore Q_{ww} \approx \left({}^{950\ CFS}/_{141\ FT^2} \right) \times 2\left[\tfrac{1}{2} \left(4.7\ FT \times 4.7\ FT \right) \right]$$
$$Q_{ww} \approx 150\ CFS$$

$$\Rightarrow Q_{TOTAL} \approx 950\ CFS + 150\ CFS \approx 1100\ CFS$$

c) AVERAGE APPROACH CHANNEL VELOCITY $\approx Q_{TOTAL}/A_a$

$$v_a \approx {}^{1100\ CFS}/_{272\ FT^2} \approx 4.0\ FPS$$

$\Rightarrow$ AVERAGE APPROACH VELOCITY HEAD $= h_a \approx v_a^2/2g$

$$h_a \approx (4.0)^2/2g \approx 0.25$$

ASSUMING THAT THE APPROACH CHANNEL ENTRANCE LOSS $\approx 0.1\ h_a$ (REF 4, PG 379) $\Rightarrow$ 0.03 FT

d) APPROACH CHANNEL FRICTION LOSS $= h_f \approx \left[v_a n / 1.49 R_h^{2/3} \right]^2 \times L$

WHERE L_c = AVERAGE APPROACH CHANNEL LENGTH $\approx$ 70 FT (FIELD ESTIMATED);

n = MANNING'S ROUGHNESS COEFFICIENT $\approx$ 0.05 (REF 7, PG 112; EXCAVATED CHANNEL, COBBLE BOTT. AND BRUSH ON SLOPES);

R_h = HYDRAULIC RADIUS = FLOW AREA / WETTED PERIMETER
FLOW AREA $= A_a \approx 272\ FT^2$, RIGHT APPROACH WALL AVERAGES ABOUT 3.9 FT IN HEIGHT ON A 1 TO 1 SLOPE (SHEET 7) $\Rightarrow$ PARTIAL WETTED PERIMETER $\approx$ 5.4 FT, LEFT APPROACH WALL HAS ABOUT A 5.3 FT REPRESENTATIVE HEIGHT @ EL 1331.9 ON A 1 TO 1 SLOPE (SHEET 7) $\Rightarrow$ PARTIAL WETTED PERIMETER $\approx$ 7.5 FT $\Rightarrow$ TOTAL WETTED PERIMETER $\approx$ 30 FT + 5.4 FT + 7.5 FT $\approx$ 42.9 FT $\Rightarrow R_h \approx 272\ FT^2 / 42.9\ FT \approx 6.3$ FT

SUBJECT DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM

BY WJV DATE 8-23-79 PROJ. NO. 78-617-186

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$\therefore h_f \approx (70\,FT)\left[(4.0)(0.05) / (1.49)(6.3)^{2/3} \right]^2 \approx 0.11\,FT$

$\therefore$ TOTAL APPROACH CHANNEL LOSS $\approx 0.03 + 0.11 \approx 0.14$ FT

$\Rightarrow$ ACTUAL EFFECTIVE HEAD $\approx$ 4.7 FT − 0.14 FT $\approx$ 4.56 FT

- SUBMERGENCE EFFECTS :

DISCHARGE w/o SUBMERGENCE $\Rightarrow$ $Q_w \approx (3.1)(30\,FT)(4.56\,FT)^{3/2} \approx 910$ CFS

$Q_{ww} \approx \left[(910\,CFS) / (4.56\,FT \times 30\,FT) \right] \times (4.56\,FT)$

≈ 140

$\Rightarrow Q_{TOTAL} \approx$ 910 CFS + 140 CFS $\approx$ 1050 CFS

$\therefore$ TAILWATER ON SPILLWAY @ $Q \approx 1050$ CFS IS APPROXIMATELY @ EL 1328.7 FT (SHEET 10)

SINCE THE RESERVOIR LEVEL @ $Q \approx 1050$ CFS IS APPROXIMATELY @ EL 1331.9 FT $\Rightarrow h_d \approx 1331.9 - 1328.7 \approx 3.2$ FT
(h_d = DIFFERENCE BETWEEN RESERVOIR AND TAILWATER LEVELS)

$\therefore \quad h_d / H_e \approx 3.2 / 4.56 \approx 0.70$ $\Rightarrow$ NO ADVERSE EFFECTS
(ASSUMING THE SUBMERGENCE RELATIONSHIP FOR AN OGEE-SHAPED WEIR IS REPRESENTATIVE FOR THIS TRAPEZOIDAL-SHAPED WEIR; REF 4, PG 392)

$\Rightarrow$ SPILLWAY CAPACITY PRIOR TO EMBANKMENT OVERTOPPING $\approx$ 1050 CFS

SUBJECT	DAM SAFETY INSPECTION
	VALLEY HI EAGLE LAKE DAM
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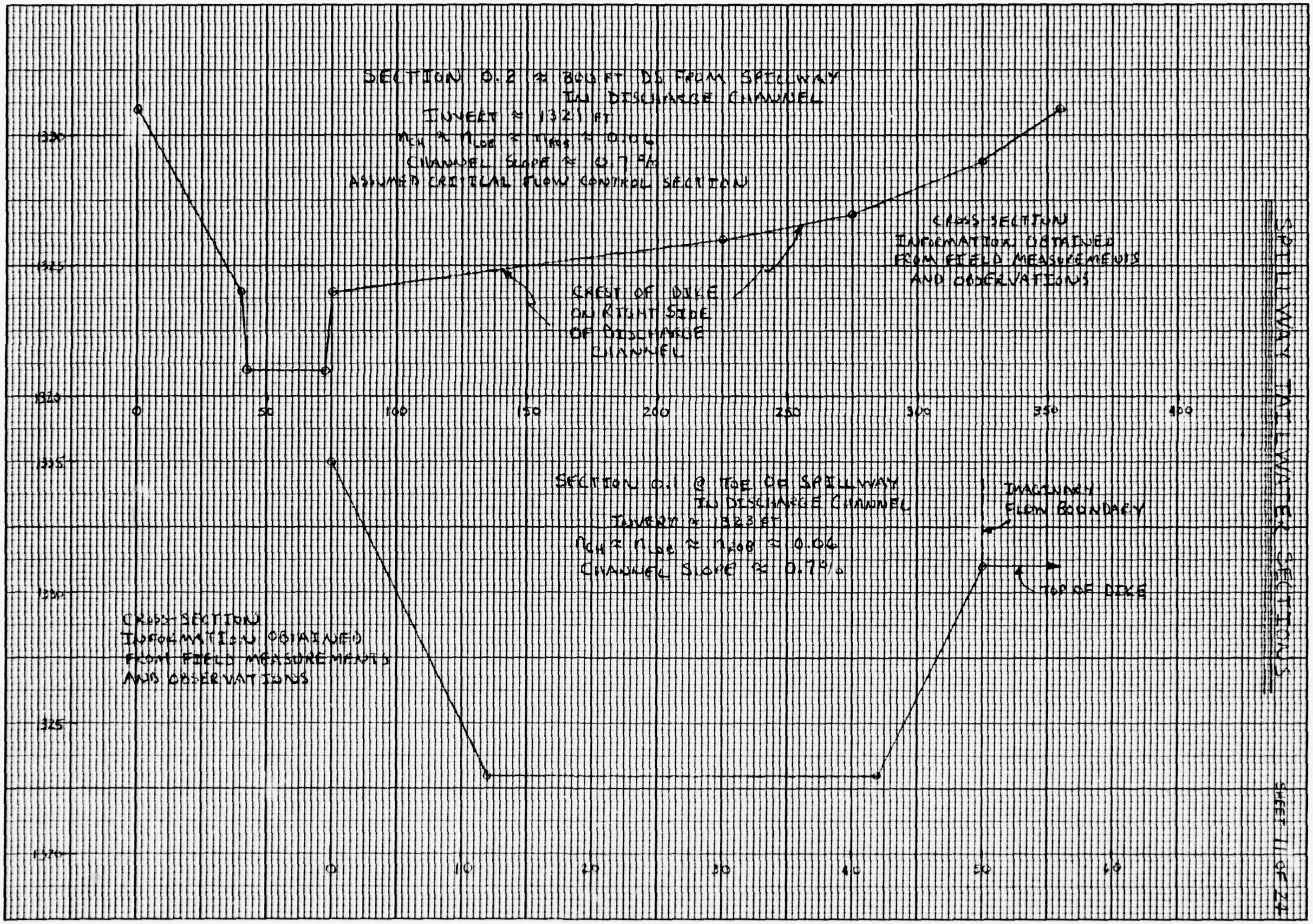
TAILWATER RATING CURVE

DUE TO THE HEIGHT OF THE SPILLWAY CREST ABOVE THE DISCHARGE CHANNEL (ONLY ≈ 4 FT), AND TO THE VERY FLAT GRADIENT OF THE DISCHARGE CHANNEL (≈ 0.7%), A BACKWATER CURVE WAS COMPUTED TO ASCERTAIN THE EFFECTS OF TAILWATER ON SPILLWAY DISCHARGES. THE BACKWATER CURVE WAS CALCULATED VIA THE HEC-2 WATER SURFACE PROFILE COMPUTER PROGRAM*. HEC-2 COMPUTES BACKWATER BY THE STANDARD STEP METHOD (REF 7, PG 274-280), BASED ON CHANNEL CROSS-SECTION INFORMATION. THE SPECIFIC CROSS-SECTION DATA USED IS GIVEN ON SHEET 11. THE COMPUTATIONS WERE INITIATED AT AN APPARENT CONTROL SECTION, LOCATED ABOUT 300 FT DOWNSTREAM FROM THE SPILLWAY, BY THE ASSUMPTION OF CRITICAL DEPTH. (THE CONTROL SECTION INCLUDED THE PROFILE ALONG THE SPILLWAY DIKE; SEE FIGURE 1, APPENDIX F.) CALCULATIONS PROCEEDED UPSTREAM TO THE TOE OF THE SPILLWAY IN ONE STEP. THE RATING TABLE BELOW CORRESPONDS TO THE HEC-2 OUTPUT FOR SECTION 0.1 @ THE TOE OF THE SPILLWA
(SEE SUMMARY INPUT / OUTPUT SHEETS, SHEET)

ELEVATION (FT)	Q (CFS)	ELEVATION (FT)	Q (CFS)
1323.0	0	1329.6	1700
1324.7	100	1329.9	2000
1326.0	300	1330.1	2300
1327.0	500	1330.5	2600
1327.8	700	1330.9	3000
1328.5	900	1331.4	3500
1328.7	1100	1331.9	4000
1329.2	1400		

* HEC-2 WATER SURFACE PROFILES (USER'S MANUAL), HYDROLOGIC ENGINEERING CENTER, U.S. ARMY CORPS OF ENGINEERS, DAVIS, CALIFORNIA, NOV. 1976


SPILLWAY TAILWATER SECTIONS
SHEET 11 OF 24
SECTION 0.2 ≈ 800 FT DS FROM SPILLWAY IN DISCHARGE CHANNEL
INVERT ≈ 1321 FT
CHANNEL SLOPE ≈ 0.7%
ASSUMED CRITICAL FLOW CONTROL SECTION
CREST OF DIKE ON RIGHT SIDE OF DISCHARGE CHANNEL
CROSS SECTION INFORMATION OBTAINED FROM FIELD MEASUREMENTS AND OBSERVATIONS
SECTION 0.1 @ TOE OF SPILLWAY IN DISCHARGE CHANNEL
INVERT ≈ 1323 FT
CHANNEL SLOPE ≈ 0.7%
IMAGINARY FLOW BOUNDARY
TOP OF DIKE
CROSS-SECTION INFORMATION OBTAINED FROM FIELD MEASUREMENTS AND OBSERVATIONS
0
50
100
150
200
250
300
350
400
10
20
30
40
60

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SPILLWAY RATING CURVE

AS THE HEAD ABOVE THE WEIR BECOMES SMALL, THE ROUGHNESS OF THE CREST AND THE CONTACT PRESSURE BETWEEN THE WATER AND THE CREST EXERT A LARGER INFLUENCE ON DISCHARGES. THAT IS, THE C-VALUES DECREASE WITH DECREASING HEAD. THE OPPOSITE TREND OCCURS FOR HIGHER HEADS. THEREFORE, ASSUME THAT THE DISCHARGE COEFFICIENT - HEAD RELATIONSHIP FOR THE TRAPEZOIDAL-SHAPED WEIR CAN BE REPRESENTED BY THAT FOR AN OGEE-SHAPED WEIR (REF 4, PG 378, FIG 250 THE MAXIMUM HEAD PRIOR TO OVERTOPPING OF THE EMBANKMENT IS ABOUT 4.7 FT, WHICH WILL BE ASSUMED TO BE THE DESIGN HEAD (H_o). THE DESIGN DISCHARGE COEFFICIENT (C_o) WILL BE ASSUMED TO EQUAL 3.1 (SHEET 6).

ALL DISCHARGES OVER THE WEIR ARE DEFINED BY THE $Q_w = CLH^{3/2}$ RELATIONSHIP, AND ALL DISCHARGES OVER THE INCLINED WINGWALL ARE DEFINED BY THE $Q_{ww} = (Q_w/A_w) \times A_{ww}$ RELATIONSHIP AS GIVEN ON SHEET 6. THE HEAD OVER THE WEIR WILL BE ADJUSTED TO ACCOUNT FOR APPROACH CHANNEL LOSSES BY PROPORTIONING THE COMPUTED LOSS OF 0.14 FT AT EL 1331.9 FT. ALSO, SUBMERGENCE EFFECTS WILL BE CONSIDERED ACCORDING TO THE TAILWATER RATING TABLE ON SHEET 10.

SPILLWAY RATING CURVE IS GIVEN ON SHEETS 13 AND 14.

