Stantec Consulting Services Inc.
5151 E Broadway Boulevard Suite 400, Tucson AZ 85711-3712

April 8, 2019
File: 181300905

Attention: Mr. Terry Hendricks, CFM
Pima County Regional Flood Control District
201 North Stone Avenue
Tucson Arizona
85701-1207

Dear Mr. Hendricks,

Reference: **Letter of Findings - Hydraulic Analysis**
Sopori Wash
Discharge & Recurrence Event Analysis
September 2, 2018 – Event [Amado, Arizona]

Stantec Consulting Services Inc. has completed a hydraulic and meteorological analysis of the rainfall event that occurred on September 2, 2018 just west of Amado, Arizona and resulted in reported flooding of several structures in the area. The meteorological analysis of the rain event is provided to the RFCD under separate cover but is also included as an appendix to this letter report.

PURPOSE OF STUDY

The purpose of this study is two-fold:

- Evaluate the noted flood event and provide an estimate of the discharge occurring within Sopori Wash and its associated frequency (e.g., 500-year recurrence) based on hydraulic analysis/modeling, and
- Review available discharge information/methodology to determine if the discharges listed within the Flood Insurance Study[1] (herein referred to as FIS-SCC[1]) for Santa Cruz County are reasonable.

BACKGROUND INFORMATION

During 2008, Sopori Wash was approved as a detailed special flood hazard area (SFHA) study by the Federal Emergency Management Agency (FEMA). The analysis of this ephemeral watercourse included new hydrologic and hydraulic analyses. The hydrologic analyses was done in accordance with Arizona Department of Water Resources State Standard SS10-07[2] and is largely based on methodology included within Arizona Department of Transportation *Highway Drainage Design Manual Hydrology*, March 1993. This method utilizes the Clark Unit hydrograph, Green and Ampt rainfall loss equations, Modified Puls channel routing and 24-hour rainfall duration. The analysis was modeled using the computer program HEC-1, version 4.1 (June 1998). The hydraulic analysis was modeled using the computer program HEC-RAS, version 4.1[3] (January 2010). The terrain used for both analyses was based on LiDAR data prepared by Merrick Engineers & Architects during 2006 and covered the entire County of Santa Cruz. Stantec Consulting Services Inc. was the prime consultant for the study of Sopori Wash, under contract with the Santa Cruz County Flood Control District (herein referred to as the SCC MapMod study).

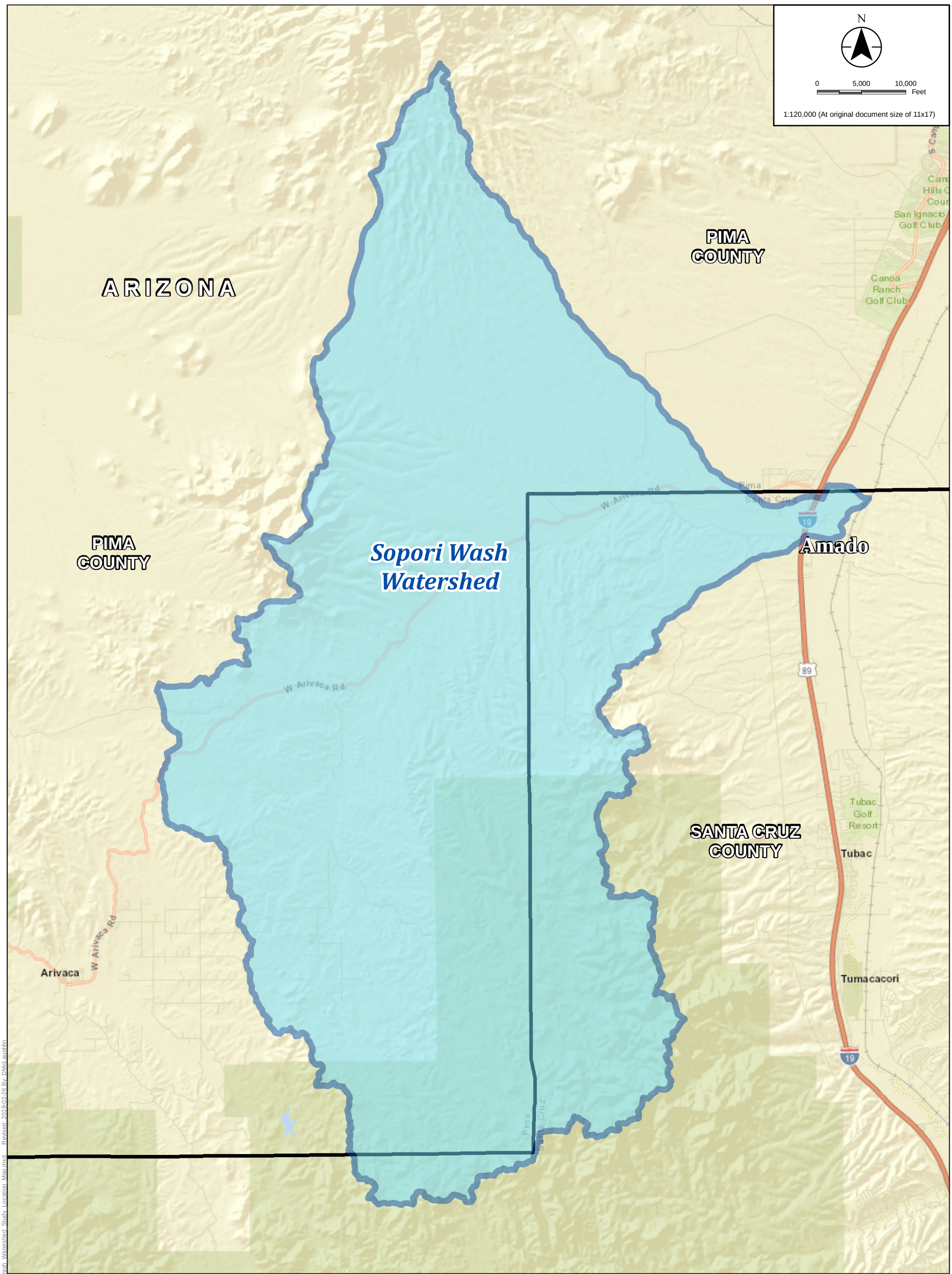
As a portion of the Sopori Wash floodplain encroaches into Pima County, the Flood Insurance Study for Pima County[4] (FIS-PIMA) lists discharge values for the same stream. However, these discharge values differ from the FIS-SCC[1] published values. The following table summarizes the different discharges published for the same stream in the FIS-SCC[1] and FIS-PIMA reports.

FEMA Published Discharges – Sopori Wash

FLOODING SOURCE Location	Drainage Area (sq.mi.)	Discharge (cfs)			
		10-Year	50-Year	100-Year	500-Year
FIS-PIMA					
SOPORI WASH					
At U.S. Highway 89	164.0	6,770	14,300	19,900	47,860
At upstream limit of detailed study	110.0	6,120	12,960	18,000	43,200
FIS-SCC[1]					
SOPORI WASH					
Downstream of Interstate 19	166.79	4,965	9,779	12,338	19,044
At upstream limit of study	111.05	4,210	7,846	9,675	14,757

The FIS-PIMA references a previous version of the FIS-SCC[5] for the source of discharge information along Sopori Wash. Detailed information related to the hydrologic supporting analysis for Sopori Wash as included within the FIS-SCC[5] was not presented with report and therefore could not be reviewed to determine the differences noted between the two FIS reports (i.e., FIS-SCC[1] and FIS-PIMA). All that was noted within the FIS-SCC[5] report was that a hydrologic analysis was performed during January of 1995 by CMG Drainage Engineering Inc. (http://www.cmgdrainage.com/) for the Santa Cruz River at a location where it confluences with Sopori Wash. The other list of FIS revisions within that report do not reference Sopori Wash.

The contributing watershed to Sopori Wash as developed by Stantec for the FIS-SCC[1] is shown in Figure 1 – Study Location Map.



PIMA COUNTY FLOOD CONTROL

Stantec

Legend

Sopori Wash Watershed

County Boundary

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl

2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Project Location 181300905

Pima & Santa Cruz Counties, AZ

Prepared by DCM on 2019-01-31

Client/Project

Pima County Flood Control
Sopori Wash
Discharge & Recurrence Event Analysis

Figure No.

1

Title

Sopori Wash Watershed Study Location Map

V:\1756\temporary\181300905\gis\workitem\Dave\mxd\Figure_1_Sopori_Wash_Watershed_Study_Location_Map.mxd Revised: 2019-02-26 By: DMcLaughlin

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

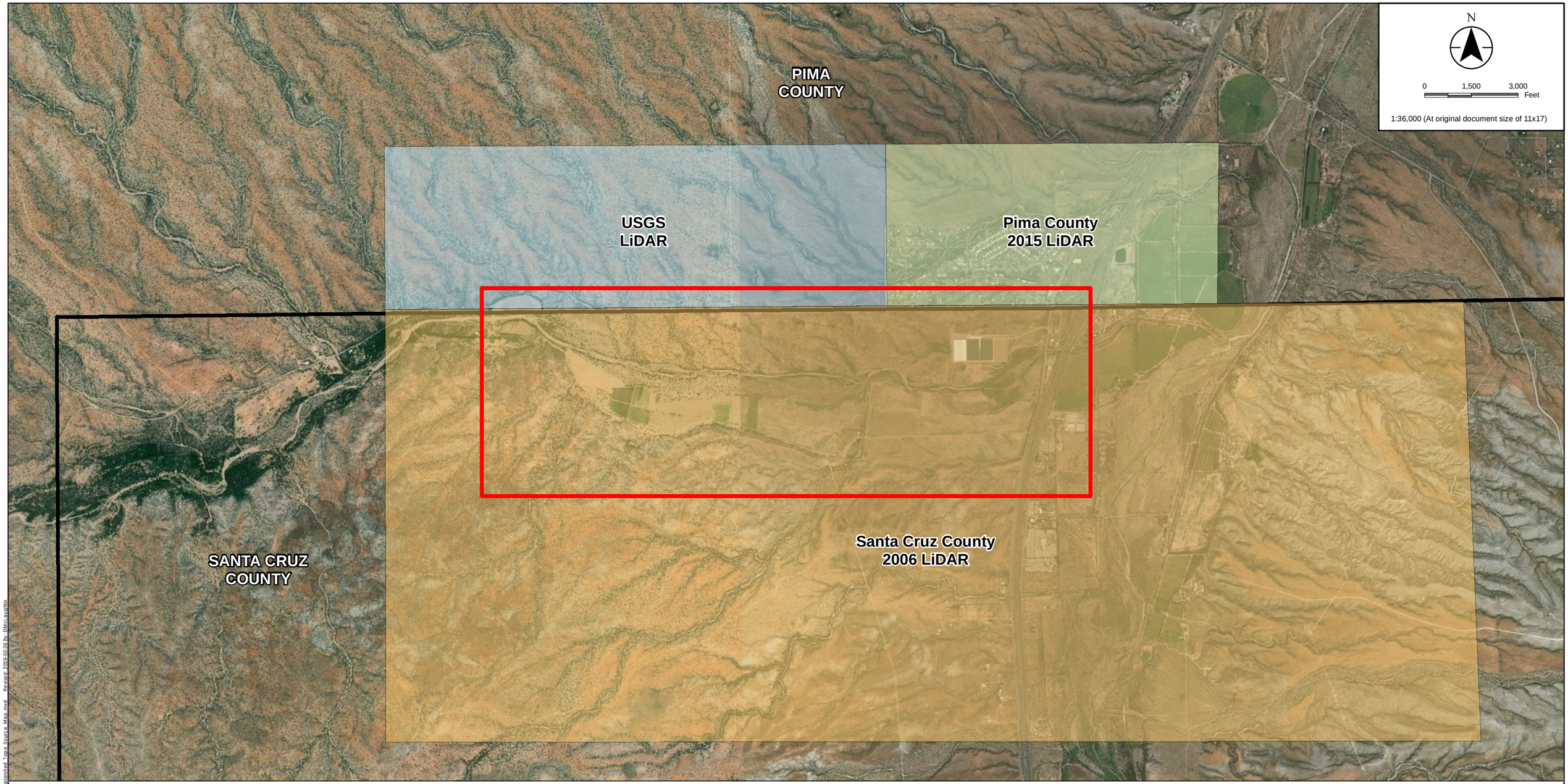
DATA COLLECTION

The hydraulic model used as part of the SCC MapMod study is the basis of the hydraulic analysis of Sopori Wash for this flood frequency analysis as this is the only hydraulic model of Sopori Wash available and therefore includes necessary hydraulic parameters and information (e.g., hydraulics structures, roughness coefficients, channel conditions). As Stantec was the study contractor for the SCC MapMod study, a copy of the hydraulic model was available without submitting a request for data to FEMA. The corresponding hydrologic model for this stream was also obtained. The concentration point within the hydrologic model corresponding to the location of interest in this study is C011.

