

1506-00039

Harding Lawson Associates
Engineering and Environmental Services



**PRELIMINARY EVALUATION
SPANISH FLAT DAM
WINNEMUCCA RANCH**

HLA Job No. 10367 064

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DISTRIBUTION

I. INTRODUCTION

A. General

This report evaluates dam safety issues and rehabilitation alternatives for Spanish Flat Dam located on the Winnemucca Ranch about 20 miles north of Reno, Nevada. This work was authorized by Washoe County Public Utility Division in a letter to Harding Lawson Associates (HLA), dated May 5, 1992.

Spanish Flat Dam is a twenty-three (23) foot high earth embankment dam located on the Winnemucca Ranch, in the Southwest 1/4, Northwest 1/4, Section 30 of Township 25 North, Range 20 East. The dam is located at an elevation of about 6,686 feet mean sea level (MSL). The embankment has a crest length of 568 feet, a drainage basin of about 6.8 square miles and a water surface of about 0.7 square mile. The low-level conduit is a 12-inch diameter smooth steel pipe with a gate on both ends. There is an open channel unlined spillway on the left abutment. The dam is in relatively poor condition. Poor condition is defined by the Bureau of Land Management (BLM) (Manual 917701), who previously inspected the dam, as:

Major repairs or modifications are required to make the structure operational or to prevent failure of the structure. Structure is only partially operational and is not adequately serving the purpose for which it was constructed.

The objective of this study was to identify repairs required to make the structure operational. Repairs must meet state and federal dam safety standards.

B. Scope of Work

1. evaluate the condition of the dam;
2. recommend alternatives and cost estimates for repair of the dam;
3. summarize methods and costs to breach the dam;
4. hazard evaluation (risk) of dam failure;

5. spillway evaluation; and
6. a final report describing dam rehabilitation alternatives and removal (breach and abandonment).

This study is intended to assist Washoe County in making a preliminary evaluation of the feasibility of rehabilitating the structure. The study included a site visit, review of existing information, and computer analysis of some hydrologic and hydraulic features related to the structure. No subsurface investigation has been performed. Design documents were not available at the time of this study.

This report is divided into three primary parts: the hydrology and hydraulic information, structure rehabilitation and rehabilitation cost estimates. Recommendations are provided for additional studies which will be required if rehabilitation of the structure is pursued.

II. HYDROLOGY

A. Model

The on-site drainage was analyzed using the U.S. Army Corps of Engineers computer program HEC-1. Within this program, the Soil Conservation Service (SCS) dimensional unit hydrograph was used to determine runoff hydrographs. In addition, the modified Puls method for routing through reservoirs was used to simulate the reservoir. The HEC-1 SCS model is designed to represent a given drainage basin as it is subject to various intensities of precipitation. The model is set up using mathematical parameters which represent various surface conditions of the given basin. This model computes stream flow hydrographs at key locations within the site. The major parameters represented by the SCS model are drainage area, precipitation, SCS curve number, and SCS watershed lag time (reference Table 1 for the hydrologic design parameters used for this analysis).

Hydrology is a complex system with many uncertain variables. This model takes into account hydrologic variables using basin average assumptions. It is HLA's opinion that these assumptions are conservative enough to account for hydrologic inconsistencies. The hydrology process is not an exact science, rather judgmental in nature; therefore, all runoff values contained herein are approximate (reference Table 2 for the hydrologic design parameters used for this analysis).

B. Drainage Basin

An analysis point was picked at the existing dam structure to determine peak flows within the drainage basin. The topographic boundary of the watershed drainage basin was approximated by outlining the watershed boundary on a 1 inch = 2000 feet topographic map of the site.

C. Precipitation

As recommended by the U.S. Army Corp of Engineers, the 100-year 24-hour storm to 1/2 probable maximum flood (pmf) is the "Design Event" for dams similar in size and location to Spanish Flat Dam (reference Appendix A for the hydrologic evaluation guidelines). The 100-year 24 hour, 500-year 24 hour, 1/2 pmf and pmf storms were evaluated to determine the overall adequacy of the Spanish Flat Dam (reference Appendices B and C for the analysis printouts).

Precipitation values for the 100-year storm were determined from the National Oceanic and Atmospheric Administration (NOAA) Atlas for the state of Nevada (NOAA Atlas No. 2, Volume 7, Nevada). The precipitation for the 500-year event was extrapolated from data in the NOAA Atlas. The precipitation for the two pmf storms were determined from procedures outlined in Hydrometeorological report (HMR) No. 49, prepared by the National Weather Service.

Due to the relatively small size of the drainage basin included within this analysis, no areal reduction factors were used to allow for storm distribution. The precipitation distribution for the 100 and 500 year events were taken from the standard SCS Type II distribution. This is the standard rainfall distribution for smaller storms developed by the SCS for this area of the country. HMR No. 5 distributions were used to distribute the pmf storms (Reference Appendix A for the pmf calculations and distributions).

D. SCS Curve Number

An SCS curve number was calculated for the basin with the following four considerations in mind:

1. Soil Type - Soils are classified according to their hydrologic behavior. The four classes in the SCS analysis are A, B, C, and D, with A being the most pervious and D being the least. The soil type for this drainage basin as described by SCS is C.

2. Vegetative Type - The type of vegetation will influence runoff and SCS has broken the type of vegetation into multiple classes (open spaces, grass, forest, etc.). The vegetation at this site consists of sagebrush with a grass understory.
3. Cover - The curve number is influenced by the amount of protective cover on the ground surface of the watershed. Cover is usually defined as the percent of ground covered with vegetation. SCS has broken this down into categories such as good, fair, and poor. The cover on this site is considered fair due to the thickness of grass understory.
4. Soil Moisture - Soil moisture is expressed in antecedent soil moisture condition (AMC). AMC is classified as I, II, or III, with AMC III being the wettest condition and AMC II as the reference point on which curve numbers are based. The curve number can be adjusted depending on the anticipated AMC. Generally, peak runoff figures are calculated using an antecedent moisture condition of II due to the approximate nature of the AMC. This analysis uses the standard antecedent moisture condition of II.

The curve number for each area can vary according to each of these variables from a low of 0 (a completely pervious watershed with no possibility of runoff) to a high of 100 (a completely impervious watershed with runoff equaling rainfall). After considering all of the above parameters, a curve number of 63 for the basin was chosen.

E. SCS Watershed Lag Time

The lag time for the basin was calculated using the velocity method. The velocity method breaks up the hydraulic length of the basin into varying slopes and land types. Each segment's length is divided by its corresponding runoff velocity to obtain a time of concentration for each reach. The SCS lag time is 0.6 times the computed time of concentration. The lag time must then be adjusted according to the actual field conditions of the given channel. Field conditions that may affect the channel's efficiency are bank and bottom soil conditions, vegetation, debris, etc. The lag time is used to estimate the delay time from initial precipitation to actual runoff at some reference point within the basin. It is of extreme importance that the lag time closely approximate the actual field conditions due to its significant impact

on the peak runoff values at each analysis point. Site reconnaissance was performed to evaluate channel conditions for the basin. The types and amount of vegetation, channel condition and slope were all verified to best determine the channel velocities. Table 1 lists the calculated lag times for the basin.

F. On-site Drainage

The site has been broken down into a single basin as identified in Plate 1 in the Illustrations. The drainage basin was chosen based on the parameters previously discussed in this section of the report. Generally, the entire basin drains directly to the dam to a single discharge point.

III. REHABILITATION

A. Dam Safety Concerns

HLA made an initial site visit on April 29, 1992. During the site visit, an inspection checklist was completed to help document existing conditions. A copy of the checklist is included in Appendix D. A similar checklist was completed by the BLM in September 1991. Comparison of the previous inspection with this inspection does not reveal any significant differences or changes. The existing embankment is represented in Plates 2 through 4 in the Illustrations. Project photos are presented on Plates 5 and 6.

Potential safety concerns associated with this structure are summarized below and depicted in plates in the Illustrations. No priority is assigned to the concerns. Potential concerns are as follows:

1. The upstream slope has been severely eroded by wave action which has reduced the effective crest width to about 6 feet.
2. Seepage appears to be passing along the low-level conduit and exits under the conduit at the downstream end. Seepage volumes are small and no piping of the soils is evident.
3. Seepage also appears along the downstream toe of the embankment at various places at about 50 to 100 feet on each side of the outlet.
4. The spillway on the left abutment has experienced some side slope sloughing and there is considerable sagebrush in the control section. These obstructions may not allow the structure to operate to the required design level.
5. The condition of the low-level outlet conduit is unknown. The conduit has not been inspected. Some minor seepage appears to be exiting from around the conduit.

The low-level conduit is pressurized at all times due to the way it is operated. This potential concern could be mitigated by simply changing the operation procedure to use the upstream control gate.

B. Dam Rehabilitation Alternatives

HLA evaluated the feasibility of different rehabilitation alternatives. Two of the alternatives (A&B) repair the structure to a working condition while a third alternative (C) breaches the structure, terminating the function of the dam. All alternatives require significant construction efforts. Each alternative is described in the following subsections.

1. **Alternative A.** This alternative consists of constructing a cutoff trench under the upstream slope of the embankment, an internal sand filter for seepage control, reconstructing the upstream slope and the crest, replacing approximately 50 feet of the low-level outlet conduit, installing a drain along the downstream toe of the embankment and shaping the spillway on the left abutment. This alternative is represented in Plate 2 in the Illustrations.

Alternative A responds to design parameters which mitigate potential structure concerns. However, with this alternative, some risk remains that the low-level conduit may be in poor condition. To reduce this risk further, the lower end of the conduit could be lined with a sleeve or it could be completely replaced. However, these costs to reduce this risk further are not included in the proposed rehabilitation.

The cost to complete the rehabilitation described in Alternative A is \$380,000. This cost includes a contingency of 20%, and engineering design fees of 9.5%. Costs are described in Table 3.

Additional geotechnical information is needed to confirm the feasibility of these alternatives. This engineering effort will be required in addition to and prior to the engineering design. The cost of additional geotechnical work needed is not included in the \$380,000. The additional geotechnical exploration is described later in this report.

2. **Alternative B.** This alternative consists of constructing a sand filter on the downstream end of the embankment and a high strength soil berm to strengthen the downstream slope, and encase the filter. The crest would be reconstructed and protected on the upstream slope with rip-

rap and a filter blanket (bedding) section. The low-level conduit would be replaced with new pipe with four cutoff collars, a new inlet slide gate, and a gate stem pedestal. This alternative is represented on Plate 3 in the Illustrations.

Alternative B appears to be the more feasible rehabilitation approach. There is some risk with this alternative that seepage under the dam may still be a concern. The estimated cost is \$206,000. This includes a 20% contingency and an engineering design fee of 11%. Costs are described in Table 4.

3. **Alternative C.** This alternative is the "do nothing" approach, however, abandonment requires significant rehabilitation effort to ensure that the abandoned embankment will not impede the natural runoff from the drainage area during flood flows. This alternative would include cutting a slot through the embankment approximately 25 feet wide at the base with 3:1 (horizontal:vertical) cut slopes. The abandoned pool area and embankment would be seeded to control erosion. This alternative is represented in Plate 4 in the Illustrations.

The cost for this alternative is estimated to be \$78,500. This cost includes a 20% contingency and an engineering design fee of 12%. Costs are described in Table 5. No geotechnical investigation is required to abandon the structure.

C. Spillway Rehabilitation

It appears the existing open channel spillway has never operated. Its ability to resist erosion has never been tested. The subsoil profile in the control section is unknown, but it appears to be natural sands and gravel. This material may erode easily during high flood flows.

The existing effective spillway width is about 10 feet. It appears the design width is about 13 feet. The bottom width of 13 feet was used in calculating flood flow capacities. The sidewalls of the used channel should be reshaped and the channel floor should be cleared of slough and vegetation.

IV. GEOTECHNICAL INVESTIGATION

A. Scope of Work

There is no geotechnical information for Spanish Flat Dam presently on file. No subsurface investigation was performed as part of this study.

Additional geotechnical investigation is required to refine Alternatives A and B presented in this study. This work is needed prior to beginning a rehabilitation design. The scope of work for the geotechnical investigation should include, but is not limited to, the following:

1. At least one exploration boring is needed in each abutment. The borings should be extended to approximately 60 feet.
2. At least three exploration borings are needed in the embankment. The holes should be located on the upstream and downstream slopes and at the downstream toe. The locations should be selected to evaluate stability, the foundation conditions, zoned components of the structure, and the phreatic surface within the embankment. The boring should extend to about 40 feet into natural material.
3. Each boring should include field permeability tests to help characterize the soils and describe engineering properties. Bureau of Reclamation Method E-18 test procedure may be used for the permeability testing.
4. Exploration test pits should be made to investigate potential borrow sources, seepage in the downstream toe area, and the erosion potential of the emergency spillway.
5. Laboratory soil tests are required for physical and engineering characterization of materials.
6. Engineering analyses are required for embankment stability, filter design, seismic potential and foundation evaluation.
7. Preparation of a report presenting all findings for the geotechnical investigation. This report will provide the basis for development of the final design, but will not include construction documents.

B. Costs of Geotechnical Investigation

Costs have been estimated assuming the field work and report would be completed in 1992.

1. Field Exploration

Drilling Subcontractor	\$8,500.00
Backhoe Exploration (test pits and clear road)	1,750.00
Engineering Labor	5,500.00
Direct Expenses (well completion, etc.)	2,500.00

- | | |
|---|--------------------------|
| 2. Laboratory Testing (includes soil grain size distribution,
plasticity, indices, dispersion, corrosivity, compaction
consolidation, and shear strength) | 2,850.00 |
| 3. Engineering Analysis | 6,300.00 |
| 4. Engineering Report (includes logs, drawings, test results,
engineering analyses, and recommended design) | <u>4,600.00</u> |
| | TOTAL \$32,000.00 |

V. SUMMARY AND CONCLUSIONS

A. Hazard Evaluation

Spanish Flat Dam is classified as intermediate in size with a storage volume of 1,630 acre-feet of water at normal pool elevation 6682.2 feet MSL. The hazard potential classification is "low." Based on a current (June 1992) but preliminary review which did not include surveys or flood plain profiles, urban development in the downstream flood plain does not include any permanent habitable structures. The potential for economic loss is considered minimal due to the lack of development downstream.

The existing embankment will pass the 1/2 pmf event with about 0.2 feet of freeboard. The recommended spillway design flood is between the 100-year and the 1/2 pmf (U.S. Army Corps of Engineers 1982 - Reference Evaluation Parameters in Appendix A).

B. Dam Height Evaluation

The current top of dam elevation is 6686.6 feet MSL and the spillway elevation is currently at 6682.2 feet MSL. The maximum water surface elevation during the pmf was determined to be 6689.06 feet. This water surface overtops the dam by 2.46 feet, and the estimated duration of water breaching the dam is estimated to be 8 hours. This storm would destroy the dam in its existing condition, however, the Army Corps of Engineers outlines that dams in low hazard areas such as this are only required to detain the 100-year to 1/2 pmf storms.

The 100-year peak water surface elevation is estimated to be 6683.15, the 500 year to be 6683.74, and the 1/2 pmf to be 6686.44. The respective freeboard values are 3.45 feet, 2.86 feet, and 0.16 feet. All water surface elevations were determined assuming the outlet to be closed and inoperable during the storm and the water surface elevation prior to the storm to be at the spillway elevation. This scenario

takes into account the possibility of two or more high intensity storms in the immediate area within a short amount of time.

Our recommendation for dam height is to raise the dam by 1 foot to maintain 1 foot of freeboard during the 1/2 pmf and over 4 feet during the 100-year storm. With the current lack of population in the area, there seems to be no need to detain the entire pmf. If population does increase significantly in the area during the life of the dam, a larger design event (pmf) and additional freeboard may be required to meet safety standards.

C. Spillway Evaluation

The spillway configuration is adequate in its existing condition to handle the 1/2 pmf event which could potentially obstruct flows. However, the spillway is overgrown with grass and sagebrush. Soil has sloughed from the channel slope and accumulated on the channel bottom. To bring the spillway back into an operable condition, the entire length of the spillway including the spillway outfall should be cleaned and reshaped to its original condition. In addition, the control section of the spillway should be protected with a loose rock rip-rap blanket with 18-inch to 24-inch boulders to control erosion in the event the spillway operates. The spillway outfall is expected to erode substantially during usage and some repair work will be needed to maintain operability. Spillway outfall erosion is not expected to effect the safety of the dam.

D. Embankment Evaluation

The embankment is in poor condition. It is in danger of failure due to erosion of the crest. The stability of the embankment is unknown. The condition of the outlet works is unknown.

Requirements to provide an adequate structure include:

1. reconstruction of the crest and protection against wave action;

2. internal embankment and foundation seepage control;
3. replace all or a portion of the outlet works.

Alternative B (see Plate 3 in the Illustrations) appears to be the most feasible rehabilitation alternative.

As an alternative to rehabilitation, the dam may be abandoned (see Plate 4 in the Illustrations). Abandonment will require that a portion of the embankment be removed and the pool area and embankment be revegetated.

E. Rehabilitation Costs

The total estimated costs for rehabilitation using Alternative B are:

Geotechnical Investigation	\$ 32,000.00
Rehabilitation Alternative	<u>\$206,000.00</u>
TOTAL	\$238,000.00

The total estimated cost to abandon the structure, Alternative C (see Plate 4 in the Illustrations), is \$78,500.00.

TABLE 1
HYDROLOGIC DESIGN PARAMETERS

<u>Basin</u>	<u>Area (Mi²)</u>	<u>SCS Curve Number</u>	<u>Lag Time (hrs.)</u>
Basin 100	6.745	63	0.693

TABLE 2
SITE DISCHARGE SUMMARY

<u>Storm</u>	<u>Peak Discharge (cfs)</u> <u>at Downstream Point of Dam</u>
100-year 24 hour	46
500-year 24 hour	94
1/2 pmf	431
pmf	6656

TABLE 3
SPANISH FLAT DAM
REHABILITATION COSTS - ALTERNATIVE A
(UPSTREAM CUTOFF TRENCH)
ENGINEERS ESTIMATE

Harding Lawson Associates

Item No.	Approx. Quantity	Unit	Description	Unit Prices	Total Price
1	1	LS	Mobilization	\$21,000	\$21,000
2	0.5	AC	Clearing and grubbing	\$2,000	\$2,000
3	7,200	CY	Excavation and embankment	\$10	\$72,000
4	3,500	CY	Excavation and export	\$10	\$35,000
5	4,500	CY	Clay import and embankment	\$10	\$45,000
6	430	CY	Sand filter placement	\$25	\$10,750
7	3,200	SY	Filter fabric	\$1.50	\$4,800
8	7,500	SF	Rip-rap	\$6	\$45,000
9	500	LF	Trench excavation	\$3	\$1,500
10	150	CY	Drain rock	\$20	\$3,000
11	160	CY	6 in. gravel road surface	\$25	\$4,000
12	50	LF	Remove ductile iron pipe	\$40	\$2,000
13	375	LF	Horizontal drains	\$42	\$15,750
14	1	LS	12 in. gate valve with pedestal (85 ft. stem)	\$13,000	\$13,000
15	50	LF	12 in. diameter ductile iron pipe with polyethylene encasement	\$66	\$3300
16	4	EA	Cutoff collars	\$1,700	\$6,800
17	500	LF	4 in. perforated PVC pipe	\$1.50	\$750
18	50	LF	4 in. PVC pipe	\$1.50	\$75
19	1	LS	Spillway reconditioning	\$3,500	\$3,500
SUBTOTAL					\$289,225
20% Contingencies					57,845
Approximate Engineering Design Fee (9.5%)					<u>33,000</u>
TOTAL					\$380,070
ROUNDED TOTAL					\$380,000

TABLE 4
SPANISH FLAT DAM
REHABILITATION COSTS - ALTERNATIVE B
(DOWNSTREAM FILTER AND BERM)
ENGINEERS ESTIMATE

Harding Lawson Associates

Item No.	Approx. Quantity	Unit	Description	Unit Prices	Total Price
1	1	LS	Mobilization	\$10,000	\$10,000
2	0.6	AC	Clearing and grubbing	\$2,000	\$1,200
3	1,200	CY	Excavation and embankment	\$10	\$12,000
4	750	CY	Sand filter placement	\$25	\$18,750
5	3,000	SY	Filter fabric	\$1.50	\$4,500
6	7,500	SF	Rip-rap	\$6	\$45,000
7	160	CY	6 in. gravel road surface	\$25	\$4,000
8	140	LF	Remove 12 in. diameter pipe	\$40	\$5,600
9	140	LF	24 in. diameter encased ductile iron pipe	\$140	\$19,600
10	1	EA	Remove 12 in. diameter valve	\$500	\$500
11	1	EA	24 in. butterfly valve	\$9,000	\$9,000
12	1	LS	24" gate valve with gate pedestal (85 ft. stem)	\$15,000	\$15,000
13	4	EA	Cutoff collars	\$1,700	\$6,000
14	1	LS	Spillway reconditioning	\$3,500	\$3,500
SUBTOTAL					\$154,650
20% Contingencies					30,930
Approximate Engineering Design Fee (11%)					<u>20,000</u>
TOTAL					\$205,580
ROUNDED TOTAL					\$206,000

TABLE 5
SPANISH FLAT DAM
REHABILITATION COSTS - ALTERNATIVE C
(ABANDONMENT)
ENGINEERS ESTIMATE

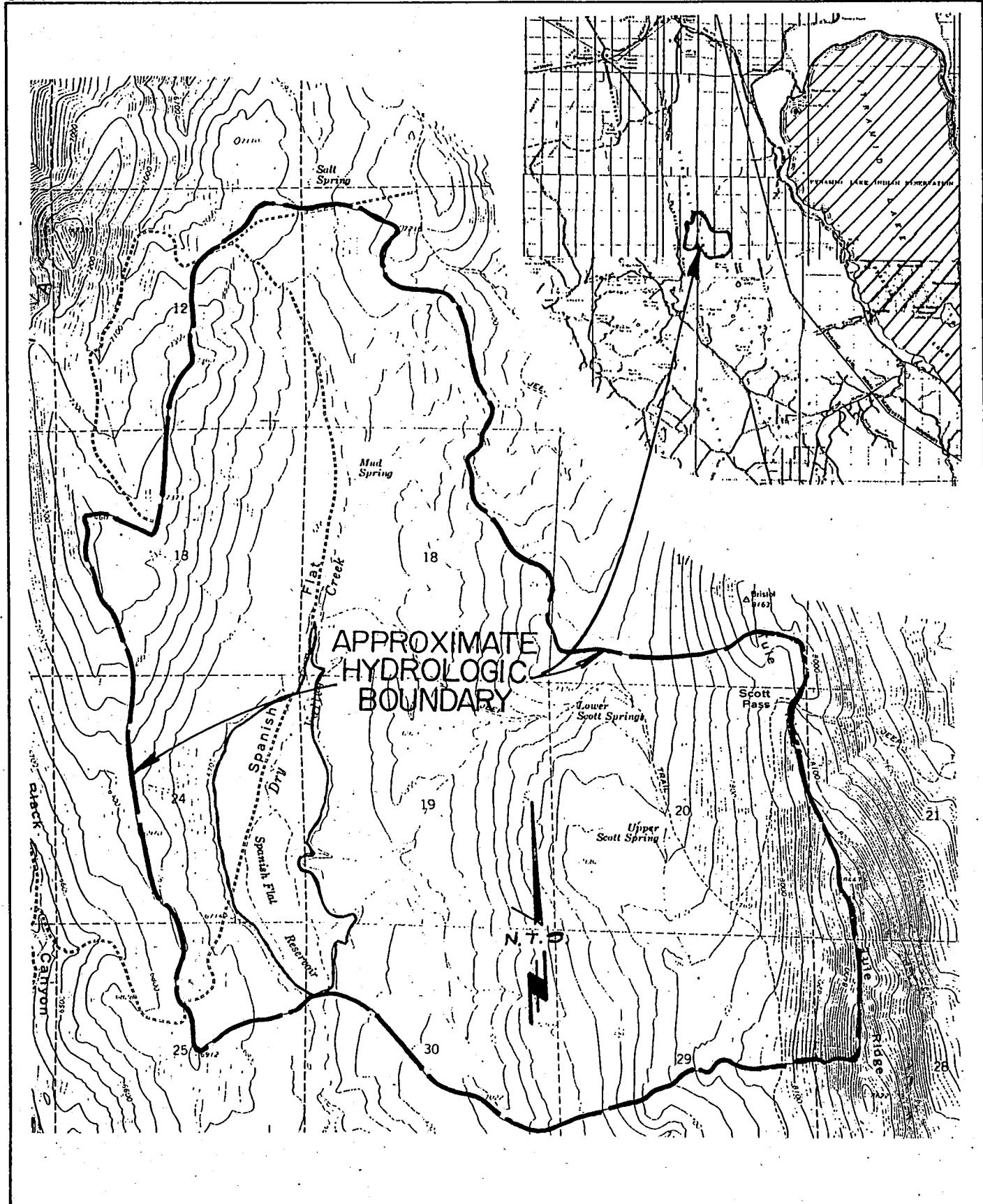
Harding Lawson Associates

Item No.	Approx. Quantity	Unit	Description	Unit Prices	Total Price
1	1	LS	Mobilization	\$10,000	\$10,000
2	3,500	CY	Excavation and export	\$5	\$17,500
3	140	LF	Remove existing 12 in. diameter outlet pipe	\$40	\$5,600
4	25	AC	Reseed area	\$1,000	\$25,000
			SUBTOTAL	\$58,100	
			20% Contingencies	11,620	
			Approximate Engineering Design Fee (12%)	<u>8,500</u>	
			TOTAL	\$78,220	
			ROUNDED TOTAL	\$78,500	

ILLUSTRATIONS

ILLUSTRATIONS

- Plate 1** Drainage Basin
- Plate 2** Alternative A Cross-Section
- Plate 3** Alternative B Cross-Section
- Plate 4** Alternative C Cross-Section
- Plate 5** Project Photos
- Plate 6** Project Photos