SUBJECT DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM

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– SPILLWAY RATING TABLE : (TABLE CONTINUED ON SHEET 14)

RESERVOIR ELEVATION (FT)	① H (FT)	H/H₀ (FT/FT)	② C/C₀	③ C	④ ESTIMATED APPROACH LOSS (FT)	⑤ EFFECTIVE HEAD: He (FT)	INITIAL ESTIMATES ⑥ Q_w (CFS)	⑦ A_w (FT²)	⑧ A_{ww} (FT²)	⑨ Q_{ww} (CFS)
1327	0	–	–	–	–	0	0	–	–	0
1328	0.8	0.17	0.84	2.60	0.02	0.78	50	23	0.6	0
1329	1.8	0.38	0.90	2.79	0.05	1.75	190	53	3.1	10
1330	2.8	0.60	0.94	2.91	0.08	2.72	390	82	7.4	40
1331	3.8	0.81	0.97	3.01	0.11	3.69	640	111	13.6	80
1331.9	4.7	1.0	1.0	3.10	0.14	4.56	910	137	20.8	140
1332	4.8	1.02	1.0	3.10	0.14	4.66	940	140	21.7	150
1333	5.8	1.23	1.03	3.19	0.17	5.63	1280	169	31.6	240
1334	6.8	1.45	1.05	3.26	0.20	6.60	1660	198	42.6	360
1335	7.8	1.66	1.07	3.32	0.23	7.57	2070	227	54.5	500
1336	8.8	1.87	1.08	3.35	0.26	8.54	2510	256	67.4	660
1327	9.8	2.09	1.09	3.38	0.29	9.51	2970	295	81.2	850

① ALTHOUGH THE LOW SPILLWAY CREST ELEVATION IS 1327 FT, THE HIGH CREST ELEVATION IS 1327.5 ⇒ AVERAGE CREST EL ≈ 1327.2 FT ⇒ H = RESERVOIR ELEV – 1327.2 FT

② REF 4, PG 378, FIG 250, BASED ON H/H_0 ; ③ $C \approx 3.1 \times C/C_0$; ④ ESTIMATED LOSS $\approx H/H_0 \times 0.14$ FT ⑤ EFFECTIVE HEAD = $H_e \approx H -$ APPROACH LOSS ;

⑥ $Q_w \approx C \times (30\text{FT}) \times H_e^{3/2}$; ⑦ $A_w \approx 30\text{FT} \times H_e$; ⑧ $A_{ww} \approx H_e^2$ BELOW EL 1332.2, AND $A_{ww} \approx (\frac{1}{2} H_e^2) + \{[\frac{1}{2}(5.2\text{FT})^2] + [5.2\text{FT} \times (H_e - 5.2\text{FT})]\}$ ABOVE;

⑨ $Q_{ww} \approx (Q_w / 30 H_e) \times A_{ww}$

SUBJECT: DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM

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- SPILLWAY RATING TABLE : (CONTINUED FROM SHEET 13)

(10) INITIAL ESTIMATE Q_T (CFS)	(11) TW ELEVATION (FT)	h_d/H_e (FT/FT)	(12) C_s/C	(13) C_s	FINAL VALUES (14) Q_W (CFS)	A_W (FT²)	A_{WW} (FT²)	Q_{WW} (CFS)	Q_T (CFS)	RESERVOIR ELEVATION (FT)
0	-	-	-	-	0	-	-	0	0	1327
50	1323.8	5.4	1.0	2.60	50	23	0.6	0	50	1328
200	1325.4	2.1	1.0	2.79	190	53	3.1	10	200	1329
430	1326.7	1.2	1.0	2.91	390	82	7.4	40	430	1330
720	1327.9	0.84	1.0	3.01	640	111	13.6	80	720	1331
1050	1328.7	0.70	1.0	3.10	910	137	20.8	140	1050	1331.9
1090	1328.7	0.71	1.0	3.10	940	140	21.7	150	1090	1332
1520	1329.4	0.64	0.99	3.16	1270	169	31.6	240	1510	1333
2020	1329.9	0.62	0.99	3.23	1640	198	42.6	350	1990	1334
2570	1330.5	0.59	0.99	3.29	2060	227	54.5	490	2550	1335
3170	1331.1	0.57	0.98	3.28	2460	256	67.4	650	3110	1336
3820	1331.7	0.56	0.98	3.31	2910	285	81.2	830	3740	1337

(10) $Q_T = Q_W + Q_{WW}$;
(11) TW ELEVATION INTERPOLATED FROM SHEET 10, BASED ON Q_T ;
(12) C_s/C FROM REF 4, PG 382, FIG 254, BASED ON h_d/H_e ;
(13) $C_s = C \times C_s/C$
(14) $Q_W = C_s\,(30\,FT)\,H_e^{3/2}$; A_W, A_{WW}, Q_{WW}, Q_T ARE DEFINED AS ON SHEET 13

SUBJECT DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM

BY WJV DATE 8-24-79 PROJ. NO. 78-617-186

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EMBANKMENT RATING CURVE

- LENGTH OF EMBANKMENT SUBMERGED VS RESERVOIR ELEVATION (BASED ON FIELD MEASUREMENTS)

RESERVOIR ELEVATION (FT)	EMBANKMENT LENGTH (FT)	
1331.9	0	
1332.0	70	
1332.2	220	
1332.3	310	
1332.4	380	
1335.7	430	BASED PARTIALLY ON 10 H TO 1 V SIDESLOPE OF RIGHT ABUTMENT AS MEASURED FROM USGS TOPO MAP
1336.0	440	
1337.0	450	

- ASSUME THE EMBANKMENT ACTS LIKE A BROAD-CRESTED WEIR WHEN OVERTOPPED, w/ DISCHARGE DEFINED BY:

$$Q = CLH^{3/2} \qquad \text{(SHEET 6)}$$

WHERE L = LENGTH OF EMBANKMENT INUNDATED, IN FT;

C = DISCHARGE COEFFICIENT FOR EMBANKMENTS = $f(H/\ell$ WHERE ℓ = BREADTH OF CREST ≈ 11 FT, AND REF 12, PG 46); AND

H = AVERAGE "FLOW-AREA WEIGHTED" HEAD ABOVE THE LOW TOP OF DAM EL 1331.9 FT. THE CREST PROFILE IS ROUGHLY TRIANGULAR, WITH THE LEFT SIDE OF THE TRIANGLE TERMINATING AT EL 1332.2 (@ THE SPILLWAY WINGWALL). THE RIGHT SIDE OF THE TRIANGLE CONTINUES TO EL 1337.0 AND ABOVE. THE LEFT SIDE IS ABOUT 110 FT LONG,

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WITH A TRIANGULAR FLOW AREA UP TO EL 1332. AND A TRAPEZOIDAL FLOW AREA ABOVE THIS ELEVATION. THE RIGHT SIDE HAS A MAXIMUM LENGTH OF ABOUT 340 FT, WITH A TRIANGULAR FLOW AREA AT ALL ELEVATIONS.

RESERVOIR ELEVATION (FT)	LEFT SIDE ① H_1 (FT)	② A_1 (FT²)	$H_1 \times A_1$ (FT³)	RIGHT SIDE ③ H_2 (FT)	④ A_2 (FT²)	$H_2 \times A_2$ (FT³)	⑤ WEIGHTED H (FT)	H/ℓ (FT/FT)
1331.9	0	–	–	0	–	–	0	–
1332.0	0.05	1.8	0.09	0.05	1.8	0.09	0.05	≈0.01
1332.2	0.15	16.5	2.48	0.15	16.5	2.48	0.15	0.01
1332.3	0.25	27.5	6.88	0.20	40.0	8.00	0.22	0.02
1332.4	0.35	38.5	13.5	0.25	67.5	16.9	0.29	0.03
1335.7	3.7	407	1506	1.9	608	1155	2.6	0.24
1336.0	4.0	440	1760	2.1	693	1455	2.8	0.25
1337.0	5.0	550	2750	2.6	884	2298	3.5	0.32

RESERVOIR ELEVATION (FT)	⑥ C	⑦ L (FT)	⑧ EMBANKMENT Q (CFS)
1331.9	–	0	0
1332.0	2.90	70	≈0
1332.2	2.95	220	40
1332.3	2.98	310	100
1332.4	2.99	330	180
1335.7	3.08	430	5550
1336.0	3.08	440	6350
1337.0	3.09	450	9100

① $H_1 = (\text{RESERVOIR ELEV} - 1331.9\text{ FT})/2$ BE. EL 1332.2, AND ABOVE EL 1331.9 ⇒ $H_1 = \frac{(\text{RESERVOIR ELEV} - 1331.9) + (\text{RESERVOIR ELEV} - 1332.)}{2}$

② $A_1 = H_1 \times L_1$, w/ $L_1 = \frac{1}{2} L$ BELOW EL 1332.2 FT, AND $L_1 = 110$ FT ABOVE;

③ $H_2 = (\text{RESERVOIR ELEV} - 1331.9)/2$;

④ $A_2 = H_2 \times L_2$, w/ $L_2 = \frac{1}{2} L$ BELOW EL 1332.2, AND $L_2 = L - 110$ FT ABOVE;

⑤ $H = [(H_1 \times A_1) + (H_2 \times A_2)] / (A_1 + A_2)$

⑥ REF 12, PG 46;

⑦ FROM SHEET 15;

⑧ $Q = CLH^{3/2}$

SUBJECT DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM

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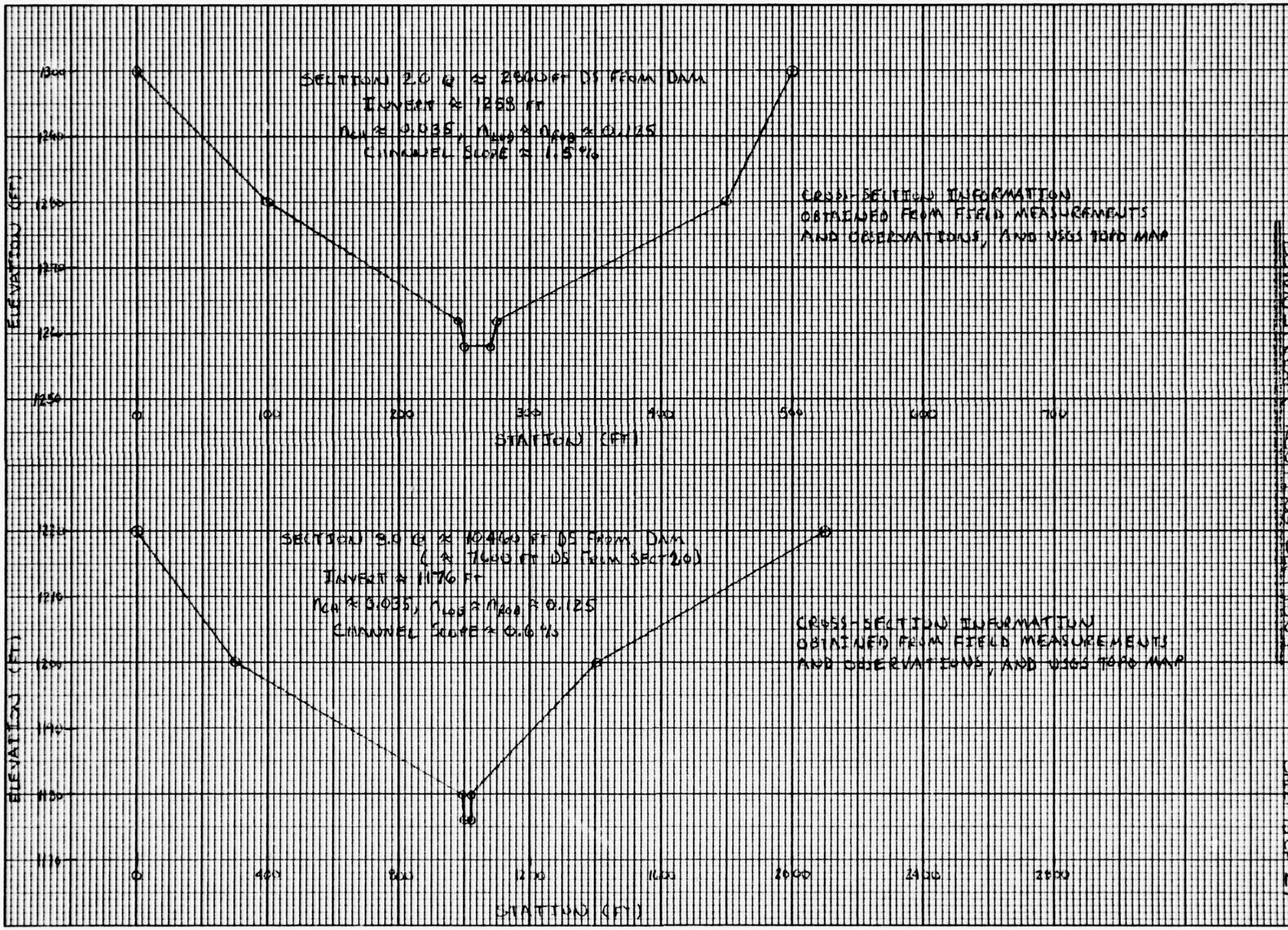
TOTAL FACILITY RATING CURVE

TOTAL DISCHARGE = SPILLWAY Q + EMBANKMENT Q

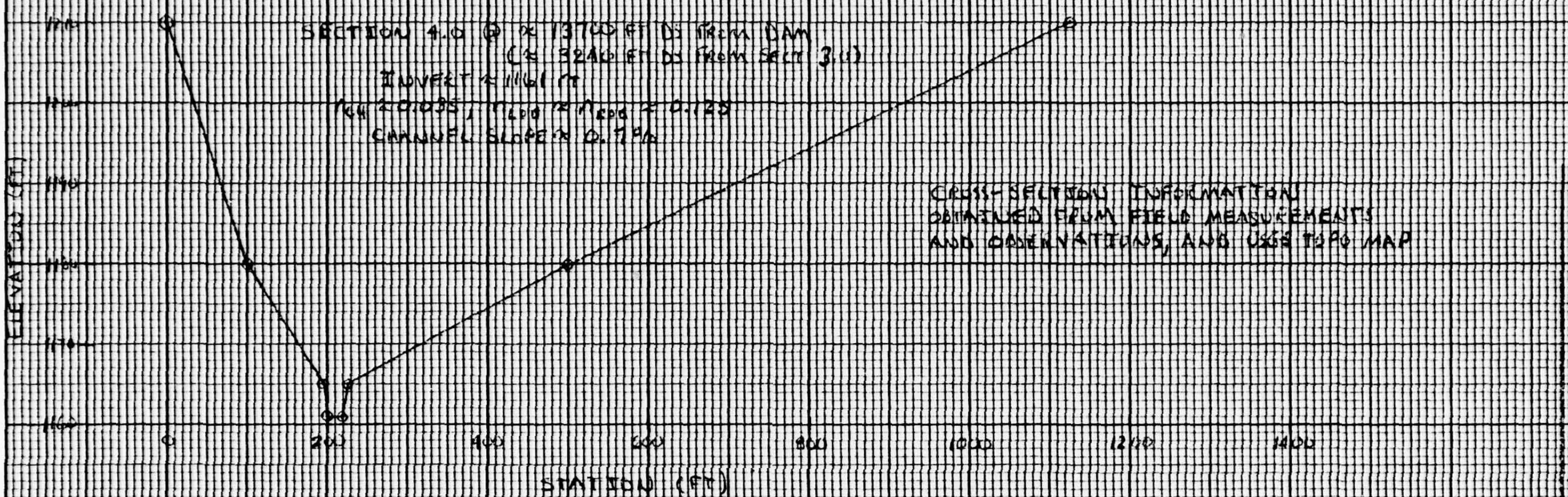
RESERVOIR ELEVATION (FT)	① SPILLWAY Q (CFS)	② EMBANKMENT Q (CFS)	TOTAL Q (CFS)
1327.0	0	-	0
1328.0	50	-	50
1329.0	200	-	200
1330.0	430	-	430
1331.0	720	-	720
1331.9	1050	0	1050
1332.0	1090	0	1090
1332.2	③ 1170	40	1210
1332.3	③ 1220	100	1320
1332.4	③ 1260	180	1440
1333.0	1510	④ 500	2010
1334.0	1990	④ 1570	3560
1335.0	2550	④ 3550	6100
1335.7	③ 2940	5550	8490
1336.0	3110	6350	9460
1337.0	3740	9100	12840

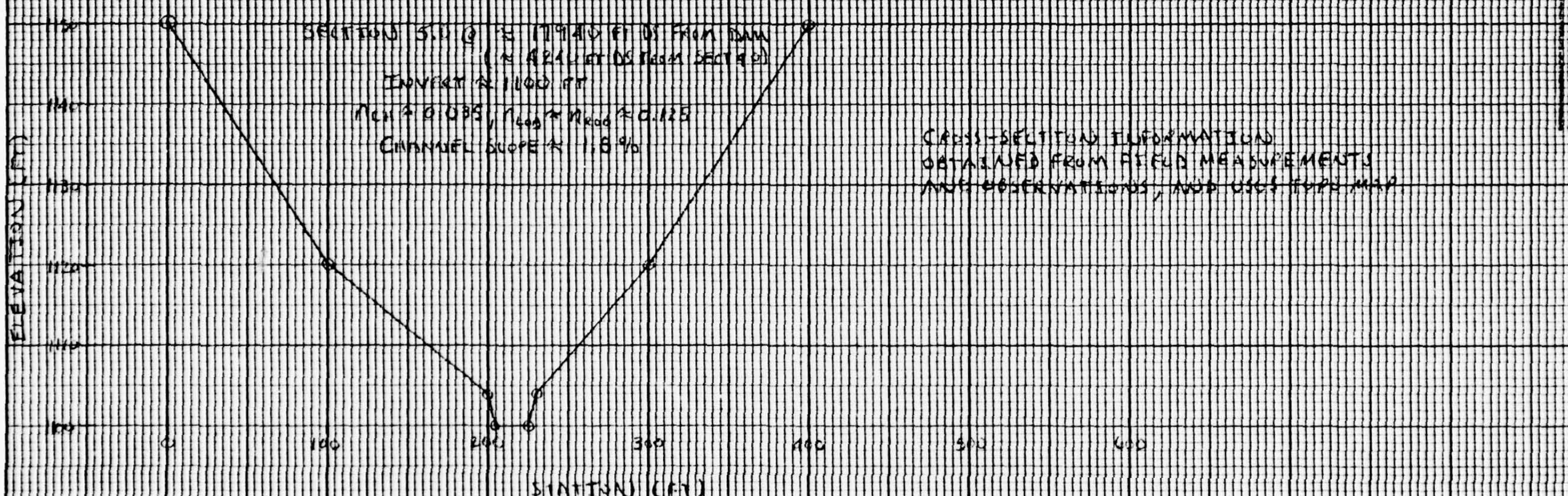
① FROM SHEET 14
② FROM SHEET 16
③ STRAIGHT-LINE INTERPOLATION
④ LOG-LOG INTERPOLATION