The RFCD obtained high water mark and inundation limits data on November 9, 2018 and provided the information to Stantec for use in this analysis. The information is included within Appendix A.

Terrain within the study area was collected and is summarized herein. Figure 2 includes the coverage of each as it applies to this study.

- 4'x4' .dem data of Santa Cruz County based on 2006 SCC MapMod study as provided by Santa Cruz County [county-wide coverage].
- PAG 2015 LiDAR data – north of the Pima County line as provided by the RFCD [limited coverage].
- USGS 1/3 arc-second .dem data to supplement the area between Santa Cruz County and Pinal County [limited state-wide coverage]



PIMA COUNTY FLOOD CONTROL

Stantec

Legend

- Study Limits
- USGS LiDAR
- Pima County LiDAR
- Santa Cruz County LiDAR
- County Boundary

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl

2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Project Location 181300905

Pima & Santa Cruz Counties, AZ

Prepared by DCM on 2019-01-31

Client/Project

Pima County Flood Control
Sopori Wash
Discharge & Recurrence Event Analysis

Figure No.

2

Title

Sopori Wash Watershed LiDAR Coverage Map

V:\1756\temporary\181300905\gis\workkemp\Dave\mxd\Figure_2_Sopori_Wash_Watershed_Topo_Source_Map.mxd Revised: 2019-02-26 By: DMcLaughlin

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

ANALYSIS OF DATA COLLECTED AND HYDRAULIC ANALYSIS

The study limits of the hydraulic analysis are shown in Figure 3.

HYDRAULIC APPROACH – SUMMARY

The approach used to estimate the discharge occurring during the September 2, 2018 flood event and the associated frequency (return period) of the event was performed using the following steps.

1. General approach:

    a. Use the existing hydraulic model (HEC-RAS) of Sopori Wash with the intent to correlate the field survey data to the predicted water surface elevation occurring at a given location to estimate of the corresponding discharge and associated return period). This hydraulic model was developed as part of the SCC MapMod study in support of the FIS-SCC[1] report.

    b. Other methods were considered such as slope-area method, but that approach was rejected given the limited field survey data available. The velocity-area method could not be used as this is an ephemeral stream.

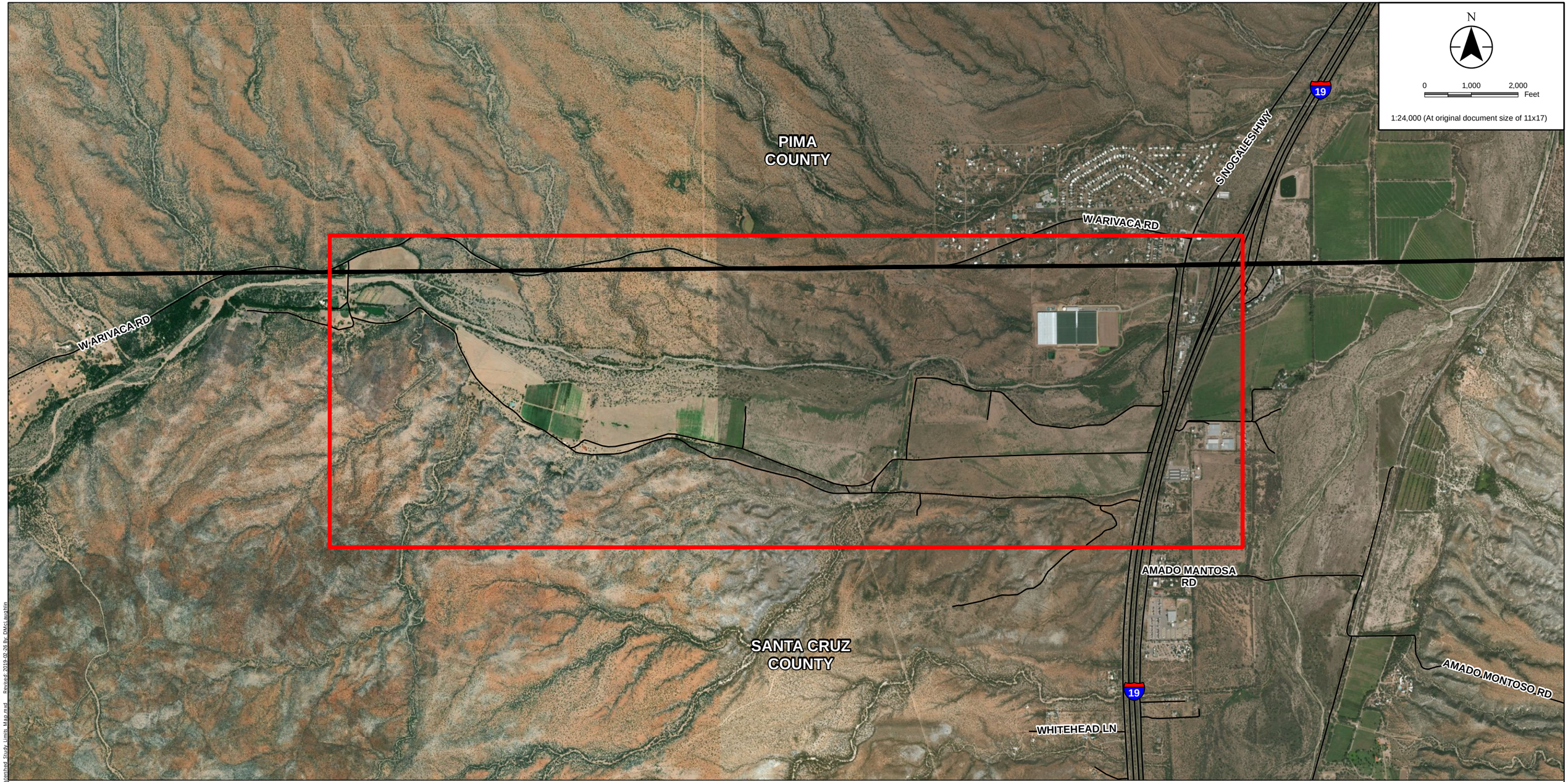
2. Perform a general review of the model: layout, parameters, and results using HEC-RAS version 4.1.

3. Review field survey data of the collected ground surface and high-water mark data in the vicinity of several hydraulic model cross sections.

4. Estimate the associated frequency (e.g., 500-year interval) using the various sources of currently published discharges available (see Comparison of Discharge Estimates section).

    a. The discharges and associated recurrence events listed within the FIS-SCC[1] report were selected as the initial frame of reference for this study as those values are the latest data published for Sopori Wash and that the discharges were developed from a known hydrologic study/model.

    b. The Hydraulic Analysis Conclusions section includes return event, or range thereof, for all available discharge methods/publications.



PIMA COUNTY
FLOOD CONTROL

Stantec

Legend

Major Road

Study Limits

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl

2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Project Location 181300905

Pima & Santa Cruz Counties, AZ

Prepared by DCM on 2019-01-31

Client/Project

Pima County Flood Control
Sopori Wash
Discharge & Recurrence Event Analysis

Figure No.

3

Title

Sopori Wash Watershed Study Limits Map

X:\1256\temporary\181300905\gis\workitem1\Dave\mxd\Figure 3 Sopori Wash Watershed Study Limits Map.mxd Revised: 2019-02-26 By: DMcLaughlin

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

REVIEW OF HYDRAULIC MODEL (HEC-RAS)

Stantec reviewed the effective hydraulic model (HEC-RAS version 4.1) of Sopori Wash and found that it required adjustment of the streamline and cross section locations (i.e., it needed to be georeferenced). This adjustment does not affect the results but merely allows for correct representation of the geometric features of the hydraulic model. No other changes to the model or hydraulic parameters were needed. It should be noted that this hydraulic model consists of a standard one-dimensional analysis of a common riverine system.

Based on an analysis of the hydraulic model when using HEC-RAS version 5.0.5[4] and the modeling enhancements associated with the newer version (i.e., RASMapper, two-dimensional flow modeling) it was determined in agreement with RFCD that version 5.0.5 would be used for this study. The review of the results of the duplicate effective model did not result in differences in the water surface elevation between the two HEC-RAS versions.

REVIEW OF FIELD SURVEY DATA AND COMPARISON TO HYDRAULIC MODEL

High water mark data (i.e., survey field shots) was reviewed for the following;

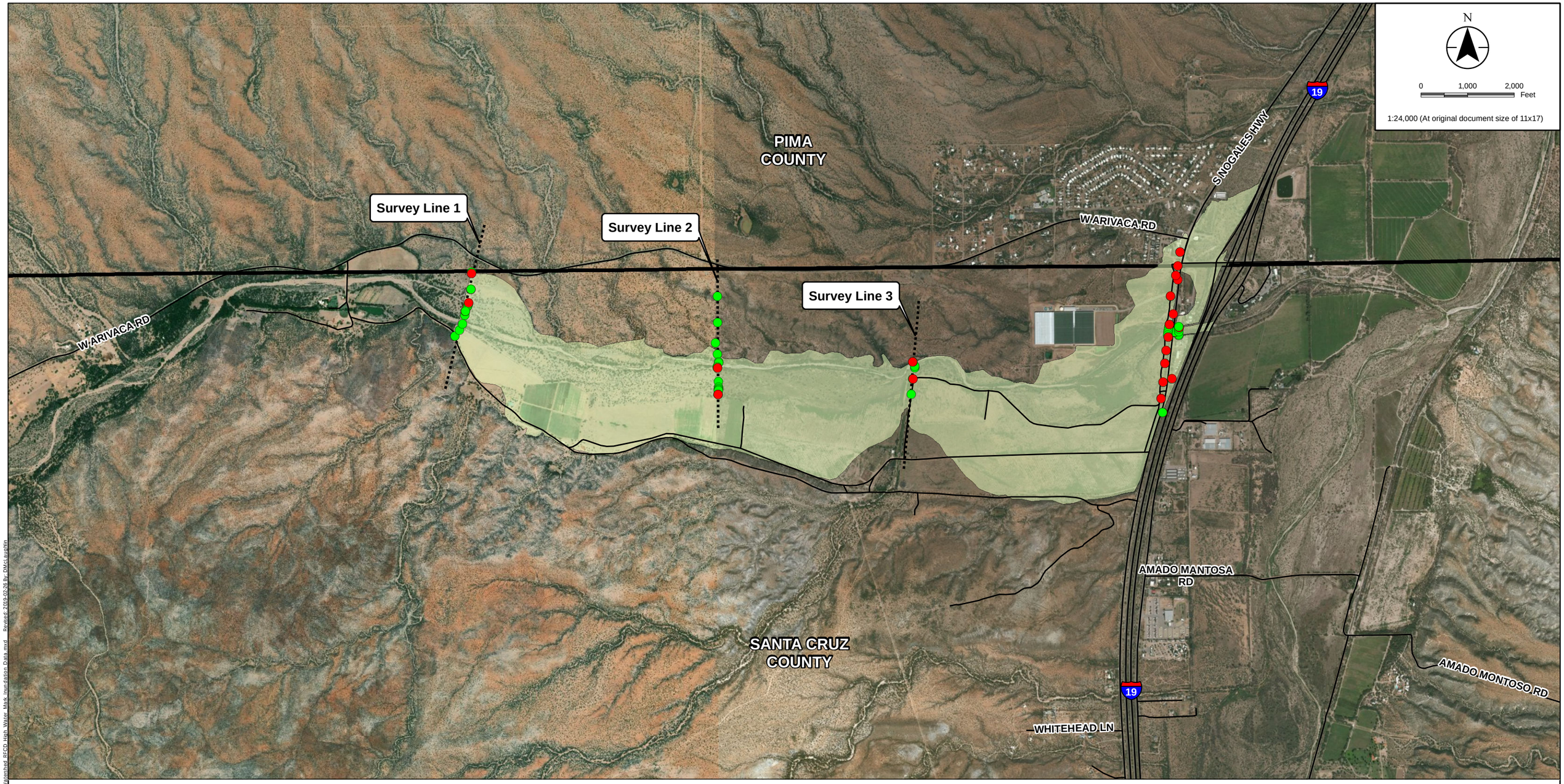
- Location (see Figure 4), and
- type(s) of data collected (ground shots and high-water marks).