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**DRAINAGE BASIN
SPANISH FLAT DAM
WINNEMUCCA RANCH**

PLATE

1

DRAWN

JOB NUMBER
1036 / 064

APPROVED

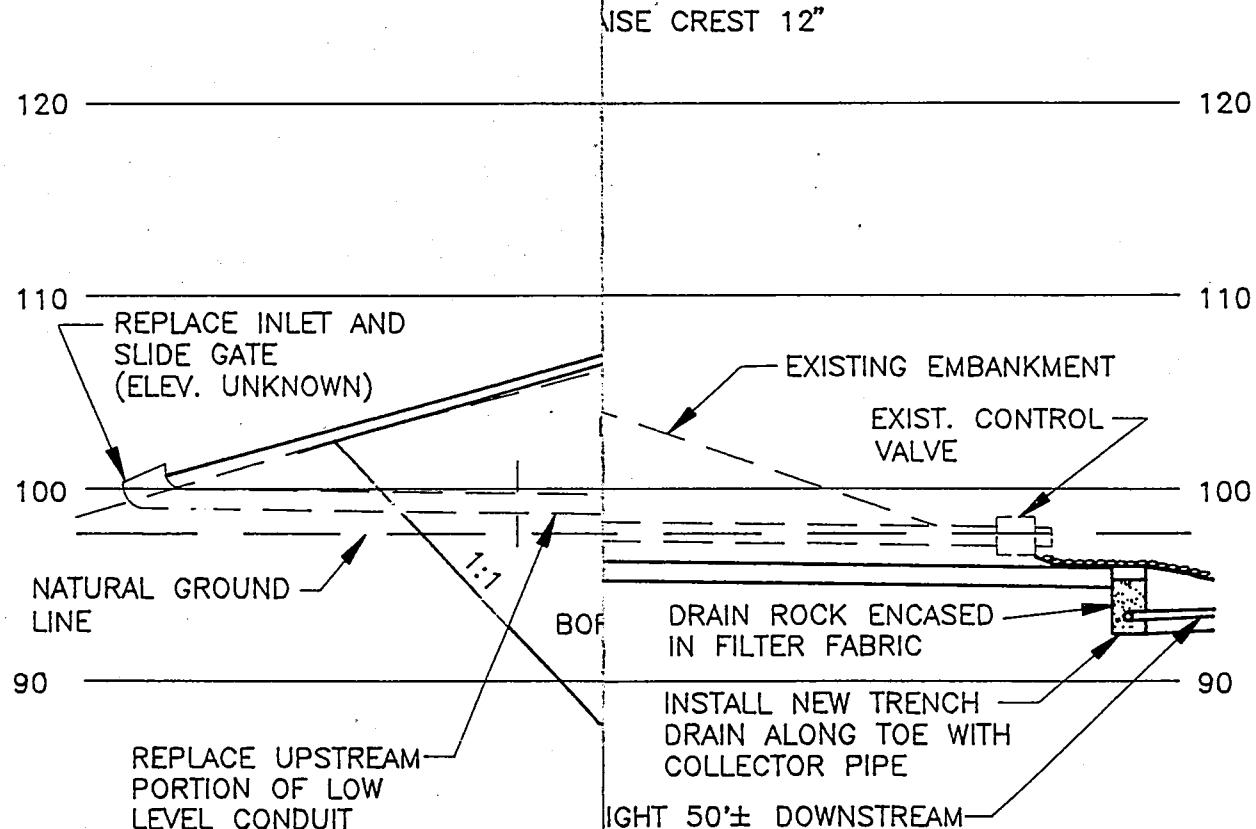
SDE

DATE

6/29/92

REVISED

DATE

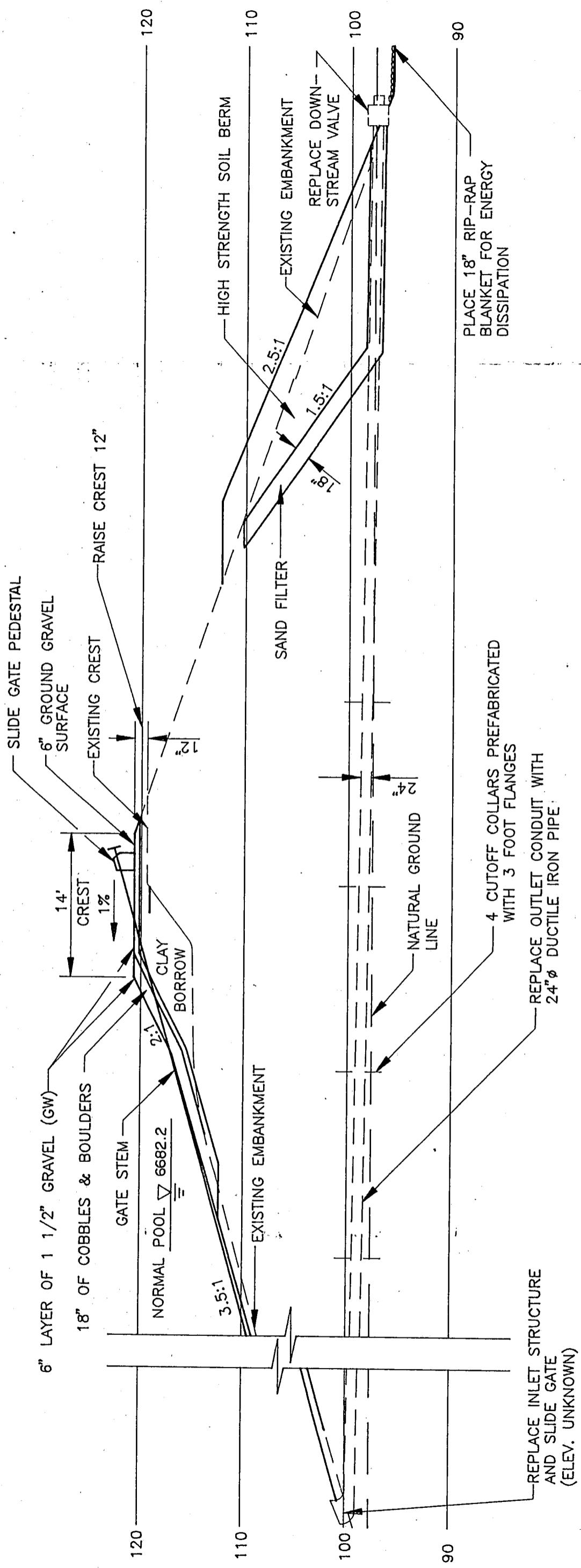


A CROSS-SECTION
AT DAM
RANCH

PLATE

2

DATE	REVISED	DATE
6/29/92		



SCALE: HORIZ. & VERT. 1" = 10'



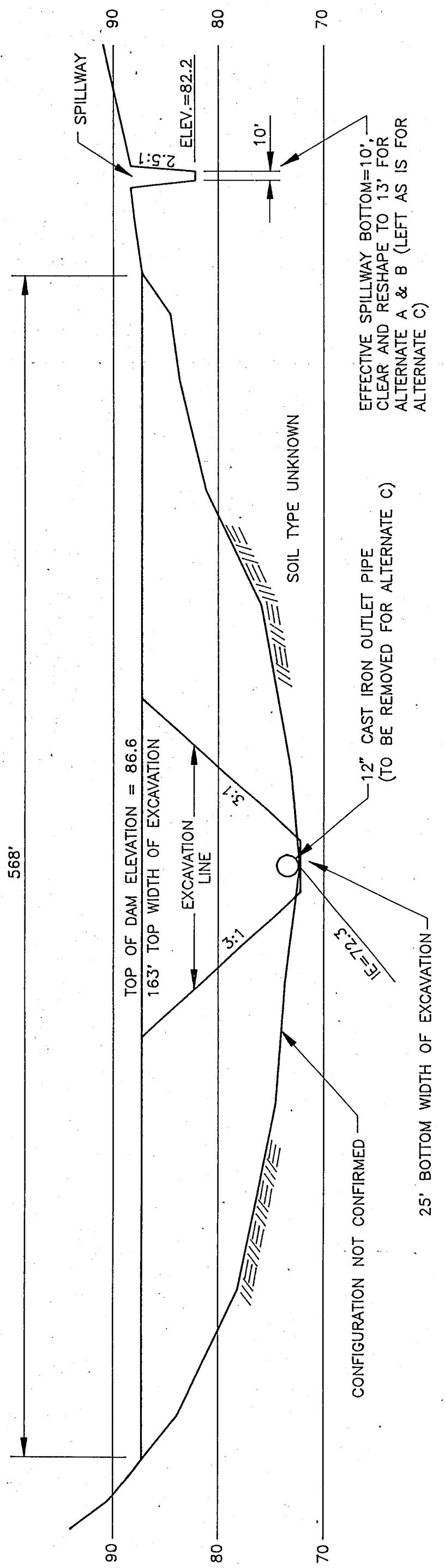
Harding Lawson Associates
Engineers and Geoscientists

**ALTERNATIVE B CROSS-SECTION
SPANISH FLAT DAM
WINNMUCCA RANCH**

PLATE

99

DRAWN
MAE
JOB NUMBER
10367 064
PROOFED
8-8
DATE
6/26/92
REVISED
DATE



DRAWN
 MAE
 10367 064

25' BOTTOM WIDTH OF EXCAVATION

12" CAST IRON OUTLET PIPE
 (TO BE REMOVED FOR ALTERNATE C)

EFFECTIVE SPILLWAY BOTTOM=10'.
 CLEAR AND RESHAPE TO 13' FOR
 ALTERNATE A & B (LEFT AS IS FOR
 ALTERNATE C)

CONFIGURATION NOT CONFIRMED

HORIZ.
 VERT.

PLATE	
4	
Harding Lawson Associates	
Engineers and Geoscientists	
ALTERNATIVE C	
DAM BREACH & PROFILE	
SPANISH FLAT DAM	
WINNEMUCCA RANCH	
DATE	REvised
6/26/92	✓
DRAWN	MAE
JOB NUMBER	10367 064



SPANISH FLAT DAM
APRIL 29, 1992



UPSTREAM FACE AND CREST
Severe erosion due to wave action



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PROJECT PHOTOS
SPANISH FLAT DAM
WINNEMUCCA RANCH

PLATE

5

DRAWN

JOB NUMBER

10367 064

APPROVED

[Signature]

DATE

6/29/92

REVISED DATE



OUTLET
Gate valve and water meter
Seepage from toe area, lower left



OPEN CHANNEL SPILLWAY
Control section
Side sloughing and vegetation



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PROJECT PHOTOS
SPANISH FLAT DAM
WINNEMUCCA RANCH

PLATE

6

DRAWN

JOB NUMBER

10367 064

APPROVED
SJS

DATE
6/29/92

REVISED DATE

APPENDIX A

APPENDIX A

This appendix contains miscellaneous design parameters including:

- Probable Maximum Precipitation calculations
- Hydrologic evaluation guidelines
- Hydrologic calculations

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Spanish Flat Dams,
Latitude 40° 01' N, Longitude 119° 16' 51'' of basin center
Area 6,245 mi² (km²)

Month JAN.

<u>Step</u>	<u>Duration (hrs)</u>
	6 12 18 24 48 72

A. Convergence PMP

1. Drainage average value from one of figures 2.5 to 2.16 8.75 in. (mm)
2. Reduction for barrier-elevation [fig. 2.18] 55%
3. Barrier-elevation reduced PMP [step 1 X step 2] 1.8 in. (mm)
4. Durational variation [figs. 2.25 to 2.27 and table 2.7]. 52 77 90 100 127 146%
5. Convergence PMP for indicated durations [steps 3 X 4] 2.5 3.7 4.3 4.8 6.1 7.0 in. (mm)
6. Incremental 10 mi² (26 km²) PMP [successive subtraction in step 5] 2.5 1.2 0.6 0.5 0.3 0.9 in. (mm)
7. Areal reduction [select from figs. 2.28 and 2.29] 100 100 100 100 100 100 %
8. Areally reduced PMP [step 6 X step 7] 2.5 1.2 0.6 0.5 0.3 0.9 in. (mm)
9. Drainage average PMP [accumulated values of step 8] 2.5 3.7 4.3 4.8 6.1 7.0 in. (mm)

B. Orographic PMP

1. Drainage average orographic index from figure 3.11a to d. 2 in. (mm)
2. Areal reduction [figure 3.20] 100%
3. Adjustment for month [one of figs. 3.12 to 3.17] 100%
4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3] 2.12 in. (mm)
5. Durational variation [table 3.6] 30 57 80 100 159 181%
6. Orographic PMP for given durations [steps 4 X 5] 6.4 1.21 1.1 2.12 3.37 4 in. (mm)

C. Total PMP

1. Add steps A9 and B6 3.1 4.9 6 6.92 9.4 11 in. (mm)
2. PMP for other durations from smooth curve fitted to plot of computed data.
3. Comparison with local-storm PMP (see sec. 6.3).

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage Spanish Flat Dam Area 6.745 mi² (km²)
 Latitude 40° 01' 19" Longitude 119° 46' 51" Minimum Elevation 620 ft (m)

Steps correspond to those in sec. 6.3A.

1. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. 8.8 in. (mm)

2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m): 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. 91.65 %

b. Multiply step 1 by step 2a. 8.07 in. (mm)

3. Average 6/1-hr ratio for drainage [fig. 4.7]. 1.63

	Duration (hr)									
	1/4	1/2	3/4	1	2	3	4	5	6	
4. Durational variation for 6/1-hr ratio of step 3 [table 4.4].	<u>13</u>	<u>70</u>	<u>87</u>	<u>100</u>	<u>124</u>	<u>138</u>	<u>147</u>	<u>154</u>	<u>160</u>	%
5. 1-mi ² (2.6-km ²) PMP for indicated durations [step 2b X step 4].	<u>3.47</u>	<u>5.65</u>	<u>7.02</u>	<u>8.01</u>	<u>10</u>	<u>11.14</u>	<u>11.86</u>	<u>12.42</u>	<u>12.91</u>	in. (mm)

6. Areal reduction [fig. 4.9]. 80 84 86 87 89 91 92 92 93 %

7. Areal reduced PMP [steps 5 X 6]. 7.78 4.75 6.44 6.97 8.9 10.14 10.91 11.42 12.01 in. (mm)

8. Incremental PMP [successive subtraction in step 7]. 6.97 1.93 1.24 .77 .51 .59 in. (mm)
7.78 1.97 1.29 .93 } 15-min. increments

9. Time sequence of incremental PMP according to:

Hourly increments [table 4.7]. 8.8 11.0 7.14 11.11 .51 .77 1.93 6.97 1.24 .59

Four largest 15-min. increments [table 4.8]. 7.78 1.97 1.29 .93 in. (mm)

15-min. .59 1.24 6.97 1.93 .77 .51 in. (mm) 12.01

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

- Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
 - Note the isohyets within drainage.
 - Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. 8.8 in. (mm)
 - a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. 91.65 %
 - Multiply step 3 by step 4a. 8.07 in. (mm)
 - Average 6/1-hr ratio for drainage [fig. 4.7]. 1.63
 - Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

7. Obtain isohyetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest

1-hr PMP	<u>24</u>	<u>23</u>	-	-	-	-	-	-	-
3rd	"	<u>14</u>	<u>14</u>	-	-	-	-	-	-
4th	"	<u>8</u>	<u>8</u>	-	-	-	-	-	-
5th	"	<u>7</u>	<u>7</u>	-	-	-	-	-	-
6th	"	<u>6</u>	<u>C</u>	-	-	-	-	-	-

8. Multiply steps 6 and 7 by step 4b to get incremental isohyetal labels of PMP.

Highest 15-min.	<u>3.47</u>	<u>2.5</u>	
2nd	"	<u>2.18</u>	<u>1.86</u>
3rd	"	<u>1.37</u>	<u>1.29</u>
4th	"	<u>1.05</u>	<u>.97</u>
Highest 1-hr		<u>8.07</u>	<u>6.62</u>
2nd	"	<u>1.94</u>	<u>1.84</u>
3rd	"	<u>1.13</u>	<u>1.13</u>
4th	"	<u>.65</u>	<u>.65</u>
5th	"	<u>.56</u>	<u>.56</u>
6th	"	<u>.48</u>	<u>.48</u>

9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].

$\Sigma = 12.83$

.56 1.13 8.07 1941.65 .48

113.

3.47 2.18 1.37 1.05

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Spanish Flat Dam
 Latitude 40° 01' 19", Longitude 119° 46' 51" of basin center
 Area 6,745 mi² (km²)

Month FEB

Step

	Duration (hrs)
6	12 18 24 48 72

A. Convergence PMP

1. Drainage average value from one of figures 2.5 to 2.16 2.6 in. (mm)

2. Reduction for barrier-elevation [fig. 2.18] 35%

3. Barrier-elevation reduced PMP [step 1 X step 2] 1.76 in. (mm)

4. Durational variation [figs. 2.25 to 2.27 and table 2.7].

52 77 90 100 127 146 %

5. Convergence PMP for indicated durations [steps 3 X 4]

2.16 3.66 4.28 4.76 6.05 6.95 in. (mm)

6. Incremental 10 mi² (26 km²) PMP [successive subtraction in step 5]

2.48 1.18 1.62 1.48 1.29 .9 in. (mm)

100 → %

7. Areal reduction [select from figs. 2.28 and 2.29]

2.48 1.18 .62 1.18 1.29 .9 in. (mm)

8. Areally reduced PMP [step 6 X step 7].

2.48 3.66 4.28 4.76 6.05 6.95 in. (mm)

9. Drainage average PMP [accumulated values of step 8]

B. Orographic PMP

1. Drainage average orographic index from figure 3.11a to d. 2 in. (mm)

2. Areal reduction [figure 3.20] 100%

3. Adjustment for month [one of figs. 3.12 to 3.17] 104%

4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3] 2.08 in. (mm)

5. Durational variation [table 3.6]

30 57 80 100 159 187 %

6. Orographic PMP for given durations [steps 4 X 5]

.62 1.19 1.66 2.18 3.3 3.89 in. (mm)

C. Total PMP

1. Add steps A9 and B6

3.1 4.85 5.91 6.81 9.35 10.61 in. (mm)

2. PMP for other durations from smooth curve fitted to plot of computed data.

3. Comparison with local-storm PMP (see sec. 6.3).

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage _____ Area _____ mi^2 (km^2)
 Latitude _____ Longitude _____ Minimum Elevation _____ ft. (m)

Steps correspond to those in sec. 6.3A.

1. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)

2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m): 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %

b. Multiply step 1 by step 2a. _____ in. (mm)

3. Average 6/1-hr ratio for drainage [fig. 4.7]. _____

	Duration (hr)									
	1/4	1/2	3/4	1	2	3	4	5	6	
4. Durational variation for 6/1-hr ratio of step 3 [table 4.4].	—	—	—	—	—	—	—	—	—	%

5. 1-mi² (2.6-km²) PMP for indicated durations [step 2b X step 4]. _____ in. (mm)

6. Areal reduction [fig. 4.9]. _____ %

7. Areal reduced PMP [steps 5 X 6]. _____ in. (mm)

8. Incremental PMP [successive subtraction in step 7]. _____ in. (mm)
 _____ } 15-min. increments

9. Time sequence of incremental PMP according to:

Hourly increments [table 4.7]. _____ in. (mm)

Four largest 15-min. increments [table 4.8]. _____ in. (mm)

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %
b. Multiply step 3 by step 4a. _____ in. (mm)
5. Average 6/1-hr ratio for drainage [fig. 4.7]. _____
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

PMP Increment	Isohyet									
	A	B	C	D	E	F	G	H	I	J
Highest 1-hr	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Highest 15-min.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in %

7. Obtain isohetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest 1-hr PMP	3rd "	4th "	5th "	6th "	_____	_____	_____	_____	_____	_____
	3rd "	4th "	5th "	6th "	_____	_____	_____	_____	_____	_____
	3rd "	4th "	5th "	6th "	_____	_____	_____	_____	_____	_____
	3rd "	4th "	5th "	6th "	_____	_____	_____	_____	_____	_____

in %

8. Multiply steps 6 and 7 by step 4b to get incremental isohetal labels of PMP.

Highest 15-min.	2nd "	3rd "	4th "	_____	_____	_____	_____	_____	_____	_____
	2nd "	3rd "	4th "	_____	_____	_____	_____	_____	_____	_____
	2nd "	3rd "	4th "	_____	_____	_____	_____	_____	_____	_____
	2nd "	3rd "	4th "	_____	_____	_____	_____	_____	_____	_____
Highest 1-hr	2nd "	3rd "	4th "	5th "	6th "	_____	_____	_____	_____	_____
	2nd "	3rd "	4th "	5th "	6th "	_____	_____	_____	_____	_____
	2nd "	3rd "	4th "	5th "	6th "	_____	_____	_____	_____	_____
	2nd "	3rd "	4th "	5th "	6th "	_____	_____	_____	_____	_____

in in. (mm)

9. Arrange "values of step 8 in time sequence [tables 4.7 and 4.8].

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Spanish Flat
 Latitude 36° 19', Longitude 109° 16' 57" of basin center
 Area 6,745 mi² (km²)

Month Mar

<u>Step</u>	<u>Duration (hrs)</u>	6	12	18	24	48	72
-------------	-----------------------	---	----	----	----	----	----

A. Convergence PMP

1. Drainage average value from one of figures 2.5 to 2.16 25 in. (mm)
2. Reduction for barrier-elevation [fig. 2.18] 55 %
3. Barrier-elevation reduced PMP [step 1 X step 2] 16.8 in. (mm)
4. Durational variation [figs. 2.25 to 2.27 and table 2.7].
54 78 91 100 126 142 %
5. Convergence PMP for indicated durations [steps 3 X 4]
2.5 3.65 4.26 4.48 5.9 6.65 in. (mm)
6. Incremental 10 mi² (26 km²) PMP [successive subtraction in step 5]
2.5 1.15 .61 .42 1.22 .75 in. (mm)
7. Areal reduction [select from figs. 2.28 and 2.29]
100 — — — — %
8. Areally reduced PMP [step 6 X step 7]
2.5 1.15 .61 .42 1.22 .75 in. (mm)
9. Drainage average PMP [accumulated values of step 8]
2.5 3.65 4.26 4.48 5.9 6.65 in. (mm)

B. Orographic PMP

1. Drainage average orographic index from figure 3.11a to d. 2 in. (mm)
2. Areal reduction [figure 3.20] 100 %
3. Adjustment for month [one of figs. 3.12 to 3.17] 100 %
4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3] 2 in. (mm)
5. Durational variation [table 3.5]
30 57 80 100 159 187 %
6. Orographic PMP for given durations [steps 4 X 5]
.6 1.14 1.6 2 3.18 3.74 in. (mm)

C. Total PMP

1. Add steps A9 and B6 3.1 4.79 6.82 6.68 9.48 10.39 in. (mm)
2. PMP for other durations from smooth curve fitted to plot of computed data.
3. Comparison with local-storm PMP (see sec. 6.3).

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage		Area	mi^2 (km^2)
Latitude	Longitude	Minimum Elevation	ft (m)

Steps correspond to those in sec. 6.3A.

1. Average 1-hr 1- mi^2 (2.6- km^2) PMP for drainage [fig. 4.5]. _____ in. (mm)

2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m): 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %

b. Multiply step 1 by step 2a. _____ in. (mm)

3. Average 6/1-hr ratio for drainage [fig. 4.7]. _____

4.	Duration (hr)									
	1/4	1/2	3/4	1	2	3	4	5	6	
Durational variation for 6/1-hr ratio of step 3 [table 4.4].	-----	-----	-----	-----	-----	-----	-----	-----	-----	%
5. 1- mi^2 (2.6- km^2) PMP for indicated durations [step 2b X step 4].	-----	-----	-----	-----	-----	-----	-----	-----	-----	in. (mm)
6. Areal reduction [fig. 4.9].	-----	-----	-----	-----	-----	-----	-----	-----	-----	%
7. Areal reduced PMP [steps 5 X 6].	-----	-----	-----	-----	-----	-----	-----	-----	-----	in. (mm)
8. Incremental PMP [successive subtraction in step 7].	-----	-----	-----	-----	-----	-----	-----	-----	-----	in. (mm)
	} 15-min. increments									

9. Time sequence of incremental PMP according to:

Hourly increments [table 4.7].

_____ in. (mm)

Four largest 15-min. increments [table 4.8].

_____ in. (mm)

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %
- b. Multiply step 3 by step 4a. _____ in. (mm)
5. Average 6/1-hr ratio for drainage [fig. 4:7]. _____
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

PMP Increment	Isohyet									
	A	B	C	D	E	F	G	H	I	J
Highest 1-hr	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Highest 15-min.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in %

7. Obtain isohyetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest

1-hr PMP

3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in %

8. Multiply steps 6 and 7 by step 4b to get incremental isohyetal labels of PMP.

Highest 15-min.

2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in in. (mm)

Highest 1-hr

2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Searisch Flat Dam
 Latitude 36° 0' 15", Longitude 119° 46' 5" of basin center
 Area 6,745 mi² (km²)

<u>Step</u>	<u>Month ADP</u>	<u>Duration (hrs)</u>					
		6	12	18	24	48	72
A. Convergence PMP							
1.	Drainage average value from one of figures 2.5 to 2.16	8.2	in. (mm)				
2.	Reduction for barrier-elevation [fig. 2.18]	55	%				
3.	Barrier-elevation reduced PMP [step 1 X step 2]	4.5	in. (mm)				
4.	Durational variation [figs. 2.25 to 2.27 and table 2.7].	57	79	92	100	103	107 %
5.	Convergence PMP for indicated durations [steps 3 X 4]	2.57	3.58	4.14	4.5	5.54	6.17 in. (mm)
6.	Incremental 10 mi ² (26 km ²) PMP [successive subtraction in step 5]	2.57	9.9	58	36	101	163 in. (mm)
7.	Areal reduction [select from figs. 2.28 and 2.29]	100	—	—	—	—	%
8.	Areally reduced PMP [step 6 X step 7]	2.57	.99	.58	36	1.04	.63 in. (mm)
9.	Drainage average PMP [accumulated values of step 8]	2.57	3.8	4.14	4.5	5.54	6.17 in. (mm)
B. Orographic PMP							
1.	Drainage average orographic index from figure 3.11a to d.	2	in. (mm)				
2.	Areal reduction [figure 3.20]	100	%				
3.	Adjustment for month [one of figs. 3.12 to 3.17]	92	%				
4.	Areally and seasonally adjusted PMP [steps 1 X 2 X 3]	1.84	in. (mm)				
5.	Durational variation [table 3.6]	30	57	80	100	109	107 %
6.	Orographic PMP for given durations [steps 4 X 5]	55	105	147	184	222	244 in. (mm)
C. Total PMP							
1.	Add steps A9 and B6	3.12	4.61	5.61	6.34	8.46	9.61 in. (mm)
2.	PMP for other durations from smooth curve fitted to plot of computed data.						
3.	Comparison with local-storm PMP (see sec. 6.3).						