DOWNSTREAM ROUTING SECTIONS

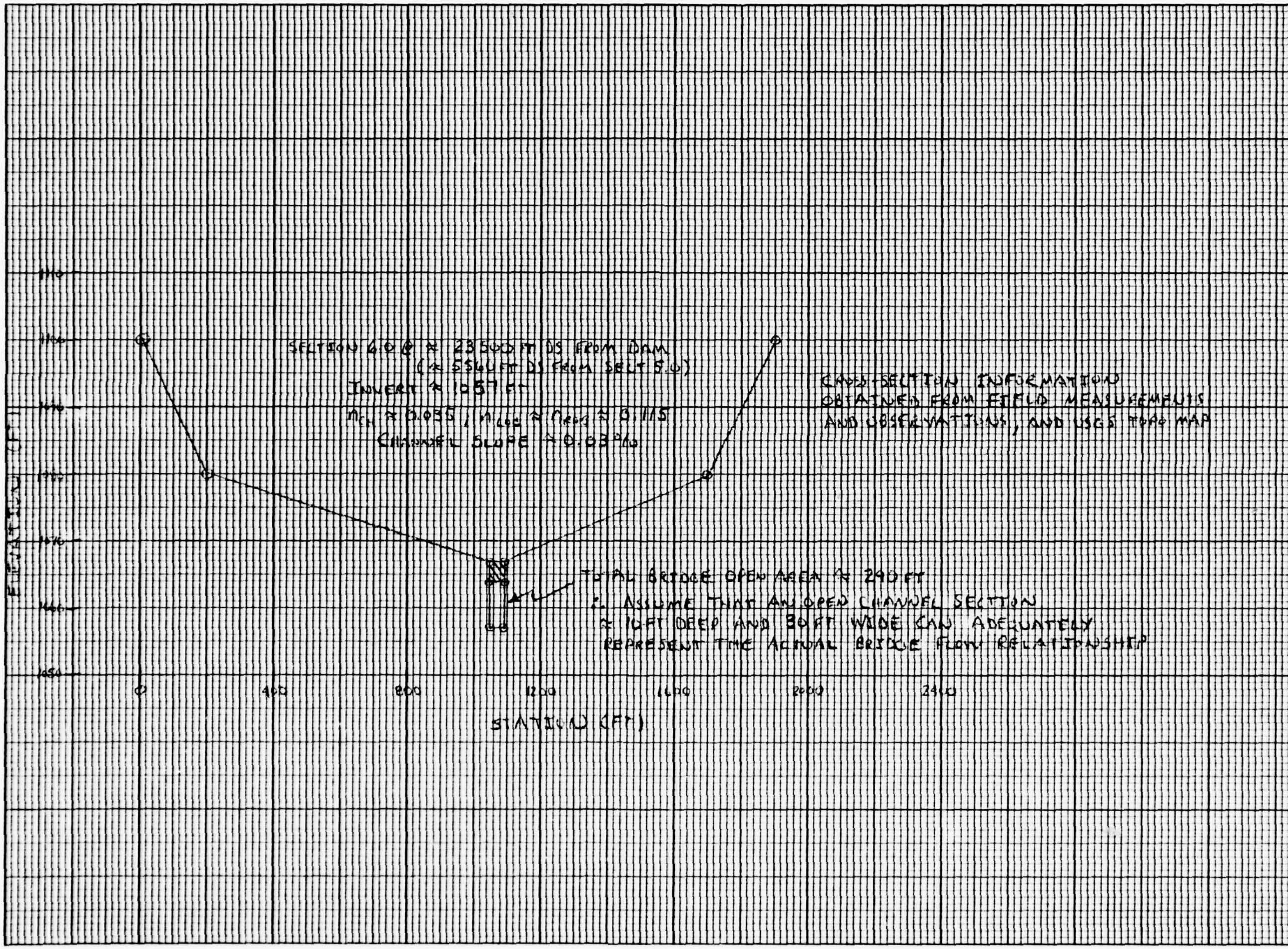


DOWNSTREAM ROUTING SECTIONS





DOWNSTREAM ROUTING SECTIONS



SUBJECT	DAM SAFETY INSPECTION VALLEY HI EAGLE LAKE DAM		
BY WJV	DATE 9-4-79	PROJ. NO. 78-617-186	
CHKD. BY	DATE	SHEET NO. 21 OF 24	

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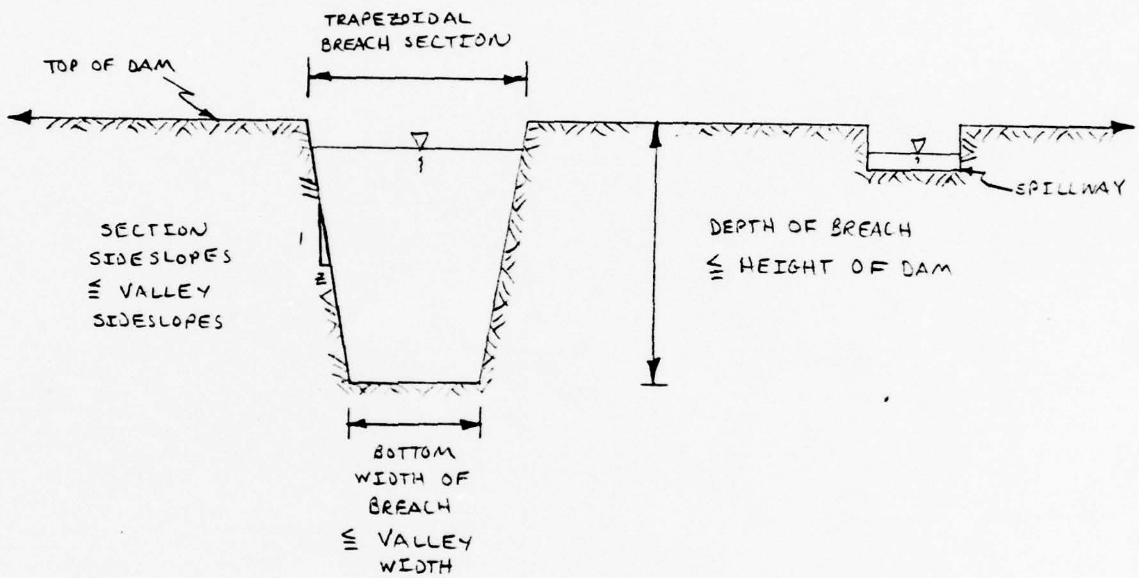
BREACH ASSUMPTIONS

- TYPICAL BREACH SECTION:



- HEC-1-DAM BREACHING ANALYSIS INPUTS:

(BREACHING WILL COMMENCE WHEN THE RESERVOIR LEVEL REACHES THE TOP OF DAM ELEVATION)

PLAN NUMBER AND COMMENT	BREACH BOTTOM WIDTH (FT)	MAX BREACH DEPTH (FT)	SECTION SIDESLOPES	*BREACH TIME (HR)	WSEL @ START OF FAILURE (FT)
① MIN BREACH SECT; MIN FAIL TIME	0	25	½H to 1V	0.5	1331.9
② MAX BREACH SECT; MIN FAIL TIME	200	25	4H to 1V	0.5	1331.9
③ MIN BREACH SECT; MAX FAIL TIME	0	25	½H to 1V	4.0	1331.9
④ MAX BREACH SECT; MAX FAIL TIME	200	25	4H to 1V	4.0	1331.9
⑤ AVERAGE POSSIBLE CONDITIONS	100	25	1H to 1V	2.0	1331.9

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- THE BREACH ASSUMPTIONS LISTED ON SHEET 22 ARE BASED SOMEWHAT ON INFORMATION CONCERNING EARTH DAM BREACHING PROVIDED BY THE COE, BALTIMORE DISTRICT; AND ALSO ON THE PHYSICAL CONSTRAINTS OF THE DAM AND SURROUNDING TERRAIN:

CONSTRAINT	VALUE
HEIGHT OF DAM	≈ 25 FT (FIELD MEASURED)
EMBANKMENT CREST LENGTH	≈ 430 FT (FIELD MEASURED)
VALLEY BOTTOM WIDTH	≈ 200 FT (FIG 3)
VALLEY SIDESLOPES ADJACENT TO DAM:	
RIGHT WALL	≈ 4H TO 1V (FIG. 3)
LEFT WALL	≈ 4H TO 1V (FIG. 3)

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HEC-1-DAM BREACHING ANALYSIS OUTPUT :

RESERVOIR DATA

UNDER 0.26 PMF CONDITIONS -

* PLAN NUMBER	VARIABLE BREACH BOTTOM WIDTH (FT)	ACTUAL MAX FLOW DURING FAIL TIME (CFS)	CORRESPONDING TIME OF FLOW (HR)	INTERPOLATED OR HEC-1 ROUTED MAX FLOW DURING FAIL TIME (CFS)	CORRESPONDING TIME OF FLOW (CFS)	ACTUAL PEAK FLOW THROUGH DAM (CFS)	CORRESPONDING TIME OF PEAK (HR)	TIME OF INITIAL BREACH (HR)
1	0	4448	43.00	4448	43.00	4448	43.00	42.50
2	200	23206	42.84	20068	42.75	23206	42.84	42.50
3	0	2191	46.50	2191	46.50	2191	46.50	42.50
4	200	4393	43.58	4371	43.50	4393	43.58	42.50
5	100	6917	43.58	6820	43.50	6917	43.58	42.50

* SEE TABLE ON SHEET 21

SUBJECT DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM

BY WJV DATE 9-4-79 PROJ. NO. 79-617-196

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HEC-1-DAM BREACHING ANALYSIS OUTPUT :

DOWNSTREAM ROUTING DATA

UNDER 0.26 PMF BASE FLOW CONDITIONS -

PLAN NUMBER [1]	VARIABLE BREACH BOTTOM WIDTH (FT)	OUTPUT @ SECTION 4 LOCATED 13700 FT DS FROM DAM				OUTPUT @ SECTION 6 LOCATED 23500 FT DS FROM DAM			
		PEAK FLOW (CFS)	CORRESPONDING WSEL [2] (FT)	WSEL W/O BREACH [3] (FT)	Δ ELEV [4] (FT)	PEAK FLOW (CFS)	CORRESPONDING WSEL [2] (FT)	WSEL W/O BREACH [3] (FT)	Δ ELEV [4] (FT)
1	0	3067	1168.9	1165.8	+3.1	2933	1068.0	1063.0	+5.0
2	200	7110	1172.5	1165.8	+6.7	5004	1070.7	1063.0	+7.7
3	0	1986	1167.3	1165.8	+1.5	1961	1065.6	1063.0	+2.6
4	200	3905	1169.8	1165.8	+4.0	3613	1069.0	1063.0	+6.0
5	100	5439	1171.3	1165.8	+5.5	4619	1070.3	1063.0	+7.3

1. SEE TABLE ON SHEET 21 ;
2. WATER SURFACE ELEVATIONS CORRESPONDING TO BREACH FLOWS (SUMMARY INPUT/OUTPUT SHEETS , SHEETS AND);
3. BASE FLOW ELEVATIONS CORRESPONDING TO THE PEAK 0.26 PMF AS INTERPOLATED FROM SHEETS AND); AND
4. Δ ELEV = CORRESPONDING WSEL - WSEL W/O BREACH

SUBJECT Dam Safety Inspection
Valley-Hi Eagle Lake Dam

BY DLB DATE 9-6-79 PROJ. NO. 78-617-186
CHKD. BY WJV DATE 9-13-79 SHEET NO. A OF O

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BACKWATER
CURVE COMPUTATIONS
FOR TAILWATER
ON SPILLWAY
WEIR

```
T1 DAM SAFETY INSPECTION - TAILWATER ON SPILLWAY
T2 START CALCULATIONS VIA CRITICAL DEPTH ASSUMPTION AT SECTION 0.2
T3     VALLEY HI EAGLE LAKE DAM DISCHARGE CHANNEL

J1   ICHECK     INQ       NINV      IDIR      STRT      METRIC     HVINS      Q        WSEL       FQ

       0.        2.        0.        0.  -1.000000     0.0        0.0        0.   1322.000     0.0

J2   NPROF     IPLOT     PREVS     XSECV     XSECH       FN       ALLDC      IBW      CHNIM     ITRACE

     1.000      0.0       0.0       0.0       0.0       0.0        0.0       0.0       0.0       0.0

J3   VARIABLE CODES FOR SUMMARY PRINTOUT

    38.000    39.000    42.000    43.000     1.000     2.000      3.000    26.000      0.0       0.0

J5   LPRNT     NUMSEC                 ********REQUESTED SECTION NUMBERS********

   -10.000   -10.000      0.0       0.0       0.0       0.0        0.0       0.0       0.0       0.0
NC     0.060     0.060     0.060     0.100     0.300      0.0        0.0        0.0        0.0        0.0
OT    14.000   100.000   300.000   500.000   700.000    900.000   1100.000   1400.000   1700.000   2000.000
GT  2300.000  2600.000  3000.000  3500.000  4000.000      0.0        0.0        0.0        0.0        0.0

X1     0.200     9.000    40.000    75.000     0.0        0.0        0.0        0.0        0.0        0.0
GR  1331.000     0.0    1324.000    40.000  1321.000     43.000   1321.000     72.000   1324.000     75.000
GR  1326.000   225.000  1327.000   275.000  1324.000    325.000   1331.000    355.000      0.0        0.0

X1     0.100     4.000     0.0      50.000   300.000    300.000    300.000      0.0        0.0        0.0
GR  1335.000     0.0    1323.000    12.000  1323.000     42.000   1331.000     50.000      0.0        0.0
EJ     0.0       0.0       0.0       0.0       0.0        0.0        0.0        0.0        0.0        0.0
```