After a careful review of the field survey data, features occurring within the general area and known constraints, Stantec decided to focus on the region of Sopori Wash between approximately 5,700 feet to 15,500 feet upstream of West Frontage Road. This region was chosen based on the following:

- The effective hydraulic model did not extend north into Pima County and therefore any regions north of the Santa Cruz County line were not included within the hydraulic model. This affects the area directly south where the flood fringe enters into Pima County and therefore includes West Frontage Road.
- Survey data west of the 15,500-foot study limit was not recorded.
- The existing stream/wash is believed to be similar in elevation as during 2006 Santa Cruz County LiDAR development.
    - Development (e.g., hydroponics farm) and other potential activities that affect the ground surface (e.g., maintenance) were noted to occur just upstream of West Frontage Road.

A detailed examination of the field survey data when compared to the ground surface elevation of the 2006 Santa Cruz County LiDAR found close agreement between the information along two general lines of field survey (Survey Lines 1 and 2, see Figure 4). A third survey line (Survey Line 3 located at the downstream end of the study area, see Figure 4) was found to show less agreement and therefore was removed from further consideration.

The upstream field survey line (Survey Line 1) is located between hydraulic (i.e., HEC-RAS) cross sections 4.402 and 4.318. The water surface elevations at each of these hydraulic sections was used to assess two recorded high-water marks along this survey line. The discharge value was adjusted until a close correlation (+/- 0.20-foot) to each noted high-water mark was obtained. An analysis of the high-water mark data found inconsistent results along this survey line. One of the high-water marks (No. 6012) corresponds closely with the water surface elevation occurring during the 500-year event (Q=19,044 cfs) while the other point (No. 6009) along the same survey line corresponded to an estimated 85-year event (Q=11,700 cfs).



PIMA COUNTY FLOOD CONTROL

Stantec

Notes

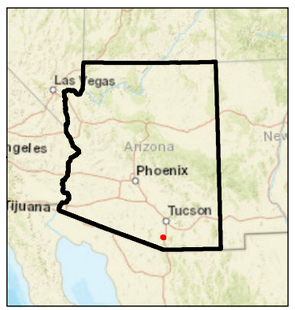
1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl

2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Ground Shot
- High Water Mark
- Survey Line
- Major Road
- Innundation Area
- County Boundary



Project Location 181300905

Pima & Santa Cruz Counties, AZ

Prepared by DCM on 2019-01-31

Client/Project

Pima County Flood Control
Sopori Wash
Discharge & Recurrence Event Analysis

Figure No.

4

Title

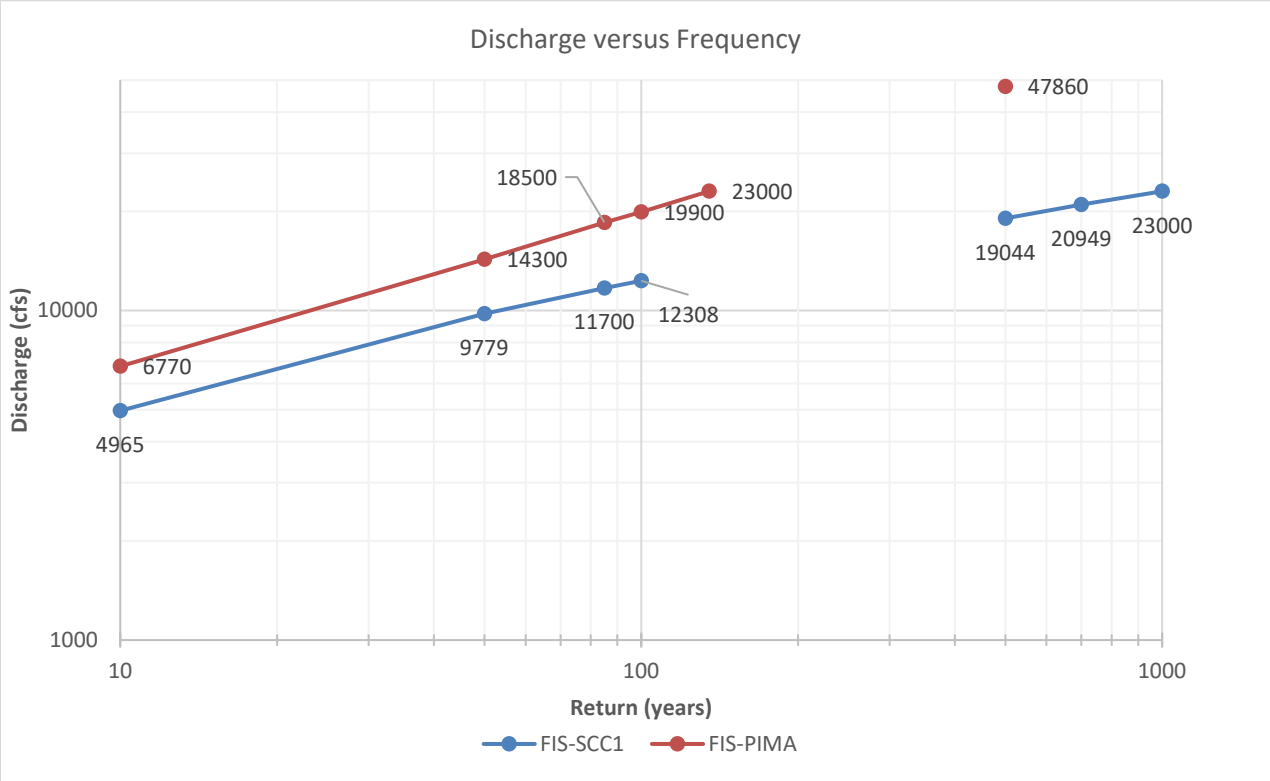
Sopori Wash Watershed
RFCD High Water Mark & Inundation Map

V:\1256\temporary\181300905\gis\workitem\Dave\mxd\Figure_4_Sopori_Wash_Watershed_RFCD_High_Water_Mark_Inundation_Data.mxd Revised: 2019-02-26 By: DMcLaughlin

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

The downstream field survey line (Survey Line 2) is located between hydraulic (i.e., HEC-RAS) cross sections 3.309 and 3.198. The water surface elevations at each of these hydraulic sections was used to assess the one recorded high-water mark along this survey line. An analysis of the high-water mark data found it corresponded to an estimated 1000-year event (Q=23,000 cfs) relative to the FIS-SCC[1] information.

A discharge versus frequency relationship was developed for this portion of the study and is based on an assumption that all values correlate well using a log-log method as shown in the following figure using the discharge values and associated return interval as listed within the FIS-SCC[1]. A second relationship using the discharges as published within the FIS-PIMA report is also included.



Based on review of the results of the one-dimensional (1D) hydraulic model and the field survey data of the high-water marks, it was determined that a better method to determine the discharge and associated frequency was necessary and would include the development of a limited two-dimensional (a.k.a. 2D) hydraulic model of the study area. This model would be limited to a similar region as was examined during the 1D model analysis. The approach is expected to provide more accurate prediction of the inundation area and could then be compared to the inundation boundary provided by the RFCD.

HYDRAULIC APPROACH 2D

This model focused on the same region as the above comparison (i.e., between 5,700 feet to 15,500 feet upstream of West Frontage Road), however, the downstream limit of this model was located closer to West Frontage Road (i.e., 1,800 feet upstream). The purpose of extending the study limits was that the results of the 2D model could be compared to inundation limits provided by the RFCD rather than compare the results to the few high-water marks in the area.

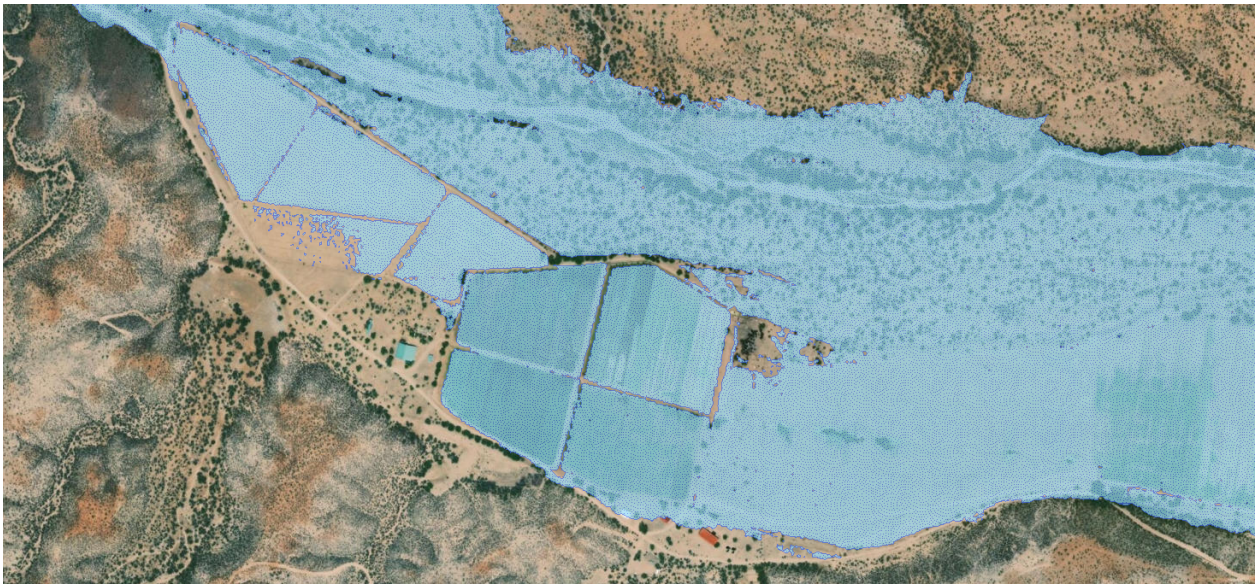
To accomplish the development of a properly prepared 2D hydraulic model, the following approach was used to develop each necessary parameter.

- Terrain data (see Data Collection for description)
- Inflow hydrographs from the SCC MapMod study. These are the only known hydrographs available for this study.
- Downstream boundary control – energy grade slope based on the effective hydraulic model in the vicinity of the downstream limit (i.e., 0.00054 ft/ft between XSs 8712 and 7640 during a maximum discharge of 19,044 cfs and therefore considers the effect of downstream hydraulic structures).
- Upstream boundary control – energy grade slope based on the effective hydraulic model in the vicinity of the upstream limit (i.e., 0.0056 ft/ft between XSs 28606 and 28184 during a maximum discharge of 19,044 cfs).
- Manning's n-values – developed coverage based on the values shown within the effective hydraulic model (i.e., 1D).
    - A separate analysis of the noted n-values included in the 1D model was undertaken and the values of the Manning's roughness coefficients were found to be reasonable.
- Breaklines – none created

The parameters associated with the hydraulic analysis are as follows.

- Grid size = 20'x20'
- Number of grid cells = 555,490
- Computational time interval = 2 seconds (Courant < 2)
- 2D Flow Equation = full momentum
- Estimated time to complete each model run ~ 12-20 hours [Xeon CPU]

The initial 2D modeling results of a maximum discharge of 19,044 cfs in comparison to the flood inundation limits indicated a close agreement. Close examination of the initial results revealed the presence of man-made embankment/grading at several locations. This is due to the active agricultural fields along the right (i.e., southern) overbank. No special consideration or analysis was performed for these features and the model included them "as-is" and therefore included them as part of the overall terrain (e.g., embankments were not breached) as it is unknown if these features are engineered to withstand overtopping/erosion. An example of this condition is shown in the following figure.