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage		Area	mi^2	(km^2)
Latitude	Longitude	Minimum Elevation	ft	(m)

Steps correspond to those in sec. 6.3A.

1. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)
2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m); 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %
b. Multiply step 1 by step 2a. _____ in. (mm)
3. Average 6/1-hr ratio for drainage [fig. 4.7]. _____

	Duration (hr)									
	1/4	1/2	3/4	1	2	3	4	5	6	
4. Durational variation for 6/1-hr ratio of step 3 [table 4.4].	-----	-----	-----	-----	-----	-----	-----	-----	-----	%
5. 1-mi ² (2.6-km ²) PMP for indicated durations [step 2b X step 4].	-----	-----	-----	-----	-----	-----	-----	-----	-----	in. (mm)

6. Areal reduction [fig. 4.9]. _____ %
7. Areal reduced PMP [steps 5 X 6]. _____ in. (mm)
8. Incremental PMP [successive subtraction in step 7]. _____ in. (mm)
} 15-min. increments

9. Time sequence of incremental PMP according to:
 - Hourly increments [table 4.7]. _____ in. (mm)
 - Four largest 15-min. increments [table 4.8]. _____ in. (mm)

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %
- b. Multiply step 3 by step 4a. _____ in. (mm)
5. Average 6/1-hr ratio for drainage [fig. 4.7]. _____
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

PMP Increment	Isohyet									
	A	B	C	D	E	F	G	H	I	J
Highest 1-hr	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Highest 15-min.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

7. Obtain isohetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest 1-hr PMP	3rd "	4th "	5th "	6th "	_____	_____	_____	_____	_____	in %
	_____	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	

8. Multiply steps 6 and 7 by step 4b to get incremental isohetal labels of PMP.

Highest 15-min.	2nd "	3rd "	4th "	_____	_____	_____	_____	_____	_____	in in. (mm)
	_____	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	
Highest 1-hr	2nd "	3rd "	4th "	5th "	6th "	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	

9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Spanish Flat DamLatitude 36°01'19", Longitude 119°46'51" of basin centerArea 6,745 mi² (km²)Month MayStep

	Duration (hrs)				
6	12	18	24	48	72

A. Convergence PMP

1. Drainage average value from one of figures 2.5 to 2.16 8 in. (mm)

2. Reduction for barrier-elevation [fig. 2.18] 55 %

3. Barrier-elevation reduced PMP [step 1 X step 2] 4.4 in. (mm)

4. Durational variation [figs. 2.25 to 2.27 and table 2.7].

50 80 92 100 122 135 %

5. Convergence PMP for indicated durations [steps 3 X 4]

2.15 3.5 4.65 4.4 5.37 5.94 in. (mm)

6. Incremental 10 mi² (26 km²) PMP [successive subtraction in step 5]

2.55 95 15 35 97 57 in. (mm)

7. Areal reduction [select from figs. 2.28 and 2.29]

100 %

8. Areally reduced PMP [step 6 X step 7]

2.55 95 15 35 97 57 in. (mm)

9. Drainage average PMP [accumulated values of step 8]

2.55 3.5 105 141 5.37 5.94 in. (mm)

B. Orographic PMP

1. Drainage average orographic index from figure 3.11a to d. 2 in. (mm)

2. Areal reduction [figure 3.20] 100 %

3. Adjustment for month [one of figs. 3.12 to 3.17] 90 %

4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3] 1.8 in. (mm)

30 57 80 100 159 187 %

5. Durational variation [table 3.6]

51 103 144 182 263 337 in. (mm)

6. Orographic PMP for given durations [steps 4 X 5]

C. Total PMP

1. Add steps A9 and B6

3.09 453 549 62 823 931 in. (mm)

2. PMP for other durations from smooth curve fitted to plot of computed data.

3. Comparison with local-storm PMP (see sec. 6.3).

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage		Area	mi^2	(km^2)
Latitude	Longitude	Minimum Elevation	ft	(m)

Steps correspond to those in sec. 6.3A.

1. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)

2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m); 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %

b. Multiply step 1 by step 2a. _____ in. (mm)

3. Average 6/1-hr ratio for drainage [fig. 4.7]. _____

Duration (hr)						
1/4	1/2	3/4	1	2	3	4
_____	_____	_____	_____	_____	_____	6

4. Durational variation for 6/1-hr ratio of step 3 [table 4.4]. _____ %

5. 1-mi² (2.6-km²) PMP for indicated durations [step 2b X step 4]. _____ in. (mm)

6. Areal reduction [fig. 4.9]. _____ %

7. Areal reduced PMP [steps 5 X 6]. _____ in. (mm)

8. Incremental PMP [successive subtraction in step 7]. _____ in. (mm)

} 15-min. increments

9. Time sequence of incremental PMP according to:

Hourly increments [table 4.7]. _____ in. (mm)

Four largest 15-min. increments [table 4.8]. _____ in. (mm)

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5].
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)].
- b. Multiply step 3 by step 4a.
5. Average 6/1-hr ratio for drainage [fig. 4.7].
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

PMP Increment	Isohyet									
	A	B	C	D	E	F	G	H	I	J
Highest 1-hr	—	—	—	—	—	—	—	—	—	—
Highest 15-min.	—	—	—	—	—	—	—	—	—	—
2nd "	—	—	—	—	—	—	—	—	—	—
3rd "	—	—	—	—	—	—	—	—	—	—
4th "	—	—	—	—	—	—	—	—	—	—

in. (mm)

%

in. (mm)

7. Obtain isohetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest 1-hr PMP	3rd "	4th "	5th "	6th "	in %
3rd "	—	—	—	—	—
4th "	—	—	—	—	—
5th "	—	—	—	—	—
6th "	—	—	—	—	—

in %

8. Multiply steps 6 and 7 by step 4b to get incremental isohetal labels of PMP.

Highest 15-min.	2nd "	3rd "	4th "	in in. (mm)
2nd "	—	—	—	—
3rd "	—	—	—	—
4th "	—	—	—	—
Highest 1-hr	—	—	—	—
2nd "	—	—	—	—
3rd "	—	—	—	—
4th "	—	—	—	—
5th "	—	—	—	—
6th "	—	—	—	—

in in. (mm)

9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Spanish Flat Dam
 Latitude 40°00' 19", Longitude 119°46' 51" of basin center
 Area 6,745 mi² (km²)

Month J.N.

<u>Step</u>	<u>Duration (hrs)</u>						
		6	12	18	24	48	72

A. Convergence PMP

1. Drainage average value from one of figures 2.5 to 2.16 8 in. (mm)

2. Reduction for barrier-elevation [fig. 2.18] 55%

3. Barrier-elevation reduced PMP [step 1 X step 2] 4.4 in. (mm)

4. Durational variation [figs. 2.25 to 2.27 and table 2.7].

61 81 92 100 120 131 %

5. Convergence PMP for indicated durations [steps 3 X 4]

2.68 3.52 4.05 4.41 5.28 5.76 in. (mm)

6. Incremental 10 mi² (26 km²) PMP [successive subtraction in step 5]

2.68 .88 .49 .31 .22 .42 in. (mm)

7. Areal reduction [select from figs. 2.28 and 2.29]

106 ----- %

8. Areally reduced PMP [step 6 X step 7]

2.68 .88 .19 .31 .22 .42 in. (mm)

9. Drainage average PMP [accumulated values of step 8]

2.68 3.52 4.05 4.41 5.28 5.76 in. (mm)

B. Orographic PMP

1. Drainage average orographic index from figure 3.11a to d. 2 in. (mm)

2. Areal reduction [figure 3.20] 106 %

3. Adjustment for month [one of figs. 3.12 to 3.17] 90 %

4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3] 1.8 in. (mm)

30 57 80 100 128 137 %

5. Durational variation [table 3.5]

.54 1.03 1.44 1.8 2.26 3.37 in. (mm)

6. Orographic PMP for given durations [steps 4 X 5]

C. Total PMP

1. Add steps A9 and B6 3.21 4.59 5.49 6.2 8.14 9.13 in. (mm)

2. PMP for other durations from smooth curve fitted to plot of computed data.

3. Comparison with local-storm PMP (see sec. 6.3).

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage		Area	$\text{mi}^2 (\text{km}^2)$
Latitude	Longitude	Minimum Elevation	ft (m)

Steps correspond to those in sec. 6.3A.

1. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)

2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m): 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %

b. Multiply step 1 by step 2a. _____ in. (mm)

3. Average 6/1-hr ratio for drainage [fig. 4.7]. _____

Duration (hr)						
1/4	1/2	3/4	1	2	3	4
_____	_____	_____	_____	_____	_____	_____

4. Durational variation for 6/1-hr ratio of step 3 [table 4.4]. _____ %

5. 1-mi² (2.6-km²) PMP for indicated durations [step 2b X step 4]. _____ in. (mm)

6. Areal reduction [fig. 4.9]. _____ %

7. Areal reduced PMP [steps 5 X 6]. _____ in. (mm)

8. Incremental PMP [successive subtraction in step 7]. _____ in. (mm)
} 15-min. increments

9. Time sequence of incremental PMP according to:

Hourly increments [table 4.7]. _____ in. (mm)

Four largest 15-min. increments [table 4.8]. _____ in. (mm)

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %
- b. Multiply step 3 by step 4a. _____ in. (mm)
5. Average 6/1-hr ratio for drainage [fig. 4.7]. _____
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

PMP Increment	Isohyet									
	A	B	C	D	E	F	G	H	I	J
Highest 1-hr	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Highest 15-min.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in %

7. Obtain isohyetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest

1-hr PMP

3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in %

8. Multiply steps 6 and 7 by step 4b to get incremental isohyetal labels of PMP.

Highest 15-min.

2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in in. (mm)

Highest 1-hr

2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Spanish Flat Dam
 Latitude 40° 01' 19", Longitude 119° 46' 51" of basin center
 Area 6,745 mi² (km²)

Month Jul

Step

Duration (hrs)
 6 12 18 24 48 72

A. Convergence PMP

1. Drainage average value from one of figures 2.5 to 2.16 2.2 in. (mm)

2. Reduction for barrier-elevation [fig. 2.18] 55 %

3. Barrier-elevation reduced PMP [step 1 X step 2] 1.5 in. (mm)

4. Durational variation [figs. 2.25 to 2.27 and table 2.7].

64 83 93 100 117 126 %

5. Convergence PMP for indicated durations [steps 3 X 4]

2.88 3.74 4.99 4.5 5.27 5.67 in. (mm)

6. Incremental 10 mi² (26 km²) PMP [successive subtraction in step 5]

2.88 86 45 31 27 14 in. (mm)

100 → %

7. Areal reduction [select from figs. 2.28 and 2.29]

2.88 86 45 31 27 14 in. (mm)

2.88 3.74 4.99 4.5 5.27 5.67 in. (mm)

B. Orographic PMP

1. Drainage average orographic index from figure 3.11a to d. 2 in. (mm)

2. Areal reduction [figure 3.20] 10 %

3. Adjustment for month [one of figs. 3.12 to 3.17] 76 %

4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3] 19 in. (mm)

5. Durational variation [table 3.6]

30 57 80 100 159 187 %

6. Orographic PMP for given durations [steps 4 X 5]

57 108 152 19 30 35 in. (mm)

C. Total PMP

1. Add steps A9 and B6

3.45 182 5.71 6.4 8.27 9.22 in. (mm)

2. PMP for other durations from smooth curve fitted to plot of computed data.

3. Comparison with local-storm PMP (see sec. 6.3).

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage Latitude	Longitude	Area mi ² (km ²)	Minimum Elevation ft (m)
----------------------	-----------	--	-----------------------------

Steps correspond to those in sec. 6.3A.

1. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)

2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m): 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %

b. Multiply step 1 by step 2a. _____ in. (mm)

3. Average 6/1-hr ratio for drainage [fig. 4.7]. _____

Duration (hr)									
1/4	1/2	3/4	1	2	3	4	5	6	
_____	_____	_____	_____	_____	_____	_____	_____	_____	%

4. Durational variation for 6/1-hr ratio of step 3 [table 4.4]. _____

5. 1-mi² (2.6-km²) PMP for indicated durations [step 2b X step 4]. _____ in. (mm)

6. Areal reduction [fig. 4.9]. _____ %

7. Areal reduced PMP [steps 5 X 6]. _____ in. (mm)

8. Incremental PMP [successive subtraction in step 7]. _____ in. (mm)

} 15-min. increments

9. Time sequence of incremental PMP according to:

Hourly increments [table 4.7]. _____ in. (mm)

Four largest 15-min. increments [table 4.8]. _____ in. (mm)

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %
- b. Multiply step 3 by step 4a. _____ in. (mm)
5. Average 6/1-hr ratio for drainage [fig. 4:7]. _____
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

PMP Increment	Isohyet									
	A	B	C	D	E	F	G	H	I	J
Highest 1-hr	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Highest 15-min.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in %

7. Obtain isohyetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest

1-hr PMP

3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in %

8. Multiply steps 6 and 7 by step 4b to get incremental isohyetal labels of PMP.

Highest 15-min.

2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in in. (mm)

Highest 1-hr

2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Spanish Flat Dam
 Latitude 36°01'14", Longitude 109°40'51" of basin center
 Area 6,745 mi² (km²)

Month Aus

<u>Step</u>	<u>Duration (hrs)</u>
	6 12 18 24 48 72

A. Convergence PMP

1. Drainage average value from one of figures 2.5 to 2.16 6.3 in. (mm)
2. Reduction for barrier-elevation [fig. 2.18] 55%
3. Barrier-elevation reduced PMP [step 1 X step 2] 4.6 in. (mm)
4. Durational variation [figs. 2.25 to 2.27 and table 2.7].
5. Convergence PMP for indicated durations [steps 3 X 4]
6. Incremental 10 mi² (26 km²) PMP [successive subtraction in step 5]
7. Areal reduction [select from figs. 2.28 and 2.29]
8. Areally reduced PMP [step 6 X step 7]
9. Drainage average PMP [accumulated values of step 8]

6.1 8.3 9.3 10.0 11.7 12.6 in. (mm)

2.94 3.82 4.3 4.6 5.36 5.8 in. (mm)

2.94 3.82 4.3 4.6 5.36 5.8 in. (mm)

100 — — — — — %

2.94 3.82 4.3 4.6 5.36 5.8 in. (mm)

2.94 3.82 4.3 4.6 5.36 5.8 in. (mm)

B. Orographic PMP

1. Drainage average orographic index from figure 3.11a to d. 2 in. (mm)
2. Areal reduction [figure 3.20] 100 %
3. Adjustment for month [one of figs. 3.12 to 3.17] 100 %
4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3] 2 in. (mm)
5. Durational variation [table 3.6]
6. Orographic PMP for given durations [steps 4 X 5]

30 57 80 100 159 187 %

16 1.14 1.6 2 3.18 3.74 in. (mm)

C. Total PMP

1. Add steps A9 and B6 3.84 4.9 5.4 6.6 8.52 9.51 in. (mm)
2. PMP for other durations from smooth curve fitted to plot of computed data.
3. Comparison with local-storm PMP (see sec. 6.3).

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage		Area	mi^2	(km^2)	
Latitude		Longitude		Minimum Elevation	ft (m)

Steps correspond to those in sec. 6.3A:

1. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)

2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m); 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %

b. Multiply step 1 by step 2a. _____ in. (mm)

3. Average 6/1-hr ratio for drainage [fig. 4.7]. _____

	Duration (hr)									
	1/4	1/2	3/4	1	2	3	4	5	6	
4. Durational variation for 6/1-hr ratio of step 3 [table 4.4].	-----	-----	-----	-----	-----	-----	-----	-----	-----	%

5. 1-mi² (2.6-km²) PMP for indicated durations [step 2b X step 4]. _____ in. (mm)

6. Areal reduction [fig. 4.9]. _____ %

7. Areal reduced PMP [steps 5 X 6]. _____ in. (mm)

8. Incremental PMP [successive subtraction in step 7]. _____ in. (mm)
} 15-min. increments

9. Time sequence of incremental PMP according to:

Hourly increments [table 4.7]. _____ in. (mm)

Four largest 15-min. increments [table 4.8]. _____ in. (mm)

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5].
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)].
- b. Multiply step 3 by step 4a.
5. Average 6/1-hr ratio for drainage [fig. 4.7].
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

PMP Increment	Isohyet									
	A	B	C	D	E	F	G	H	I	J
Highest 1-hr	—	—	—	—	—	—	—	—	—	—
Highest 15-min.	—	—	—	—	—	—	—	—	—	—
2nd "	—	—	—	—	—	—	—	—	—	—
3rd "	—	—	—	—	—	—	—	—	—	—
4th "	—	—	—	—	—	—	—	—	—	—

in %

7. Obtain isohyetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest 1-hr PMP	—	—	—	—	—	—	—	—	—	—
3rd "	—	—	—	—	—	—	—	—	—	—
4th "	—	—	—	—	—	—	—	—	—	—
5th "	—	—	—	—	—	—	—	—	—	—
6th "	—	—	—	—	—	—	—	—	—	—

in %

8. Multiply steps 6 and 7 by step 4b to get incremental isohyetal labels of PMP.

Highest 15-min.	—	—	—	—	—	—	—	—	—	—
2nd "	—	—	—	—	—	—	—	—	—	—
3rd "	—	—	—	—	—	—	—	—	—	—
4th "	—	—	—	—	—	—	—	—	—	—
Highest 1-hr	—	—	—	—	—	—	—	—	—	—
2nd "	—	—	—	—	—	—	—	—	—	—
3rd "	—	—	—	—	—	—	—	—	—	—
4th "	—	—	—	—	—	—	—	—	—	—
5th "	—	—	—	—	—	—	—	—	—	—
6th "	—	—	—	—	—	—	—	—	—	—

in in. (mm)

9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Spanish Flat Dam
 Latitude 40° 01' 19", Longitude 109° 46' 51" of basin center

Area 6,745 mi² (km²)Month Sep.Step

	Duration (hrs)				
6	12	18	24	48	72

A. Convergence PMP

1. Drainage average value from one of figures 2.5 to 2.16 0.8 in. (mm)
2. Reduction for barrier-elevation [fig. 2.18] 55%
3. Barrier-elevation reduced PMP [step 1 X step 2] 4.8 in. (mm)
4. Durational variation [figs. 2.25 to 2.27 and table 2.7]. 64 83 93 100 111 126 %
5. Convergence PMP for indicated durations [steps 3 X 4] 3.07 3.98 4.46 4.46 5.62 6.05 in. (mm)
6. Incremental 10 mi² (26 km²) PMP [successive subtraction in step 5] 3.07 .91 .46 .34 .82 .43 in. (mm)
7. Areal reduction [select from figs. 2.28 and 2.29] 100 → %
8. Areally reduced PMP [step 6 X step 7] 3.07 .91 .46 .34 .82 .43 in. (mm)
9. Drainage average PMP [accumulated values of step 8] 3.07 3.98 4.46 4.46 5.62 6.05 in. (mm)

B. Orographic PMP

1. Drainage average orographic index from figure 3.11a to d. 2 in. (mm)
2. Areal reduction [figure 3.20] 100 %
3. Adjustment for month [one of figs. 3.12 to 3.17] .74 %
4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3] 2.08 in. (mm)
5. Durational variation [table 3.6] 30 57 80 100 159 187%
6. Orographic PMP for given durations [steps 4 X 5] .62 1.19 1.66 2.08 3.31 3.89 in. (mm)

C. Total PMP

1. Add steps A9 and B6 3.69 5.17 6.12 6.88 8.93 9.94 in. (mm)
2. PMP for other durations from smooth curve fitted to plot of computed data.
3. Comparison with local-storm PMP (see sec. 6.3).

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage		Area	mi^2	(km^2)
Latitude	Longitude	Minimum Elevation	ft	(m)

Steps correspond to those in sec. 6.3A.

1. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)

2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m): 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %

b. Multiply step 1 by step 2a. _____ in. (mm)

3. Average 6/1-hr ratio for drainage [fig. 4.7]. _____

	Duration (hr)							%
	1/4	1/2	3/4	1	2	3	4	
4. Durational variation for 6/1-hr ratio of step 3 [table 4.4].	—	—	—	—	—	—	—	
5. 1-mi ² (2.6-km ²) PMP for indicated durations [step 2b X step 4].	—	—	—	—	—	—	—	
6. Areal reduction [fig. 4.9].	—	—	—	—	—	—	—	
7. Areal reduced PMP [steps 5 X 6].	—	—	—	—	—	—	—	
8. Incremental PMP [successive subtraction in step 7].	—	—	—	—	—	—	—	
	} 15-min. increments							in. (mm)

9. Time sequence of incremental PMP according to:

Hourly increments [table 4.7]. _____ in. (mm)

Four largest 15-min. increments [table 4.8]. _____ in. (mm)

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %
- b. Multiply step 3 by step 4a. _____ in. (mm)
5. Average 6/1-hr ratio for drainage [fig. 4.7]. _____
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

PMP Increment	Isohyet									
	A	B	C	D	E	F	G	H	I	J
Highest 1-hr	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Highest 15-min.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

7. Obtain isohetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest

1-hr PMP

3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in %

8. Multiply steps 6 and 7 by step 4b to get incremental isohetal labels of PMP.

Highest 15-min.

2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in in. (mm)

Highest 1-hr

2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Spanish Flat Dam,
Latitude 36° 01' 19", Longitude 119° 46' 51"
of basin center

Area 6,745 mi² (km²)

Month Oct

Step

Duration (hrs)					
6	12	18	24	48	72

A. Convergence PMP

1. Drainage average value from one of figures 2.5 to 2.16 8.3 in. (mm)
2. Reduction for barrier-elevation [fig. 2.18] 55 %
3. Barrier-elevation reduced PMP [step 1 X step 2] 1.6 in. (mm)
4. Durational variation [figs. 2.25 to 2.27 and table 2.7]. 60 81 92 100 120 132 %
5. Convergence PMP for indicated durations [steps 3 X 4] 2.76 3.73 4.2 4.6 5.5 6.1 in. (mm)
6. Incremental 10 mi² (26 km²) PMP [successive subtraction in step 5] 2.76 97 .47 .4 .9 .6 in. (mm)
7. Areal reduction [select from figs. 2.28 and 2.29] 100 %
8. Areally reduced PMP [step 6 X step 7] 2.76 .97 .47 .4 .9 .6 in. (mm)
9. Drainage average PMP [accumulated values of step 8] 2.76 3.73 4.2 4.6 5.5 6.1 in. (mm)

B. Orographic PMP

1. Drainage average orographic index from figure 3.11a to d. 2 in. (mm)
2. Areal reduction [figure 3.20] 100 %
3. Adjustment for month [one of figs. 3.12 to 3.17] 108 %
4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3] 2.16 in. (mm)
5. Durational variation [table 3.6] 30 57 80 100 151 182 %
6. Orographic PMP for given durations [steps 4 X 5] 65 1.23 1.73 2.16 3.13 4.04 in. (mm)

C. Total PMP

1. Add steps A9 and B6 3.41 4.96 5.93 6.76 8.23 10.1 in. (mm)
2. PMP for other durations from smooth curve fitted to plot of computed data.
3. Comparison with local-storm PMP (see sec. 6.3).

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage Area _____ mi² (km²)
Latitude _____ Longitude _____ Minimum Elevation _____ ft (m)

Steps correspond to those in sec. 6.3A.

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %
- b. Multiply step 3 by step 4a. _____ in. (mm)
5. Average 6/1-hr ratio for drainage [fig. 4.7]. _____
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

PMP Increment	Isohyet									
	A	B	C	D	E	F	G	H	I	J
Highest 1-hr	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Highest 15-min.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

7. Obtain isohetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest

1-hr PMP

3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in %

8. Multiply steps 6 and 7 by step 4b to get incremental isohyetal labels of PMP.

Highest 15-min.

2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in in. (mm)

Highest 1-hr

2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Spanish Flat
 Latitude 40° 01' 19", Longitude 119° 46' 51" of basin center
 Area 6,745 mi² (km²)

Month Nov

Step

Duration (hrs)

6 12 18 24 48 72

A. Convergence PMP

1. Drainage average value from one of figures 2.5 to 2.16 88 in. (mm)

2. Reduction for barrier-elevation [fig. 2.18] 55%

3. Barrier-elevation reduced PMP [step 1 X step 2] 18 in. (mm)

4. Durational variation [figs. 2.25 to 2.27 and table 2.7].

34 78 91 100 126 142 %

5. Convergence PMP for indicated durations [steps 3 X 4]

2.59 3.71 4.37 4.8 6.05 6.8 in. (mm)

6. Incremental 10 mi² (26 km²) PMP [successive subtraction in step 5]

2.59 1.15 6.3 .43 1.25 .75 in. (mm)

7. Areal reduction [select from figs. 2.28 and 2.29]

100 %

8. Areally reduced PMP [step 6 X step 7]

2.59 1.15 6.3 .43 1.25 .75 in. (mm)

9. Drainage average PMP [accumulated values of step 8]

2.59 3.71 4.37 4.8 6.05 6.8 in. (mm)

B. Orographic PMP

1. Drainage average orographic index from figure 3.11a to d. 2 in. (mm)

2. Areal reduction [figure 3.20] 100 %

3. Adjustment for month [one of figs. 3.12 to 3.17] 100 %

4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3] 2.10 in. (mm)

30 57 60 100 159 187 %

5. Durational variation [table 3.6]

1.65 1.73 1.73 2.16 3.43 4.04 in. (mm)

6. Orographic PMP for given durations [steps 4 X 5]

3.24 4.97 6.1 6.96 9.16 11.81 in. (mm)

C. Total PMP

1. Add steps A9 and B6

2. PMP for other durations from smooth curve fitted to plot of computed data.

3. Comparison with local-storm PMP (see sec. 6.3).

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage Latitude	Longitude	Area mi ² (km ²)	Minimum Elevation ft (m)
Steps correspond to those in sec. 6.3A.			
1. Average 1-hr 1-mi ² (2.6-km ²) PMP for drainage [fig. 4.5].			in. (mm)
2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m): 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)].			%
b. Multiply step 1 by step 2a.			in. (mm)
3. Average 6/1-hr ratio for drainage [fig. 4.7].			in. (mm)
4. Durational variation for 6/1-hr ratio of step 3 [table 4.4].	Duration (hr) 1/4 1/2 3/4 1 2 3 4 5 6		
5. 1-mi ² (2.6-km ²) PMP for indicated durations [step 2b X step 4].			%
6. Areal reduction [fig. 4.9].			in. (mm)
7. Areal reduced PMP [steps 5 X 6].			%
8. Incremental PMP [successive subtraction in step 7].			in. (mm)
9. Time sequence of incremental PMP according to: Hourly increments [table 4.7].		in. (mm) } 15-min. increments	
Four largest 15-min. increments [table 4.8].			in. (mm)

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %
- b. Multiply step 3 by step 4a. _____ in. (mm)
5. Average 6/1-hr ratio for drainage [fig. 4.7]. _____
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5. _____

PMP Increment	Isohyet									
	A	B	C	D	E	F	G	H	I	J
Highest 1-hr	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Highest 15-min.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

in %

7. Obtain isohetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest

1-hr PMP

3rd "

4th "

5th "

6th "

in %

8. Multiply steps 6 and 7 by step 4b to get incremental isohyetal labels of PMP.

Highest 15-min.