SUBJECT DAM SAFETY INSPECTION
VALLEY-Hi EAGLE LAKE DAM

BY DLB DATE 9-6-79 PROJ. NO. 78-617-1B6

CHKD. BY WJV DATE 9-13-79 SHEET NO. B OF O

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VALLEY HI EAGLE LAKE DAM

SUMMARY PRINTOUT

	SECNO	XLCH	ELMIN	Q	CWSEL	CRIWS	EG	VCH
SECTION @ TOE OF WEIR	0.200	0.0	1321.00	100.00	1321.71	1321.71	1322.06	4.75
	0.200	0.0	1321.00	300.00	1322.46	1322.46	1323.17	6.74
	0.200	0.0	1321.00	500.00	1323.04	1323.04	1324.01	7.88
	0.200	0.0	1321.00	700.00	1323.53	1323.53	1324.73	8.76
	0.200	0.0	1321.00	900.00	1323.98	1323.98	1325.36	9.43
	0.200	0.0	1321.00	1100.00	1324.84	1324.84	1325.86	8.31
	0.200	0.0	1321.00	1400.00	1325.41	1325.41	1326.31	8.19
	0.200	0.0	1321.00	1700.00	1325.75	1325.75	1326.65	8.47
	0.200	0.0	1321.00	2000.00	1326.16	1326.16	1326.92	8.12
	0.200	0.0	1321.00	2300.00	1326.40	1326.40	1327.15	8.23
	0.200	0.0	1321.00	2600.00	1326.55	1326.55	1327.35	8.63
	0.200	0.0	1321.00	3000.00	1326.73	1326.73	1327.60	9.15
	0.200	0.0	1321.00	3500.00	1326.94	1326.94	1327.89	9.67
	0.200	0.0	1321.00	4000.00	1327.09	1327.09	1328.15	10.31
SECTION @ CONTROL @ ≈ 300 FT DS FROM WEIR	0.100	300.00	1323.00	100.00	1324.67	0.0	1324.73	1.89
	0.100	300.00	1323.00	300.00	1326.04	0.0	1326.18	2.99
	0.100	300.00	1323.00	500.00	1327.00	0.0	1327.21	3.68
	0.100	300.00	1323.00	700.00	1327.79	0.0	1328.06	4.20
	0.100	300.00	1323.00	900.00	1328.47	0.0	1328.81	4.64
	0.100	300.00	1323.00	1100.00	1328.74	0.0	1329.19	5.36
	0.100	300.00	1323.00	1400.00	1329.19	0.0	1329.80	6.24
	0.100	300.00	1323.00	1700.00	1329.64	0.0	1330.40	6.99
	0.100	300.00	1323.00	2000.00	1329.85	0.0	1330.83	7.93
	0.100	300.00	1323.00	2300.00	1330.14	0.0	1331.31	8.67
	0.100	300.00	1323.00	2600.00	1330.50	0.0	1331.83	9.24
	0.100	300.00	1323.00	3000.00	1330.94	0.0	1332.48	9.95
	0.100	300.00	1323.00	3500.00	1331.42	0.0	1333.24	10.83
	0.100	300.00	1323.00	4000.00	1331.90	0.0	1333.98	11.58

SUBJECT DAM SAFETY INSPECTION

VALLEY-HI EAGLE LAKE DAM

BY DLB DATE 9-5-79 PROJ. NO. 78-617-186

CHKD. BY NJV DATE 9-13-79 SHEET NO. C OF O

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OVERTOPPING

DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM ****** OVERTOPPING ANALYSIS ******
15-MINUTE TIME STEP AND 72-HOUR STORM DURATION

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
288	0	15	0	0	0	0	0	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 6 LRTIO= 1
RTIOS= .10 .20 .30 .40 .50 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW INTO VALLEY HI EAGLE LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.20	0.00	2.20	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	23.30	117.50	127.00	136.00	142.50	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

INITIAL AND CONSTANT RAINFALL LOSSES AS PER COE

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 1.76 CP= .55 NTA= 0

BASE FLOW PARAMETERS AS PER COE

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 7.81 AND R= 8.11 INTERVALS

UNIT HYDROGRAPH 48 END-OF-PERIOD ORDINATES, LAG= 1.77 HOURS, CP= .55 VOL= 1.00

21.	79.	160.	252.	340.	408.	445.	446.	410.	362.
320.	283.	250.	221.	195.	173.	152.	135.	119.	105.
93.	82.	73.	64.	57.	50.	44.	39.	35.	31.
27.	24.	21.	18.	17.	15.	13.	11.	10.	9.

C

SUBJECT: DAM SAFETY INSPECTION
VALLEY-HI EAGLE LAKE DAM

BY: DLB DATE: 9-5-79 PROJ. NO. 78-617-186
CHKD. BY: WJV DATE: 9-13-79 SHEET NO. D OF 0

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```
   0                                      END-OF-PERIOD FLOW
MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q       MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q

                                                                         SUM   27.03  24.37   2.66   140180.
                                                                             ( 687.)( 619.)(  68.)( 3969.46)
```

INFLOWS INTO RESERVOIR

0.2 PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1207.	830.	284.	97.	28036.
CMS	34.	23.	8.	3.	794.
INCHES		3.51	4.81	4.94	4.94
MM		89.13	122.13	125.46	125.46
AC-FT		411.	564.	579.	579.
THOUS CU M		508.	696.	714.	714.

0.3 PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1810.	1245.	426.	146.	42054.
CMS	51.	35.	12.	4.	1191.
INCHES		5.26	7.21	7.41	7.41
MM		133.69	183.19	188.19	188.19
AC-FT		617.	846.	869.	869.
THOUS CU M		761.	1043.	1072.	1072.

PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6033.	4149.	1421.	487.	140179.
CMS	171.	117.	40.	14.	3969.
INCHES		17.54	24.04	24.70	24.70
MM		445.63	610.64	627.30	627.30
AC-FT		2057.	2819.	2896.	2896.
THOUS CU M		2538.	3478.	3572.	3572.

HYDROGRAPH ROUTING

ROUTE INFLOW THROUGH RESERVOIR

```
                 ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                   101       1       0       0       0       0       1       0       0
                                       ROUTING DATA
          QLOSS  CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
            0.0  0.000    0.00       1       1       0       0               0

                 NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                     1       0       0   0.000   0.000   0.000  -1327.      -1

SURFACE AREA=       0.      25.      44.      62.      92.

    CAPACITY=       0.     126.     296.     555.    1174.

   ELEVATION=    1307.    1322.    1327.    1332.    1340.

                  CREL   SPWID    COQW    EXPW   ELEVL    COQL   CAREA    EXPL
                1327.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0

                                       DAM DATA
                              TOPEL    COQD    EXPD   DAMWID
                             1331.9     0.0     0.0       0.
```

SUBJECT DAM SAFETY INSPECTION
VALLEY-HI EAGLE LAKE DAM

BY DLB DATE 9-5-79 PROJ. NO. 78-617-186

CHKD. BY BMM DATE 9-13-79 SHEET NO. E OF O

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RESERVOIR OUTFLOW HYDROGRAPHS

0.2 PMF

PEAK OUTFLOW IS 827. AT TIME 43.25 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	827.	667.	268.	95.	27359.
CMS	23.	19.	8.	3.	775.
INCHES		2.82	4.54	4.82	4.82
MM		21.58	115.34	122.43	122.43
AC-FT		331.	533.	565.	565.
THOUS CU M		408.	657.	697.	697.

0.3 PMF

PEAK OUTFLOW IS 1441. AT TIME 42.75 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1441.	1054.	409.	143.	41246.
CMS	41.	30.	12.	4.	1168.
INCHES		4.46	6.91	7.27	7.27
MM		113.16	175.62	184.58	184.58
AC-FT		522.	811.	852.	852.
THOUS CU M		644.	1000.	1051.	1051.

PMF

PEAK OUTFLOW IS 5865. AT TIME 41.75 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5865.	4031.	1400.	482.	138731.
CMS	166.	114.	40.	14.	3928.
INCHES		17.04	23.68	24.44	24.44
MM		432.88	601.53	620.82	620.82
AC-FT		1999.	2777.	2866.	2866.
THOUS CU M		2465.	3426.	3536.	3536.

OVERTOPPING OCCURS @ ≈ 0.24 PMF

HYDROGRAPH ROUTING

ROUTE FROM DAM TO SECTION 2 + 2860 FT DS FROM DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
102	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

SUBJECT DAM SAFETY INSPECTION
VALLEY-HI EAGLE LAKE DAM

BY DLB DATE 9-5-79 PROJ. NO. 78-617-186

CHKD. BY BMM DATE 9-13-79 SHEET NO. F OF O

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NORMAL DEPTH CHANNEL ROUTING
----------------------------

     QN(1)   QN(2)   QN(3)   ELNVT   ELMAX   RLNTH     SEL
     .1250   .0350   .1250  1258.0  1300.0   2860.   .01500

     CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
        0.00 1300.00   100.00 1280.00   245.00 1262.00   250.00 1258.00   270.00 1258.00
      275.00 1262.00   450.00 1280.00   500.00 1300.00

STORAGE       0.00       3.30       7.50      15.79      29.79      49.49      74.89     106.00     142.81
            231.53     285.65     340.17     397.10     456.43     518.17     582.32     648.87     717.83

OUTFLOW       0.00     396.56    1337.28    2998.59    5435.57    8774.80   13130.35   18609.09   25312.65
          42819.96   54542.06   67668.64   82190.43   98105.80  115418.47  134135.94  154268.56  175828.84

STAGE      1258.00    1260.21    1262.42    1264.63    1266.84    1269.05    1271.26    1273.47    1275.68
           1280.11    1282.32    1284.53    1286.74    1288.95    1291.16    1293.37    1295.58    1297.79

FLOW          0.00     396.56    1337.28    2998.59    5435.57    8774.80   13130.35   18609.09   25312.65
          42819.96   54542.06   67668.64   82190.43   98105.80  115418.47  134135.94  154268.56  175828.84

                              HYDROGRAPH ROUTING

          ROUTE FROM SECTION 2 TO SECTION 3 + 10460 FT DS FROM DAM

                   ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                     203       1       0       0       0       0       1       0       0
                                        ROUTING DATA
           QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
             0.0   0.000    0.00       1       1       0       0               0

                   NSTPS   NSTDL     LAG   AMSKK       X     TSK    STORA  ISPRAT
                       1       0       0   0.000   0.000   0.000    -1.        0

NORMAL DEPTH CHANNEL ROUTING
----------------------------

     QN(1)   QN(2)   QN(3)   ELNVT   ELMAX   RLNTH     SEL
     .1250   .0350   .1250  1176.0  1220.0   7600.   .00600

     CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
        0.00 1220.00   300.00 1200.00  1000.00 1180.00  1005.00 1176.00  1025.00 1176.00
     1030.00 1180.00  1400.00 1200.00  2100.00 1220.00

STORAGE       0.00       9.25      22.61      73.42     174.28     325.20     526.18     777.21    1078.31
           1630.67    2281.28    2778.89    3323.28    3914.46    4552.41    5237.16    5968.68    6746.99

OUTFLOW       0.00     271.40     930.29    2270.39    4665.66    8450.21   13913.23   21317.98   30909.63
          57566.23   75265.55   96270.01  120606.23  148396.86  179779.69  214899.30  253903.14  296939.40
```

SUBJECT: DAM SAFETY INSPECTION
VALLEY-HI EAGLE LAKE DAM

BY: DLB DATE: 9-5-79 PROJ. NO.: 78-617-186

CHKD. BY: BMM DATE: 9-13-79 SHEET NO.: G OF: O

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                              HYDROGRAPH ROUTING

          ROUTE FROM SECTION 3 TO SECTION 4 + 13700 FT DS FROM DAM

                  ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                    304       1       0       0       0       0       1       0       0
                                     ROUTING DATA
          QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
            0.0   0.000    0.00       1       1       0       0               0

                  NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                      1       0       0   0.000   0.000   0.000     -1.       0


NORMAL DEPTH CHANNEL ROUTING
----------------------------

   QN(1)   QN(2)   QN(3)   ELNVT   ELMAX   RLNTH     SEL
   .1250   .0350   .1250  1161.0  1210.0   3240.  .00700


   CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
      0.00 1210.00  100.00 1180.00  195.00 1165.00  200.00 1161.00  220.00 1161.00
    225.00 1165.00  500.00 1180.00 1125.00 1210.00

STORAGE        0.00       4.45      11.25      28.59      58.12      99.86     153.81     219.95     298.25
             490.75     604.93     731.06     869.15    1019.20    1181.20    1355.16    1541.07    1738.94

OUTFLOW        0.00     352.00    1242.18    2881.71    5455.70    9158.00   14162.71   20631.50   28730.84
           50368.06   64154.18   80084.23   98279.01  118856.61  141932.57  167619.96  196029.60  227270.19

STAGE       1161.00    1163.58    1166.16    1168.74    1171.32    1173.89    1176.47    1179.05    1181.63
            1186.79    1189.37    1191.95    1194.53    1197.11    1199.68    1202.26    1204.84    1207.42

FLOW           0.00     352.00    1242.18    2881.71    5455.70    9158.00   14162.71   20631.50   28730.84
           50368.06   64154.18   80084.23   98279.01  118856.61  141932.57  167619.96  196029.60  227270.19

                              HYDROGRAPH ROUTING

          ROUTE FROM SECTION 4 TO SECTION 5 + 17940 FT DS FROM DAM

                  ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                    405       1       0       0       0       0       1       0       0
                                     ROUTING DATA
          QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
            0.0   0.000    0.00       1       1       0       0               0

                  NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                      1       0       0   0.000   0.000   0.000     -1.       0
```

SUBJECT DAM SAFETY INSPECTION
VALLEY-HI EAGLE LAKE DAM

BY DLB DATE 9-5-79 PROJ. NO. 78-617-186

CHKD. BY BMM DATE 9-13-79 SHEET NO. H OF O

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NORMAL DEPTH CHANNEL ROUTING

```
 QN(1)   QN(2)   QN(3)   ELNVT   ELMAX   RLNTH     SEL
 .1250   .0350   .1250  1100.0  1150.0   4240.  .01800

 CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
   0.00 1150.00  100.00 1120.00  200.00 1104.00  205.00 1100.00  225.00 1100.00
 230.00 1104.00  300.00 1120.00  400.00 1150.00

STORAGE       0.00      5.97     14.25     28.95     50.82     79.84    116.03    159.38    209.69
            324.73    388.99    457.75    531.00    608.74    690.98    777.71    868.93    964.65

OUTFLOW       0.00    584.22   2061.16   4560.62   8105.15  12797.23  18736.97  26021.97  34875.88
          57329.37  70764.94  85714.31 102212.27 120295.33 140001.06 161367.71 184433.91 209238.50

STAGE      1100.00   1102.63   1105.26   1107.89   1110.53   1113.16   1115.79   1118.42   1121.05
           1126.32   1128.95   1131.58   1134.21   1136.84   1139.47   1142.11   1144.74   1147.37

FLOW          0.00    584.22   2061.16   4560.62   8105.15  12797.23  18736.97  26021.97  34875.88
          57329.37  70764.94  85714.31 102212.27 120295.33 140001.06 161367.71 184433.91 209238.50

                         HYDROGRAPH ROUTING

       ROUTE FROM SECTION 5 TO SECTION 6 * 23500 FT DS FROM DAM (* RT 915 BRIDGE)

               ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                 506       1       0       0       0       0       1       0       0
                                    ROUTING DATA
       QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
         0.0   0.000    0.00       1       1       0       0               0

               NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                   1       0       0   0.000   0.000   0.000     -1.       0
```

NORMAL DEPTH CHANNEL ROUTING

```
 QN(1)   QN(2)   QN(3)   ELNVT   ELMAX   RLNTH     SEL
 .1150   .0350   .1150  1057.0  1100.0   5560.  .00300

 CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
   0.00 1100.00  200.00 1080.00 1050.00 1067.00 1051.00 1057.00 1081.00 1057.00
1082.00 1067.00 1700.00 1080.00 1900.00 1100.00

STORAGE       0.00      8.73     17.59     26.59     35.71     57.42    146.50    309.40    546.12
           1241.05   1677.96   2128.75   2592.61   3069.55   3559.56   4062.65   4578.82   5108.05