Additional scenarios were analyzed related to various discharges (return period) and adjustment to Manning's n-values. The following table includes the various 2D modeling scenarios undertaken by Stantec along with a brief explanation of each model.

Scenario No.	HEC-RAS Plan title	Discharge (cfs)	Manning's*	Results Map
1	19,044 cfs	19,044	Base values	Figure 5
2	19,044 cfs, n+10	19,044	Base values +10%	Figure 6
3	20,949 cfs	20,949	Base values	Figure 7
4	23,000 cfs	23,000	Base values	Figure 8
5	12,338 cfs	12,338	Base values	Figure 9
6	19,044 cfs, n+50	19,044	Base values +50%	Figure 10

* Manning's n-values were obtained from the hydraulic model used in support of the FIS-SCC[1]. Herein referred to as "base values".

A discussion of the results of each of the above modeling scenarios follows. The corresponding figures are included after the discussion.

Scenario 1

This scenario includes a maximum discharge of 19,044 cfs (referred to herein as the base hydrograph) across the composite terrain (see Figure 2) with Manning's n-values based on the original 1D model.

The results of the hydraulic analysis and the flood inundation limits produced from field survey are shown in Figure 5.

The results of this scenario compare well to the flood inundation area as surveyed by the RFCD. However, it is noted that there is greater disparity along the southern edge (right bank) when compared to the northern edge (left bank). A possible reason for the noted difference is that the southern or right overbank region is an active agricultural field and therefore agricultural practices such as field leveling and berming for irrigation could significantly impact the inundation area and modeling results. However, there is insufficient survey data along the southern inundation limit to verify this observation.

Scenario 2

This scenario includes the base hydrograph with a maximum peak discharge of 19,044 cfs, however, roughness coefficients were increased 10-percent over the base values included within to Scenario 1. This is a sensitivity analysis whereby the results are reviewed when changes to specific parameters are made, in this case n-values.

The results of the hydraulic analysis and the flood inundation limits produced from field survey are shown in Figure 6.

The results of this scenario are nearly identical to that of Scenario 1 and suggests that minor adjustment(s) to roughness coefficients do not result in significant differences to the predicted inundation area.

Scenario 3

This scenario includes a modified hydrograph whereby the base hydrograph discharge ordinates were increased by 10-percent thereby resulting in a maximum peak discharge of 20,949 cfs. Like Scenario 1, Manning's n-values were based on the original 1D model.

The results of the hydraulic analysis and the flood inundation limits produced from field survey are shown in Figure 7.

The results of this scenario are nearly identical to that of Scenario 1 and suggests that minor adjustment(s) to the discharge do not results in significant differences to the predicted inundation area or overall width of flow.

Scenario 4

This scenario includes a modified hydrograph whereby the base hydrograph discharge ordinates were increased by 20-percent. This results in a maximum discharge of 23,000 cfs. Like Scenario 1, Manning's n-values were based on the original 1D model.

The results of the hydraulic analysis and the flood inundation limits produced from field survey are shown in Figure 8.

The results of this scenario are nearly identical to that of Scenario 1 but there are visible differences along the northern edge of the inundation zone, however, these differences are again rather small in that the overall width of flow differs only slightly.

Scenario 5

This scenario includes a hydrograph with a maximum peak discharge of 12,338 cfs across the composite terrain with Manning's n-values based on the original 1D model.

The results of the hydraulic analysis and the flood inundation limits produced from field survey are shown in Figure 9.

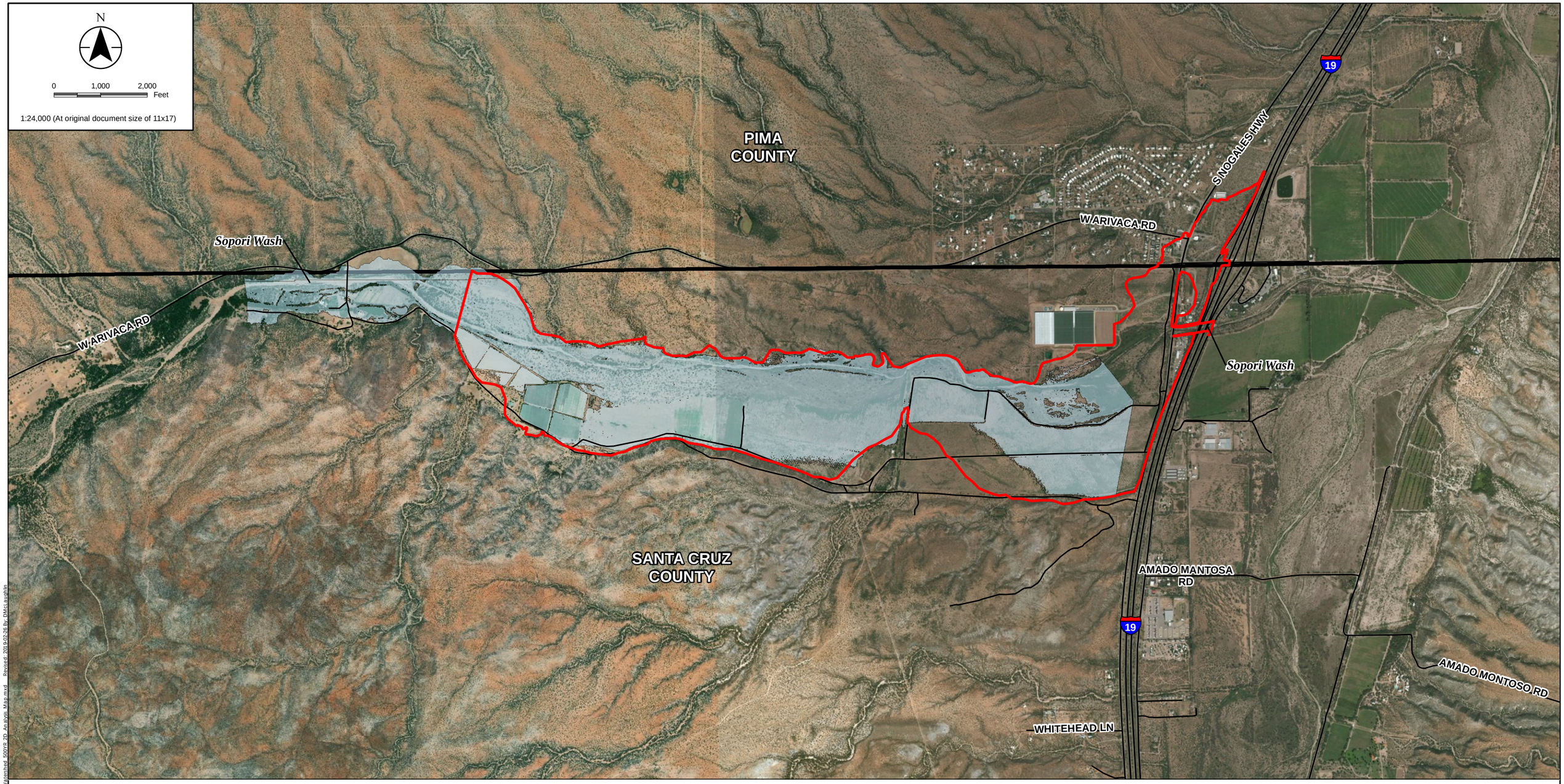
The results of this scenario reveal extensive differences within the study when compared to the results of Scenario 1 and the flood event inundation limits provided by the RCFD.

Scenario 6

This scenario includes the base hydrograph with a maximum peak discharge of 19,044 cfs, however, roughness coefficients were increased 50-percent increase to all Manning's n-values when compared to Scenario 1. This is a sensitivity analysis whereby the results are reviewed when changes to specific parameters are made, in this case n-values

The results of the hydraulic analysis and the flood inundation limits produced from field survey are shown in Figure 10.

The results of this scenario are nearly identical to that of Scenario 1 and suggests that large adjustment(s) to roughness coefficients do not result in significant differences to the predicted inundation area.



PIMA COUNTY FLOOD CONTROL

Stantec

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl

2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Major Road
- PSOMAS Inundation Boundary
- 500-Year from 2D Analysis
- County Boundary

Project Location 181300905

Pima & Santa Cruz Counties, AZ

Prepared by DCM on 2019-01-31

Client/Project

Pima County Flood Control
Sopori Wash
Discharge & Recurrence Event Analysis

Figure No.

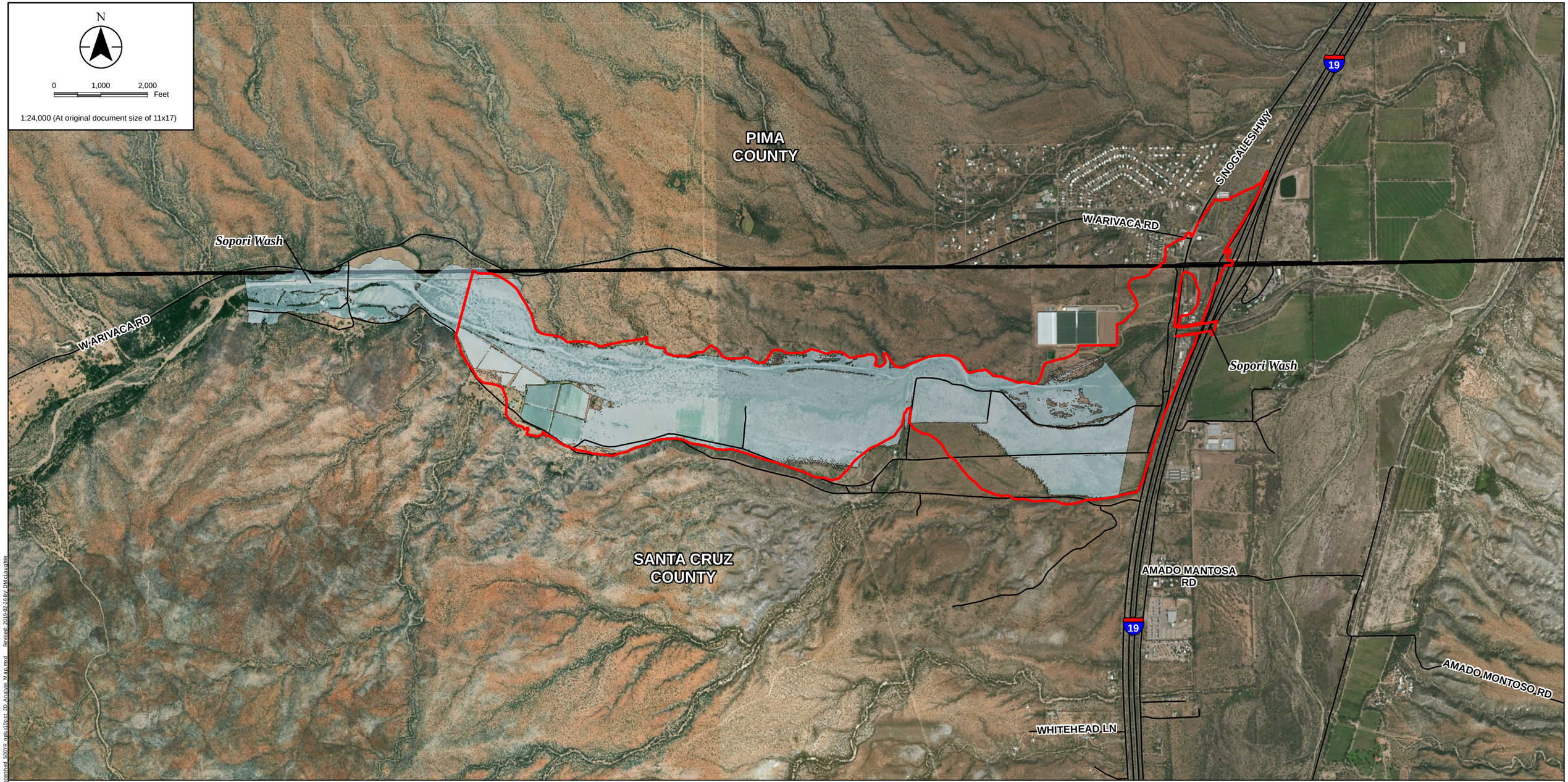
5

Title

Sopori Wash Watershed
19,044 cfs from 2D Analysis Map

V:\1725\temporary\181300905\gis\workitem1\Dave1.mxd\Figure 5_Sopori Wash Watershed_50Yr 2D Analysis Map.mxd Revised: 2019-02-06 By: DMcLaughlin

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



PIMA COUNTY FLOOD CONTROL

Stantec

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl

2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Major Road
- PSOMAS Inundation Boundary
- 500-Year n+10% from 2D Analysis
- County Boundary

Project Location 181300905

Pima & Santa Cruz Counties, AZ

Prepared by DCM on 2019-01-31

Client/Project

Pima County Flood Control
Sopori Wash
Discharge & Recurrence Event Analysis

Figure No.