2nd "

3rd "

4th "

Highest 1-hr

2nd "

3rd "

4th "

5th "

6th "

in in. (mm)

9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].

Table 6.1.—General-storm PMP computations for the Colorado River and Great basin

Drainage Spanish Flats
 Latitude 40°01'19", Longitude 105°51' of basin center
 Area 6,715 mi² (km²)

Month Dec.

Step

Duration (hrs)

6 12 18 24 48 72

A. Convergence PMP

1. Drainage average value from one of figures 2.5 to 2.16 6.9 in. (mm)
2. Reduction for barrier-elevation [fig. 2.18] 55%
3. Barrier-elevation reduced PMP [step 1 X step 2] 1.9 in. (mm)
4. Durational variation [figs. 2.25 to 2.27 and table 2.7].
5. Convergence PMP for indicated durations [steps 3 X 4] 52 77 90 100 127 146 %
6. Incremental 10 mi² (26 km²) PMP [successive subtraction in step 5] 2.55 3.77 4.4 4.9 6.27 7.16 in. (mm)
7. Areal reduction [select from figs. 2.28 and 2.29] 2.55 1.22 .63 .5 1.32 .93 in. (mm)
8. Areally reduced PMP [step 6 X step 7] 100 %
9. Drainage average PMP [accumulated values of step 8] 2.55 3.77 4.4 4.9 6.27 7.15 in. (mm)

B. Orographic PMP

1. Drainage average orographic index from figure 3.11a to d. 2 in. (mm)
2. Areal reduction [figure 3.20] 60%
3. Adjustment for month [one of figs. 3.12 to 3.17] 102%
4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3] 2.11 in. (mm)
5. Durational variation [table 3.6] 30 57 80 100 152 187 %
6. Orographic PMP for given durations [steps 4 X 5] 1.64 1.22 1.71 2.11 3.4 4 in. (mm)

C. Total PMP

1. Add steps A9 and B6 3.19 1.91 1.11 2.01 9.62 11.15 in. (mm)
2. PMP for other durations from smooth curve fitted to plot of computed data.
3. Comparison with local-storm PMP (see sec. 6.3).

Table 6.3A.--Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage Latitude	Longitude	Area mi ² (km ²)
		Minimum Elevation ft (m)

Steps correspond to those in sec. 6.3A.

1. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)
2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m); 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %
b. Multiply step 1 by step 2a. _____ in. (mm)
3. Average 6/1-hr ratio for drainage [fig. 4.7]. _____
4. Durational variation for 6/1-hr ratio of step 3 [table 4.4].

Duration (hr)								
1/4	1/2	3/4	1	2	3	4	5	6

 _____ %
5. 1-mi² (2.6-km²) PMP for indicated durations [step 2b X step 4]. _____ in. (mm)
6. Areal reduction [fig. 4.9]. _____ %
7. Areal reduced PMP [steps 5 X 6]. _____ in. (mm)
8. Incremental PMP [successive subtraction in step 7]. _____ in. (mm)
} 15-min. increments
9. Time sequence of incremental PMP according to:
 - Hourly increments [table 4.7]. _____ in. (mm)
 - Four largest 15-min. increments [table 4.8]. _____ in. (mm)

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [fig. 4.10] over drainage adjusted to 1:500,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi² (2.6-km²) PMP for drainage [fig. 4.5]. _____ in. (mm)
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %
b. Multiply step 3 by step 4a. _____ in. (mm)
5. Average 6/1-hr ratio for drainage [fig. 4.7]. _____
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

PMP Increment	Isohyet									
	A	B	C	D	E	F	G	H	I	J
Highest 1-hr	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Highest 15-min.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

7. Obtain isohetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest 1-hr PMP	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

8. Multiply steps 6 and 7 by step 4b to get incremental isohetal labels of PMP.

Highest 15-min.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Highest 1-hr	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2nd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3rd "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
6th "	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].

EVALUATION PARAMETERS (Continued)

NAME OF DAM: Spanish Flat Dam

CLASSIFICATION CRITERIA:

SIZE:

Storage Volume (to top of dam) (AF) 2260 ±

Hydraulic Height (Ft) 23' ±

HAZARD POTENTIAL:

Urban development in Flood Plain None

Potential for economic loss in Flood Plain None

This criteria is based on limited field inspection and mapping. Accuracy is consistent with a reconnaissance level of engineering effort.

TABLE 1 Dam Size Classification

Category	Impoundment	
	Storage (acre-feet)	Height (feet)
Small	< 1,000 and \geq 50	\leq 40 and \geq 25
Intermediate	\geq 1,000 and < 50,000	\geq 40 and < 100
Large	\geq 50,000	\geq 100

TABLE 2 Hazard Potential Classification

Category	Urban Development	Economic Loss
	No permanent structure for human habitation	Minimal (undeveloped to occasional structures or agriculture)
Significant	No urban development and no more than a small number of habitable structures	Appreciable (notable agriculture, industry, or structures)
High	Urban development with more than a small number of habitable structures*	Excessive (extensive community, industry, or agriculture)

Because this definition does not cite a specific number of lives that could be lost, difficulty was experienced in determining whether dams should be categorized as having "significant or high hazard potential." The issue was clarified by emphasizing that the hazard potential classification should be based on the density of downstream development containing habitable structures. For example, dams located upstream of isolated farmhouses would be classified as having significant hazard potential, and those located upstream of several houses or a residential development would be classified as having high hazard potential.

TABLE 3 Hydrologic Evaluation Guidelines: Recommended Spillway Design Floods

Hazard	Size	Spillway Design Flood (SDF)*
Low	Small	50- to 100-year frequency
	Intermediate	100-year to 1/2 PMF
	Large	1/2 PMF to PMF
	Very Large	PMF
Significant	Small	100-year to 1/2 PMF
	Intermediate	1/2 PMF to PMF
	Large	PMF
High	Small	1/2 PMF to PMF
	Intermediate	PMF
	Large	PMF

*The recommended design floods in this column represent the magnitude of the spillway design flood (SDF), which is intended to represent the largest flood that need be considered in the evaluation of a given project, regardless of whether a spillway is provided; i.e., a given project should be capable of safely passing the appropriate SDF. Where a range of SDF is indicated, the magnitude that most closely relates to the involved risk should be selected.

100-year = 100-year exceedance interval. The flood magnitude expected to be exceeded, on the average, of once in 100 years. It may also be expressed as an exceedance frequency with a 1% chance of being exceeded in any given year.

PMF = probable maximum flood. The flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The PMF is derived from the probable maximum precipitation (PMP), which information is generally available from the National Weather Service, NOAA. Most federal agencies apply reduction factors to the PMP when appropriate. Reductions may be applied because rainfall isohyets are unlikely to conform to the exact shape of the drainage basin. In some cases local topography will cause changes from the generalized PMP values; therefore, it may be advisable to contact federal construction agencies to obtain the prevailing practice in specific areas.

SOURCE: U.S. Army Corps of Engineers (1982b).



PROJECT Washoe Creek,
SUBJECT Spanish Flat Reservoir

SHEET 1 OF 1
JOB NO. 3512 0641.05
DATE 5-18-92
COMPUTED BY MAC
CHECKED BY

Time of Concentration

Elev.	Length	Flow Type	Slope	Velocity	Tc (hrs)
6500					
8200	1000'	Wetted, Free surface	35%	6 FPS	0.0463
8100	400'		2%	5.1 FPS	0.0218
8020	600'		13.3%	3.6 FPS	0.0463
8000	400'		5%	2.3 FPS	0.0483
7820	1500'		12%	3.5 FPS	0.1193
7780	500		6%	2.9 FPS	0.0479
7640	1600'		8.75%	3.4 FPS	0.1481
7600	500		6%	2.9 FPS	0.0479
7540	700	Small upland gully	8.50%	5.8 FPS	0.0335
7240	3700		8.1%	5.7 FPS	0.1803
7020	2200		10%	6.4 FPS	0.0955
6920	1300		7.7%	5.5 FPS	0.0657
6900	700		7.9%	3.5 FPS	0.0556
6840	800		7.5%	5.5 FPS	0.0404
6820	500		4%	4 FPS	0.0347
6700	2100		5.7%	4.7 FPS	0.1241
				$\Sigma =$	1.1534

SCS lag = 0.693 hrs



Harding Lawson Associates
Engineering
and
Environmental Services

PROJECT Wade County
SUBJECT Spanish Flat Reservoir

SHEET 2 OF 1
JOB NO. 3512, 06105
DATE 5-18-92
COMPUTED BY MAC
CHECKED BY _____

Basin Area ~ 6.745 mi²

Reservoir Area ~ 0.4016 mi². Var.

Normal 11 mi²

EG700' 4.8 mi²

100 yr - 26 in storm Precip = 2.9 in

Lat. 40° 01' 10"
Long. 119° 46' 51"

S.L 13700' C

CN = 63

% impervious = 6%

Zrn	Zd/Hr = 1.6 in	50%
Syr	Zd/Hr = 1.7 in	20%
100yr	Zd/Hr = 1.95 in	10%
25yr	Zd/Hr = 2.4 in	4%
50yr	Zd/Hr = 2.5 in	2%
100yr	Zd/Hr = 2.9 in	1%
500yr	Zd/Hr = 3.7 in	0.2%

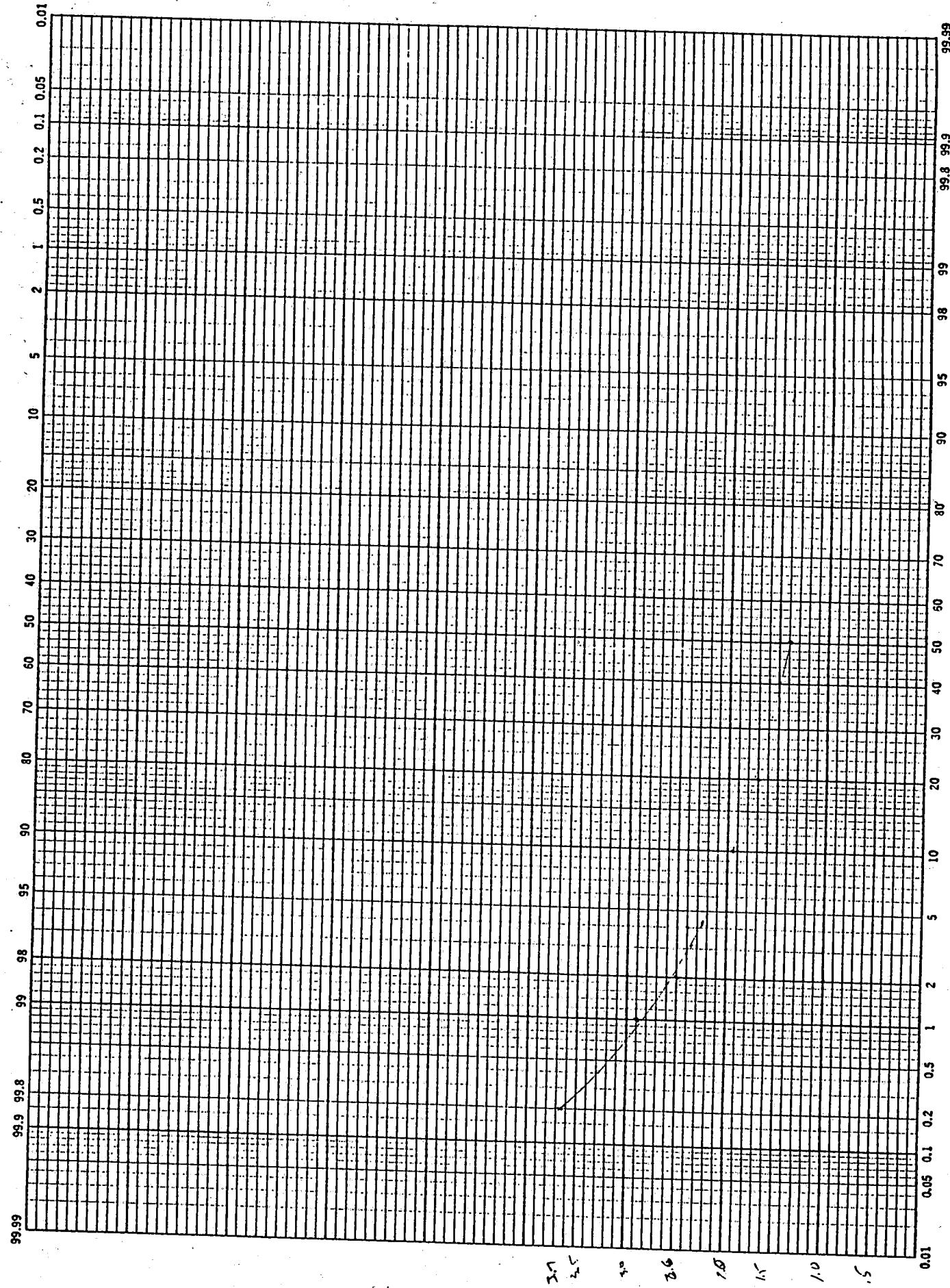
by extrapolation of data

Reservoir Volume Estimates

Elev	Area	Volume (cu)	Volume (acre-ft)	£ 100(Ac-ft)
137	72.3	3,066,624	48,444	48
11	86	11,279,600	181,293	181
100	13,381,632	172,628,624	2873	2873

EUGENE DIETZGEN CO.
MADE IN U. S. A.

O-PS [REDACTED] GRAPH [REDACTED]
PROBABILITY X 90 DIVISIONS





Harding Lawson Associates
Engineering
and
Environmental Services

PROJECT
SUBJECT

Spanish Flat Dam

SHEET 1 OF _____
JOB NO. 3512.064.05
DATE 5/26/92
COMPUTED BY JAC
CHECKED BY _____

100 yr flow 776 cfs

check width of cut necessary to pass flow
w. 4 ft ~ 10' of water.

$$S = 0.02$$

$$N = 0.030$$

$$Q = 776 \text{ cfs}$$

Find width w. Depth = 1'

$$Q = \frac{1.19}{n} A R^{1/3} S^{1/2}$$

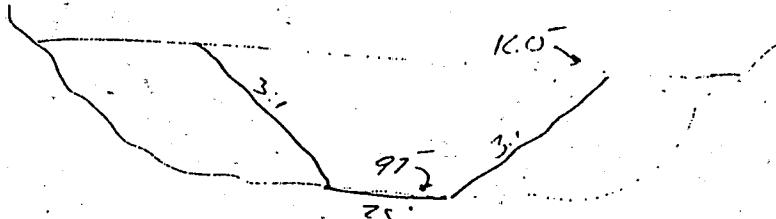
$$\frac{Q}{1.19 S^{1/2}} = A R^{2/3}$$

$$\frac{776(0.03)}{1.19(0.02)^{1/2}} = 110.48$$

use trapezoidal section w/ 3:1 s.s. incl.

$$\begin{aligned} \text{Depth} &= 2.3' \\ \text{Bottom width} &= 25' \end{aligned}$$

Volume of excavation =



APPENDIX B

APPENDIX B

This appendix contains the hydrologic analysis printout for Spanish Flat Dam. This printout reflects the 100-year 24 hour and 500-year 24 hour storm events.

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* RUN DATE 06/26/92 TIME 14:04:41 *
*****
*****
```

```

X   X   XXXXXX  XXXXX  X   X
X   X   X   X   X   X   XX
X   X   X   X   X   X   X
XXXXXX  XXXX  X   XXXXX  X
X   X   X   X   X   X   X
X   X   X   X   X   X   X
X   X   XXXXXX  XXXXX  XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DS, AND HEC1KV.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT

PAGE 1

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1	ID SPANISH FLAT RESERVOIR
2	ID 100 YEAR 24-HR AND 500 YEAR 24-HR STORMS
3	ID SCS METHOD, PRECIPITATION FROM NOAA ATLAS (EXTRAPOLATED TO 500 YEAR)
4	ID SCS TYPE II DISTRIBUTION
5	IT 10 26JUN92 1200 175
6	IO 0 2 0
7	JR PREC 1.00 1.276

```
*****  
* FLOOD HYDROGRAPH PACKAGE (HIEC-1) *  
* MAY 1991 *  
* VERSION 4.0.1E *  
* RUN DATE 06/26/92 TIME 14:04:41 *  
*****
```

* * * U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *

SPANISH FLAT RESERVOIR
100 YEAR 24-HR AND 500 YEAR 24-HR STORMS
SCS METHOD, PRECIPITATION FROM NOAA ATLAS (EXTRAPOLATED TO 500 YEAR)
SCS TYPE II DISTRIBUTION

6 10 OUTPUT CONTROL VARIABLES

IPRINT	0	PRINT CONTROL
IPILOT	2	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

8 IN TIME DATA FOR INPUT TIME SERIES

JXMIN	15	TIME INTERVAL IN MINUTES
JXDATE	26JUN92	STARTING DATE
JXTIME	1200	STARTING TIME

IT HYDROGRAPH TIME DATA

NMIN	10	MINUTES IN COMPUTATION INTERVAL
IDATE	26JUN92	STARTING DATE
ITIME	1200	STARTING TIME
NQ	175	NUMBER OF HYDROGRAPH ORDINATES
IIDATE	27JUN92	ENDING DATE
NDTIME	1700	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL 0.17 HOURS
TOTAL TIME BASE 29.00 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION

1.28

* 100 *
* 20 KK

TOTAL FIGURE TO DAY

SUBBASIN RUNOFF DATA

24 BA SUBBASIN CHARACTERISTICS TAREA 6.7% SUBBASIN AREA

PRECIPITATION DATA

TOTAL STORM STATIONS		RECORDING STATIONS	
PT	WEIGHTS	PR	WEIGHTS
5 PW		7 PR	
6 PW	1.00	8 PW	1.00

9 LS
SCS LOSS RATE
STRL 1.17 INITIAL ABSTRACTION
CRVNBR 63.00 CURVE NUMBER
RTIMP 6.00 PERCENT IMPERVIOUS AREA

SCS DIMENSIONLESS UNITGRAPH

PRECIPITATION STATION DATA

STATION	TOTAL	AVG. ANNUAL	WEIGHT
SCS	2.90	0.00	1.00

TEMPORAL DISTRIBUTION

TOTAL FLOW TO DAM

NOFF DATA

SUBBASIN AREA

5

TOTAL STORM STATIONS	SCS WEIGHTS	1.00
RECORDING STATIONS	SCS WEIGHTS	1.00

CS LOSS RATE	STRL	1.17	INITIAL ABSTRACTION
CRVNBR	63.00	CURVE NUMBER	
BTIMP	6.00	PERCENT IMPERVIOUS AREA	

CS DIMENSIONLESS UNITGRAPH
TIA C 0.60 142

STATION	SCS, WEIGHT =	1.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.01	0.01
0.13	0.18	0.03
0.01	0.01	0.01
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00

UNIT HYDROGRAPH

23 END-OF-PERIOD ORDINATES
 475. 1499. 3067. 4053. 4168. 3646. 2841. 1880. 1318. 951.
 666. 469. 329. 229. 163. 116. 82. 58. 42. 31.

HYDROGRAPH AT STATION 100

*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
*	26	JUN	1200	1	0.00	0.00	0.	*
*	26	JUN	1210	2	0.00	0.00	0.	*
*	26	JUN	1220	3	0.00	0.00	0.	*
*	26	JUN	1230	4	0.01	0.00	1.	*
*	26	JUN	1240	5	0.01	0.00	3.	*
*	26	JUN	1250	6	0.01	0.00	4.	*
*	26	JUN	1300	7	0.01	0.00	5.	*
*	26	JUN	1310	8	0.01	0.00	6.	*
*	26	JUN	1320	9	0.01	0.00	7.	*
*	26	JUN	1330	10	0.01	0.00	8.	*
*	26	JUN	1340	11	0.01	0.00	8.	*
*	26	JUN	1350	12	0.01	0.00	8.	*
*	26	JUN	1400	13	0.01	0.00	9.	*
*	27	JUN	0240	89	0.01	0.01	0.00	205.
*	27	JUN	0250	90	0.01	0.01	0.00	189.
*	27	JUN	0300	91	0.01	0.01	0.01	175.
*	27	JUN	0310	92	0.01	0.01	0.01	164.
*	27	JUN	0320	93	0.01	0.01	0.00	156.
*	27	JUN	0330	94	0.01	0.01	0.00	146.
*	27	JUN	0340	95	0.01	0.01	0.00	139.
*	27	JUN	0350	96	0.01	0.01	0.00	134.
*	27	JUN	0400	97	0.01	0.01	0.00	129.
*	27	JUN	0410	98	0.01	0.01	0.00	125.
*	27	JUN	0420	99	0.01	0.01	0.00	122.
*	27	JUN	0430	100	0.01	0.01	0.00	120.
*	27	JUN	0440	101	0.01	0.01	0.00	119.

26 JUN 2140	59	0.02	0.02	0.00	22.	*	27 JUN 1220	147	0.00	0.00	0.00	57.
26 JUN 2150	60	0.02	0.02	0.00	22.	*	27 JUN 1230	148	0.00	0.00	0.00	48.
26 JUN 2200	61	0.02	0.02	0.00	23.	*	27 JUN 1240	149	0.00	0.00	0.00	38.
26 JUN 2210	62	0.02	0.02	0.00	24.	*	27 JUN 1250	150	0.00	0.00	0.00	28.
26 JUN 2220	63	0.02	0.02	0.00	25.	*	27 JUN 1300	151	0.00	0.00	0.00	
26 JUN 2230	64	0.02	0.02	0.00	27.	*	27 JUN 1310	152	0.00	0.00	0.00	20.
26 JUN 2240	65	0.03	0.03	0.00	28.	*	27 JUN 1320	153	0.00	0.00	0.00	14.
26 JUN 2250	66	0.03	0.03	0.00	30.	*	27 JUN 1330	154	0.00	0.00	0.00	10.
26 JUN 2300	67	0.03	0.03	0.00	33.	*	27 JUN 1340	155	0.00	0.00	0.00	2.
26 JUN 2310	68	0.04	0.04	0.00	37.	*	27 JUN 1350	156	0.00	0.00	0.00	5.
26 JUN 2320	69	0.05	0.04	0.00	42.	*	27 JUN 1400	157	0.00	0.00	0.00	1.
26 JUN 2330	70	0.05	0.05	0.00	47.	*	27 JUN 1410	158	0.00	0.00	0.00	2.
26 JUN 2340	71	0.20	0.19	0.01	57.	*	27 JUN 1420	159	0.00	0.00	0.00	
26 JUN 2350	72	0.37	0.34	0.03	84.	*	27 JUN 1430	160	0.00	0.00	0.00	3.
27 JUN 0000	73	0.53	0.43	0.10	178.	*	27 JUN 1440	161	0.00	0.00	0.00	1.
27 JUN 0010	74	0.09	0.06	0.02	346.	*	27 JUN 1450	162	0.00	0.00	0.00	
27 JUN 0020	75	0.07	0.05	0.02	563.	*	27 JUN 1500	163	0.00	0.00	0.00	0.
27 JUN 0030	76	0.05	0.04	0.02	719.	*	27 JUN 1510	164	0.00	0.00	0.00	0.
27 JUN 0040	77	0.04	0.03	0.01	776.	*	27 JUN 1520	165	0.00	0.00	0.00	0.
27 JUN 0050	78	0.04	0.03	0.01	750.	*	27 JUN 1530	166	0.00	0.00	0.00	0.
27 JUN 0100	79	0.03	0.02	0.01	674.	*	27 JUN 1540	167	0.00	0.00	0.00	0.
27 JUN 0110	80	0.03	0.02	0.01	573.	*	27 JUN 1550	168	0.00	0.00	0.00	0.
27 JUN 0120	81	0.03	0.02	0.01	498.	*	27 JUN 1600	169	0.00	0.00	0.00	0.
27 JUN 0130	82	0.03	0.02	0.01	436.	*	27 JUN 1610	170	0.00	0.00	0.00	0.
27 JUN 0140	83	0.02	0.01	0.01	383.	*	27 JUN 1620	171	0.00	0.00	0.00	0.
27 JUN 0150	84	0.02	0.01	0.01	339.	*	27 JUN 1630	172	0.00	0.00	0.00	0.
27 JUN 0200	85	0.02	0.01	0.01	302.	*	27 JUN 1640	173	0.00	0.00	0.00	0.
27 JUN 0210	86	0.02	0.01	0.01	270.	*	27 JUN 1650	174	0.00	0.00	0.00	0.
27 JUN 0220	87	0.02	0.01	0.01	245.	*	27 JUN 1700	175	0.00	0.00	0.00	0.
27 JUN 0230	88	0.02	0.01	0.01	224.	*						

TOTAL RAINFALL = 2.90, TOTAL LOSS = 2.36, TOTAL EXCESS = 0.54

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.00-HR
+ 776.	12.67	(INCHES) (AC-FT)	276.	98.	81.	81.
			0.381	0.540	0.542	0.542
			137.	194.	195.	195.