OUTFLOW       0.00    251.51    744.49   1376.70   2107.11   3064.85   4870.70   8143.58  13401.18
          31632.94  47181.96  66097.36  87867.93 112397.35 139619.21 169487.41 201970.35 237047.19
```

SUBJECT: DAM SAFETY INSPECTION
VALLEY-HI EAGLE LAKE DAM

BY: DLB DATE: 9-5-79 PROJ. NO. 78-617-186

CHKD. BY: BMM DATE: 9-13-79 SHEET NO. I OF O

GAI CONSULTANTS, INC
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Environmental Specialists

SUMMARY OF DAM SAFETY ANALYSIS

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1327.00	1327.00	1331.90
STORAGE	296.	296.	555.
OUTFLOW	0.	0.	1050.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1329.69	0.00	427.	359.	0.00	43.75	0.00
.20	1331.29	0.00	518.	827.	0.00	43.25	0.00
.30	1332.40	.50	586.	1441.	3.00	42.75	0.00
.40	1333.05	1.15	628.	2082.	4.50	42.50	0.00
.50	1333.48	1.58	657.	2755.	5.50	42.25	0.00
1.00	1334.91	3.01	757.	5865.	8.25	41.75	0.00

PLAN 1 STATION 102

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	360.	1260.0	43.75
.20	827.	1261.2	43.25
.30	1437.	1262.6	42.75
.40	2080.	1263.4	42.50
.50	2758.	1264.3	42.25
1.00	5847.	1267.1	41.75

PLAN 1 STATION 203

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	358.	1178.6	44.00
.20	822.	1180.3	43.50
.30	1384.	1181.4	43.25
.40	2002.	1182.5	43.00
.50	2633.	1183.3	42.75
1.00	5595.	1185.8	42.50

PLAN 1 STATION 304

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	358.	1163.6	44.00
.20	821.	1164.9	43.75
.30	1381.	1166.4	43.50
.40	1996.	1167.3	43.25
.50	2627.	1168.3	43.00
1.00	5582.	1171.4	42.50

SUBJECT DAM SAFETY INSPECTION
VALLEY-HI EAGLE LAKE DAM

BY DLB DATE 9-5-79 PROJ. NO. 78-617-186

CHKD. BY BMM DATE 9-13-79 SHEET NO. J OF O

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PLAN 1 STATION 405

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	357.	1101.6	44.25
.20	821.	1103.1	43.75
.30	1381.	1104.1	43.50
.40	1997.	1105.1	43.25
.50	2626.	1105.9	43.00
1.00	5572.	1108.6	42.75

PLAN 1 STATION 506

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	356.	1059.7	44.50
.20	819.	1061.8	44.00
.30	1373.	1063.8	43.75
.40	1988.	1065.7	43.50
.50	2596.	1067.2	43.25
1.00	5317.	1070.9	43.25

SUBJECT DAM SAFETY INSPECTION

VALLEY-HI EAGLE LAKE DAM

BY DLB DATE 9-6-79 PROJ. NO. 78-617-186

CHKD. BY BMM DATE 9-13-79 SHEET NO. K OF O

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BREACHING

BREACHING ANALYSIS CONSISTS OF SAME INPUT DATA AS FOR THE OVERTOPPING ANALYSIS W/ THE ADDITION OF THE BREACH DATA GIVEN HERE.

```
DAM SAFETY INSPECTION
VALLEY HI EAGLE LAKE DAM ****** BREACHING  ANALYSIS ******
15-MINUTE TIME STEP AND 72-HOUR STORM DURATION

                              JOB SPECIFICATION
  NQ      NHR     NMIN     IDAY      IHR     IMIN    METRC    IPLT    IPRT    NSTAN
 288        0       15        0        0        0        0       0       0        0
                          JOPER      NWT    LROPT    TRACE
                              5        0        0        0

                   MULTI-PLAN ANALYSES TO BE PERFORMED
                       NPLAN= 5 NRTIO= 1 LRTIO= 1
  RTIOS=    .26


                           HYDROGRAPH ROUTING

ROUTE INFLOW THROUGH RESERVOIR
                                                       DAM DATA
                                             TOPEL     COQD     EXPD   DAMWID
                                            1331.9      0.0      0.0       0.
```

PLAN

①

```
                                                    DAM BREACH DATA
                                   BRWID         Z     ELBM    TFAIL      WSEL   FAILEL
                                      0.       .50  1307.00      .50   1327.00  1331.90

        BEGIN DAM FAILURE AT 42.50 HOURS

        PEAK OUTFLOW IS      4448. AT TIME  43.00 HOURS
```

②

```
                                                    DAM BREACH DATA
                                   BRWID         Z     ELBM    TFAIL      WSEL   FAILEL
                                    200.      4.00  1307.00      .50   1327.00  1331.90

        BEGIN DAM FAILURE AT 42.50 HOURS

        PEAK OUTFLOW IS     23206. AT TIME  42.84 HOURS
```

③

```
                                                    DAM BREACH DATA
                                   BRWID         Z     ELBM    TFAIL      WSEL   FAILEL
                                      0.       .50  1307.00     4.00   1327.00  1331.90