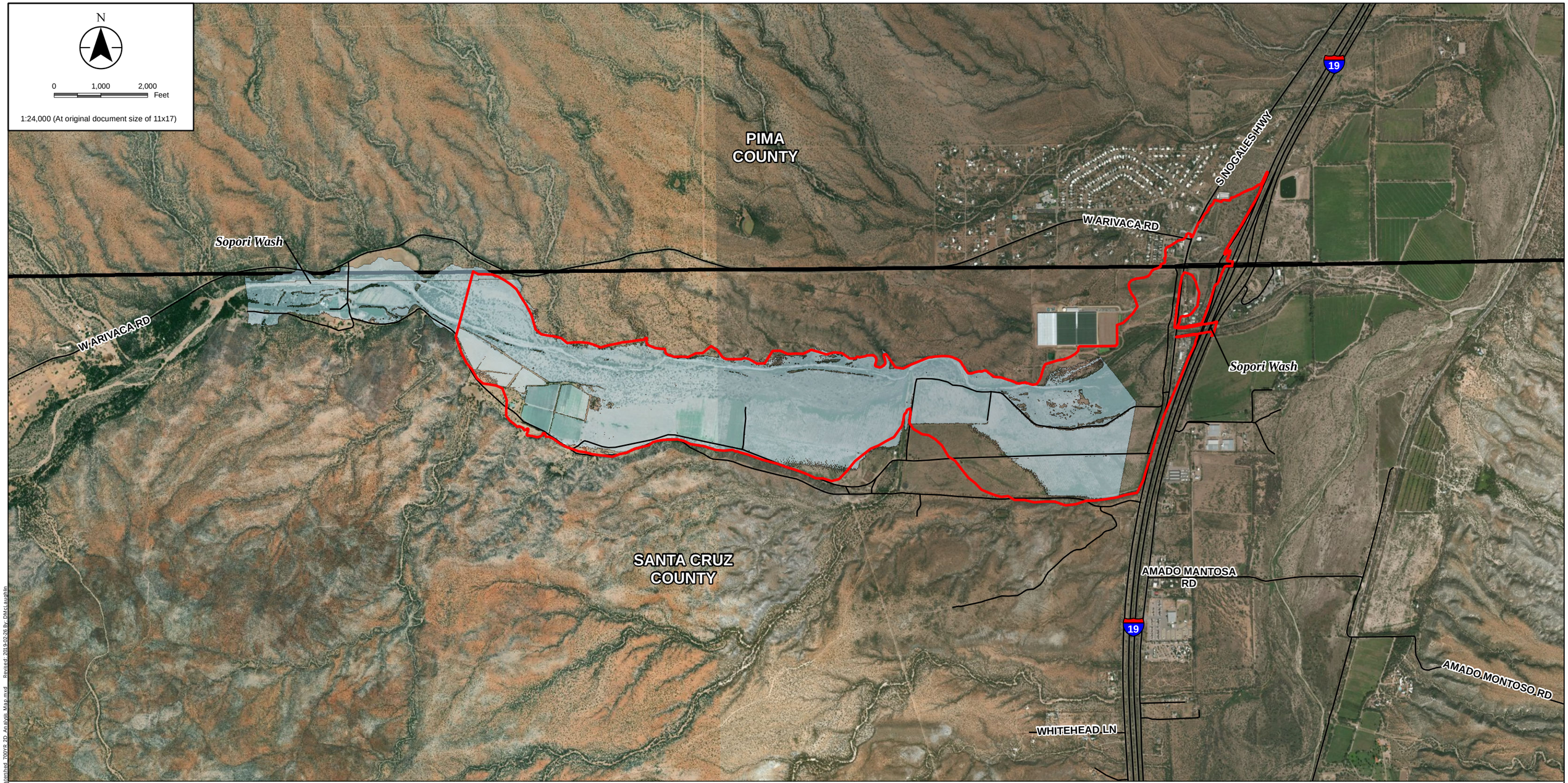
6

Title

Sopori Wash Watershed
19,044 cfs n+10% from 2D Analysis Map

V:\1756\temporary\181300905\gis\workitem\Dave\mxd\Figure_6_Sopori_Wash_Watershed_500YR_npluv10pct_2D_Analysis_Map.mxd Revised: 2019-02-26 By: DMclaughlin

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



PIMA COUNTY FLOOD CONTROL

Stantec

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl

2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Major Road
- PSOMAS Inundation Boundary
- 700-Year from 2D Analysis
- County Boundary

Project Location 181300905

Pima & Santa Cruz Counties, AZ

Prepared by DCM on 2019-01-31

Client/Project

Pima County Flood Control
Sopori Wash
Discharge & Recurrence Event Analysis

Figure No.

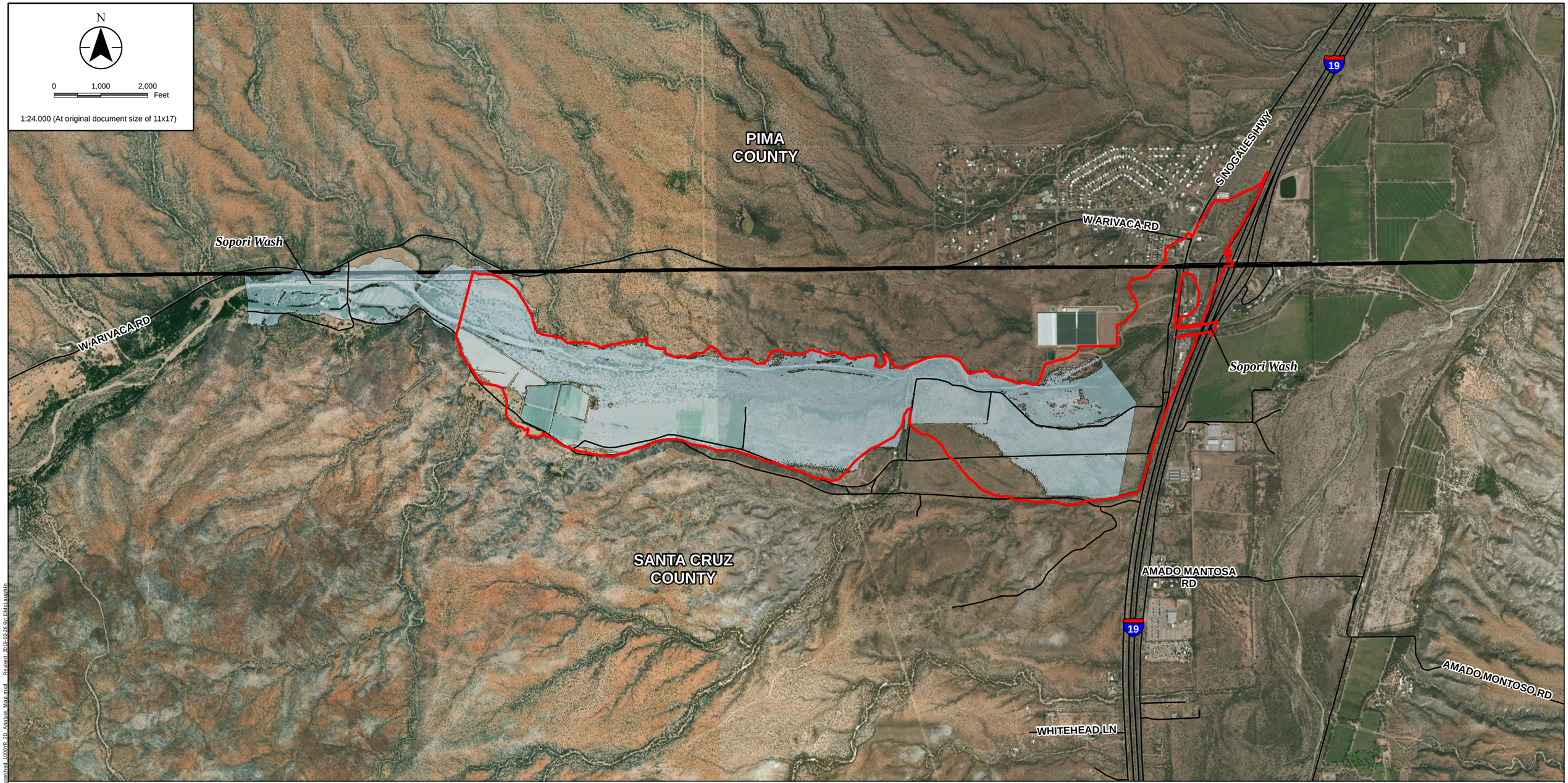
7

Title

Sopori Wash Watershed
20,949 cfs from 2D Analysis Map

V:\1725\temporary\181300905\gis\workitem1\Dave\mxd\Figure 7 Sopori Wash Watershed 700YR 2D Analysis Map.mxd Revised: 2019-02-06 By: DMcLaughlin

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



PIMA COUNTY FLOOD CONTROL

Stantec

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl

2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Major Road
- PSOMAS Inundation Boundary
- 1000-Year from 2D Analysis
- County Boundary

Project Location 181300905

Pima & Santa Cruz Counties, AZ

Prepared by DCM on 2019-01-31

Client/Project

Pima County Flood Control
Sopori Wash
Discharge & Recurrence Event Analysis

Figure No.