CUMULATIVE AREA = 6.74 SQ MI

HYDROGRAPH AT STATION 100
PLAN 1, RATIO = 1.00

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
26	JUN	1200	1	0.00	0.00	0.00	0.	*	27	JUN	0240	89	0.01	0.01	0.00	205.
26	JUN	1210	2	0.00	0.00	0.00	0.	*	27	JUN	0250	90	0.01	0.01	0.00	189.
26	JUN	1220	3	0.00	0.00	0.00	0.	*	27	JUN	0300	91	0.01	0.01	0.01	175.
26	JUN	1230	4	0.01	0.01	0.00	1.	*	27	JUN	0310	92	0.01	0.01	0.01	164.
26	JUN	1240	5	0.01	0.01	0.00	3.	*	27	JUN	0320	93	0.01	0.01	0.00	154.
26	JUN	1250	6	0.01	0.01	0.00	4.	*	27	JUN	0330	94	0.01	0.01	0.00	146.
26	JUN	1300	7	0.01	0.01	0.00	5.	*	27	JUN	0340	95	0.01	0.01	0.00	139.
26	JUN	1310	8	0.01	0.01	0.00	6.	*	27	JUN	0350	96	0.01	0.01	0.00	134.
26	JUN	1320	9	0.01	0.01	0.00	7.	*	27	JUN	0400	97	0.01	0.01	0.00	129.
26	JUN	1330	10	0.01	0.01	0.00	8.	*	27	JUN	0410	98	0.01	0.01	0.00	125.
26	JUN	1340	11	0.01	0.01	0.00	8.	*	27	JUN	0420	99	0.01	0.01	0.00	122.
26	JUN	1350	12	0.01	0.01	0.00	8.	*	27	JUN	0430	100	0.01	0.01	0.00	120.
26	JUN	1400	13	0.01	0.01	0.00	9.	*	27	JUN	0440	101	0.01	0.01	0.00	119.
26	JUN	1410	14	0.01	0.01	0.00	9.	*	27	JUN	0450	102	0.01	0.01	0.00	117.
26	JUN	1420	15	0.01	0.01	0.00	9.	*	27	JUN	0500	103	0.01	0.01	0.00	115.
26	JUN	1430	16	0.01	0.01	0.00	9.	*	27	JUN	0510	104	0.01	0.01	0.00	111.
26	JUN	1440	17	0.01	0.01	0.00	9.	*	27	JUN	0520	105	0.01	0.01	0.00	108.
26	JUN	1450	18	0.01	0.01	0.00	9.	*	27	JUN	0530	106	0.01	0.01	0.00	106.
26	JUN	1500	19	0.01	0.01	0.00	9.	*	27	JUN	0540	107	0.01	0.01	0.00	104.
26	JUN	1510	20	0.01	0.01	0.00	9.	*	27	JUN	0550	108	0.01	0.01	0.00	103.
26	JUN	1520	21	0.01	0.01	0.00	9.	*	27	JUN	0600	109	0.01	0.00	0.00	101.
26	JUN	1530	22	0.01	0.01	0.00	9.	*	27	JUN	0610	110	0.01	0.00	0.00	99.
26	JUN	1540	23	0.01	0.01	0.00	9.	*	27	JUN	0620	111	0.01	0.00	0.00	96.
26	JUN	1550	24	0.01	0.01	0.00	9.	*	27	JUN	0630	112	0.01	0.00	0.00	93.
26	JUN	1600	25	0.01	0.01	0.00	9.	*	27	JUN	0640	113	0.01	0.00	0.00	90.
26	JUN	1610	26	0.01	0.01	0.00	9.	*	27	JUN	0650	114	0.01	0.00	0.00	88.
26	JUN	1620	27	0.01	0.01	0.00	10.	*	27	JUN	0700	115	0.01	0.00	0.00	86.
26	JUN	1630	28	0.01	0.01	0.00	10.	*	27	JUN	0710	116	0.01	0.00	0.00	85.
26	JUN	1640	29	0.01	0.01	0.00	11.	*	27	JUN	0720	117	0.01	0.00	0.00	84.
26	JUN	1650	30	0.01	0.01	0.00	11.	*	27	JUN	0730	118	0.01	0.00	0.00	83.
26	JUN	1700	31	0.01	0.01	0.00	11.	*	27	JUN	0740	119	0.01	0.00	0.00	81.
26	JUN	1710	32	0.01	0.01	0.00	12.	*	27	JUN	0750	120	0.01	0.00	0.00	78.
26	JUN	1720	33	0.01	0.01	0.00	12.	*	27	JUN	0800	121	0.01	0.00	0.00	
26	JUN	1730	34	0.01	0.01	0.00	12.	*	27	JUN	0810	122	0.01	0.00	0.00	
26	JUN	1740	35	0.01	0.01	0.00	12.	*	27	JUN	0820	123	0.01	0.00	0.00	

26 JUN 1750	36	0.01	0.00	12.	*	27 JUN 0830	124	0.01	0.00	0.00	0.00	75.	
26 JUN 1800	37	0.01	0.01	12.	*	27 JUN 0840	125	0.01	0.00	0.00	0.00	72.	
26 JUN 1810	38	0.01	0.01	12.	*	27 JUN 0850	126	0.01	0.00	0.00	0.00	69.	
26 JUN 1820	39	0.01	0.01	12.	*	27 JUN 0900	127	0.01	0.00	0.00	0.00	68.	
26 JUN 1830	40	0.01	0.01	13.	*	27 JUN 0910	128	0.01	0.00	0.00	0.00	67.	
26 JUN 1840	41	0.01	0.01	13.	*	27 JUN 0920	129	0.01	0.00	0.00	0.00	66.	
26 JUN 1850	42	0.01	0.01	14.	*	27 JUN 0930	130	0.01	0.00	0.00	0.00	65.	
26 JUN 1900	43	0.01	0.01	14.	*	27 JUN 0940	131	0.01	0.00	0.00	0.00	65.	
26 JUN 1910	44	0.01	0.01	14.	*	27 JUN 0950	132	0.01	0.00	0.00	0.00	65.	
26 JUN 1920	45	0.01	0.01	15.	*	27 JUN 1000	133	0.01	0.00	0.00	0.00	65.	
26 JUN 1930	46	0.01	0.01	15.	*	27 JUN 1010	134	0.01	0.00	0.00	0.00	65.	
26 JUN 1940	47	0.01	0.01	15.	*	27 JUN 1020	135	0.01	0.00	0.00	0.00	65.	
26 JUN 1950	48	0.01	0.01	15.	*	27 JUN 1030	136	0.01	0.00	0.00	0.00	65.	
26 JUN 2000	49	0.01	0.01	15.	*	27 JUN 1040	137	0.01	0.00	0.00	0.00	65.	
26 JUN 2010	50	0.01	0.01	15.	*	27 JUN 1050	138	0.01	0.00	0.00	0.00	65.	
26 JUN 2020	51	0.01	0.01	15.	*	27 JUN 1100	139	0.01	0.00	0.00	0.00	65.	
26 JUN 2030	52	0.01	0.01	16.	*	27 JUN 1110	140	0.01	0.00	0.00	0.00	65.	
26 JUN 2040	53	0.01	0.01	16.	*	27 JUN 1120	141	0.01	0.00	0.00	0.00	65.	
26 JUN 2050	54	0.01	0.01	17.	*	27 JUN 1130	142	0.01	0.00	0.00	0.00	65.	
26 JUN 2100	55	0.01	0.01	18.	*	27 JUN 1140	143	0.01	0.00	0.00	0.00	65.	
26 JUN 2110	56	0.02	0.01	19.	*	27 JUN 1150	144	0.00	0.00	0.00	0.00	65.	
26 JUN 2120	57	0.02	0.01	20.	*	27 JUN 1200	145	0.00	0.00	0.00	0.00	65.	
26 JUN 2130	58	0.02	0.01	21.	*	27 JUN 1210	146	0.00	0.00	0.00	0.00	62.	
26 JUN 2140	59	0.02	0.02	22.	*	27 JUN 1220	147	0.00	0.00	0.00	0.00	57.	
26 JUN 2150	60	0.02	0.02	22.	*	27 JUN 1230	148	0.00	0.00	0.00	0.00	48.	
26 JUN 2200	61	0.02	0.02	23.	*	27 JUN 1240	149	0.00	0.00	0.00	0.00	38.	
26 JUN 2210	62	0.02	0.02	24.	*	27 JUN 1250	150	0.00	0.00	0.00	0.00	28.	
26 JUN 2220	63	0.02	0.02	25.	*	27 JUN 1300	151	0.00	0.00	0.00	0.00	20.	
26 JUN 2230	64	0.02	0.02	27.	*	27 JUN 1310	152	0.00	0.00	0.00	0.00	5.	
26 JUN 2240	65	0.03	0.03	28.	*	27 JUN 1320	153	0.00	0.00	0.00	0.00	14.	
26 JUN 2250	66	0.03	0.03	30.	*	27 JUN 1330	154	0.00	0.00	0.00	0.00	3.	
26 JUN 2300	67	0.03	0.03	33.	*	27 JUN 1340	155	0.00	0.00	0.00	0.00	2.	
26 JUN 2310	68	0.04	0.04	37.	*	27 JUN 1350	156	0.00	0.00	0.00	0.00	1.	
26 JUN 2320	69	0.05	0.04	42.	*	27 JUN 1400	157	0.00	0.00	0.00	0.00	0.	
26 JUN 2330	70	0.05	0.05	47.	*	27 JUN 1410	158	0.00	0.00	0.00	0.00	0.	
26 JUN 2340	71	0.20	0.19	57.	*	27 JUN 1420	159	0.00	0.00	0.00	0.00	0.	
26 JUN 2350	72	0.37	0.34	84.	*	27 JUN 1430	160	0.00	0.00	0.00	0.00	0.	
27 JUN 0000	73	0.53	0.43	178.	*	27 JUN 1440	161	0.00	0.00	0.00	0.00	0.	
27 JUN 0010	74	0.69	0.66	346.	*	27 JUN 1450	162	0.00	0.00	0.00	0.00	0.	
27 JUN 0020	75	0.07	0.05	563.	*	27 JUN 1500	163	0.00	0.00	0.00	0.00	0.	
27 JUN 0030	76	0.05	0.04	719.	*	27 JUN 1510	164	0.00	0.00	0.00	0.00	0.	
27 JUN 0040	77	0.04	0.03	0.01	776.	*	27 JUN 1520	165	0.00	0.00	0.00	0.00	0.
27 JUN 0050	78	0.04	0.03	0.01	750.	*	27 JUN 1530	166	0.00	0.00	0.00	0.00	0.
27 JUN 0100	79	0.03	0.02	0.01	674.	*	27 JUN 1540	167	0.00	0.00	0.00	0.00	0.
27 JUN 0110	80	0.03	0.02	0.01	573.	*	27 JUN 1550	168	0.00	0.00	0.00	0.00	0.

27 JUN 0120	81	0.03	0.02	0.01	498.	*	27 JUN 1600	169	0.00	0.00	0.00	0.
27 JUN 0130	82	0.03	0.02	0.01	436.	*	27 JUN 1610	170	0.00	0.00	0.00	0.
27 JUN 0140	83	0.02	0.01	0.01	383.	*	27 JUN 1620	171	0.00	0.00	0.00	0.
27 JUN 0150	84	0.02	0.01	0.01	339.	*	27 JUN 1630	172	0.00	0.00	0.00	0.
27 JUN 0200	85	0.02	0.01	0.01	302.	*	27 JUN 1640	173	0.00	0.00	0.00	0.
27 JUN 0210	86	0.02	0.01	0.01	270.	*	27 JUN 1650	174	0.00	0.00	0.00	0.
27 JUN 0220	87	0.02	0.01	0.01	245.	*	27 JUN 1700	175	0.00	0.00	0.00	0.

TOTAL RAINFALL = 2.90, TOTAL LOSS = 2.36, TOTAL EXCESS = 0.54

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	29.00-HR
		(CFS)	(INCHES)	(AC-FT)	
776.	12.67	276.	0.381	137.	98. 0.540 194.

CUMULATIVE AREA = 6-74 89 MI

7

261430	16.0
261440	17.0
261450	18.0
261500	19.0
261510	20.0
261520	21.0
261530	22.0
261540	23.0
261550	24.0
261600	25.0
261610	26.0
261620	27.0
261630	28.0
261640	29.0
261650	30.0
261700	31.0
261710	32.0
261720	33.0
261730	34.0
261740	35.0
261750	36.0
261800	37.0
261810	38.0
261820	39.0
261830	40.0
261840	41.0
261850	42.0
261900	43.0
261910	44.0
261920	45.0
261930	46.0
261940	47.0
261950	48.0
262000	49.0
262010	50.0
262020	51.0
262030	52.0
262040	53.0
262050	54.0
262100	55.0
262110	56.0
262120	57.0
262130	58.0
262140	59.0
262150	60.0

262200	61.	0
262210	62.	0
262220	63.	0
262230	64.	0
262240	65.	0
262250	66.	0
262300	67.	0
262310	68.	0
262320	69.	0
262330	70.	0
262340	71.	0
262350	72.	0
270000	73.	0
270010	74.	0
270020	75.	0
270030	76.	0
270040	77.	0
270050	78.	0
270100	79.	0
270110	80.	0
270120	81.	0
270130	82.	0
270140	83.	0
270150	84.	0
270200	85.	0
270210	86.	0
270220	87.	0
270230	88.	0
270240	89.	0
270250	90.	0
270300	91.	0
270310	92.	0
270320	93.	0
270330	94.	0
270340	95.	0
270350	96.	0
270400	97.	0
270410	98.	0
270420	99.	0
270500	103.	0
270510	104.	0
270520	105.	0

270530	106.	0
270540	107.	0
270550	108.	0
270600	109.	0
270610	110.	0
270620	111.	0
270630	112.	0
270640	113.	0
270650	114.	0
270700	115.	0
270710	116.	0
270720	117.	0
270730	118.	0
270740	119.	0
270750	120.	0
270800	121.	0
270810	122.	0
270820	123.	0
270830	124.	0
270840	125.	0
270850	126.	0
270900	127.	0
270910	128.	0
270920	129.	0
270930	130.	0
270940	131.	0
270950	132.	0
271000	133.	0
271010	134.	0
271020	135.	0
271030	136.	0
271040	137.	0
271050	138.	0
271100	139.	0
271110	140.	0
271120	141.	0
271130	142.	0
271140	143.	0
271150	144.	0
271200	145.	0
271210	146.	0
271220	147.	0
271230	148.	0
271240	149.	0
271250	150.	0

271300 151.0

271310 152.0

271320 153.0

271330 154.0

271340 1550

271350 1560

271400 1570

271410 1580

271420 1590

271430 1600

271440 1610

271450 1620

271500 1630

271510 1640

271520 1650

271530 1660

271540 1670

271550 1680

271600 1690

271610 1700

271620 1710

271630 1720

271640 1730

271650 1740

271700 1750

HYDROGRAPH AT STATION 100
PLAN 1, RATIO = 1.28

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
26	JUN	1200	1	0.00	0.00	0.00	0.	*	27	JUN	0240	89	0.02	0.01	0.01	346.
26	JUN	1210	2	0.00	0.00	0.00	0.	*	27	JUN	0250	90	0.02	0.01	0.01	318.
26	JUN	1220	3	0.01	0.01	0.00	1.	*	27	JUN	0300	91	0.02	0.01	0.01	293.
26	JUN	1230	4	0.01	0.01	0.00	2.	*	27	JUN	0310	92	0.02	0.01	0.01	273.
26	JUN	1240	5	0.01	0.01	0.00	3.	*	27	JUN	0320	93	0.02	0.01	0.01	255.
26	JUN	1250	6	0.01	0.01	0.00	5.	*	27	JUN	0330	94	0.01	0.01	0.01	241.
26	JUN	1300	7	0.01	0.01	0.00	7.	*	27	JUN	0340	95	0.01	0.01	0.01	229.
26	JUN	1310	8	0.01	0.01	0.00	8.	*	27	JUN	0350	96	0.01	0.01	0.01	219.
26	JUN	1320	9	0.01	0.01	0.00	9.	*	27	JUN	0400	97	0.01	0.01	0.01	211.

26 JUN 1330	10	0.01	0.00	10.	*	27 JUN 0410	98	0.01	0.01	0.01	0.01
26 JUN 1340	11	0.01	0.01	10.	*	27 JUN 0420	99	0.01	0.01	0.01	0.01
26 JUN 1350	12	0.01	0.01	11.	*	27 JUN 0430	100	0.01	0.01	0.01	0.01
26 JUN 1400	13	0.01	0.01	11.	*	27 JUN 0440	101	0.01	0.01	0.01	0.01
26 JUN 1410	14	0.01	0.01	11.	*	27 JUN 0450	102	0.01	0.01	0.01	0.01
26 JUN 1420	15	0.01	0.01	11.	*	27 JUN 0500	103	0.01	0.01	0.01	0.01
26 JUN 1430	16	0.01	0.01	11.	*	27 JUN 0510	104	0.01	0.01	0.01	0.01
26 JUN 1440	17	0.01	0.01	11.	*	27 JUN 0520	105	0.01	0.01	0.01	0.01
26 JUN 1450	18	0.01	0.01	12.	*	27 JUN 0530	106	0.01	0.01	0.01	0.01
26 JUN 1500	19	0.01	0.01	12.	*	27 JUN 0540	107	0.01	0.01	0.01	0.01
26 JUN 1510	20	0.01	0.01	12.	*	27 JUN 0550	108	0.01	0.01	0.01	0.01
26 JUN 1520	21	0.01	0.01	12.	*	27 JUN 0600	109	0.01	0.00	0.00	0.00
26 JUN 1530	22	0.01	0.01	12.	*	27 JUN 0610	110	0.01	0.00	0.00	0.00
26 JUN 1540	23	0.01	0.01	12.	*	27 JUN 0620	111	0.01	0.00	0.00	0.00
26 JUN 1550	24	0.01	0.01	12.	*	27 JUN 0630	112	0.01	0.00	0.00	0.00
26 JUN 1600	25	0.01	0.01	12.	*	27 JUN 0640	113	0.01	0.00	0.00	0.00
26 JUN 1610	26	0.01	0.01	12.	*	27 JUN 0650	114	0.01	0.00	0.00	0.00
26 JUN 1620	27	0.01	0.01	13.	*	27 JUN 0700	115	0.01	0.00	0.00	0.00
26 JUN 1630	28	0.01	0.01	13.	*	27 JUN 0710	116	0.01	0.00	0.00	0.00
26 JUN 1640	29	0.01	0.01	14.	*	27 JUN 0720	117	0.01	0.00	0.00	0.00
26 JUN 1650	30	0.01	0.01	14.	*	27 JUN 0730	118	0.01	0.00	0.00	0.00
26 JUN 1700	31	0.01	0.01	15.	*	27 JUN 0740	119	0.01	0.00	0.00	0.00
26 JUN 1710	32	0.01	0.01	15.	*	27 JUN 0750	120	0.01	0.00	0.00	0.00
26 JUN 1720	33	0.01	0.01	15.	*	27 JUN 0800	121	0.01	0.00	0.00	0.00
26 JUN 1730	34	0.01	0.01	15.	*	27 JUN 0810	122	0.01	0.00	0.00	0.00
26 JUN 1740	35	0.01	0.01	15.	*	27 JUN 0820	123	0.01	0.00	0.00	0.00
26 JUN 1750	36	0.01	0.01	15.	*	27 JUN 0830	124	0.01	0.00	0.00	0.00
26 JUN 1800	37	0.01	0.01	15.	*	27 JUN 0840	125	0.01	0.00	0.00	0.00
26 JUN 1810	38	0.01	0.01	15.	*	27 JUN 0850	126	0.01	0.00	0.00	0.00
26 JUN 1820	39	0.01	0.01	16.	*	27 JUN 0900	127	0.01	0.00	0.00	0.00
26 JUN 1830	40	0.01	0.01	16.	*	27 JUN 0910	128	0.01	0.00	0.00	0.00
26 JUN 1840	41	0.01	0.01	16.	*	27 JUN 0920	129	0.01	0.00	0.00	0.00
26 JUN 1920	45	0.01	0.01	17.	*	27 JUN 0930	130	0.01	0.00	0.00	0.00
26 JUN 1930	46	0.01	0.01	17.	*	27 JUN 1010	134	0.01	0.00	0.00	0.00
26 JUN 1940	47	0.01	0.01	18.	*	27 JUN 1020	135	0.01	0.00	0.00	0.00
26 JUN 1950	48	0.01	0.01	18.	*	27 JUN 1030	136	0.01	0.00	0.00	0.00
26 JUN 2000	49	0.01	0.01	19.	*	27 JUN 1000	133	0.01	0.00	0.00	0.00
26 JUN 2010	50	0.01	0.01	19.	*	27 JUN 1040	137	0.01	0.00	0.00	0.00
26 JUN 2020	51	0.02	0.02	20.	*	27 JUN 1050	138	0.01	0.00	0.00	0.00
26 JUN 2030	52	0.02	0.02	20.	*	27 JUN 1110	140	0.01	0.00	0.00	0.00
26 JUN 2040	53	0.02	0.02	21.	*	27 JUN 1120	141	0.01	0.00	0.00	0.00
26 JUN 2050	54	0.02	0.02	22.	*	27 JUN 1130	142	0.01	0.00	0.00	0.00

26 JUN 2100	55	0.02	0.00	23.	*	27 JUN 1140	143	0.01	0.00
26 JUN 2110	56	0.02	0.02	25.	*	27 JUN 1150	144	0.01	0.00
26 JUN 2120	57	0.02	0.02	26.	*	27 JUN 1200	145	0.00	0.00
26 JUN 2130	58	0.02	0.02	27.	*	27 JUN 1210	146	0.00	0.00
26 JUN 2140	59	0.02	0.02	28.	*	27 JUN 1220	147	0.00	0.00
26 JUN 2150	60	0.02	0.02	29.	*	27 JUN 1230	148	0.00	0.00
26 JUN 2200	61	0.02	0.02	30.	*	27 JUN 1240	149	0.00	0.00
26 JUN 2210	62	0.02	0.02	31.	*	27 JUN 1250	150	0.00	0.00
26 JUN 2220	63	0.03	0.03	32.	*	27 JUN 1300	151	0.00	0.00
26 JUN 2230	64	0.03	0.03	34.	*	27 JUN 1310	152	0.00	0.00
26 JUN 2240	65	0.04	0.03	36.	*	27 JUN 1320	153	0.00	0.00
26 JUN 2250	66	0.04	0.04	39.	*	27 JUN 1330	154	0.00	0.00
26 JUN 2300	67	0.04	0.04	43.	*	27 JUN 1340	155	0.00	0.00
26 JUN 2310	68	0.05	0.05	48.	*	27 JUN 1350	156	0.00	0.00
26 JUN 2320	69	0.06	0.05	53.	*	27 JUN 1400	157	0.00	0.00
26 JUN 2330	70	0.06	0.06	60.	*	27 JUN 1410	158	0.00	0.00
26 JUN 2340	71	0.26	0.24	74.	*	27 JUN 1420	159	0.00	0.00
26 JUN 2350	72	0.47	0.39	88.	*	27 JUN 1430	160	0.00	0.00
27 JUN 0000	73	0.68	0.48	20.	*	27 JUN 1440	161	0.00	0.00
27 JUN 0010	74	0.11	0.07	0.04	*	27 JUN 1450	162	0.00	0.00
27 JUN 0020	75	0.09	0.05	0.03	*	27 JUN 1500	163	0.00	0.00
27 JUN 0030	76	0.07	0.04	0.03	*	27 JUN 1510	164	0.00	0.00
27 JUN 0040	77	0.06	0.03	0.02	*	27 JUN 1520	165	0.00	0.00
27 JUN 0050	78	0.05	0.03	0.02	*	27 JUN 1530	166	0.00	0.00
27 JUN 0100	79	0.04	0.03	0.02	*	27 JUN 1540	167	0.00	0.00
27 JUN 0110	80	0.04	0.02	0.02	*	27 JUN 1550	168	0.00	0.00
27 JUN 0120	81	0.03	0.02	0.02	*	27 JUN 1600	169	0.00	0.00
27 JUN 0130	82	0.03	0.02	0.01	*	27 JUN 1610	170	0.00	0.00
27 JUN 0140	83	0.03	0.01	0.01	*	27 JUN 1620	171	0.00	0.00
27 JUN 0150	84	0.03	0.01	0.01	*	27 JUN 1630	172	0.00	0.00
27 JUN 0200	85	0.02	0.01	0.01	*	27 JUN 1640	173	0.00	0.00
27 JUN 0210	86	0.02	0.01	0.01	*	27 JUN 1650	174	0.00	0.00
27 JUN 0220	87	0.02	0.01	0.01	*	27 JUN 1700	175	0.00	0.00
27 JUN 0230	88	0.02	0.01	0.01	*	380.	*		

TOTAL RAINFALL = 3.70, TOTAL LOSS = 2.76, TOTAL EXCESS = 0.94

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			29.00-HR
			6-HR	24-HR	72-HR	
+ 1528.	12.67	(INCHES)	502.	169.	140.	140.
			0.692	0.933	0.936	0.936

(AC-FT) 249. 336. 337. 337.

$$\text{CUMULATIVE AREA} = 6.74 \text{ SQ MI}$$

1

STATION 100

	(0) OUTFLOW	400.	600.	800.	1000.	1200.	1400.	1600.	0.	0.	(L) PRECIP,	(X) EXCESS	0.
RAINY PER	0.	200.	400.	600.	800.	1000.	1200.	1400.	0.0	0.0	0.4	0.2	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.6	0.4	0.2	0.0

סאטורן ראנר

270840	125.	0
270850	126.	0
270900	127.	0
270910	128.	0
270920	129.	0
270930	130.	0
270940	131.	0
270950	132.	0
271000	133.	0
271010	134.	0
271020	135.	0
271030	136.	0
271040	137.	0
271050	138.	0
271100	139.	0
271110	140.	0
271120	141.	0
271130	142.	0
271140	143.	0
271150	144.	0
271200	145.	0
271210	146.	0
271220	147.	0
271230	148.	0
271240	149.	0
271250	150.	0
271300	151.	0
271310	152.0	
271320	153.0	
271330	154.0	
271340	1550	
271350	1560	
271430	1600	
271440	1610	
271450	1620	
271500	1630	
271510	1640	
271520	1650	
271530	1660	
271540	1670	
271550	1680	
271600	1690	

0 1700
0 1710
0 1720
0 1730
0 1740
0 1750-

* * * * *
KK * * 150 *
* * * * *

RESERVOIR ROUTING

HYDROGRAPH ROUTING DATA

S	STORAGE ROUTING	NUMBER OF SUBREACHES	SPILLWAY CREST ELEVATION
	NSTPS	1	86.60 ELEVATION AT TOP OF DAM
	ITYP	ELEV TYPE OF INITIAL CONDITION	DAM WIDTH
	RSVRIC	82.20 INITIAL CONDITION	COOH COEFICIENT
	X	0.00 WORKING R AND D COEFFICIENT	EXPW EXPONENT OF HEAD
W	STORAGE	0.0 2256.0 6219.0	
E	EL ELEVATION	72.30 86.00 100.00	
S	SPILLWAY	CREL 82.20 SPILLWAY CREST ELEVATION	
	SPWID	13.00 SPILLWAY WIDTH	
	COOH	3.80 WEIR COEFFICIENT	
	EXPW	1.50 EXPONENT OF HEAD	
T	TOP OF DAM		
	TOPEL		
	DAMHWD		
	COOH		
	EXPW		