        BEGIN DAM FAILURE AT 42.50 HOURS

        PEAK OUTFLOW IS      2191. AT TIME  46.50 HOURS
```

SUBJECT DAM SAFETY INSPECTION
VALLEY-HI EAGLE LAKE DAM

BY DLB DATE 9-5-79 PROJ. NO. 78-617-186

CHKD. BY BMM DATE 9-13-79 SHEET NO. L OF O

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(4)

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
200.	4.00	1307.00	4.00	1327.00	1331.90

BEGIN DAM FAILURE AT 42.50 HOURS

PEAK OUTFLOW IS 4393. AT TIME 43.58 HOURS

(5)

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
100.	1.00	1307.00	2.00	1327.00	1331.90

BEGIN DAM FAILURE AT 42.50 HOURS

PEAK OUTFLOW IS 6917. AT TIME 43.58 HOURS

SUBJECT DAM SAFETY INSPECTION
VALLEY-HI EAGLE LAKE DAM

BY DLB DATE 9-5-79 PROJ. NO. 78-617-186

CHKD. BY BMM DATE 9-13-79 SHEET NO. M OF O

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THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .042 HOURS DURING BREACH FORMATION.
DOWNSTREAM CALCULATIONS WILL USE A TIME INTERVAL OF .250 HOURS.
THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.
INTERMEDIATE FLOWS ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

TIME (HOURS)	TIME FROM BEGINNING OF BREACH (HOURS)	INTERPOLATED BREACH HYDROGRAPH (CFS)	-	COMPUTED BREACH HYDROGRAPH (CFS)	=	ERROR (CFS)	ACCUMULATED ERROR (CFS)	ACCUMULATED ERROR (AC-FT)
42.500	0.000	1076.		1076.		0.	0.	0.
42.542	.042	1341.		1215.		126.	126.	0.
42.583	.083	1606.		1436.		170.	296.	1.
42.625	.125	1871.		1706.		165.	461.	2.
42.667	.167	2136.		2008.		128.	589.	2.
42.708	.208	2401.		2330.		70.	659.	2.
42.750	.250	2666.		2666.		0.	659.	2.
42.792	.292	2990.		3006.		-16.	643.	2.
42.833	.333	3313.		3345.		-32.	611.	2.
42.875	.375	3637.		3678.		-41.	570.	2.
42.917	.417	3961.		4002.		-41.	530.	2.
42.958	.458	4285.		4312.		-27.	503.	2.
43.000	.500	4609.		4609.		-0.	503.	2.
43.042	.542	4850.		4900.		-51.	452.	2.
43.083	.583	5090.		5171.		-81.	371.	1.
43.125	.625	5331.		5419.		-89.	283.	1.
43.167	.667	5571.		5645.		-74.	209.	1.
43.208	.708	5811.		5861.		-50.	159.	1.
43.250	.750	6052.		6052.		0.	159.	1.
43.292	.792	6180.		6215.		-35.	123.	0.
43.333	.833	6308.		6376.		-68.	56.	0.
43.375	.875	6436.		6510.		-74.	-18.	-0.
43.417	.917	6564.		6624.		-60.	-78.	-0.
43.458	.958	6692.		6738.		-46.	-124.	-0.
43.500	1.000	6820.		6820.		0.	-124.	-0.
43.542	1.042	6786.		6888.		-102.	-226.	-1.
43.583	1.083	6752.		6917.		-164.	-390.	-1.
43.625	1.125	6719.		6905.		-186.	-577.	-2.
43.667	1.167	6685.		6851.		-166.	-743.	-3.
43.708	1.208	6651.		6755.		-104.	-847.	-3.
43.750	1.250	6618.		6618.		0.	-847.	-3.
43.792	1.292	6338.		6438.		-100.	-947.	-3.
43.833	1.333	6058.		6217.		-159.	-1106.	-4.
43.875	1.375	5779.		5956.		-177.	-1283.	-4.
43.917	1.417	5499.		5655.		-156.	-1439.	-5.
43.958	1.458	5220.		5316.		-96.	-1535.	-5.
44.000	1.500	4940.		4940.		0.	-1535.	-5.
44.042	1.542	4487.		4532.		-45.	-1580.	-5.
44.083	1.583	4033.		4095.		-62.	-1642.	-6.
44.125	1.625	3580.		3636.		-56.	-1698.	-6.
44.167	1.667	3127.		3163.		-36.	-1735.	-6.
44.208	1.708	2673.		2686.		-13.	-1748.	-6.
44.250	1.750	2220.		2220.		0.	-1748.	-6.
44.292	1.792	1965.		1783.		181.	-1566.	-5.
44.333	1.833	1709.		1400.		309.	-1257.	-4.
44.375	1.875	1454.		1095.		359.	-898.	-3.
44.417	1.917	1198.		884.		315.	-583.	-2.
44.458	1.958	943.		759.		184.	-399.	-1.
44.500	2.000	687.		687.		0.	-399.	-1.

5

SUBJECT DAM SAFETY INSPECTION
VALLEY-HI EAGLE LAKE DAM

BY DLB DATE 9-5-79 PROJ. NO. 78-617-186

CHKD. BY BMM DATE 9-13-79 SHEET NO. N OF O

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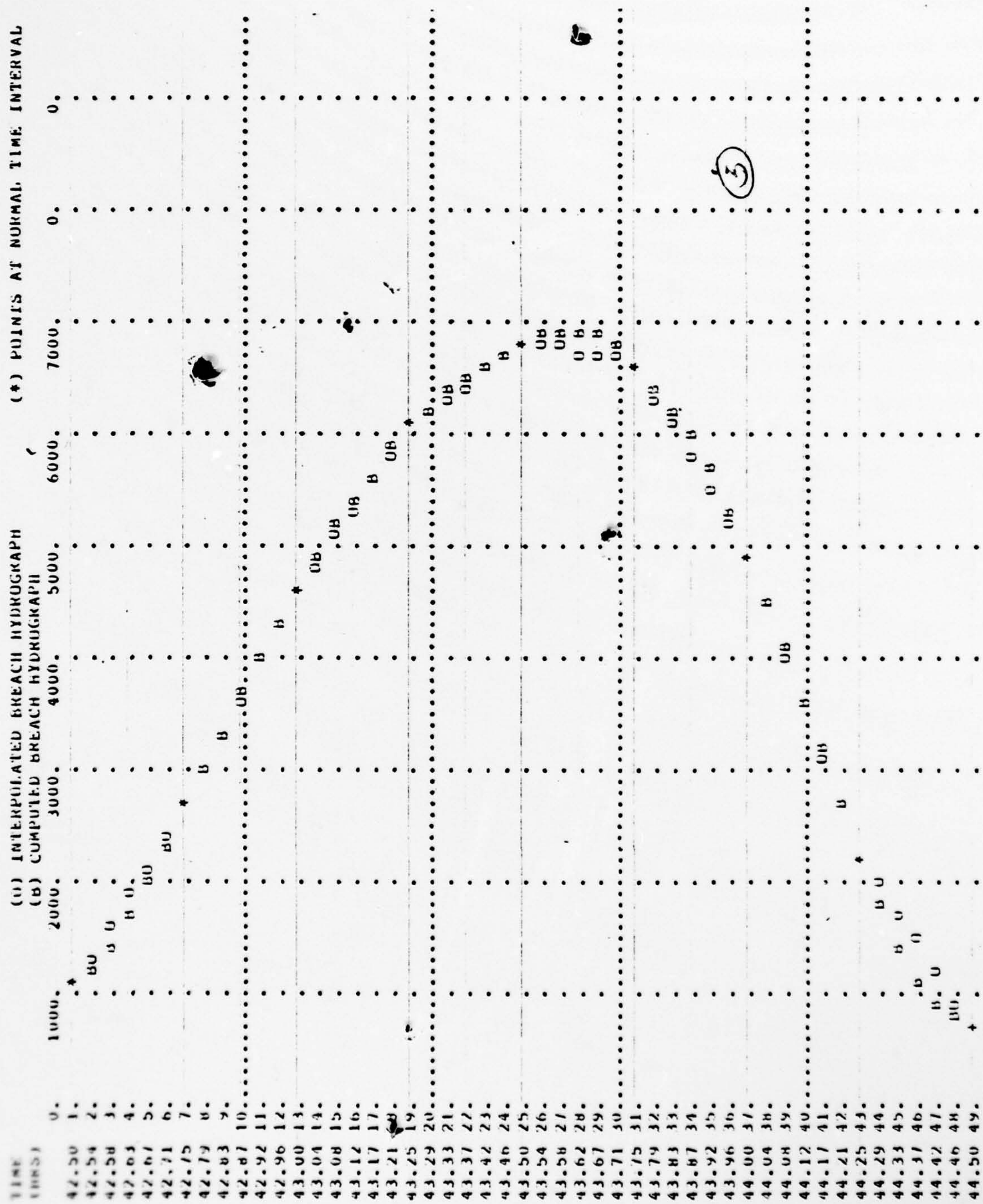

SUBJECT DAM SAFETY INSPECTION
VALLEY-HI EAGLE LAKE DAM

BY DLB DATE 9-5-79 PROJ. NO. 78-617-186
CHKD. BY BMM DATE 9-13-79 SHEET NO. 0 OF 0

GAI CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists

SUMMARY OF DAM SAFETY ANALYSIS

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1327.00	1327.00	1331.90
STORAGE	296.	296.	555.
OUTFLOW	0.	0.	1050.

PLAN	RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1	.26	1331.99	.09	560.	4448.	.56	43.00	42.50
2	.26	1331.96	.06	558.	23206.	.30	42.84	42.50
3	.26	1332.06	.16	564.	2191.	1.42	46.50	42.50
4	.26	1331.97	.07	559.	4393.	.42	43.58	42.50
5	.26	1331.97	.07	559.	6917.	.42	43.58	42.50

PLAN 1 STATION 506

PLAN	RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1	.26	2933.	1068.0	44.25
2	.26	5004.	1070.7	43.75
3	.26	1961.	1065.6	47.25
4	.26	3613.	1069.0	44.75
5	.26	4619.	1070.3	44.50

SECTION @
PA ROUTE 915
(1ST HOUSES)

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APPENDIX D

PHOTOGRAPHS

1

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3

4

PHOTOGRAPH 5 Close-up view of concrete deterioration associated with the spillway overflow weir and sidewalls.