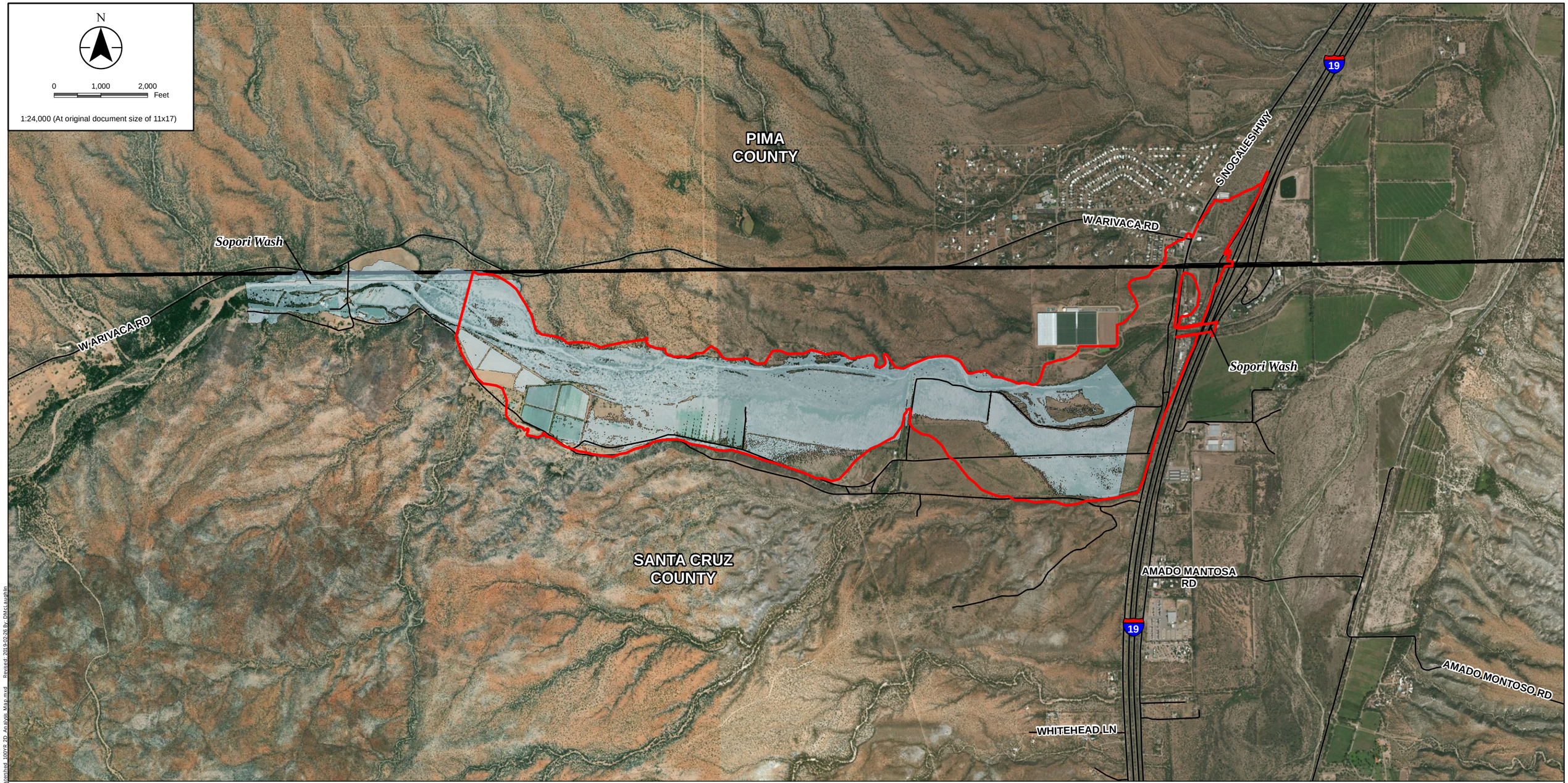
8

Title

Sopori Wash Watershed
23,000 cfs from 2D Analysis Map

V:\1256\temporary\181300905\gis\workitem1\Dave\mxd\Figure 8 Sopori Wash Watershed 1000YR 2D Analysis Map.mxd Revised: 2019-02-26 By: DMcLaughlin

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



PIMA COUNTY FLOOD CONTROL

Stantec

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl

2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Major Road
- PSOMAS Inundation Boundary
- 100-Year from 2D Analysis
- County Boundary

Project Location 181300905

Pima & Santa Cruz Counties, AZ

Prepared by DCM on 2019-01-31

Client/Project

Pima County Flood Control
Sopori Wash
Discharge & Recurrence Event Analysis

Figure No.

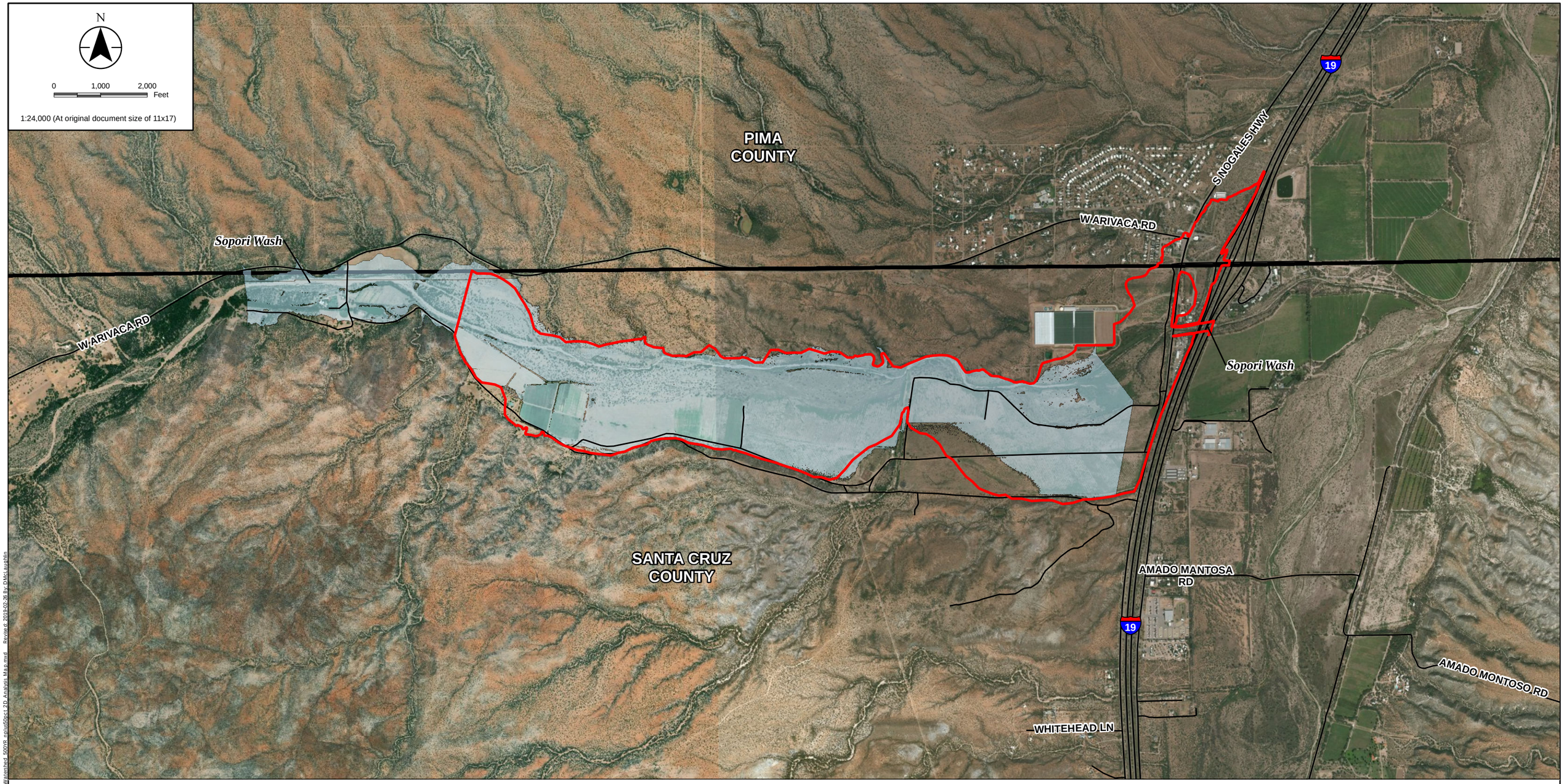
9

Title

Sopori Wash Watershed
12,338 cfs from 2D Analysis Map

V:\1756\temporary\181300905\gis\workitem\Dave\mxd\Figure 9 Sopori Wash Watershed 100Yr 2D Analysis Map.mxd Revised: 2019-02-06 By: DMcLaughlin

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



PIMA COUNTY
FLOOD CONTROL

Stantec

Legend

- Major Road
- PSOMAS Inundation Boundary
- 500-Year n+50% from 2D Analysis
- County Boundary

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl

2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Project Location 181300905

Pima & Santa Cruz Counties, AZ

Prepared by DCM on 2019-01-31

Client/Project

Pima County Flood Control
Sopori Wash
Discharge & Recurrence Event Analysis

Figure No.

10

Title

Sopori Wash Watershed
20,949 cfs n+50% from 2D Analysis Map

V:\1725\temporary\181300905\gis\workitem1\Dave\mxd\Figure_10_Sopori_Wash_Watershed_500YR_nplus50pct_2D_Analysis_Map.mxd Revised: 2019-02-28 By: DMcLaughlin

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

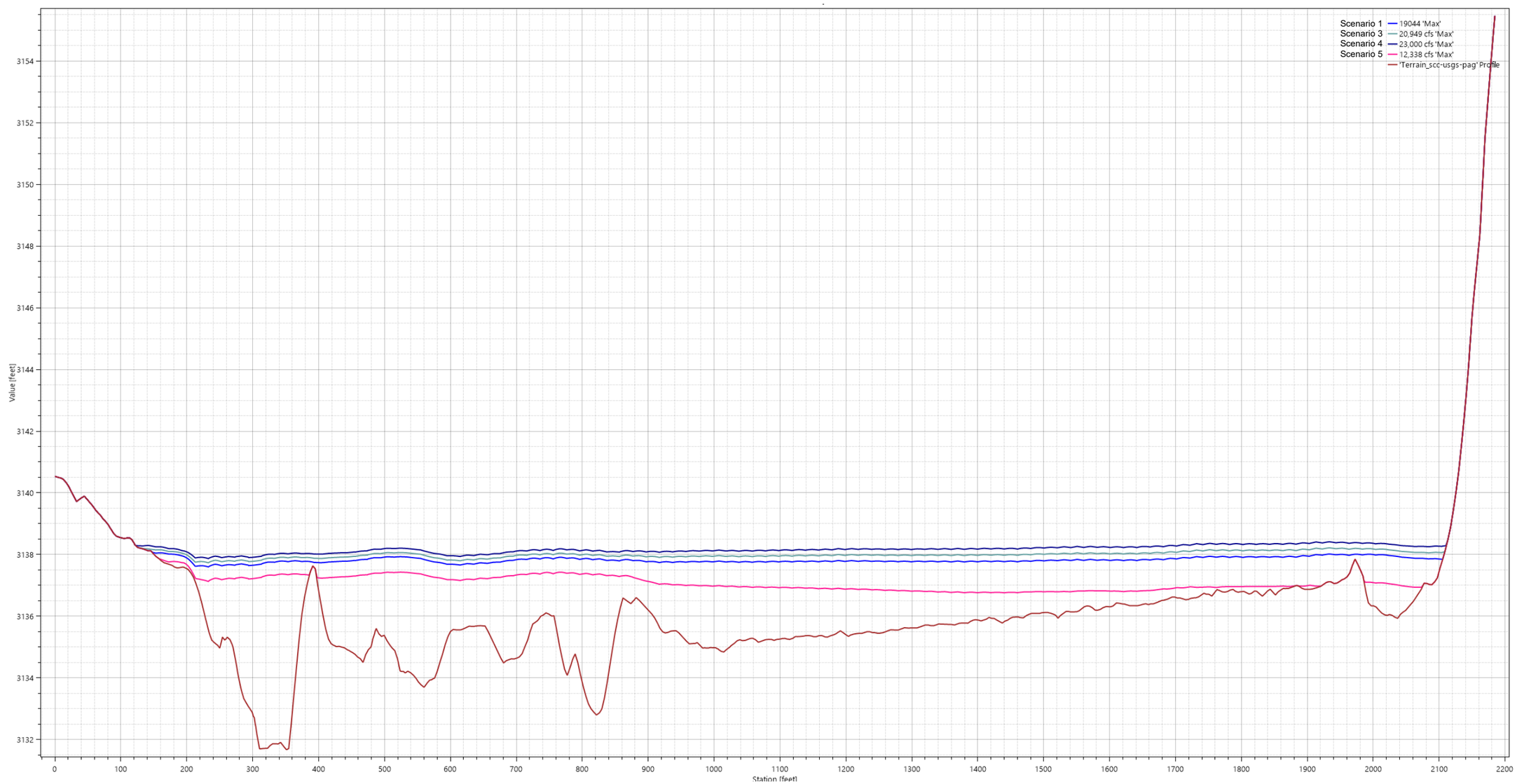
HYDRAULIC COMPARISON – DIRECT GRAPHICAL REPRESENTATION

As Figures 5, 6, 7, 8 and 10 reveal similar inundation limits among the various scenarios considered within this study, a cross section of the wash provides a better illustration of the differences in both depth and width of flow when comparing: Scenario 1 (19,044 cfs), Scenario 3 (20,949 cfs), Scenario 4 (23,000 cfs) and Scenario 5 (12,338 cfs) are shown in Figure 11. Scenario 2 (19,044 cfs, n+10%) and Scenario 6 (19,044 cfs, n+50%) were not included in this comparison as the results of those scenarios revealed insignificant differences.

Figure 11 shows the resulting water surface elevations for the specific scenarios and as can be quickly taken from the figure, there is only slight differences in the water surface elevation between the 19,044, 20,949 and 23,000 cfs discharge values. The vertical difference between the 19,044 and 20,949-year water surface is approximately 0.20-foot and a similar difference was noted between the water surface elevation resulting from the discharges of 20,949 and 23,000 cfs.