COMPUTED OUTFLOW-ELEVATION DATA

(EXCLUDING FLOW OVER DAM)

COUTFLOW	0.00	0.00	0.64	5.09	17.18	40.71	79.52	137.40	218.19	325.69
ELEVATION	72.30	82.20	82.25	82.42	82.69	83.08	83.57	84.18	84.89	85.72
COUTFLOW	463.73	636.12	846.68	1099.22	1397.56	1745.52	2146.91	2605.55	3125.26	3709.86
ELEVATION	86.65	87.69	88.85	90.11	91.48	92.97	94.56	96.26	98.08	100.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

(INCLUDING FLOW OVER DAM)

STORAGE	0.00	1630.25	1639.29	1666.43	1711.67	1775.00	1856.42	1955.93	2073.54	2209.24
OUTFLOW	0.00	0.00	0.64	5.09	17.18	40.71	79.52	137.40	218.19	325.69
ELEVATION	72.30	82.20	82.25	82.42	82.69	83.08	83.57	84.18	84.89	85.72
STORAGE	2256.00	2440.00	2735.47	3062.06	3419.74	3808.52	4228.41	4679.41	5161.50	5674.70
OUTFLOW	365.93	480.44	2345.06	5880.11	10927.37	17524.17	25750.36	35702.49	47485.56	61209.20
ELEVATION	86.00	86.65	87.69	88.85	90.11	91.48	92.97	94.56	96.26	98.08

STORAGE	6219.00
OUTFLOW	76985.80
ELEVATION	100.00

HYDROGRAPH AT STATION 150
PLAN 1, RATIO = 1.00

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE									
26	JUN	1200	1	0.	1630.2	82.2	*	26	JUN	2150	60	1.	1639.2	82.3	*	27	JUN	0740	119	42.	1777.3	83.1
26	JUN	1210	2	0.	1630.2	82.2	*	26	JUN	2200	61	1.	1639.5	82.3	*	27	JUN	0750	120	42.	1777.8	83.1
26	JUN	1220	3	0.	1630.3	82.2	*	26	JUN	2210	62	1.	1639.8	82.3	*	27	JUN	0800	121	42.	1778.4	83.1
26	JUN	1230	4	0.	1630.3	82.2	*	26	JUN	2220	63	1.	1640.2	82.3	*	27	JUN	0810	122	42.	1778.9	83.1
26	JUN	1240	5	0.	1630.3	82.2	*	26	JUN	2230	64	1.	1640.5	82.3	*	27	JUN	0820	123	43.	1779.4	83.1
26	JUN	1250	6	0.	1630.3	82.2	*	26	JUN	2240	65	1.	1640.9	82.3	*	27	JUN	0830	124	43.	1779.9	83.1

26 JUN 1300	7	0.	1630.4	82.2 * 26 JUN 2250	66	1.	1641.3	82.3 * 27 JUN 0840	125	43.	1780.3	83.1
26 JUN 1310	8	0.	1630.5	82.2 * 26 JUN 2300	67	1.	1641.7	82.3 * 27 JUN 0850	126	43.	1780.7	83.1
26 JUN 1320	9	0.	1630.6	82.2 * 26 JUN 2310	68	1.	1642.2	82.3 * 27 JUN 0900	127	43.	1781.1	83.1
26 JUN 1330	10	0.	1630.7	82.2 * 26 JUN 2320	69	1.	1642.7	82.3 * 27 JUN 0910	128	43.	1781.4	83.1
26 JUN 1340	11	0.	1630.8	82.2 * 26 JUN 2330	70	1.	1643.3	82.3 * 27 JUN 0920	129	44.	1781.7	83.1
26 JUN 1350	12	0.	1630.9	82.2 * 26 JUN 2340	71	1.	1644.0	82.3 * 27 JUN 0930	130	44.	1782.0	83.1
26 JUN 1400	13	0.	1631.0	82.2 * 26 JUN 2350	72	1.	1644.9	82.3 * 27 JUN 0940	131	44.	1782.3	83.1
26 JUN 1410	14	0.	1631.1	82.2 * 27 JUN 0000	73	2.	1646.7	82.3 * 27 JUN 0950	132	44.	1782.6	83.1
26 JUN 1420	15	0.	1631.3	82.2 * 27 JUN 0010	74	2.	1650.3	82.3 * 27 JUN 1000	133	44.	1782.9	83.1
26 JUN 1430	16	0.	1631.4	82.2 * 27 JUN 0020	75	3.	1656.5	82.4 * 27 JUN 1010	134	44.	1783.2	83.1
26 JUN 1440	17	0.	1631.5	82.2 * 27 JUN 0030	76	5.	1665.3	82.4 * 27 JUN 1020	135	44.	1783.4	83.1
26 JUN 1450	18	0.	1631.6	82.2 * 27 JUN 0040	77	7.	1675.5	82.5 * 27 JUN 1030	136	44.	1783.7	83.1
26 JUN 1500	19	0.	1631.7	82.2 * 27 JUN 0050	78	10.	1685.9	82.5 * 27 JUN 1040	137	45.	1784.0	83.1
26 JUN 1510	20	0.	1631.9	82.2 * 27 JUN 0100	79	12.	1695.5	82.6 * 27 JUN 1050	138	45.	1784.3	83.1
26 JUN 1520	21	0.	1632.0	82.2 * 27 JUN 0110	80	15.	1703.9	82.6 * 27 JUN 1100	139	45.	1784.6	83.1
26 JUN 1530	22	0.	1632.1	82.2 * 27 JUN 0120	81	17.	1711.1	82.7 * 27 JUN 1110	140	45.	1784.8	83.1
26 JUN 1540	23	0.	1632.2	82.2 * 27 JUN 0130	82	19.	1717.3	82.7 * 27 JUN 1120	141	45.	1785.1	83.1
26 JUN 1550	24	0.	1632.4	82.2 * 27 JUN 0140	83	21.	1722.6	82.8 * 27 JUN 1130	142	45.	1785.4	83.1
26 JUN 1600	25	0.	1632.5	82.2 * 27 JUN 0150	84	22.	1727.3	82.8 * 27 JUN 1140	143	45.	1785.7	83.1
26 JUN 1610	26	0.	1632.6	82.2 * 27 JUN 0200	85	24.	1731.4	82.8 * 27 JUN 1150	144	45.	1785.9	83.1
26 JUN 1620	27	0.	1632.8	82.2 * 27 JUN 0210	86	25.	1735.0	82.8 * 27 JUN 1200	145	46.	1786.2	83.1
26 JUN 1630	28	0.	1632.9	82.2 * 27 JUN 0220	87	26.	1738.2	82.9 * 27 JUN 1210	146	46.	1786.5	83.1
26 JUN 1640	29	0.	1633.0	82.2 * 27 JUN 0230	88	27.	1741.0	82.9 * 27 JUN 1220	147	46.	1786.6	83.1
26 JUN 1650	30	0.	1633.2	82.2 * 27 JUN 0240	89	28.	1743.6	82.9 * 27 JUN 1230	148	46.	1786.7	83.2
26 JUN 1700	31	0.	1633.3	82.2 * 27 JUN 0250	90	29.	1745.9	82.9 * 27 JUN 1240	149	46.	1786.7	83.2
26 JUN 1710	32	0.	1633.5	82.2 * 27 JUN 0300	91	30.	1748.0	82.9 * 27 JUN 1250	150	46.	1786.5	83.1
26 JUN 1720	33	0.	1633.7	82.2 * 27 JUN 0310	92	31.	1750.0	82.9 * 27 JUN 1300	151	46.	1786.2	83.1
26 JUN 1730	34	0.	1633.8	82.2 * 27 JUN 0320	93	31.	1751.7	82.9 * 27 JUN 1310	152	45.	1785.8	83.1
26 JUN 1740	35	0.	1634.0	82.2 * 27 JUN 0330	94	32.	1753.4	82.9 * 27 JUN 1320	153	45.	1785.4	83.1
26 JUN 1750	36	0.	1634.1	82.2 * 27 JUN 0340	95	33.	1754.9	83.0 * 27 JUN 1330	154	45.	1784.9	83.1
26 JUN 1800	37	0.	1634.3	82.2 * 27 JUN 0350	96	33.	1756.3	83.0 * 27 JUN 1340	155	45.	1784.3	83.1
26 JUN 1810	38	0.	1634.5	82.2 * 27 JUN 0400	97	34.	1757.7	83.0 * 27 JUN 1350	156	44.	1783.8	83.1
26 JUN 1820	39	0.	1634.6	82.2 * 27 JUN 0410	98	34.	1758.9	83.0 * 27 JUN 1400	157	44.	1783.2	83.1
26 JUN 1830	40	0.	1634.8	82.2 * 27 JUN 0420	99	35.	1760.2	83.0 * 27 JUN 1410	158	44.	1782.6	83.1
26 JUN 1840	41	0.	1635.0	82.2 * 27 JUN 0430	100	35.	1761.4	83.0 * 27 JUN 1420	159	44.	1782.0	83.1
26 JUN 1850	42	0.	1635.2	82.2 * 27 JUN 0440	101	36.	1762.5	83.0 * 27 JUN 1430	160	43.	1781.5	83.1
26 JUN 1900	43	0.	1635.3	82.2 * 27 JUN 0450	102	36.	1763.6	83.0 * 27 JUN 1440	161	43.	1780.9	83.1
26 JUN 1910	44	0.	1635.5	82.2 * 27 JUN 0500	103	36.	1764.7	83.0 * 27 JUN 1450	162	43.	1780.3	83.1
26 JUN 1920	45	0.	1635.7	82.2 * 27 JUN 0510	104	37.	1765.8	83.0 * 27 JUN 1500	163	43.	1779.7	83.1
26 JUN 1930	46	0.	1635.9	82.2 * 27 JUN 0520	105	37.	1766.8	83.0 * 27 JUN 1510	164	42.	1779.1	83.1
26 JUN 1940	47	0.	1636.1	82.2 * 27 JUN 0530	106	38.	1767.8	83.0 * 27 JUN 1520	165	42.	1778.5	83.1
26 JUN 1950	48	0.	1636.3	82.2 * 27 JUN 0540	107	38.	1768.7	83.0 * 27 JUN 1530	166	42.	1778.0	83.1
26 JUN 2000	49	0.	1636.5	82.2 * 27 JUN 0550	108	38.	1769.6	83.0 * 27 JUN 1540	167	42.	1777.4	83.1
26 JUN 2010	50	0.	1636.7	82.2 * 27 JUN 0600	109	39.	1770.4	83.1 * 27 JUN 1550	168	41.	1776.8	83.1
26 JUN 2020	51	0.	1636.9	82.2 * 27 JUN 0610	110	39.	1771.3	83.1 * 27 JUN 1600	169	41.	1776.2	83.1

26 JUN 2030	52	0.	1637.1	82.2 *	27 JUN 0620	111	39.	1772.1	83.1 *	27 JUN 1610	170	41.	1775.7	83.1
26 JUN 2040	53	0.	1637.4	82.2 *	27 JUN 0630	112	40.	1772.9	83.1 *	27 JUN 1620	171	41.	1775.1	83.1
26 JUN 2050	54	0.	1637.6	82.2 *	27 JUN 0640	113	40.	1773.6	83.1 *	27 JUN 1630	172	41.	1774.5	83.1
26 JUN 2100	55	0.	1637.8	82.2 *	27 JUN 0650	114	40.	1774.2	83.1 *	27 JUN 1640	173	40.	1774.0	83.1
26 JUN 2110	56	1.	1638.1	82.2 *	27 JUN 0700	115	41.	1774.9	83.1 *	27 JUN 1650	174	40.	1773.4	83.1
26 JUN 2120	57	1.	1638.3	82.2 *	27 JUN 0710	116	41.	1775.5	83.1 *	27 JUN 1700	175	40.	1772.9	83.1
26 JUN 2130	58	1.	1638.6	82.3 *	27 JUN 0720	117	41.	1776.1	83.1 *					
26 JUN 2140	59	1.	1638.9	82.3 *	27 JUN 0730	118	41.	1776.7	83.1 *					

PEAK OUTFLOW IS 46. AT TIME 24.50 HOURS

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			STATION 150
			6-HR	24-HR	72-HR	
+ 46.	24.50	(INCHES) (AC-FT)	45.	26.	22.	22.
		0.061 22.	0.146 52.	0.146 52.	0.146 52.	
PEAK STORAGE + (AC-FT)	TIME (HR)		MAXIMUM AVERAGE STORAGE			
+ 1787.	24.50		6-HR	24-HR	72-HR	29.00-HR
		1784.	1727.	1711.	1711.	
PEAK STAGE + (FEET)	TIME (HR)		MAXIMUM AVERAGE STAGE			
+ 83.15	24.50		6-HR	24-HR	72-HR	29.00-HR
		83.13	82.79	82.69	82.69	
CUMULATIVE AREA = 6.74 SQ MI						

DAHRMN PER 261200	11-----	(I) INFLOW, 000 CFS	(O) OUTFLOW, 000 CFS			(S) STORAGE, 000 CFS	STATION 150
			200.	300.	400.		
0.	0.	100.	500.	600.	700.	800.	0.
0.	0.	0.	0.	0.	0.	1640.	1680.
						1720.	1760.
						1800.	0.
						S .	S .
						S .	S .
						S .	S .

261240	51
261250	61
261300	701
261310	801
261320	901
261330	1001
261340	1101
261350	1201
261400	1301
261410	1401
261420	1501
261430	1601
261440	1701
261450	1801
261500	1901
261510	2001
261520	2101
261530	2201
261540	2301
261550	2401
261600	2501
261610	2601
261620	2701
261630	2801
261700	3101
261710	3201
261720	3301
261730	3401
261740	3501
261750	3601
261800	3701
261810	3801
261820	3901
261830	4001
261840	4101
261850	4201
261900	4301
261910	4401
261920	4501
261930	4601
261940	4701
261950	4801
262000	4901

262010	500	I	S
262020	510	I	S
262030	520	I	S
262040	530	I	S
262050	540	I	S
262100	550	I	S
262110	560	I	S
262120	570	I	S
262130	580	I	S
262140	590	I	S
262150	600	I	S
262200	610	I	S
262210	620	I	S
262220	630	I	S
262230	640	I	S
262240	650	I	S
262250	660	I	S
262300	670	I	S
262310	680	I	S
262320	690	I	S
262330	700	I	S
262340	710	I	S
262350	720	I	S
270000	730	I	S
270010	740	I	S
270020	750	I	S
270030	760	I	S
270040	77.0	I	S
270050	78.0	I	S
270100	79.0	I	S
270110	80.0	I	S
270120	81.0	I	S
270130	82.0	I	S
270140	83.0	I	S
270150	84.0	I	S
270200	85.0	I	S
270210	86.0	I	S
270220	87.0	I	S
270250	89.0	I	S
270300	91.0	I	S
270310	92.0	I	S
270320	93.0	I	S
270330	94.0	I	S

40	95.	0	1
50	96.	0	1
00	97.	0	1
10	98.	0	1
20	99.	0	1
30	100.	0	1
40	101.	0	1
50	102.	0	1
00	103.	0	1
10	104.	0	1
20	105.	0	1
30	106.	0	1
40	107.	0	1
50	108.	0	1
00	109.	0	1
10	110.	0	1
20	111.	0	1
30	112.	0	1
40	113.	0	1
50	114.	0	1
00	115.	0	1
10	116.	0	1
20	117.	0	1
30	118.	0	1
40	119.	0	1
50	120.	0	1
00	121.	0	1
10	122.	0	1
20	123.	0	1
30	124.	0	1
40	125.	0	1
50	126.	0	1
00	127.	0	1
10	128.	0	1
20	129.	0	1
30	130.	0	1
40	131.	0	1
50	132.	0	1
00	133.	0	1
10	134.	0	1
20	135.	0	1
30	136.	0	1
40	137.	0	1
50	138.	0	1
00	139.	0	1

HYDROGRAPH AT STATION 150
PLAN 1, RATIO = 1.28

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE *	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE *	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE *
26	JUN	1200	1	0.	1630.2	82.2 *	26	JUN	2150	60	1.	1641.6	82.3 *	27	JUN	0740	119	91.	1877.8	83.7
26	JUN	1210	2	0.	1630.2	82.2 *	26	JUN	2200	61	1.	1642.0	82.3 *	27	JUN	0750	120	91.	1878.4	83.7
26	JUN	1220	3	0.	1630.3	82.2 *	26	JUN	2210	62	1.	1642.4	82.3 *	27	JUN	0800	121	92.	1878.9	83.7
26	JUN	1230	4	0.	1630.3	82.2 *	26	JUN	2220	63	1.	1642.9	82.3 *	27	JUN	0810	122	92.	1879.5	83.7
26	JUN	1240	5	0.	1630.3	82.2 *	26	JUN	2230	64	1.	1643.3	82.3 *	27	JUN	0820	123	92.	1879.9	83.7
26	JUN	1250	6	0.	1630.4	82.2 *	26	JUN	2240	65	1.	1643.8	82.3 *	27	JUN	0830	124	92.	1880.3	83.7
26	JUN	1300	7	0.	1630.4	82.2 *	26	JUN	2250	66	1.	1644.3	82.3 *	27	JUN	0840	125	93.	1880.7	83.7
26	JUN	1310	8	0.	1630.5	82.2 *	26	JUN	2300	67	1.	1644.8	82.3 *	27	JUN	0850	126	93.	1881.0	83.7
26	JUN	1320	9	0.	1630.7	82.2 *	26	JUN	2310	68	1.	1645.4	82.3 *	27	JUN	0900	127	93.	1881.2	83.7
26	JUN	1330	10	0.	1630.8	82.2 *	26	JUN	2320	69	1.	1646.1	82.3 *	27	JUN	0910	128	93.	1881.4	83.7
26	JUN	1340	11	0.	1630.9	82.2 *	26	JUN	2330	70	2.	1646.8	82.3 *	27	JUN	0920	129	93.	1881.5	83.7
26	JUN	1350	12	0.	1631.1	82.2 *	26	JUN	2340	71	2.	1647.7	82.3 *	27	JUN	0930	130	93.	1881.7	83.7
26	JUN	1400	13	0.	1631.2	82.2 *	26	JUN	2350	72	2.	1649.1	82.3 *	27	JUN	0940	131	93.	1881.8	83.7
26	JUN	1410	14	0.	1631.4	82.2 *	27	JUN	0000	73	2.	1652.3	82.3 *	27	JUN	0950	132	93.	1882.0	83.7
26	JUN	1420	15	0.	1631.5	82.2 *	27	JUN	0010	74	4.	1659.2	82.4 *	27	JUN	1000	133	93.	1882.1	83.7
26	JUN	1430	16	0.	1631.7	82.2 *	27	JUN	0020	75	6.	1671.7	82.5 *	27	JUN	1010	134	93.	1882.2	83.7
26	JUN	1440	17	0.	1631.8	82.2 *	27	JUN	0030	76	11.	1689.2	82.6 *	27	JUN	1020	135	94.	1882.3	83.7
26	JUN	1450	18	0.	1632.0	82.2 *	27	JUN	0040	77	16.	1709.4	82.7 *	27	JUN	1030	136	94.	1882.5	83.7
26	JUN	1500	19	0.	1632.2	82.2 *	27	JUN	0050	78	23.	1729.6	82.8 *	27	JUN	1040	137	94.	1882.6	83.7
26	JUN	1510	20	0.	1632.3	82.2 *	27	JUN	0100	79	30.	1748.1	82.9 *	27	JUN	1050	138	94.	1882.7	83.7
26	JUN	1520	21	0.	1632.5	82.2 *	27	JUN	0110	80	36.	1763.8	83.0 *	27	JUN	1100	139	94.	1882.8	83.7
26	JUN	1530	22	0.	1632.6	82.2 *	27	JUN	0120	81	42.	1776.9	83.1 *	27	JUN	1110	140	94.	1882.9	83.7
26	JUN	1540	23	0.	1632.8	82.2 *	27	JUN	0130	82	46.	1788.0	83.2 *	27	JUN	1120	141	94.	1883.1	83.7
26	JUN	1550	24	0.	1633.0	82.2 *	27	JUN	0140	83	51.	1797.4	83.2 *	27	JUN	1130	142	94.	1883.2	83.7
26	JUN	1600	25	0.	1633.1	82.2 *	27	JUN	0150	84	54.	1805.5	83.3 *	27	JUN	1140	143	94.	1883.3	83.7
26	JUN	1610	26	0.	1633.3	82.2 *	27	JUN	0200	85	57.	1812.5	83.3 *	27	JUN	1150	144	94.	1883.4	83.7
26	JUN	1620	27	0.	1633.4	82.2 *	27	JUN	0210	86	60.	1818.5	83.3 *	27	JUN	1200	145	94.	1883.5	83.7
26	JUN	1630	28	0.	1633.6	82.2 *	27	JUN	0220	87	63.	1823.7	83.4 *	27	JUN	1210	146	94.	1883.6	83.7
26	JUN	1640	29	0.	1633.8	82.2 *	27	JUN	0230	88	65.	1828.3	83.4 *	27	JUN	1220	147	94.	1883.6	83.7
26	JUN	1650	30	0.	1634.0	82.2 *	27	JUN	0240	89	67.	1832.4	83.4 *	27	JUN	1230	148	94.	1883.5	83.7
26	JUN	1700	31	0.	1634.2	82.2 *	27	JUN	0250	90	69.	1836.0	83.4 *	27	JUN	1240	149	94.	1883.1	83.7
26	JUN	1710	32	0.	1634.4	82.2 *	27	JUN	0300	91	71.	1839.3	83.5 *	27	JUN	1250	150	94.	1882.5	83.7
26	JUN	1720	33	0.	1634.6	82.2 *	27	JUN	0310	92	72.	1842.2	83.5 *	27	JUN	1300	151	93.	1881.8	83.7
26	JUN	1730	34	0.	1634.8	82.2 *	27	JUN	0320	93	73.	1844.8	83.5 *	27	JUN	1310	152	93.	1880.9	83.7
26	JUN	1740	35	0.	1635.0	82.2 *	27	JUN	0330	94	75.	1847.2	83.5 *	27	JUN	1320	153	92.	1879.8	83.7
26	JUN	1750	36	0.	1635.2	82.2 *	27	JUN	0340	95	76.	1849.4	83.5 *	27	JUN	1330	154	92.	1878.8	83.7
26	JUN	1800	37	0.	1635.4	82.2 *	27	JUN	0350	96	77.	1851.5	83.5 *	27	JUN	1340	155	91.	1877.6	83.7
26	JUN	1810	38	0.	1635.6	82.2 *	27	JUN	0400	97	78.	1853.4	83.6 *	27	JUN	1350	156	90.	1876.5	83.7
26	JUN	1820	39	0.	1635.8	82.2 *	27	JUN	0410	98	79.	1855.1	83.6 *	27	JUN	1400	157	90.	1875.3	83.7
26	JUN	1830	40	0.	1636.1	82.2 *	27	JUN	0420	99	80.	1856.8	83.6 *	27	JUN	1410	158	89.	1874.1	83.7
26	JUN	1840	41	0.	1636.3	82.2 *	27	JUN	0430	100	81.	1858.5	83.6 *	27	JUN	1420	159	88.	1872.9	83.7
26	JUN	1850	42	0.	1636.5	82.2 *	27	JUN	0440	101	81.	1860.0	83.6 *	27	JUN	1430	160	88.	1871.7	83.7
26	JUN	1900	43	0.	1636.7	82.2 *	27	JUN	0450	102	82.	1861.5	83.6 *	27	JUN	1440	161	87.	1870.5	83.7

26 JUN 1910	44	0.	1637.0	82.2 * 27 JUN 0500 103	83.	1863.0	83.6 * 27 JUN 1450 162	86.	1869.4	83.7
26 JUN 1920	45	0.	1637.2	82.2 * 27 JUN 0510 104	84.	1864.4	83.6 * 27 JUN 1500 163	86.	1868.2	83.6
26 JUN 1930	46	0.	1637.5	82.2 * 27 JUN 0520 105	84.	1865.7	83.6 * 27 JUN 1510 164	85.	1867.0	83.6
26 JUN 1940	47	0.	1637.7	82.2 * 27 JUN 0530 106	85.	1866.9	83.6 * 27 JUN 1520 165	85.	1865.8	83.6
26 JUN 1950	48	1.	1638.0	82.2 * 27 JUN 0540 107	86.	1868.0	83.6 * 27 JUN 1530 166	84.	1864.7	83.6
26 JUN 2000	49	1.	1638.3	82.2 * 27 JUN 0550 108	86.	1869.1	83.7 * 27 JUN 1540 167	85.	1863.5	83.6
26 JUN 2010	50	1.	1638.5	82.3 * 27 JUN 0600 109	87.	1870.2	83.7 * 27 JUN 1550 168	83.	1862.4	83.6
26 JUN 2020	51	1.	1638.8	82.3 * 27 JUN 0610 110	87.	1871.2	83.7 * 27 JUN 1600 169	82.	1861.2	83.6
26 JUN 2030	52	1.	1639.0	82.3 * 27 JUN 0620 111	88.	1872.2	83.7 * 27 JUN 1610 170	81.	1860.1	83.6
26 JUN 2040	53	1.	1639.3	82.3 * 27 JUN 0630 112	88.	1873.1	83.7 * 27 JUN 1620 171	81.	1859.0	83.6
26 JUN 2050	54	1.	1639.6	82.3 * 27 JUN 0640 113	89.	1873.9	83.7 * 27 JUN 1630 172	80.	1857.9	83.6
26 JUN 2100	55	1.	1639.9	82.3 * 27 JUN 0650 114	89.	1874.6	83.7 * 27 JUN 1640 173	80.	1856.8	83.6
26 JUN 2110	56	1.	1640.2	82.3 * 27 JUN 0700 115	90.	1875.3	83.7 * 27 JUN 1650 174	79.	1855.7	83.6
26 JUN 2120	57	1.	1640.6	82.3 * 27 JUN 0710 116	90.	1876.0	83.7 * 27 JUN 1700 175	79.	1854.6	83.6
26 JUN 2130	58	1.	1640.9	82.3 * 27 JUN 0720 117	90.	1876.6	83.7 *			
26 JUN 2140	59	1.	1641.3	82.3 * 27 JUN 0730 118	91.	1877.2	83.7 *			

PEAK OUTFLOW IS 94. AT TIME 24.17 HOURS

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW		
			6-HR	24-HR	72-HR
+ (AC-FT)	(INCHES)	(AC-FT)	93.	57.	47.
+ 94.	24.17	0.128	0.312	0.312	0.312
+ 1884.	24.17	46.	112.	112.	112.