PHOTOGRAPH 6 View, looking downstream, of the spillway discharge channel.

PHOTOGRAPH 7 View of the downstream end of the spillway discharge channel approximately 250 feet from the overflow weir which is located along the centerline of of the embankment.

PHOTOGRAPH 8 View, looking upstream, of the earth and rock dike which forms the right sidewall of the spillway channel. Note the lack of protective vegetation.


5


6


7


8

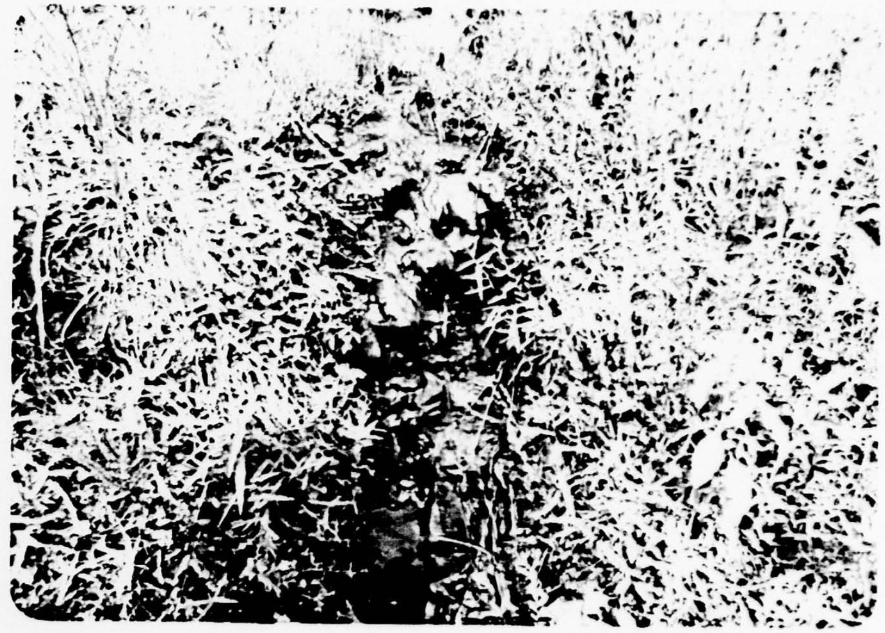
PHOTOGRAPH 9 View of the concrete headwall and unlined channel at the discharge end of the outlet conduit located at the downstream embankment toe.

PHOTOGRAPH 10 Close-up view of water draining from the area at the base of the downstream embankment toe to the left of the outlet conduit.

PHOTOGRAPH 11 View of the area immediately downstream of the dam as seen from the embankment crest.

PHOTOGRAPH 12 View of one residence located near the stream along PA Route 915 approximately 4.5 miles downstream of the embankment.


9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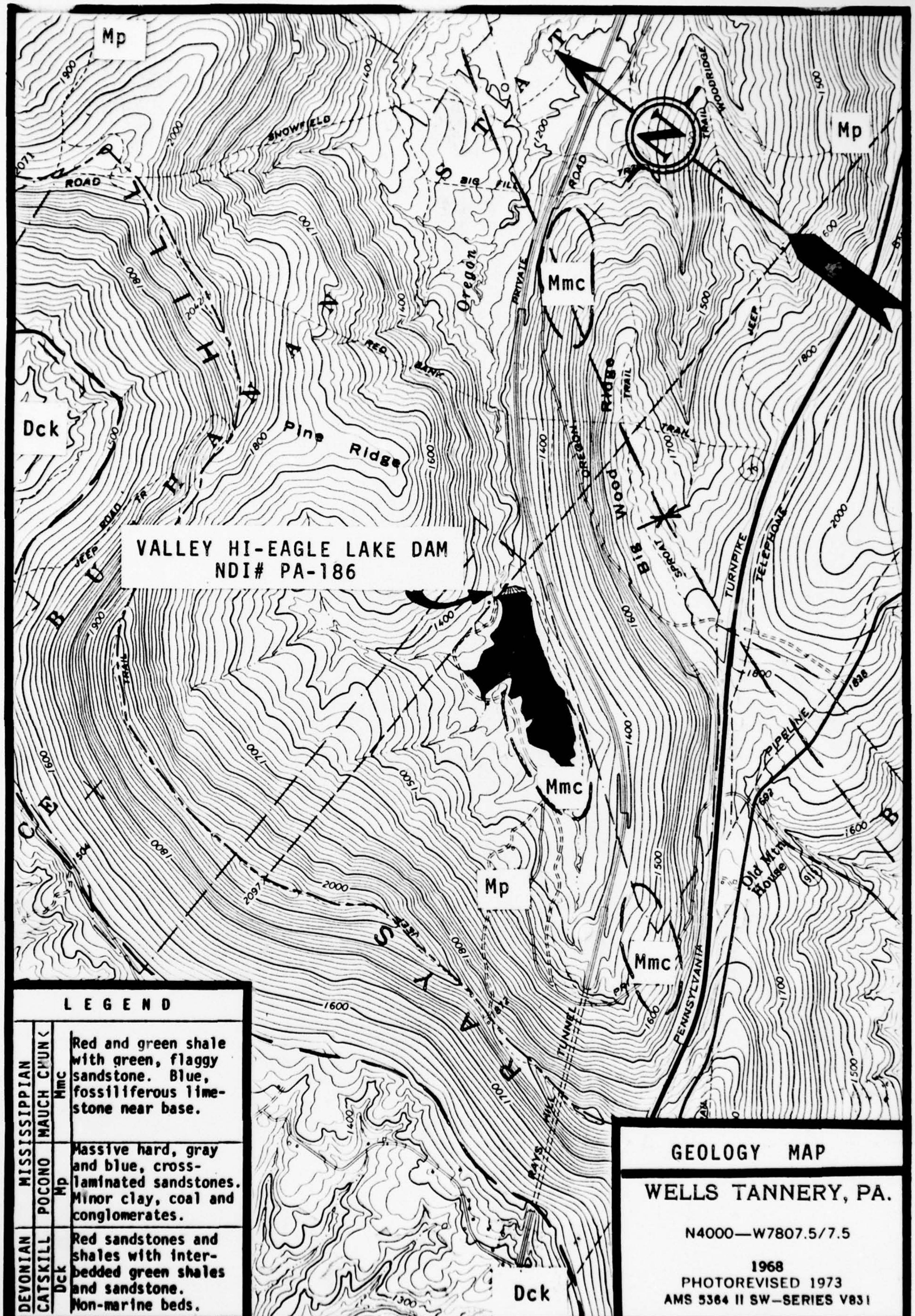
APPENDIX E

GEOLOGY

Geology

Valley Hi-Eagle Lake Dam is located in the Appalachian Mountain Section of the Valley and Ridge Province of south-central Pennsylvania. This section lies immediately east of the Allegheny Front and is a region of sharp contrast with the plateau country west of the Front. The Appalachian Mountain Section is composed of a broad band of long narrow mountain ridges and intermountane valleys which cross the state from the south-central border nearly to the northeast corner. Intense lateral compression from the southeast produced a series of high amplitude anticlines and synclines whose axes generally trend in a southwest-northeast direction. Folding was followed by uplift and, subsequent erosion cut valleys in the soft nonresistant beds and left the hard, resistant strata as ridges.

The dam and reservoir are located on Oregon Creek on the north side of an abandoned stretch of Pennsylvania Turnpike between the Rays Hill and Sideling Hill Tunnels. The area between Rays and Sideling Hill is in a gentle syncline, complicated by a minor anticline just downstream of the dam. Both structures strike northeast-southwest with the dominant syncline merging into the much larger Broad Top synclinorium to the north. Plunge along the strike of the syncline between Rays and Sideling Hills is northward so that progressively younger strata outcrop north of the site. Mississippian age strata compose the near surface bedrock in the immediate vicinity of the dam and reservoir. Patchy remnants of the lower portion of the Mauch Chunk Formation lie along the axial trace of syncline east of the site. Portions of the reservoir are underlain by red shales and sandstones of the Mauch Chunk Formation. The more resistant, massive Pocono sandstone generally occurs along the flank of the syncline east and west of the site and also along the crest of the minor anticline just east of the dam.


VALLEY HI-EAGLE LAKE DAM
NDI# PA-186
GEOLOGY MAP
WELLS TANNERY, PA.
N4000—W7807.5/7.5
1968
PHOTOREVISED 1973
AMS 5364 II SW—SERIES V831
LEGEND
MISSISSIPPIAN MAUCH CHUNK Mmc Red and green shale with green, flaggy sandstone. Blue, fossiliferous limestone near base.
MISSISSIPPIAN POCONO Mp Massive hard, gray and blue, cross-laminated sandstones. Minor clay, coal and conglomerates.
DEVONIAN CATSKILL Dck Red sandstones and shales with interbedded green shales and sandstone. Non-marine beds.
Mp
Mmc
Dck
N
Pine Ridge
Big Wood Ridge
Oregon
BUCHANAN STATE FOREST
RAYS
PENNSYLVANIA TURNPIKE
TELEPHONE
PIPELINE
TUNNEL
SNOWFIELD
ROAD
BIG FILL
RED BANK
PRIVATE ROAD
OREGON
TRAIL
JEEP
JEEP ROAD TR
WOODRIDGE TRAIL
SPROAT
Old Mtn House
1400
1500
1600
1700
1800
1900
2000
2097
1300
1826

AD-A079 001 GAI CONSULTANTS INC MONROEVILLE PA F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. VALLEY-HI EAGLE LAKE DAM (NDS --ETC(U)
SEP 79 B M MIHALCIN DACW31-79-C-0013
UNCLASSIFIED NL

2 OF 2
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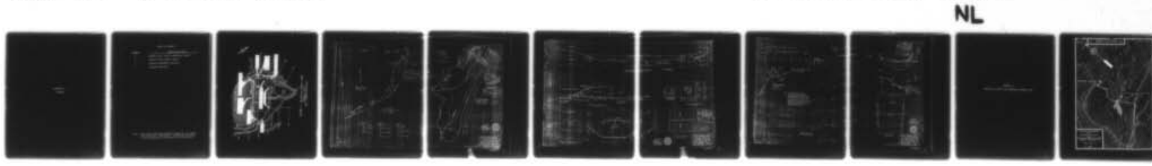

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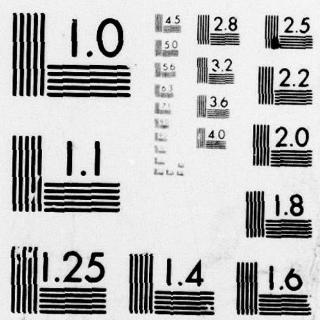


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

APPENDIX F

FIGURES

LIST OF FIGURES

Figure	Description/Title
1	General Plan (field inspection notes)
2	Location and General Layout
3	Typical Embankment Sections
4	Spillway Sections

Note: The design drawings presented herein do not represent "as-built" conditions. Elevations contained on the drawings are considered to be inaccurate.

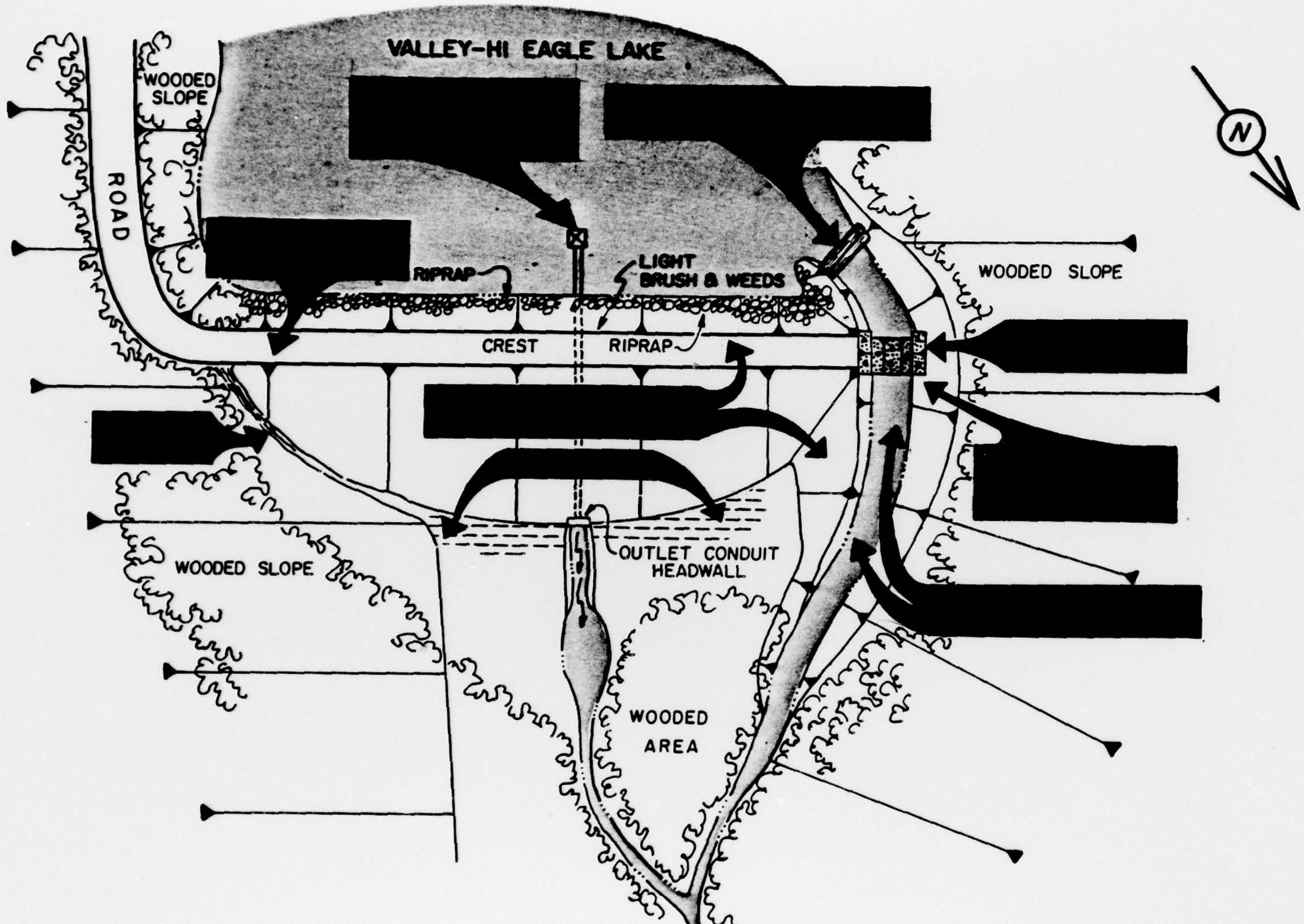
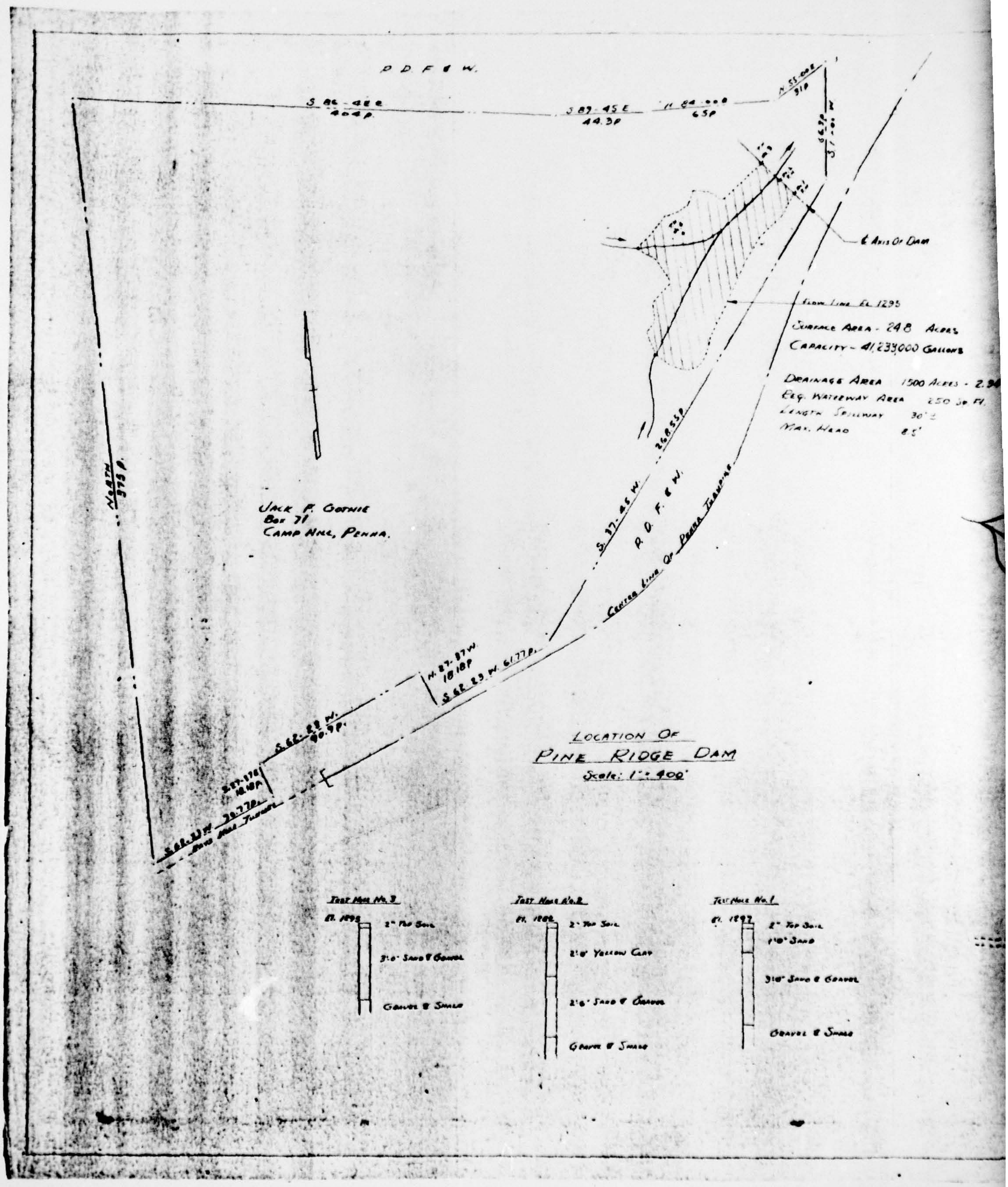