This figure also reveals the width of flow during 19,044 cfs is 1,960-feet while the width associated with the 23,000 cfs discharge is 1,988-feet, a difference of only 28-feet or an increase of 1.4-percent when compared to the width of the 19,044 cfs discharge. The vertical difference between these two discharges (i.e., 19,044 and 23,000) is approximately 0.38-feet or 4.5-inches.

Figure 11 - Cross Section near Survey Line 2



HYDRAULIC ANALYSIS CONCLUSION

The conclusion of the analyses included within this study indicate that the discharge occurring with Sopori Wash during the subject flood event (September 2, 2018) was greater than 12,338 cfs and was within the range of between 19,044 and 23,000 cfs. A more accurate estimate of the discharge occurring within Sopori Wash cannot be provided due to the uncertainty association with: the existing ground surface as the 2006 Santa Cruz County LiDAR data was used as the basis of the ground information used in this study, field survey data of the inundation limits and high-water marks, selection of Manning's n-values and extent of modification of the ground due to agricultural practices…etc.

The confidence associated with this conclusion is a direct correlation to the field data provided shortly after the flood event occurred.

The overall conclusion when considering the resulting inundation from the various flood scenarios and the chart is that Sopori Wash has significant width that even large changes in the discharge above 19,000 cfs result in negligible difference in the width and water surface elevation.

The following table summarizes the estimate range of return events, relative to each of the noted discharge values published or as determined by indirect method (see Comparison of Discharge Estimated section). The stated return events are based on an estimated discharge of 19,044 and 23,000 cfs.

Source	Return* (lower)	Return* (Upper)
USGS Gage Records	140	325
USGS Regional Regression Analysis (2014)	140	250
FIS-Santa Cruz County[1]	500	1000
FIS-Pima County[4]	90	140

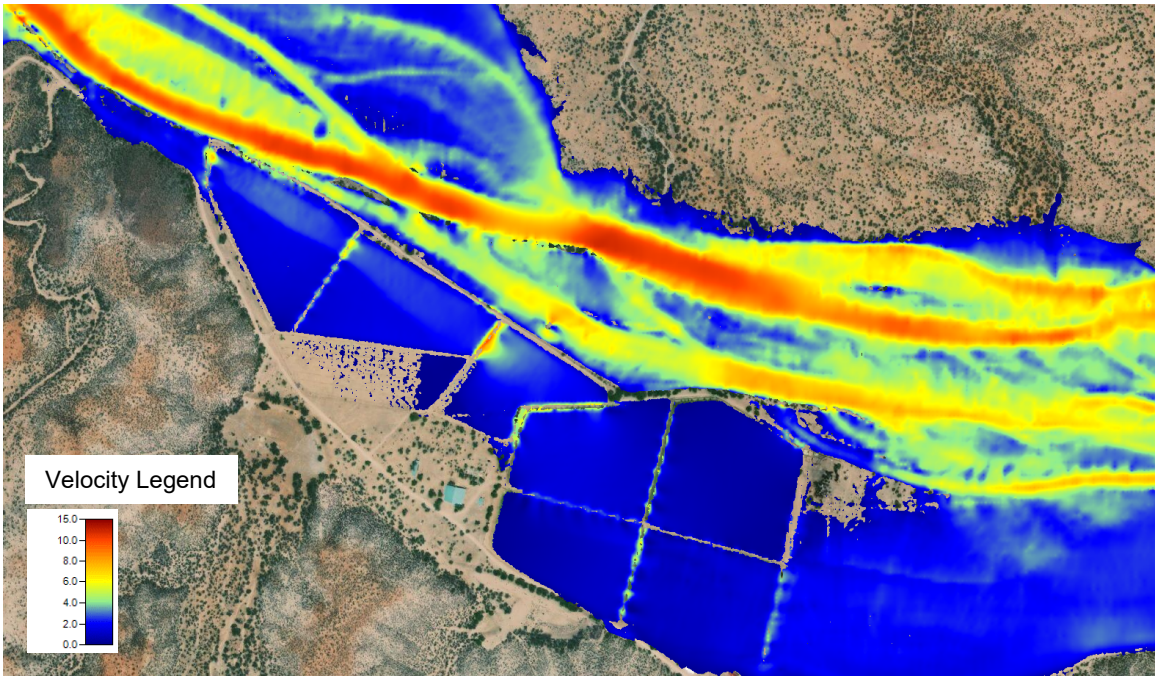
* in years

SPECIAL CONSIDERATIONS AND NOTES

It should be noted that the basis of the terrain used for this study is the 2006 dem data of Santa Cruz County. This terrain was also used in the development of the inundation limits of the noted flooding event. Even though a comparison of field survey (i.e., ground shots) to the 2006 dem data revealed close agreement (+/- 0.5-foot), there were notable differences at several locations. The reason for these notable differences cannot be provided within the limitations of this study as such would require geomorphological analysis.

The 2D hydraulic analysis did not consider embankment failure (i.e., breach) of the noted agricultural berms (see Hydraulic Approach 2D and associated figure). Information related to these man-made structures was not provided or researched. Overtopping of each embankment was noted during the hydraulic as shown in the following figure.

Reference: Sopori Wash-Discharge & Recurrence Event Analysis



High-water mark data provided did not include the type of high-water mark recorded. Generally, there are three types of high-water marks in tranquil flow conditions: mud lines, seed lines, and debris lines. For rapid flow there are four types: cut lines, wash lines, mud lines and debris snags. Each of these types has a different accuracy associated with it *Identifying and Preserving High-Water Mark Data*[5], Chapter 24 of Section A, Surface-Water Techniques Book 3, Applications of Hydraulics, Techniques and Methods 3–A24, 2016.

Reference: **Sopori Wash-Discharge & Recurrence Event Analysis**

COMPARISON OF DISCHARGE ESTIMATES

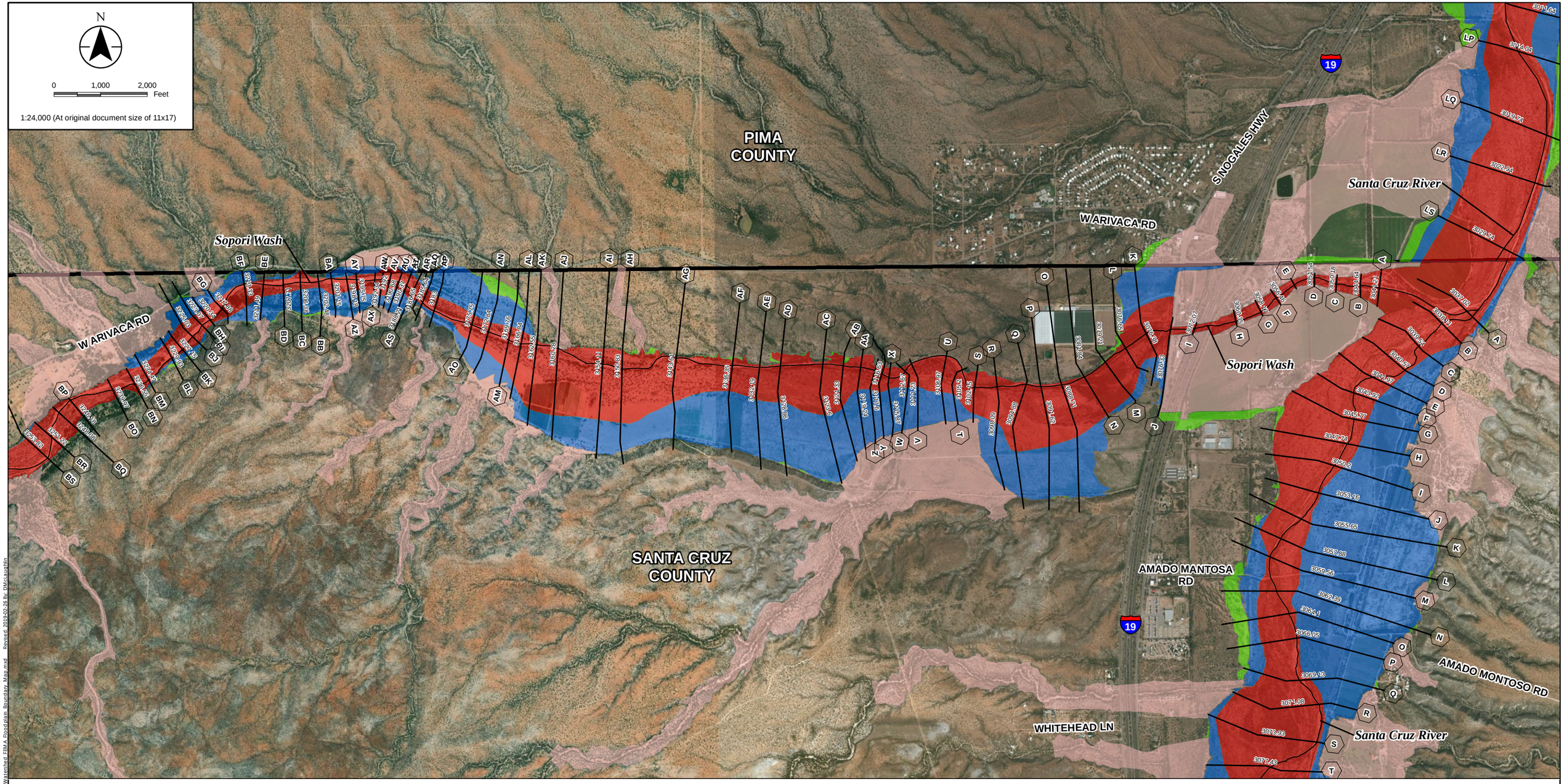
The RFCD requested a comparison of the discharge values published within the current edition of the Flood Insurance Study (FIS-SCC[1]) for Santa Cruz County, Arizona and Incorporated Areas (December 2, 2011) to other methods/sources (e.g., indirect methods, gage analysis).

FEMA

The FIS-SCC[1] contains the following information as it relates to Sopori Wash (p.25). The information shown within the FIS-SCC[1] was based on the hydrologic analysis completed by Stantec as part of the SCC MapMod study. This hydrologic analysis was completed using the computer program HEC-1 in accordance with ADWR State Standard SS10-07.

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second) 10%-Annual Chance	2%-Annual Chance	1%-Annual Chance	.2%-Annual Chance
Sopori Wash					
Downstream of Interstate 19	166.79	4,965	9,779	12,338	19,044
At Upstream Limit of Study	111.05	4,210	7,846	9,675	14,757

The effective digital floodplain boundaries and related information (e.g., cross section name and location) is shown within Figure 12.



PIMA COUNTY FLOOD CONTROL

Stantec

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl
2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- NFHL Cross Sections
- NFHL Streams/Rivers
- County Boundary

NFHL Effective Floodplains

- AE - FLOODWAY
- AE - 1 PCT ANNUAL CHANCE FLOOD HAZARD
- A - 1 PCT ANNUAL CHANCE FLOOD HAZARD
- X - 0.2 PCT ANNUAL CHANCE FLOOD HAZARD

Project Location 181300905

Pima & Santa Cruz Counties, AZ

Prepared by DCM on 2019-01-31

Client/Project

Pima County Flood Control
Sopori Wash
Discharge & Recurrence Event Analysis

Figure No.

12

Title

Sopori Wash Watershed
FEMA Floodplain Boundary Map

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

V:\1751\temporary\181300905\gis\workterm\Dave\mxd\Figure 12 Sopori Wash Watershed FEMA Floodplain Boundary Map.mxd Revised: 2019-02-26 By: DMcLaughlin

Reference: **Sopori Wash-Discharge & Recurrence Event Analysis**

SUMMARY OF OTHER METHODS AVAILABLE

The following is a list of other methods available, either during the time of the SCC MapMod study or now, to estimate discharge values where Sopori Wash meets the Santa Cruz River.

1. Method for Estimating Magnitude and Frequency of Floods in the Southwestern United States, USGS, report 93-419, 1994[6]

2. Method for Estimating Magnitude and Frequency of Floods in Arizona, Developed with Unregulated and Rural Peak-Flow Data through Water Year 2010, USGS, report 2014-5211, 2014[7]

3. Statistical Summaries of Streamflow Data and Characteristics of Drainage Basins for Selected Streamflow-Gaging Stations in Arizona Through Water Year 1996, USGS, report 98-4225, 1998[8]

USGS REGIONAL REGRESSION - 1994

Method No.1 includes a regression analysis of gages located within Region 13 (Southern Arizona) and resulted in the following equations.