PEAK STORAGE + (FEET)	TIME (HR)	(HR)	MAXIMUM AVERAGE STORAGE		
			6-HR	24-HR	72-HR
+ 83.74	24.17	1882.	1791.	1764.	1764.
CUMULATIVE AREA = 6.74 sq mi			83.01	83.01	

STATION 150

(1) INFLOW, (0) OUTFLOW

A scatter plot showing the relationship between DAHRMN PER (Y-axis) and (S) STORAGE (X-axis).

The X-axis is labeled "(S) STORAGE" and ranges from 0.0 to 1900.0 with increments of 200.0.

The Y-axis is labeled "DAHRMN PER" and ranges from 0.0 to 11 with increments of 2.0.

The data points are represented by small dots, forming a dense triangular cluster centered around (1000, 5).

51850	4200	51900	4301	51910	4401	51920	4501	51930	4601	51940	4701	51950	4801	51960	4901	51970	5001	51980	5101	51990	5201	52000	5301	52040	5401	52050	5401	52100	5501	52110	5601	52120	5701	52130	5801	52140	5901	52220	6301	52230	6401	52240	6501	52250	6601	52300	6701	52310	6801	52320	690	52330	700	52340	710	52350	720	52360	730	52370	740	52380	750	52390	760	52400	770	52450	780	52460	790	52470	800	52480	810	52490	820	52500	830	52510	840	52520	850	52530	860
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270220	87.	0	1
270230	88.	0	1
270240	89.	0	1
270250	90.	0	1
270300	91.	0	1
270310	92.	0	1
270320	93.	0	1
270330	94.	0	1
270340	95.	0	1
270350	96.	0	1
270400	97.	0	1
270410	98.	0	1
270420	99.	0	1
270430	100.	0	1
270440	101.	0	1
270450	102.	0	1
270500	103.	0	1
270510	104.	0	1
270520	105.	0	1
270530	106.	0	1
270540	107.	0	1
270550	108.	0	1
270600	109.	0	1
270610	110.	0	1
270620	111.	0	1
270630	112.	0	1
270640	113.	0	1
270650	114.	0	1
270700	115.	0	1
270710	116.	0	1
270720	117.	0	1
270730	118.	0	1
270740	119.	0	1
270750	120.	0	1
270800	121.	0	1
270810	122.	0	1
270820	123.	0	1
270830	124.	0	1
270840	125.	0	1
270850	126.	0	1
270900	127.	1	
270910	128.	1	
270920	129.	1	
270930	130.	1	
270940	131.	1	

270950	132.	1
271000	133.	1
271010	134.	1
271020	135.	1
271030	136.	1
271040	137.	1
271050	138.	1
271100	139.	1
271110	140.	1
271120	141.	1
271130	142.	1
271140	143.	1
271150	144.	1
271200	145.	1
271210	146.	1
271220	147.	10
271230	148.	10
271240	149.	10
271250	150.	10
271300	151.	0
271310	152.	0
271320	153.	0
271330	154.	0
271340	155.	0
271350	156.	0
271400	1571	0
271410	1581	0
271420	1591	0
271430	1601	0
271440	1611	0
271450	1621	0
271500	1631	0
271540	1671	0
271550	1681	0
271520	1651	0
271530	1661	0
271610	1701	0
271620	1711	0
271630	1721	0
271640	1731	0
271650	1741	0
271700	1751	0

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
HYDROGRAPH AT					
+	100	6.74	1	FLOW	776.
				TIME	12.67
					1528.
ROUTED TO					
+	150	6.74	1	FLOW	46.
				TIME	24.50
					94.
					24.17

** PEAK STAGES IN FEET **

1	STAGE	83.15	83.74
	TIME	24.50	24.17

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 150
 (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1	ELEVATION	STORAGE	OUTFLOW	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM	MAX OUTFLOW	TIME OF FAILURE	TIME OF
				AC-FT	CFS	HOURS			
				82.20	82.20	86.60			
				1630.	1630.	2426.			
				0.	0.	456.			
RATIO OF RESERVOIR PFM	MAXIMUM DEPTH W.S.ELEV	OVER DAM							
1.00	83.15	0.00		1787.	46.	0.00	24.50	0.00	
1.28	83.74	0.00		1884.	94.	0.00	24.17	0.00	

APPENDIX C

APPENDIX C

This appendix contains the hydrologic analysis printout for Spanish Flat Dam. This printout reflects the 1/2 probable maximum flood and the probable maximum flood.

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* RUN DATE 06/26/92 TIME 14:16:34 *
*****
```

```

X   X   XXXXXX   XXXXX   X   X
X   X   X   X   X   X   XX
X   X   X   X   X   X
XXXXXX XXXX   X   XXXX   X
X   X   X   X   X   X
X   X   X   X   X   X
X   X   XXXXXX   XXXXX   XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -ANSK- ON RM CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN7 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1	ID	SPANISH FLAT RESERVOIR
2	ID	PMP AND 1/2 PMP STORM CALCULATIONS
3	ID	HMR NO. 49 PRECIPITATIONS
4	ID	HMR NO. 5 (U.S. WEATHER BUREAU) DISTRIBUTIONS
5	IT	10 26JUN92 1200 100
6	IO	0 2 0
7	JR	PREC 1.00 0.5

PAGE 1

8	IN	15 26JUN92	1200
9	PG	PHP	12.01
10	P1	.1475	.1475
11	P1	1.29	.93
12	P1	.1275	.1275
13	KK	100	
14	KH	*****	*****
15	KM	TOTAL FLOW TO DAM	
16	KH	*****	*****
17	BA	6.745	
18	PT	PHP	
19	PW	1	
20	PR	PHP	
21	PW	1	
22	LS	0	63
23	UD	0.693	6
24	KK	150	
25	KH	*****	*****
26	KH	RESERVOIR ROUTING	
27	KH	*****	*****
28	RS	1	ELEV
29	SV	0	2256
30	SE	72.3	86
31	SS	82.2	13.0
32	ST	86.6	568
33	ZZ		2.63

 *

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

* MAY 1991 *

* VERSION 4.0.1E *

* RUN DATE 06/26/92 TIME 14:16:34 *

* *

 *

* U.S. ARMY CORPS OF ENGINEERS *

* HYDROLOGIC ENGINEERING CENTER *

* 609 SECOND STREET *

* DAVIS, CALIFORNIA 95616 *

* (916) 551-1748 *

* *

SPANISH FLAT RESERVOIR
PHP AND 1/2 PHP STORM CALCULATIONS
HHR NO. 49 PRECIPITATIONS

HMR NO. 5 (U.S. WEATHER BUREAU) DISTRIBUTIONS

6 10 OUTPUT CONTROL VARIABLES
 IPRINT 0 PRINT CONTROL
 IPLOT 2 PLOT CONTROL
 QSCAL 0. HYDROGRAPH PLOT SCALE

8 IN TIME DATA FOR INPUT TIME SERIES
 JXMIN 15 TIME INTERVAL IN MINUTES
 JDATE 26JUN92 STARTING DATE
 JTTIME 1200 STARTING TIME

IT HYDROGRAPH TIME DATA
 NMIN 10 MINUTES IN COMPUTATION INTERVAL
 IDATE 26JUN92 STARTING DATE
 ITIME 1200 STARTING TIME
 NQ 100 NUMBER OF HYDROGRAPH ORDINATES
 NDATE 27JUN92 ENDING DATE
 NDTIME 0430 ENDING TIME
 ICENT 19 CENTURY MARK

 COMPUTATION INTERVAL 0.17 HOURS
 TOTAL TIME BASE 16.50 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FARENHEIT

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 1.00 0.50

* * * * *
13 KK * * 100 *
* * * * *

TOTAL FLOW TO DAM

SUBBASIN RUNOFF DATA

17 BA SUBBASIN CHARACTERISTICS
TAREA 6.74 SUBBASIN AREA

PRECIPITATION DATA

18 PT	TOTAL STORM STATIONS	PMP
19 PW	WEIGHTS	1.00
20 PR	RECORDING STATIONS	PMP
21 PW	WEIGHTS	1.00
22 LS	SCS LOSS RATE	
	STRTL	1.17 INITIAL ABSTRACTION
	CRVNBR	63.00 CURVE NUMBER
	RTIMP	6.00 PERCENT IMPERVIOUS AREA
23 UD	SCS DIMENSIONLESS UNITGRAPH	
	TLAG	0.69 LAG

PRECIPITATION STATION DATA

STATION	TOTAL	AVG. ANNUAL	WEIGHT
PMP	12.01	0.00	1.00

TEMPORAL DISTRIBUTIONS

STATION	PMP,	WEIGHT =	1.00
0.10	0.10	0.10	0.10
0.21	0.21	1.85	1.58
0.32	0.32	0.32	0.32
0.09	0.08	0.09	0.09

0.10 0.10 0.10 0.10 0.21 0.21 0.21
0.21 0.21 1.85 1.58 0.86 0.74 0.62 0.32 0.32
0.32 0.32 0.32 0.32 0.13 0.13 0.13 0.13 0.13
0.09 0.08 0.09 0.09 0.08 0.09 0.09 0.09 0.09

UNIT HYDROGRAPH

23 END-OF-PERIOD ORDINATES

	475.	1499.	3067.	4053.	4168.	3646.	2841.	1880.	1318.	951.
666.	469.	329.	229.	163.	116.	82.	58.	42.	31.	

21. 12. 3.

HYDROGRAPH AT STATION 100

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
26	JUN	1200	1	0.00	0.00	0.00	0.	*	26	JUN	2020	51	0.00	0.00	0.00	41.
26	JUN	1210	2	0.10	0.09	0.01	3.	*	26	JUN	2030	52	0.00	0.00	0.00	28.
26	JUN	1220	3	0.10	0.09	0.01	12.	*	26	JUN	2040	53	0.00	0.00	0.00	19.
26	JUN	1230	4	0.10	0.09	0.01	30.	*	26	JUN	2050	54	0.00	0.00	0.00	12.
26	JUN	1240	5	0.10	0.09	0.01	54.	*	26	JUN	2100	55	0.00	0.00	0.00	8.
26	JUN	1250	6	0.10	0.09	0.01	78.	*	26	JUN	2110	56	0.00	0.00	0.00	5.
26	JUN	1300	7	0.10	0.09	0.01	100.	*	26	JUN	2120	57	0.00	0.00	0.00	3.
26	JUN	1310	8	0.21	0.19	0.01	120.	*	26	JUN	2130	58	0.00	0.00	0.00	1.
26	JUN	1320	9	0.21	0.19	0.01	141.	*	26	JUN	2140	59	0.00	0.00	0.00	0.
26	JUN	1330	10	0.21	0.19	0.01	169.	*	26	JUN	2150	60	0.00	0.00	0.00	0.
26	JUN	1340	11	0.21	0.19	0.02	205.	*	26	JUN	2200	61	0.00	0.00	0.00	0.
26	JUN	1350	12	0.21	0.17	0.03	256.	*	26	JUN	2210	62	0.00	0.00	0.00	0.
26	JUN	1400	13	0.21	0.16	0.04	333.	*	26	JUN	2220	63	0.00	0.00	0.00	0.
26	JUN	1410	14	1.86	1.10	0.76	783.	*	26	JUN	2230	64	0.00	0.00	0.00	0.
26	JUN	1420	15	1.59	0.61	0.97	2087.	*	26	JUN	2240	65	0.00	0.00	0.00	0.
26	JUN	1430	16	1.32	0.38	0.94	4715.	*	26	JUN	2250	66	0.00	0.00	0.00	0.
26	JUN	1440	17	0.86	0.20	0.66	8199.	*	26	JUN	2300	67	0.00	0.00	0.00	0.
26	JUN	1450	18	0.74	0.15	0.59	11575.	*	26	JUN	2310	68	0.00	0.00	0.00	0.
26	JUN	1500	19	0.62	0.12	0.51	13995.	*	26	JUN	2320	69	0.00	0.00	0.00	0.
26	JUN	1510	20	0.32	0.06	0.26	15121.	*	26	JUN	2330	70	0.00	0.00	0.00	0.
26	JUN	1520	21	0.32	0.05	0.27	14918.	*	26	JUN	2340	71	0.00	0.00	0.00	0.
26	JUN	1530	22	0.32	0.05	0.27	13810.	*	26	JUN	2350	72	0.00	0.00	0.00	0.
26	JUN	1540	23	0.32	0.05	0.27	12368.	*	27	JUN	0030	73	0.00	0.00	0.00	0.
26	JUN	1550	24	0.32	0.05	0.27	11007.	*	27	JUN	0010	74	0.00	0.00	0.00	0.
26	JUN	1600	25	0.32	0.04	0.28	9880.	*	27	JUN	0020	75	0.00	0.00	0.00	0.
26	JUN	1610	26	0.13	0.02	0.11	8961.	*	27	JUN	0100	79	0.00	0.00	0.00	0.
26	JUN	1620	27	0.13	0.02	0.11	8159.	*	27	JUN	0040	77	0.00	0.00	0.00	0.
26	JUN	1630	28	0.13	0.02	0.11	7270.	*	27	JUN	0050	78	0.00	0.00	0.00	0.
26	JUN	1640	29	0.13	0.02	0.11	6331.	*	27	JUN	0120	81	0.00	0.00	0.00	0.
26	JUN	1650	30	0.13	0.02	0.11	5456.	*	27	JUN	0110	80	0.00	0.00	0.00	0.
26	JUN	1700	31	0.13	0.02	0.11	4724.	*	27	JUN	0120	81	0.00	0.00	0.00	0.

26 JUN 1710	32	0.09	0.01	0.07	4149.	*	27 JUN 0130	82	0.00	0.00	0.00	0.
26 JUN 1720	33	0.09	0.01	0.07	3724.	*	27 JUN 0140	83	0.00	0.00	0.00	0.
26 JUN 1730	34	0.09	0.01	0.07	3553.	*	27 JUN 0150	84	0.00	0.00	0.00	0.
26 JUN 1740	35	0.09	0.01	0.07	3017.	*	27 JUN 0200	85	0.00	0.00	0.00	0.
26 JUN 1750	36	0.09	0.01	0.08	2729.	*	27 JUN 0210	86	0.00	0.00	0.00	0.
26 JUN 1800	37	0.09	0.01	0.08	2498.	*	27 JUN 0220	87	0.00	0.00	0.00	0.
26 JUN 1810	38	0.00	0.00	0.00	2291.	*	27 JUN 0230	88	0.00	0.00	0.00	0.
26 JUN 1820	39	0.00	0.00	0.00	2065.	*	27 JUN 0240	89	0.00	0.00	0.00	0.
26 JUN 1830	40	0.00	0.00	0.00	1756.	*	27 JUN 0250	90	0.00	0.00	0.00	0.
26 JUN 1840	41	0.00	0.00	0.00	1397.	*	27 JUN 0300	91	0.00	0.00	0.00	0.
26 JUN 1850	42	0.00	0.00	0.00	1047.	*	27 JUN 0310	92	0.00	0.00	0.00	0.
26 JUN 1900	43	0.00	0.00	0.00	747.	*	27 JUN 0320	93	0.00	0.00	0.00	0.
26 JUN 1910	44	0.00	0.00	0.00	516.	*	27 JUN 0330	94	0.00	0.00	0.00	0.
26 JUN 1920	45	0.00	0.00	0.00	361.	*	27 JUN 0340	95	0.00	0.00	0.00	0.
26 JUN 1930	46	0.00	0.00	0.00	253.	*	27 JUN 0350	96	0.00	0.00	0.00	0.
26 JUN 1940	47	0.00	0.00	0.00	176.	*	27 JUN 0400	97	0.00	0.00	0.00	0.
26 JUN 1950	48	0.00	0.00	0.00	123.	*	27 JUN 0410	98	0.00	0.00	0.00	0.
26 JUN 2000	49	0.00	0.00	0.00	85.	*	27 JUN 0420	99	0.00	0.00	0.00	0.
26 JUN 2010	50	0.00	0.00	0.00	59.	*	27 JUN 0430	100	0.00	0.00	0.00	0.

TOTAL RAINFALL = 12.01, TOTAL LOSS = 4.68, TOTAL EXCESS = 7.33

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	
15121.	3.17	(CFS)	(CFS)	(CFS)	
*		(INCHES)	5279.	1933.	1933.
		(AC-FT)	7.277	7.326	7.326
			2618.	2635.	2635..

CUMULATIVE AREA = 6.74 SQ MI

HYDROGRAPH AT STATION 100
PLAN 1, RATIO = 1.00

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q					
26 JUN 1200	1	0.00	0.00	0.00	0.	*	26 JUN 2020	51	0.00	0.00	0.00	41.

26 JUN 1210	2	0.10	0.09	0.01	3..	*	26 JUN 2030	52	0.00	0.00	0.00	0.00	0.00	28.
26 JUN 1220	3	0.10	0.09	0.01	12..	*	26 JUN 2040	53	0.00	0.00	0.00	0.00	0.00	19.
26 JUN 1230	4	0.10	0.09	0.01	30..	*	26 JUN 2050	54	0.00	0.00	0.00	0.00	0.00	12..
26 JUN 1240	5	0.10	0.09	0.01	54..	*	26 JUN 2100	55	0.00	0.00	0.00	0.00	0.00	8..
26 JUN 1250	6	0.10	0.09	0.01	78..	*	26 JUN 2110	56	0.00	0.00	0.00	0.00	0.00	5..
26 JUN 1300	7	0.10	0.09	0.01	100..	*	26 JUN 2120	57	0.00	0.00	0.00	0.00	0.00	3..
26 JUN 1310	8	0.21	0.19	0.01	120..	*	26 JUN 2130	58	0.00	0.00	0.00	0.00	0.00	1..
26 JUN 1320	9	0.21	0.19	0.01	141..	*	26 JUN 2140	59	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1330	10	0.21	0.19	0.01	169..	*	26 JUN 2150	60	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1340	11	0.21	0.19	0.02	205..	*	26 JUN 2200	61	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1350	12	0.21	0.17	0.03	256..	*	26 JUN 2210	62	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1400	13	0.21	0.16	0.04	333..	*	26 JUN 2220	63	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1410	14	1.86	1.10	0.76	783..	*	26 JUN 2230	64	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1420	15	1.59	0.61	0.97	2087..	*	26 JUN 2240	65	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1430	16	1.32	0.38	0.94	4715..	*	26 JUN 2250	66	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1440	17	0.86	0.20	0.66	8199..	*	26 JUN 2300	67	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1450	18	0.74	0.15	0.59	11575..	*	26 JUN 2310	68	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1500	19	0.62	0.12	0.51	13995..	*	26 JUN 2320	69	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1510	20	0.32	0.06	0.26	15121..	*	26 JUN 2330	70	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1520	21	0.32	0.05	0.27	14918..	*	26 JUN 2340	71	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1530	22	0.32	0.05	0.27	13810..	*	26 JUN 2350	72	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1540	23	0.32	0.05	0.27	12368..	*	27 JUN 0000	73	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1550	24	0.32	0.05	0.27	11007..	*	27 JUN 0010	74	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1600	25	0.32	0.04	0.28	9880..	*	27 JUN 0020	75	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1610	26	0.13	0.02	0.11	8961..	*	27 JUN 0030	76	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1620	27	0.13	0.02	0.11	8159..	*	27 JUN 0040	77	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1630	28	0.13	0.02	0.11	7270..	*	27 JUN 0050	78	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1640	29	0.13	0.02	0.11	63331..	*	27 JUN 0100	79	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1650	30	0.13	0.02	0.11	5456..	*	27 JUN 0110	80	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1700	31	0.13	0.02	0.11	4724..	*	27 JUN 0120	81	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1710	32	0.09	0.01	0.07	4169..	*	27 JUN 0130	82	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1720	33	0.09	0.01	0.07	3724..	*	27 JUN 0140	83	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1730	34	0.09	0.01	0.07	3553..	*	27 JUN 0150	84	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1740	35	0.09	0.01	0.07	3017..	*	27 JUN 0200	85	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1820	39	0.00	0.00	0.00	2985..	*	27 JUN 0210	86	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1830	40	0.00	0.00	0.00	1756..	*	27 JUN 0220	87	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1840	41	0.00	0.00	0.00	1397..	*	27 JUN 0300	91	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1850	42	0.00	0.00	0.00	1047..	*	27 JUN 0310	92	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1900	43	0.00	0.00	0.00	747..	*	27 JUN 0320	93	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1910	44	0.00	0.00	0.00	516..	*	27 JUN 0330	94	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1920	45	0.00	0.00	0.00	361..	*	27 JUN 0340	95	0.00	0.00	0.00	0.00	0.00	0..
26 JUN 1930	46	0.00	0.00	0.00	253..	*	27 JUN 0350	96	0.00	0.00	0.00	0.00	0.00	0..

26 JUN 1940	47	0.00	0.00	0.00	176.	*	27 JUN 0400	97	0.00	0.00	0.00	0.
26 JUN 1950	48	0.00	0.00	0.00	123.	*	27 JUN 0410	98	0.00	0.00	0.00	0.
26 JUN 2000	49	0.00	0.00	0.00	85.	*	27 JUN 0420	99	0.00	0.00	0.00	0.
26 JUN 2010	50	0.00	0.00	0.00	59..	*	27 JUN 0430	100	0.00	0.00	0.00	0.

TOTAL RAINFALL = 12.01, TOTAL LOSS = 4.68, TOTAL EXCESS = 7.33

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR 24-HR 72-HR 16.50-HR	(CFS)
+ 15121.	3.17	5279.	1933.
		(INCHES)	1933.
		7.277	7.326
		(AC-FT)	7.326
		2618.	2635.
			2635.

CUMULATIVE AREA = 6.74 SQ MI

1

STATION	100	(O) OUTFLOW	DAHRMN PER	(L) PRECIP,	(X) EXCESS
261200	10	0.	0.0	0.	0.
261210	20	2000.	4000.	6000.	0.
261220	30			8000.	0.
261230	40			10000.	0.
261240	50			12000.	0.
261250	60			14000.	0.
261300	70			16000.	0.
261310	8.0				0.
261350	12.0				0.
261400	13.0				0.
261410	14.				0.
261420	15.				0.
261430	16.				0.
261440	17.				0.
261450	18.				0.
261500	19.				0.

LXXXXX	261510	20.
LXXXXX	261520	21.
LXXXXX	261530	22.
LXXXXX	261540	23.
LXXXXX	261550	24.
LXXXXX	261600	25.
LXXXXX	261610	26.
LXXXXX	261620	27.
LXXXXX	261630	28.
LXXXXX	261640	29.
LXXXXX	261650	30.
LXXXXX	261700	31.
LXXXXX	261710	32.
LXXXXX	261720	33.
LXXXXX	261730	34.
LXXXXX	261740	35.
LXXXXX	261750	36.
LXXXXX	261800	37.
LXXXXX	261810	38.
LXXXXX	261820	39.
LXXXXX	261830	40.
LXXXXX	261840	41.
LXXXXX	261850	42.
LXXXXX	261900	43.
LXXXXX	261910	44.
LXXXXX	261920	45.
LXXXXX	261930	46.0
LXXXXX	261940	47.0
LXXXXX	261950	48.0
LXXXXX	262000	490
LXXXXX	262040	530
LXXXXX	262050	540
LXXXXX	262100	550
LXXXXX	262110	560
LXXXXX	262120	570
LXXXXX	262200	610
LXXXXX	262210	620
LXXXXX	262220	630
LXXXXX	262230	640

262240	650
262250	660
262300	670
262310	680
262320	690
262330	700
262340	710
262350	720
270000	730
270010	740
270020	750
270030	760
270040	770
270050	780
270100	790
270110	800
270120	810
270130	820
270140	830
270150	840
270200	850
270210	860
270220	870
270230	880
270240	890
270250	900
270300	910
270310	920
270320	930
270330	940
270340	950
270350	960
270400	970
270410	980
270420	990
270430	1000

HYDROGRAPH AT STATION 100
PLAN 1, RATIO = 0.50

26 JUN 1910	44	0.00	0.00	0.00	208.	*	27 JUN 0330	94	0.00	0.00	0.00	0.
26 JUN 1920	45	0.00	0.00	0.00	146.	*	27 JUN 0340	95	0.00	0.00	0.00	0.
26 JUN 1930	46	0.00	0.00	0.00	102.	*	27 JUN 0350	96	0.00	0.00	0.00	0.
26 JUN 1940	47	0.00	0.00	0.00	71.	*	27 JUN 0400	97	0.00	0.00	0.00	0.
26 JUN 1950	48	0.00	0.00	0.00	49.	*	27 JUN 0410	98	0.00	0.00	0.00	0.
26 JUN 2000	49	0.00	0.00	0.00	34.	*	27 JUN 0420	99	0.00	0.00	0.00	0.
26 JUN 2010	50	0.00	0.00	0.00	24.	*	27 JUN 0430	100	0.00	0.00	0.00	0.

TOTAL RAINFALL = 6.01, TOTAL LOSS = 3.60, TOTAL EXCESS = 2.41

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW		
			6-HR	24-HR	72-HR
+ 4594.	3.33	(INCHES) (AC-FT)	1732.	636.	636.
			2.387	2.409	2.409
			859.	867.	867.

CUMULATIVE AREA = 6.74 SQ MI

STATION 100

DAIRMN PER 261200	10	(O) OUTFLOW			(L) PRECIP, 0.0	(X) EXCESS 0.0
		0.	1000.	2000.		
0.0	0.0	0.0	0.0	0.0	0.0	
261210	20	.	.	.	L.	
261220	30	.	.	.	LLL.	
261230	40	.	.	.	LLL.	
261240	50	.	.	.	LLL.	
261250	60	.	.	.	LLL.	
261300	70	.	.	.	LLL.	
261310	8.0	.	.	.	LLL.	
261320	9.0	.	.	.	LLL.	
261330	10.0	.	.	.	LLL.	
261340	11.0	.	.	.	LLL.	
261350	12.0	.	.	.	LLL.	
261400	13.0	.	.	.	LLL.	
261410	14.0	.	.	.	LLL.	
261420	15.0	.	.	.	LLL.	
261430	16.	0	.	.	LLL.	