FIGURE 1 - VALLEY-HI EAGLE LAKE
GENERAL PLAN
FIELD INSPECTION NOTES


P.D.F. & W.
S 86-48 E 404 P.
S 89-45 E 44.3 P
N 84-00 E 65 P
N 55-00 E 31 P
S 7-00 W 66.9 P
℄ Axis Of Dam
Flow Line El. 1295
Surface Area - 24.8 Acres
Capacity - 41,233,000 Gallons
Drainage Area 1500 Acres - 2.34
Req. Waterway Area 250 Sq. Ft.
Length Spillway 30' ±
Max. Head 8.5'
North 375 P.
Jack F. Gothie
Box 71
Camp Hill, Penna.
S. 37-45 W. 268.55 P.
P.D.F. & W.
Center Line Of Penna. Turnpike
N. 27-37 W. 18.18 P
S 62-23 W. 61.77 P.
S. 62-23 W. 40.9 P.
S. 27-37 E. 18.18 P.
S 62-23 W. 36.77 P.
Location Of
Pine Ridge Dam
Scale: 1" = 400'
Test Hole No. 3
El. 1293
2" Top Soil
3'-0" Sand & Gravel
Gravel & Shale
Test Hole No. 2
El. 1292
2" Top Soil
2'-0" Yellow Clay
2'-6" Sand & Gravel
Gravel & Shale
Test Hole No. 1
El. 1297
2" Top Soil
1'-0" Sand
3'-0" Sand & Gravel
Gravel & Shale

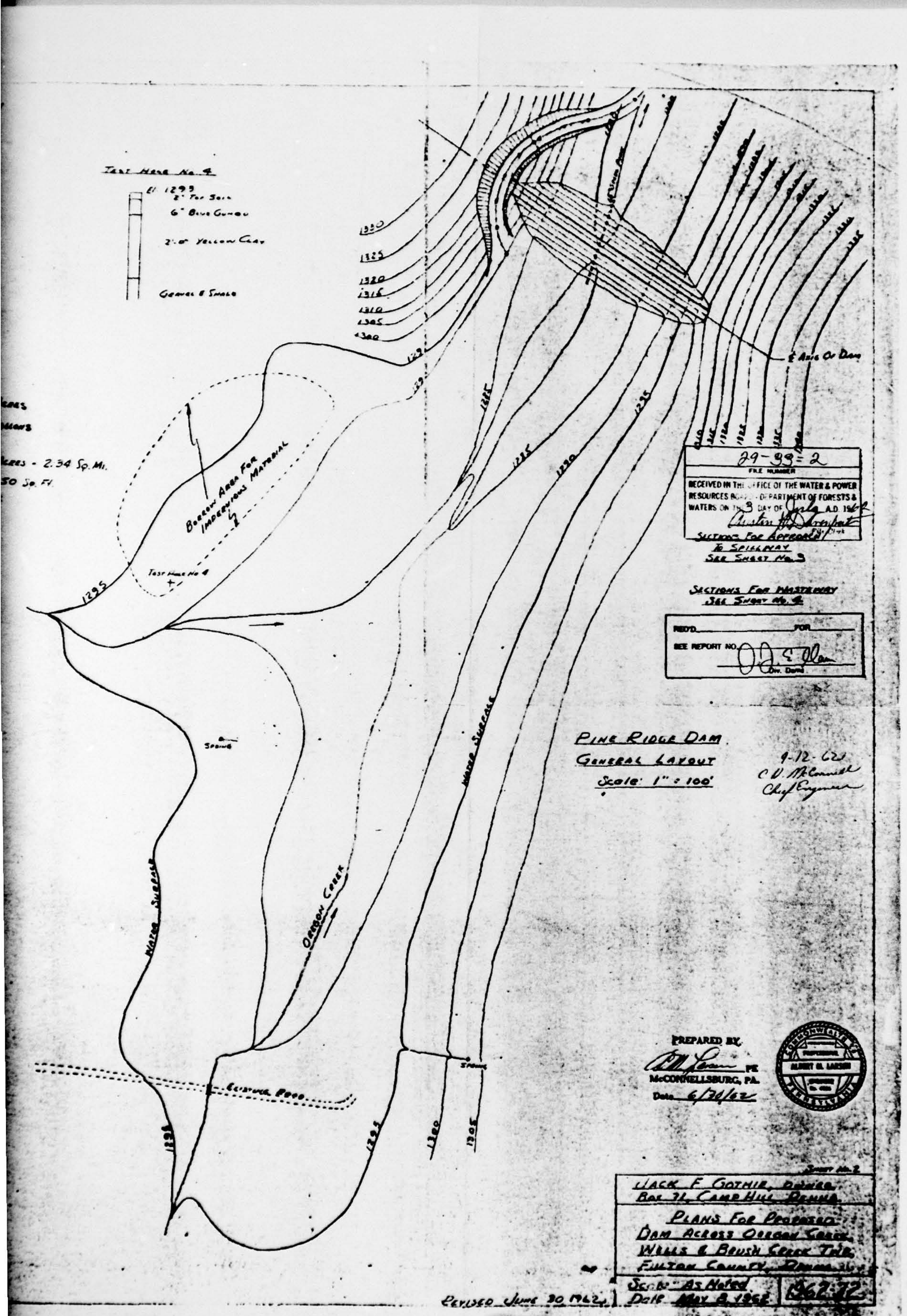
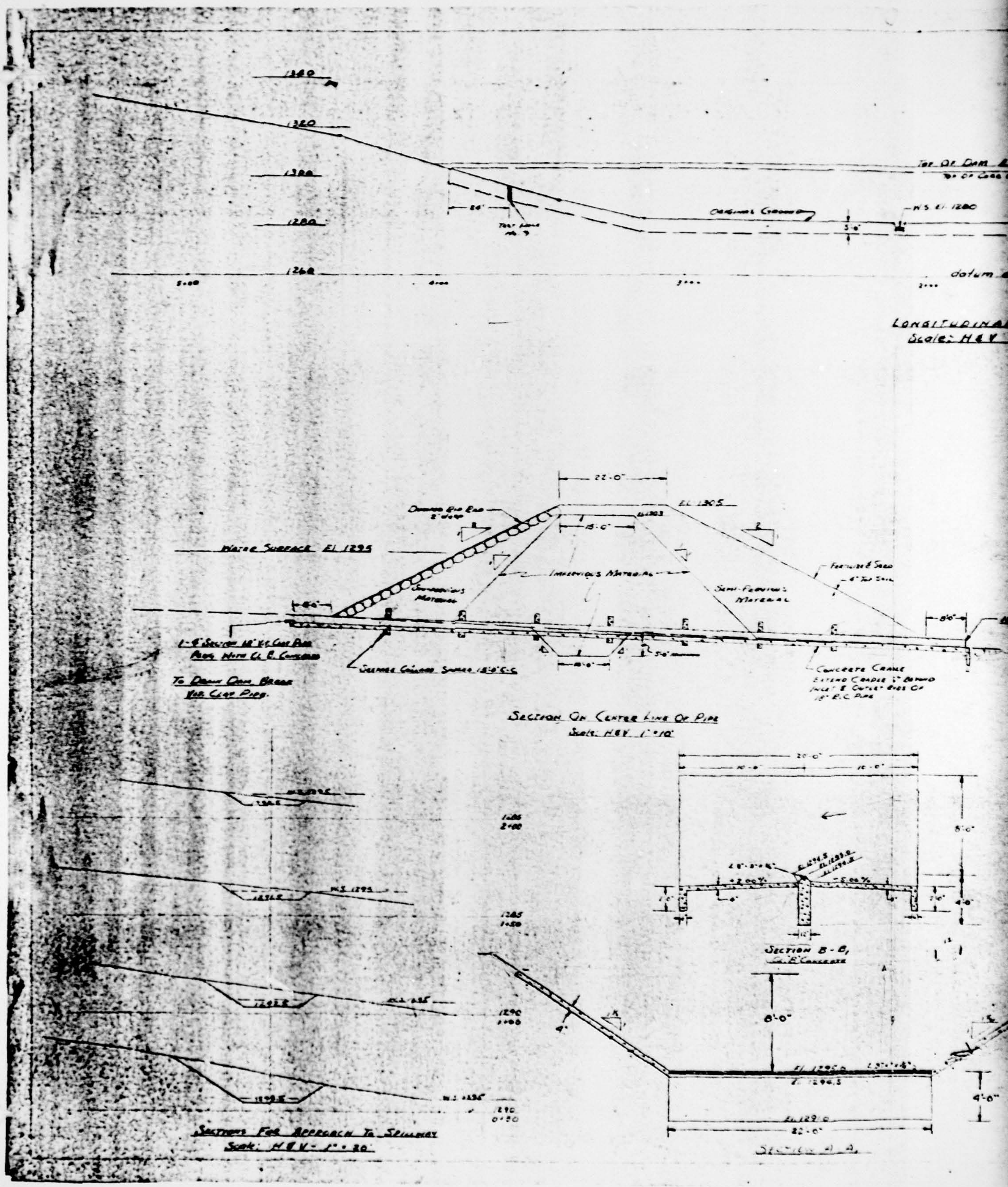
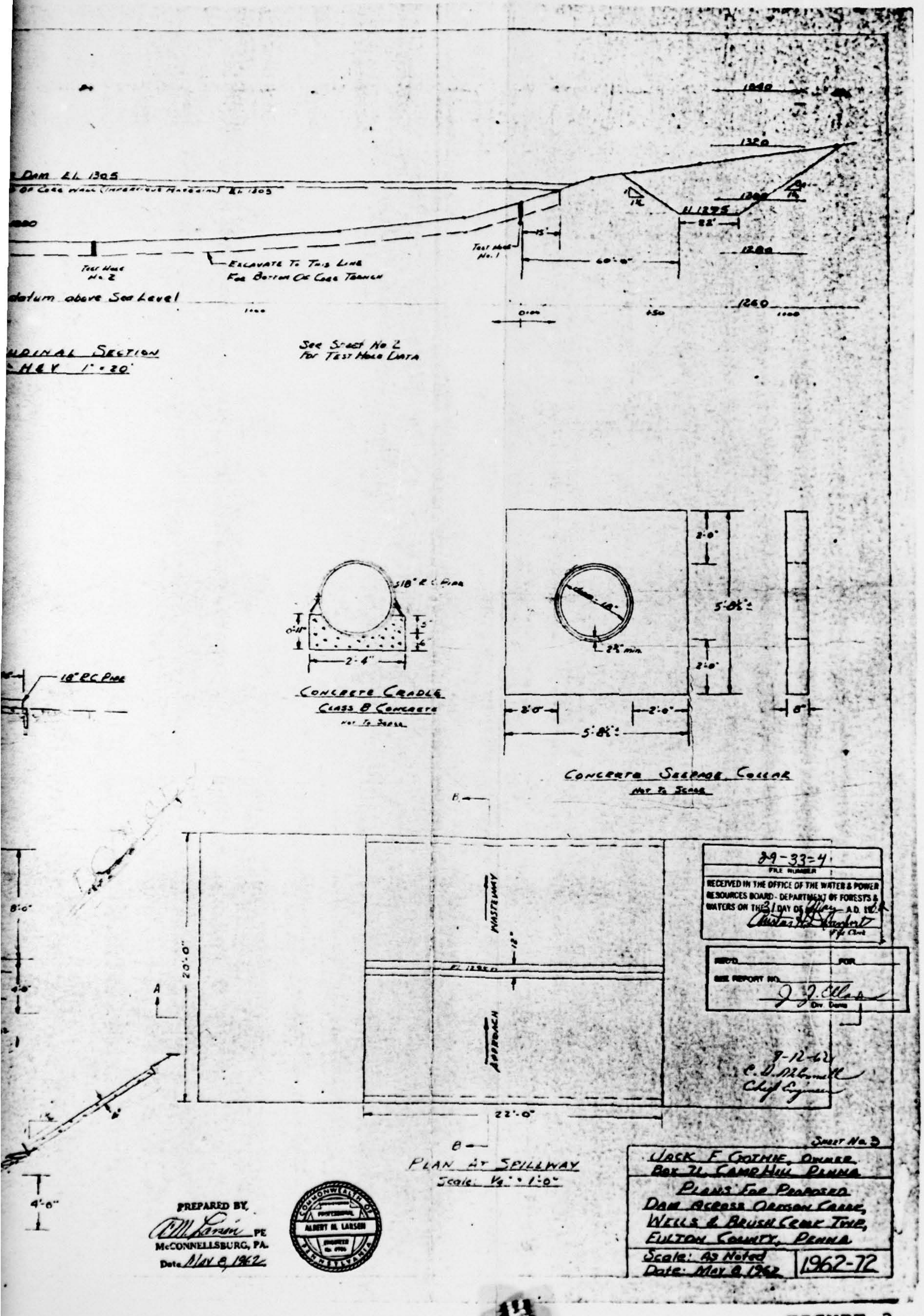

Test Hole No. 4
El. 1299
Gravel & Shale
Borrow Area For Impervious Material
Test Hole No. 4
Water Surface
Oregon Creek
Spring
Existing Road
Axis Of Dam
29-99-2
FILE NUMBER
RECEIVED IN THE OFFICE OF THE WATER & POWER RESOURCES BOARD DEPARTMENT OF FORESTS & WATERS
Sections For Approach To Spillway See Sheet No. 3
Sections For Wasteway See Sheet No. 4
RECD. FOR
SEE REPORT NO.
Pine Ridge Dam
General Layout
Scale: 1" = 100'
9-12-62
C.V. McConnell
Chief Engineer
PREPARED BY
McCONNELLSBURG, PA.
Date 6/30/62
Sheet No. 2
Jack F. Gothie, Owner
Box 71, Camp Hill, Penna.
Plans For Proposed Dam Across Oregon Creek
Fulton County, Penna.
Scale As Noted
Date May 8, 1962
Revised June 30, 1962

FIGURE 2

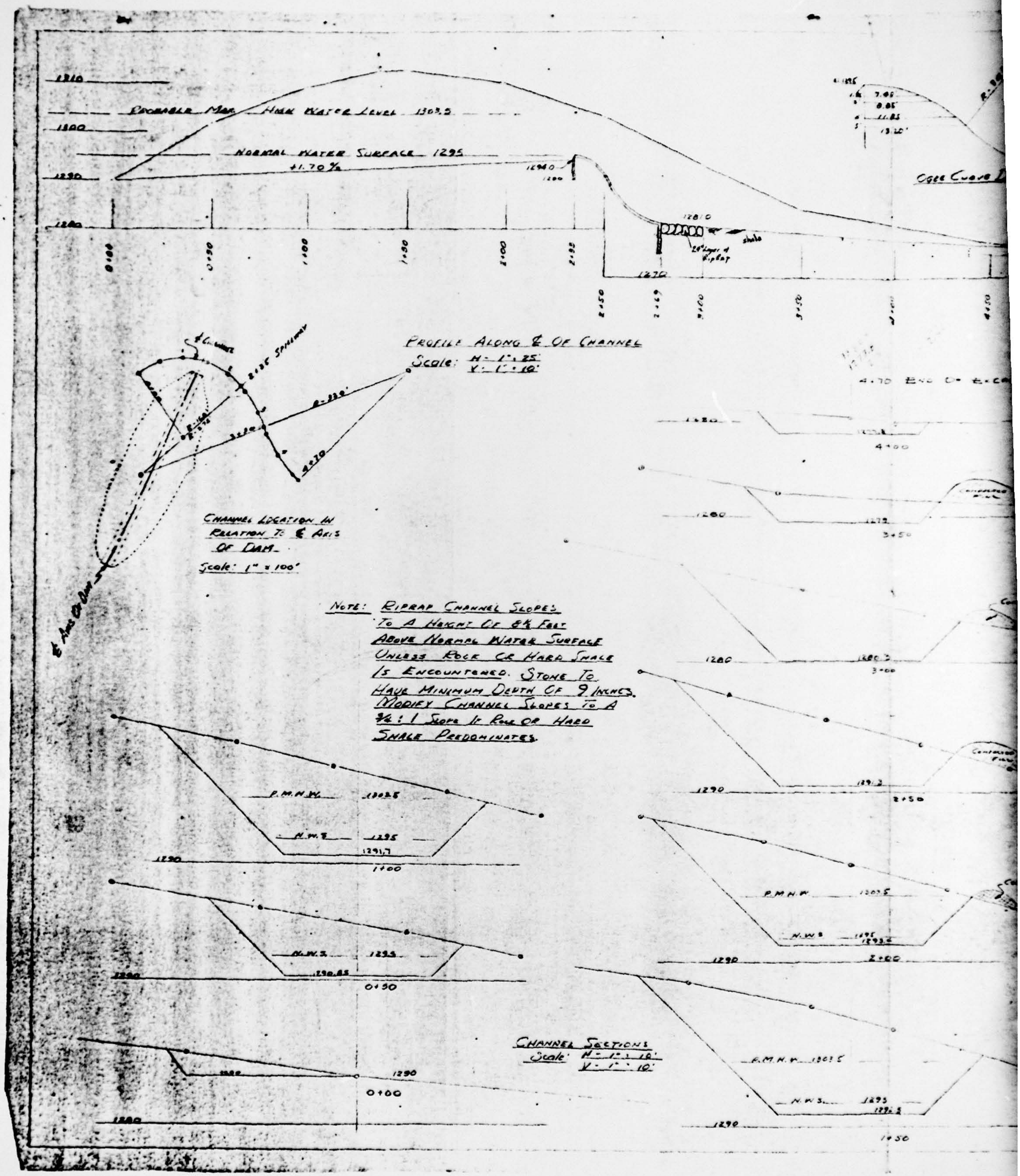


1340
1320
1300
1280
1260
Original Ground
W.S. El. 1280
datum
Longitudinal
Scale: H & V
22'-0"
EL 1305
15'-0"
Water Surface El 1295
Impervious Material
Semi-Pervious Material
Concrete Cradle
Section On Center Line Of Pipe
Scale: H & V 1"=10'
20'-0"
10'-0"
10'-0"
8'-0"
4'-0"
Section B - B
Sections For Approach To Spillway
Scale: H & V - 1" = 20'
El 1290.0
22'-0"
Section A - A

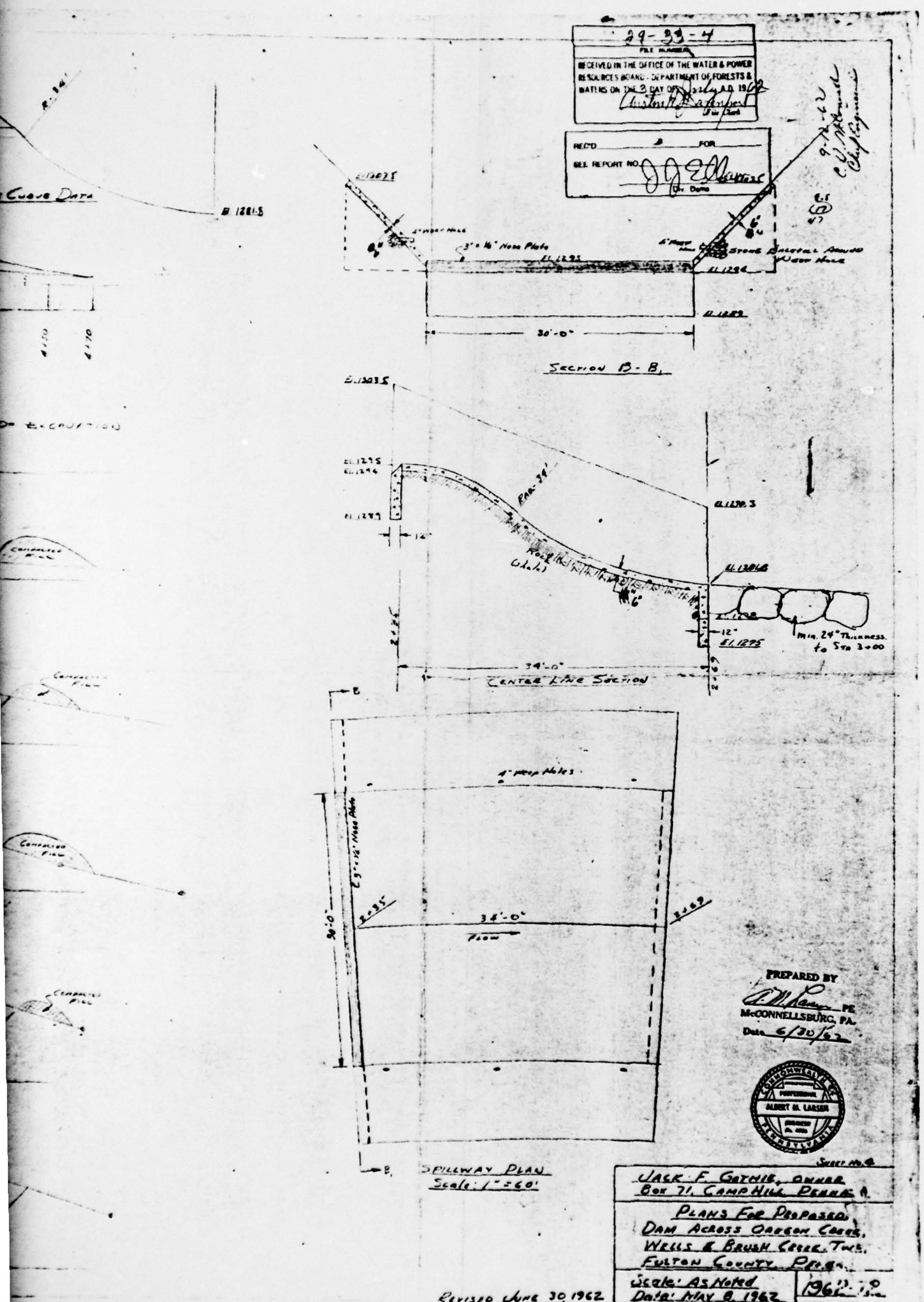


1340
1320
Dam EL 1305
1300
11 1295
22'
1280
Test Hole No 2
Excavate To This Line For Bottom Of Core Trench
Test Hole No. 1
15'
60'-0"
datum above Sea Level
1260
See Sheet No 2 For Test Hole Data
18" RC Pipe
2'-4"
Concrete Cradle
Class B Concrete
Not To Scale
5'-8½"
2'-0"
2½" min
8"
Concrete Seepage Collar
Not To Scale
Wasteway
Approach
20'-0"
22'-0"
Plan At Spillway
Scale: ¼" = 1'-0"
29-33-4
FILE NUMBER
RECEIVED IN THE OFFICE OF THE WATER & POWER RESOURCES BOARD - DEPARTMENT OF FORESTS & WATERS ON THE 31 DAY OF May A.D. 1962
REC'D
FOR
SEE REPORT NO.
Div. Dams
9-12-62
Chief Engineer
Sheet No 3
Jack F Gothie, Owner
Box 71 Camp Hill Penna
Plans For Proposed
Dam Across Oregon Creek,
Wells & Brush Creek Twp,
Fulton County, Penna
Scale: As Noted
Date: May 8, 1962
1962-72
PREPARED BY
PE
McCONNELLSBURG, PA.
Date May 8, 1962
COMMONWEALTH OF PENNSYLVANIA
PROFESSIONAL
ALBERT M. LARSON
ENGINEER

FIGURE 3



Probable Max. High Water Level 1303.5
Normal Water Surface 1295
+1.70%
Ogee Curve
28" Layer of Riprap
Shale
Profile Along ℄ Of Channel
Scale: H - 1" = 25' V - 1" = 10'
℄ Spillway
℄ Axis Of Dam
Channel Location In Relation To ℄ Axis Of Dam
Scale: 1" = 100'
4+70 End Of ℄ Channel
Note: Riprap Channel Slopes To A Height Of 8½ Feet Above Normal Water Surface Unless Rock Or Hard Shale Is Encountered. Stone To Have Minimum Depth Of 9 Inches. Modify Channel Slopes To A ¾ : 1 Slope If Rock Or Hard Shale Predominates.
P.M.H.W. 1303.5
N.W.S. 1295
Channel Sections
Scale: H - 1" = 10' V - 1" = 10'
0+00
0+50
1+00
1+50
2+00
2+50
3+00
3+50
4+00



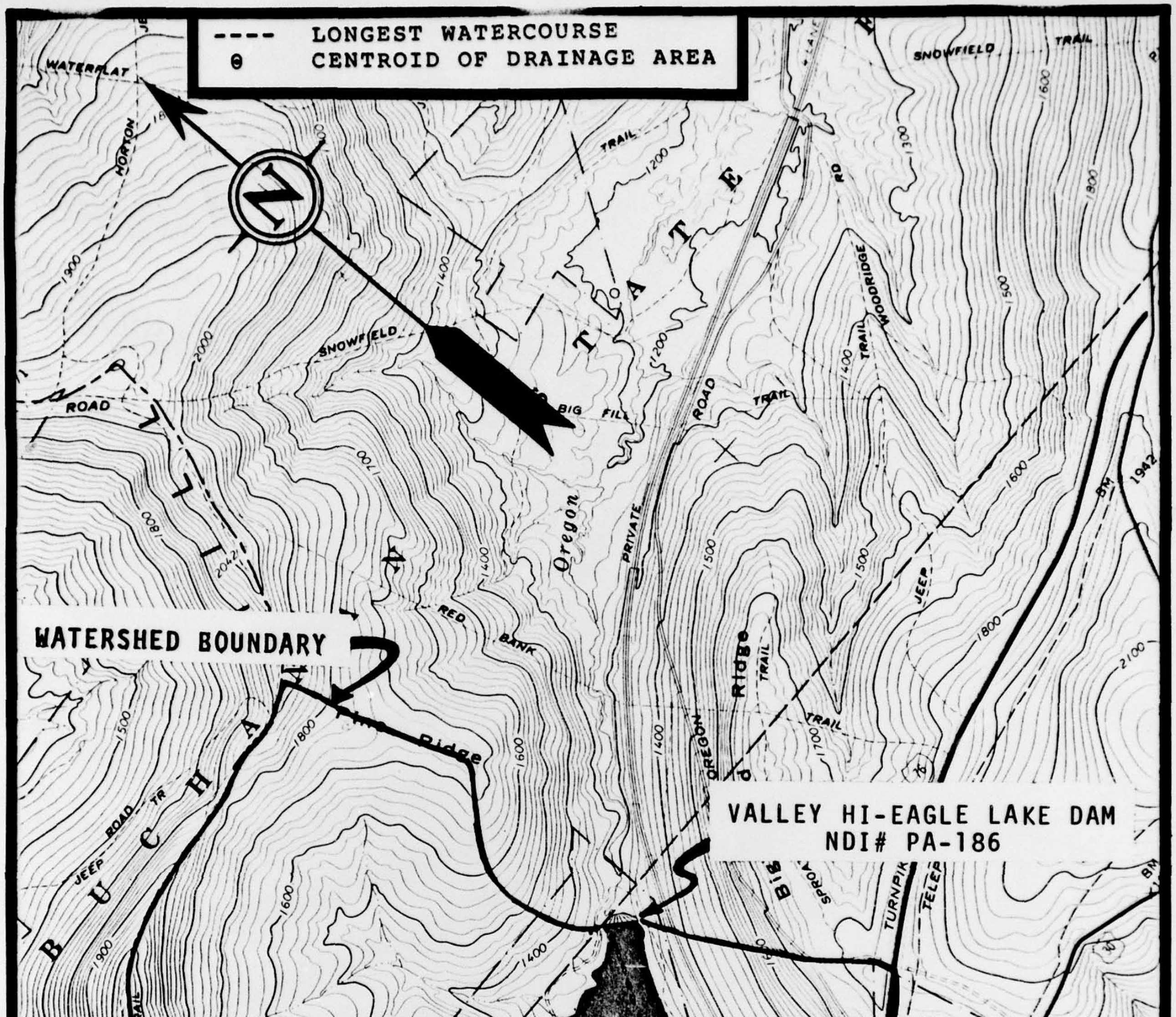
29-33-4
FILE NUMBER
RECEIVED IN THE OFFICE OF THE WATER & POWER RESOURCES BOARD - DEPARTMENT OF FORESTS & WATERS ON THE 3 DAY OF July A.D. 1962
REC'D FOR
SEE REPORT NO.
Section B-B.
30'-0"
El. 1295
El. 1294
El. 1289
Stone Backfill Around Weep Hole
3" x 16" Nose Plate
El. 1303.5
El. 1279.3
El. 1295
El. 1294
El. 1289
Rad. 34'
12"
Rock
34'-0"
Center Line Section
Min. 24" Thickness to Sta 3+00
4" Weep Holes
30'-0"
34'-0"
Flow
Spillway Plan
Scale: 1" = 60'
PREPARED BY
PE
McCONNELLSBURG, PA.
Date 6/30/62
ALBERT M. LARSEN
Sheet No. 8
Jack F. Gothie, Owner
Box 71, Camp Hill, Penna.
Plans For Proposed Dam Across Oregon Creek, Wells & Brush Creek Twp. Fulton County, Penna.
Scale: As Noted
Date: May 8, 1962
Revised June 30, 1962

FIGURE 4

2

APPENDIX G

REGIONAL VICINITY AND WATERSHED BOUNDARY MAP



WATERSHED BOUNDARY
AND
REGIONAL VICINITY
MAP

WELLS TANNERY, PA.

N4000—W7807.5/7.5

1968
PHOTOREVISED 1973