261440	17.	0.	LXXX.
261450	18.	0.	LXXX.
261500	19.	0.	LXXX.
261510	20.	0.	LXXX.
261520	21.	0.	LXXX.
261530	22.	0.	LXXX.
261540	23.	0.	LXXX.
261550	24.	0.	LXXX.
261600	25.	0.	LXXX.
261610	26.	0.	LX.
261620	27.	0.	LX.
261630	28.	0.	X.
261640	29.	0.	X.
261650	30.	0.	X.
261700	31.	0.	X.
261710	32.	0.	X.
261720	33.	0.	X.
261730	34.	0.	X.
261740	35.	0.	X.
261750	36.	0.	X.
261800	37.	0.	X.
261810	38.	0.	X.
261820	39.	0.	X.
261830	40.	0.	X.
261840	41.	0.	X.
261850	42.	0.	X.
261900	43.	0.	X.
261910	44.	0.	X.
261920	45.0	0.	X.
261930	46.0	0.	X.
261940	47.0	0.	X.
261950	480	0.	X.
262000	490	0.	X.
262010	500	0.	X.
262020	510	0.	X.
262030	520	0.	X.
262040	530	0.	X.
262050	540	0.	X.
262100	550	0.	X.
262110	560	0.	X.
262120	570	0.	X.
262130	580	0.	X.
262140	590	0.	X.
262150	600	0.	X.
262200	610	0.	X.

262210	620
262220	630
262230	640
262240	650
262250	660
262300	670
262310	680
262320	690
262330	700
262340	710
262350	720
270030	730
270040	770
270050	780
270100	790
270110	800
270120	810
270130	820
270140	830
270150	840
270200	850
270210	860
270220	870
270250	880
270260	890
270280	900
270300	910
270310	920
270350	960
270400	970
270410	980
270420	990
270430	1000

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

(INCLUDING FLOW OVER DAM)

	STORAGE			OUTFLOW			ELEVATION		
STORAGE	0.00	1630.25	1639.29	1666.43	1711.67	1775.00	1856.42	1955.93	2073.54
OUTFLOW	0.00	0.00	0.64	5.09	17.18	40.71	79.52	137.40	218.19
ELEVATION	72.30	82.20	82.25	82.42	82.69	83.08	83.57	84.18	84.89
STORAGE	2256.00	2440.00	2735.47	3062.06	3419.74	3808.52	4228.41	4679.41	5161.50
OUTFLOW	365.93	480.44	2345.06	5880.11	10927.37	17524.17	25750.36	35702.49	47485.56
ELEVATION	86.00	86.65	87.69	88.85	90.11	91.48	92.97	94.56	96.26
STORAGE	6219.00								
OUTFLOW	76985.80								
ELEVATION	100.00								

HYDROGRAPH AT STATION 150

PLAN 1, RATIO = 1.00

*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE								
*	26	JUN	1200	1	0.	1630.2	82.2	*	26	JUN	1740	35	5015.	2991.1	88.6	*	26	JUN	2320	69	454.	2423.0	86.6
*	26	JUN	1210	2	0.	1630.3	82.2	*	26	JUN	1750	36	4697.	2964.0	88.5	*	26	JUN	2330	70	451.	2416.8	86.6
*	26	JUN	1220	3	0.	1630.4	82.2	*	26	JUN	1800	37	4394.	2937.5	88.4	*	26	JUN	2340	71	448.	2410.6	86.5
*	26	JUN	1230	4	0.	1630.7	82.2	*	26	JUN	1810	38	4110.	2912.1	88.3	*	26	JUN	2350	72	444.	2404.4	86.5
*	26	JUN	1240	5	0.	1631.2	82.2	*	26	JUN	1820	39	3842.	2887.4	88.2	*	27	JUN	0000	73	441.	2398.3	86.5
*	26	JUN	1250	6	0.	1632.1	82.2	*	26	JUN	1830	40	3579.	2862.6	88.1	*	27	JUN	0010	74	438.	2392.3	86.5
*	26	JUN	1300	7	0.	1633.4	82.2	*	26	JUN	1840	41	3313.	2836.9	88.1	*	27	JUN	0020	75	434.	2386.3	86.5
*	26	JUN	1310	8	0.	1634.9	82.2	*	26	JUN	1850	42	3044.	2809.9	88.0	*	27	JUN	0030	76	431.	2380.3	86.4
*	26	JUN	1320	9	0.	1636.7	82.2	*	26	JUN	1900	43	2775.	2782.2	87.9	*	27	JUN	0040	77	428.	2374.4	86.4
*	26	JUN	1330	10	1.	1638.8	82.3	*	26	JUN	1910	44	2517.	2754.5	87.8	*	27	JUN	0050	78	425.	2368.5	86.4
*	26	JUN	1340	11	1.	1641.3	82.3	*	26	JUN	1920	45	2275.	2727.5	87.7	*	27	JUN	0100	79	422.	2362.7	86.4
*	26	JUN	1350	12	1.	1644.5	82.3	*	26	JUN	1930	46	2055.	2701.9	87.6	*	27	JUN	0110	80	419.	2356.9	86.4
*	26	JUN	1400	13	2.	1648.5	82.3	*	26	JUN	1940	47	1857.	2678.0	87.5	*	27	JUN	0120	81	416.	2351.2	86.3
*	26	JUN	1410	14	3.	1656.2	82.4	*	26	JUN	1950	48	1681.	2655.7	87.4	*	27	JUN	0130	82	413.	2345.5	86.3
*	26	JUN	1420	15	7.	1675.9	82.5	*	26	JUN	2000	49	1524.	2635.0	87.3	*	27	JUN	0140	83	410.	2339.8	86.3
*	26	JUN	1430	16	21.	1722.5	82.8	*	26	JUN	2010	50	1386.	2616.0	87.3	*	27	JUN	0150	84	407.	2334.2	86.3
*	26	JUN	1440	17	57.	1810.9	83.3	*	26	JUN	2020	51	1265.	2598.4	87.2	*	27	JUN	0200	85	404.	2328.6	86.3
*	26	JUN	1450	18	131.	1945.8	84.1	*	26	JUN	2030	52	1158.	2582.2	87.2	*	27	JUN	0210	86	401.	2323.1	86.2

26 JUN 1500	19	253.	2119.3	85.2 *	26 JUN 2040	53
26 JUN 1510	20	397.	2315.4	86.2 *	26 JUN 2050	54
26 JUN 1520	21	766.	2514.3	86.9 *	26 JUN 2100	55
26 JUN 1530	22	1985.	2693.6	87.5 *	26 JUN 2110	56
26 JUN 1540	23	3318.	2837.3	88.1 *	26 JUN 2120	57
26 JUN 1550	24	4474.	2944.5	88.4 *	26 JUN 2130	58
26 JUN 1600	25	5367.	3020.4	88.7 *	26 JUN 2140	59
26 JUN 1610	26	6002.	3071.8	88.9 *	26 JUN 2150	60
26 JUN 1620	27	6415.	3104.0	89.0 *	26 JUN 2200	61
26 JUN 1630	28	6628.	3120.4	89.1 *	26 JUN 2210	62
26 JUN 1640	29	6656.	3122.6	89.1 *	26 JUN 2220	63
26 JUN 1650	30	6531.	3113.0	89.0 *	26 JUN 2230	64
26 JUN 1700	31	6296.	3094.8	89.0 *	26 JUN 2240	65
26 JUN 1710	32	5998.	3071.4	88.9 *	26 JUN 2250	66
26 JUN 1720	33	5672.	3045.4	88.8 *	26 JUN 2300	67
26 JUN 1730	34	5342.	3018.4	88.7 *	26 JUN 2310	68

PEAK OUTFLOW IS 6656. AT TIME 4.67 HOURS

MAXIMUM AVERAGE FLOW
6-HR 24-HR 72-HR 16.50-HR

MAXIMUM AVERAGE STORAGE
6-HR 24-HR 72-HR 16.50-HR

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE	STATION
+ (FEET)	(HR)	6-HR 24-HR 72-HR 16.50-HR	150
89.06	4.67	88.03 86.28 86.23 86.28	

CUMULATIVE AREA = 6.74 SQ MI

(1) INFLOW, (0) OUTFLOW

261850	42.	1	0
261900	43.	1	0
261910	44.	1	0
261920	45.	1	0
261930	46.1	0	0
261940	47.1	0	0
261950	48.1	0	0
262000	49.1	0	0
262040	53.1	0	0
262050	54.1	0	0
262100	55.1	0	0
262110	56.1	0	0
262120	57.1	0	0
262130	58.1	0	0
262140	59.1	0	0
262150	60.1	0	0
262200	61.1	0	0
262210	62.1	0	0
262220	63.1	0	0
262230	64.1	0	0
262240	65.1	0	0
262250	66.1	0	0
262300	67.1	0	0
262310	68.1	0	0
262320	69.1	0	0
262330	70.1	0	0
262340	71.1	0	0
262350	72.1	0	0
270000	73.1	0	0
270010	74.1	0	0
270020	75.1	0	0
270030	76.1	0	0
270040	77.1	0	0
270050	78.1	0	0
270100	79.1	0	0
270110	80.1	0	0
270120	81.1	0	0
270130	82.1	0	0
270140	83.1	0	0
270150	84.1	0	0
270200	85.1	0	0
270210	86.1	0	0

270220 871 0
 270230 881 0
 270240 891 0
 270250 901 0
 270300 911 0
 270310 921 0
 270320 931 0
 270330 941 0
 270340 951 0
 270350 961 0
 270400 971 0
 270410 981 0
 270420 991 0
 270430 1001 0

HYDROGRAPH AT STATION 150
 PLAN 1, RATIO = .50

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
26	JUN	1200	1	0.	1630.2	82.2	*	26	JUN	1740	35	410.	2340.2	86.3	*	26	JUN	2320	69	359.	2248.5	86.0
26	JUN	1210	2	0.	1630.3	82.2	*	26	JUN	1750	36	415.	2350.0	86.3	*	26	JUN	2330	70	355.	2243.6	85.9
26	JUN	1220	3	0.	1630.3	82.2	*	26	JUN	1800	37	419.	2358.5	86.4	*	26	JUN	2340	71	351.	2238.7	85.9
26	JUN	1230	4	0.	1630.4	82.2	*	26	JUN	1810	38	423.	2365.8	86.4	*	26	JUN	2350	72	347.	2233.9	85.9
26	JUN	1240	5	0.	1630.7	82.2	*	26	JUN	1820	39	427.	2372.0	86.4	*	27	JUN	0000	73	343.	2229.2	85.8
26	JUN	1250	6	0.	1631.2	82.2	*	26	JUN	1830	40	429.	2376.7	86.4	*	27	JUN	0010	74	339.	2224.5	85.8
26	JUN	1300	7	0.	1631.8	82.2	*	26	JUN	1840	41	431.	2379.4	86.4	*	27	JUN	0020	75	335.	2219.9	85.8
26	JUN	1310	8	0.	1632.6	82.2	*	26	JUN	1850	42	431.	2380.2	86.4	*	27	JUN	0030	76	331.	2215.3	85.8
26	JUN	1320	9	0.	1633.5	82.2	*	26	JUN	1900	43	431.	2379.3	86.4	*	27	JUN	0040	77	327.	2210.7	85.7
26	JUN	1330	10	0.	1634.5	82.2	*	26	JUN	1910	44	429.	2376.9	86.4	*	27	JUN	0050	78	323.	2206.3	85.7
26	JUN	1340	11	0.	1635.8	82.2	*	26	JUN	1920	45	427.	2373.4	86.4	*	27	JUN	0100	79	319.	2201.8	85.7
26	JUN	1350	12	0.	1637.3	82.2	*	26	JUN	1930	46	425.	2369.3	86.4	*	27	JUN	0110	80	316.	2197.5	85.6
26	JUN	1400	13	1.	1638.9	82.3	*	26	JUN	1940	47	423.	2364.6	86.4	*	27	JUN	0120	81	312.	2193.1	85.6
26	JUN	1410	14	1.	1641.1	82.3	*	26	JUN	1950	48	420.	2359.6	86.4	*	27	JUN	0130	82	309.	2188.9	85.6
26	JUN	1420	15	1.	1645.5	82.3	*	26	JUN	2000	49	417.	2354.4	86.3	*	27	JUN	0140	83	305.	2184.6	85.6
26	JUN	1430	16	3.	1655.4	82.4	*	26	JUN	2010	50	414.	2349.1	86.3	*	27	JUN	0150	84	302.	2180.5	85.5
26	JUN	1440	17	7.	1675.5	82.5	*	26	JUN	2020	51	412.	2343.7	86.3	*	27	JUN	0200	85	298.	2176.3	85.5
26	JUN	1450	18	16.	1708.9	82.7	*	26	JUN	2030	52	409.	2338.2	86.3	*	27	JUN	0210	86	295.	2172.2	85.5
26	JUN	1500	19	33.	1755.4	83.0	*	26	JUN	2040	53	406.	2332.8	86.3	*	27	JUN	0220	87	292.	2168.2	85.5
26	JUN	1510	20	57.	1811.6	83.3	*	26	JUN	2050	54	403.	2327.3	86.3	*	27	JUN	0230	88	288.	2164.2	85.4

26 JUN 1520	21	88.	1872.6	83.7 *	26 JUN 2100	55	400.	2321.8	86.2 *	27 JUN 0240	89	285.	2160.3	85.4
26 JUN 1530	22	123.	1933.3	84.0 *	26 JUN 2110	56	397.	2316.4	86.2 *	27 JUN 0250	90	282.	2156.3	85.4
26 JUN 1540	23	160.	1990.1	84.4 *	26 JUN 2120	57	394.	2310.9	86.2 *	27 JUN 0300	91	279.	2152.5	85.4
26 JUN 1550	24	195.	2041.7	84.7 *	26 JUN 2130	58	391.	2305.5	86.2 *	27 JUN 0310	92	276.	2148.7	85.3
26 JUN 1600	25	229.	2088.4	85.0 *	26 JUN 2140	59	389.	2300.2	86.2 *	27 JUN 0320	93	273.	2144.9	85.3
26 JUN 1610	26	262.	2130.8	85.2 *	26 JUN 2150	60	386.	2294.8	86.1 *	27 JUN 0330	94	270.	2141.1	85.3
26 JUN 1620	27	293.	2169.6	85.5 *	26 JUN 2200	61	383.	2289.5	86.1 *	27 JUN 0340	95	267.	2137.4	85.3
26 JUN 1630	28	322.	2204.3	85.7 *	26 JUN 2210	62	380.	2284.3	86.1 *	27 JUN 0350	96	264.	2133.8	85.3
26 JUN 1640	29	347.	2234.4	85.9 *	26 JUN 2220	63	378.	2279.1	86.1 *	27 JUN 0400	97	261.	2130.2	85.2
26 JUN 1650	30	368.	2260.0	86.0 *	26 JUN 2230	64	375.	2273.9	86.1 *	27 JUN 0410	98	259.	2126.6	85.2
26 JUN 1700	31	379.	2281.5	86.1 *	26 JUN 2240	65	372.	2268.7	86.0 *	27 JUN 0420	99	256.	2123.1	85.2
26 JUN 1710	32	388.	2299.7	86.2 *	26 JUN 2250	66	370.	2263.6	86.0 *	27 JUN 0430	100	253.	2119.6	85.2
26 JUN 1720	33	397.	2315.2	86.2 *	26 JUN 2300	67	367.	2258.5	86.0 *					
26 JUN 1730	34	404.	2328.6	86.3 *	26 JUN 2310	68	364.	2253.5	86.0 *					

PEAK OUTFLOW IS 431. AT TIME 6:33 HOURS

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW		
			6-HR	24-HR	72-HR
+ 431.	6.83	(INCHES) (AC-FT)	405.	276.	276.
+ 2380.	6.83	0.558 201.	1.048 377.	1.048 377.	1.048 377.

PEAK STORAGE + (AC-FT)	TIME (HR)	(HR)	MAXIMUM AVERAGE STORAGE		
			6-HR	24-HR	72-HR
+ 86.44	6.83	2331.	2125.	2125.	2125.

CUMULATIVE AREA = 6.74 SQ MI

STATION 150

0.	1000.	(I) INFLOW, 2000.	(O) OUTFLOW, 4000.	5000.	0.	0.	0.	0.	0.	0.	0.
		(S) STORAGE									

A scatter plot showing the relationship between DAHRMN PER (Y-axis) and various X-axis values. The Y-axis ranges from 0.0 to 2400.0. The X-axis values include 261200, 261210, 261220, 261230, 261240, 261250, 261300, 261310, 261320, 261330, 261340, 261350, 261400, 261410, 261420, 261430, 261440, 261450, 261500, 261510, 261520, 261530, 261540, 261550, 261600, 261610, 261620, 261630, 261640, 261650, 261700, 261710, 261720, 261730, 261740, 261750, 261800, 261810, 261820, 261830, 261840, 261850, and 261900. The data points are represented by small dots, with some points labeled with 'S' or 'I'.

261910	44.	1	0
261920	45.	1	0
261930	46.	1	0
261940	47.	1	0
261950	481	0	
262000	491	0	
262010	501	0	
262020	511	0	
262050	541	0	
262100	551	0	
262140	591	0	
262150	601	0	
262160	611	0	
262200	611	0	
262210	621	0	
262220	631	0	
262230	641	0	
262240	651	0	
262250	661	0	
262300	671	0	
262310	681	0	
262320	691	0	
262330	701	0	
262340	711	0	
262350	721	0	
270000	731	0	
270010	741	0	
270020	751	0	
270030	761	0	
270040	771	0	
270050	781	0	
270100	791	0	
270110	801	0	
270120	811	0	
270130	821	0	
270200	851	0	
270210	861	0	
270220	871	0	
270230	881	0	

270240 891 0
 270250 901 0
 270300 911 0
 270310 921 0
 270320 931 0
 270330 941 0
 270340 951 0
 270350 961 0
 270400 971 0
 270410 981 0
 270420 991 0
 270430 1001--0

1
1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATION 1	RATION 2
HYDROGRAPH AT	100	6.74	1	FLOW TIME	15121. 3.17

ROUTED TO

+	150	6.74	1	FLOW TIME	6656. 4.67	431. 6.83
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** PEAK STAGES IN FEET **

1	STAGE	89.06	86.44
	TIME	4.67	6.83

150
 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION
 (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION STORAGE OUTFLOW	82.20 1630. 0.	86.60 1630. 456.

RATIO OF RESERVOIR W.F. 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
1.00	89.06	2.46	3123.	6656.	8.00	4.67
0.50	86.44	0.00	2380.	431.	0.00	6.83

*** NORMAL END OF HEC-1 ***

APPENDIX D

INSPECTION CHECKLIST

NAME OF DAM: Spanish Flat Dam

STATE: Nevada

COUNTY: Washoe

INVENTORY NO.: --

HAZARD CATEGORY: Low hazard/Intermediate

TYPE OF DAM: Earth (homogeneous) size

OWNER: Public Utilities Division

DATE INSPECTED: April 29, 1992

WEATHER: Clear

TEMPERATURE: ---

POOL ELEVATION: low

TAILWATER ELEVATION: no tailwater

DIRECTIONS: Mark an "X" in the YES or NO column.

If an item does not apply, write "N/A" in the REMARKS column.

ITEM	YES	NO	REMARKS
------	-----	----	---------

1. EMBANKMENT.

A. Crest -- height= 23'

, length= 508'

, width= 6-8'

(1) Any visual settlements?

X

12" differential on crest

(2) Any misalignments?

X

(3) Any cracking?

X

(4) Any traffic damage?

X

cattle traffic and rodents

B. Upstream Face -- Slope= 12-14°

(1) Any erosion?

X

upstream near crest

(2) Any longitudinal cracks?

X

(3) Any transverse cracks?

X

(4) Is riprap protection adequate?

X

(5) Any stone deterioration?

N/A

no riprap on upstream

(6) Any visual settlement,
depression or bulges?

X

slight upstream deposition from
wave action

C. Downstream Face -- Slope= 18-19°

(1) Any erosion?

X

near crest upstream

(2) Any longitudinal cracks?

X

(3) Any transverse cracks?

X

(4) Any visual settlement,
depressions or bulges?

X

(5) Is the toe drain dry?

N/A

no drain apparent

(6) Are the relief wells flowing?

N/A

(7) Any boils at the toe?

X

(8) Any seepage areas?

X

under outlet & along toe

(9) Any traffic or animal damage?

X

cattle

(10) Any burrowing animals?

X

limited to near crest

D. Amount and Type of Vegetation.

Moderate cover on downstream - no trees.

2. CONCRETE DAM.

A. Type of Dam. N/A

(1) Length. ---

(2) Height. ---

ITEM	YES	NO	REMARKS
B. Concrete Block or Monolith -- Size= N/A			
(1) Any misalignment?			
(2) Any settlement?			
(3) Any overturning?			
(4) Any heaving?			
(5) Any cracks?			
(6) Any leakage?			
(7) Any spalls or erosion?			
(8) Any exposed reinforcement?			
(9) Joints.			
a. Any displacement or offset?			
b. Any leakage at cracks?			
c. Any spalling?			
(10) Are drains functioning?			
(11) Other?			

3. ABUTMENT CONTACTS.

A. Any erosion?	X	
B. Any visual differential movement?	X	
C. Any cracks?	X	
D. Any seepage present?	X	at downstream toe
E. Other?	X	spillway on left abatement

4. OUTLET WORKS.

A. Intake Structure -- Size= not observed - underwater

(1) Any settlement?	N/A	
(2) Any tilting?	N/A	
(3) Do concrete surfaces show:		
a. Spalling?	N/A	
b. Cracking?	N/A	
c. Erosion?	N/A	
d. Exposed reinforcement?	N/A	
e. Other?		
(4) Do joints show:		
a. Displacement or offset?	N/A	
b. Loss of joint material?	N/A	
c. Leakage?	N/A	
(5) Metal appurtenances.	X	gates stem
a. Any corrosion present?	X	
b. Any breakage present?	X	no crank
c. Is the anchor system secure?	X	

B. Conduit -- Size= 12" smooth steel pipe

(1) Is the conduit concrete?	X	
(2) Do concrete surfaces show:	N/A - no concrete visible	
a. Spalling?		
b. Cracking?		
c. Erosion?		
d. Exposed reinforcement?		
e. Other?		

ITEM	YES	NO	REMARKS
(3) Do joints show: N/A			
a. Displacement or offset?			
b. Loss of joint material?			
c. Leakage?			
(4) Is the conduit metal?	X		
a. Corrosion present?	X		not observed
b. Protective coatings adequate?	X		not observed
c. Is the conduit misaligned?			unknown
(5) Low level gate.			
a. Is there a low level gate?	X		
b. Is the low level gate operational?	X		no crank available at dam

C. Stilling Basin.

(1) Do concrete surfaces show:	No concrete N/A		
a. Spalling?			
b. Cracking?			
c. Erosion?			
d. Exposed reinforcement?			
e. Other?			
(2) Do the joints show: N/A			
a. Displacement or offset?			
b. Loss of joint material?			
c. Leakage?			
(3) Do the energy dissipators show:			
a. Signs of deterioration?		X	
b. Are they covered with debris?		X	
c. Other?	X		insufficient riprap

D. Downstream Channel.

(1) Is the channel:			
a. Eroding or backcutting?	X		slightly
b. Sloughing?		X	
c. Obstructed?		X	
(2) Is released water:			
a. Undercutting the outlet?		X	
b. Eroding the embankment?		X	

5. SPILLWAY.

A. Description.

(1) Location?	open channel 10' base width		
(2) Type of spillway?	left abatement		
(3) Size of spillway?	open channel earth		
(4) Spillway lining?	10' bottom, 21-24° side slopes		
(5) Is the spillway in good condition?		soil with random cobbles	
			some sloughing, much sagebrush
	X		no sign of operation

B. Gates. N/A

(1) Type of gates?			
(2) Is control at the weir?			
(3) Size of gates?			

ITEM	YES	NO	REMARKS
(4) Are the gates: no spillway gates			
a. Broken or bent?	N/A		
b. Corroded or rusted?	N/A		
c. Periodically maintained?	N/A		
d. Operational?	N/A		
e. Date last operated?	N/A		

C. Does spillway show:

(1) Any cracking in concrete?	N/A		
(2) Any spalling of concrete?	N/A		
(3) Any exposed reinforcement in the concrete?	N/A		
(4) Any erosion?	X		
(5) Any slope sloughing?	X		cobbles and soil
(6) Any obstruction?	X		sagebrush
(7) Displacement or offset joints?	N/A		
(8) Loss of joint material?	N/A		
(9) Leakage of the joints?	N/A		
(10) Other?	--		

D. Do the energy dissipators show: N/A

(1) Signs of deterioration?			
(2) Are they covered with debris?			
(3) Other?			

E. Has release water:

(1) Eroded the embankment?		X	
(2) Undercut the outlet?		X	
(3) Eroded the downstream channel?		X	
(4) Other?			

F. Is there an emergency spillway?

(If YES describe)

		X	only one spillway
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6. RESERVOIR.

A. Freeboard.

(1) Normal freeboard? approx. 6 feet			
(2) Present freeboard? 15 feet +			
(3) Highwater mark? near crest elevation			
(4) Location of pool staff gage? immediately above inlet gate			

B. Condition of the reservoir.

(1) Any slides in reservoir area?		X	
(2) Any debris in reservoir?		X	
(3) Any sediment?	X		minor amounts/not measured
(4) Any upstream reservoir?		X	

ITEM	REMARKS
C. Reservoir capacities.	unknown
(1) Flood pool?	unknown
(2) Conservation pool?	unknown
(3) Dead storage?	unknown

D. Hydrology.

(1) Stream gages:	downstream end of outlet is gaged
a. Gages on inflow?	none
b. Gages below the dam?	yes-where 2 canyon joins
c. Gages on other streams?	yes-see Dan Dragon-Utilities Div.
(2) Rainfall gages?	yes-telemetry
(3) Source of water?	primarily runoff
(4) Drainage basin runoff characteristics?	mountain desert, heavy sagebrush

7. DOWNSTREAM CONDITION.

A. Downstream land use.

rangeland

B. Downstream Flood Plain Development.

(1) Estimated number of residences downstream?	none
(2) Type of highways?	state highway in Long Valley
(3) Type of railroads?	none
(4) Utilities?	none
(5) Other?	none

C. Shape of Downstream Valley. stream flows into Long Valley Creek below Doyle 15-20

U-shaped/erosional

INSPECTOR'S SIGNATURE:

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QUALITY CONTROL REVIEWER


John J. Welsh, P.E.
Civil Engineer - 5498 (NV)

MAC/DLD/rs/10367064.103