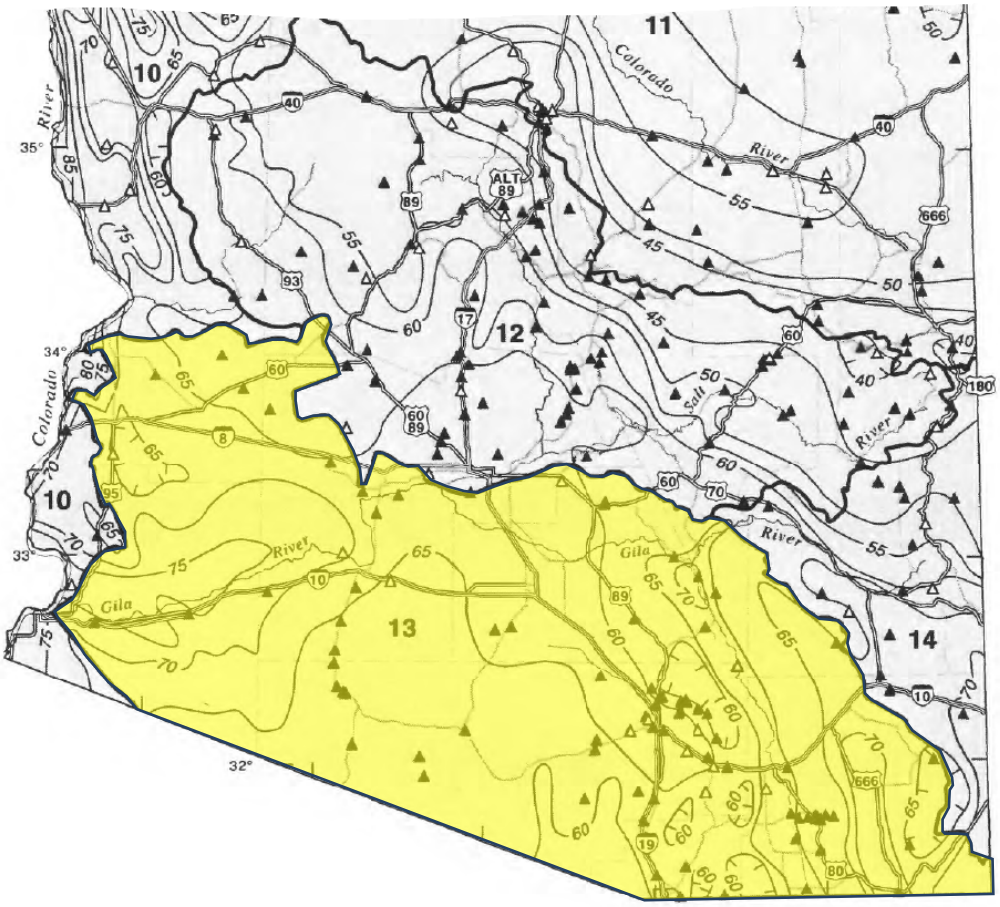
Table 17. Generalized least-squares regression equations for estimating regional flood-frequency relations for the Southern Arizona Region 13
Equation: Q, peak discharge, in cubic feet per second; and AREA, drainage area, in square miles. Data were based on 73 stations. Average number of years of systematic record is 21.

Recurrence interval, in years	Equation	Average standard error of prediction, in percent	Equivalent years of record
2	$Q=10^{(6.38-4.29AREA^{-0.06})}$	57	2.0
5	$Q=10^{(5.78-3.31AREA^{-0.08})}$	40	6.25
10	$Q=10^{(5.68-3.02AREA^{-0.09})}$	37	11.1
25	$Q=10^{(5.64-2.78AREA^{-0.10})}$	39	15.0
50	$Q=10^{(5.57-2.59AREA^{-0.11})}$	43	15.9
100	$Q=10^{(5.52-2.42AREA^{-0.12})}$	48	16.1

The above regression equations only require the input of a single parameter: contributing area of the watershed in square miles.

Region 13 covers the portion of Arizona shown (yellow with solid boundary) in the following figure.

Reference: **Sopori Wash-Discharge & Recurrence Event Analysis**



Reference: **Sopori Wash-Discharge & Recurrence Event Analysis**

USGS REGIONAL REGRESSION - 2014

Method No.2 was a revision of the gage data analysis and resulting equations shown within Method No.1 and includes a regression analysis of gages located within Region 5 (Southeastern Basin and Range) and resulted in the following equations and again only required the input of the contributing area in square miles.

Regionalization and Regression Analysis to Estimate Flood Magnitude and Frequency at Ungaged Sites 29

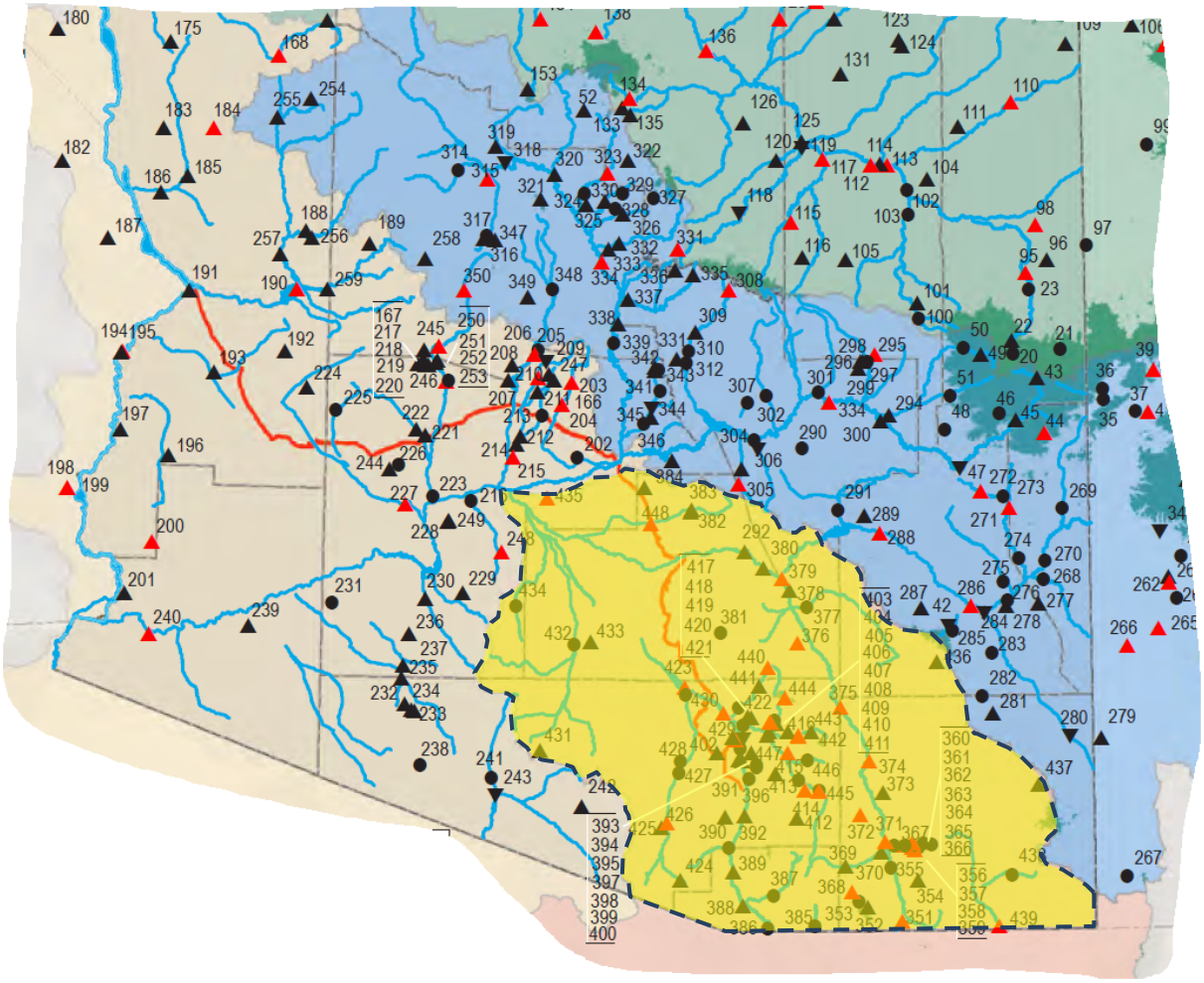
Table 9. Regional regression equations for predicting the 50–, 20–, 10–, 4–, 2–, 1–, 0.5–, and 0.2–percent annual exceedance probability flows in 5 flood regions of Arizona.—Continued

[*DRNAREA*, drainage area in square miles; *PRECIP*, mean annual precipitation in inches; *ELEV*, mean basin elevation in feet]

P–percent annual exceedance probability	Regional regression equations
Flood region 5 (Southeastern Basin and Range) regression equation	
50	$10^{(6.363-4.386\,DRNAREA^{-0.060})}$
20	$10^{(5.868-3.506\,DRNAREA^{-0.080})}$
10	$10^{(5.778-3.218\,DRNAREA^{-0.090})}$
4	$10^{(5.757-2.988\,DRNAREA^{-0.100})}$
2	$10^{(5.696-2.795\,DRNAREA^{-0.110})}$
1	$10^{(5.651-2.634\,DRNAREA^{-0.120})}$
0.5	$10^{(5.761-2.638\,DRNAREA^{-0.120})}$
0.2	$10^{(5.750-2.502\,DRNAREA^{-0.130})}$

Flood region 5 covers the portion of Arizona shown in the following figure (yellow with dashed boundary) and is noticeably different from the coverage within Method No.2.

Reference: **Sopori Wash-Discharge & Recurrence Event Analysis**



USGS STREAM GAGE ANALYSIS

Method No.3 is based on a site-specific analysis of the gage that monitors stream discharge within Sopori Wash as is located approximately 1.3 miles upstream of the mouth of Sopori Wash. This stream was only monitored between 1954-1958, 1964-1976 and 1978 (total of 19 years) and reported a maximum discharge of 8,000 cfs during 1958. The reported discharge of 16,000 cfs during 1948 is not part of the systematic record per the USGS. The published analysis of this gage provided the following results.

Reference: Sopori Wash-Discharge & Recurrence Event Analysis

408 **GILA RIVER BASIN**

09481750 SOPORI WASH AT AMADO, AZ

LOCATION.--Lat 31°43'25", long 111°03'40", NE$^1/_4$NE$^1/_4$ sec.1, T.20 S., R.12 E., Santa Cruz County, Hydrologic Unit 15050301, 200 ft bel bridge on State Highway 89, 1.1 mi north of Amado.
DRAINAGE AREA.--176 mi^2.

Annual peak discharges

Water year	Date	Annual peak discharge (ft^3/s)	Discharge codes	Water year	Date	Annual peak discharge (ft^3/s)	Discharge codes
1948	08-15-48	16,000	HP	1968	00-00-68	500	LT
1954	00-00-54	6,500		1969	00-00-69	500	LT
1955	08-00-55	2,700		1970	09-04-70	1,800	
1956	00-00-56	500	ES	1971	09-01-71	2,900	
1957	00-00-57	100	ES	1972	07-14-72	[2]7,300	
1958	00-00-58	[1]8,000		1973	07-00-73	400	
1964	09-10-64	3,800		1974	07-23-74	3,900	
1965	00-00-65	500	LT	1975	08-23-75	2,700	
1966	12-22-65	1500		1976	09-25-76	2,500	
1967	00-00-67	500	LT	1978	10-00-77	2,300	HP

[1]Highest since 1949.
[2]Highest since 1958.

Magnitude and probability of instantaneous peak flow based on period of record 1948, 1954-58, 1964-76, 1978

Discharge, in ft^3/s, for indicated recurrence interval in years, and exceedance probablility, in percent					
2 50%	5 20%	10 10%	25 4%	50† 2%	100† 1%
2,230	4,610	6,780	10,200	13,400	17,100

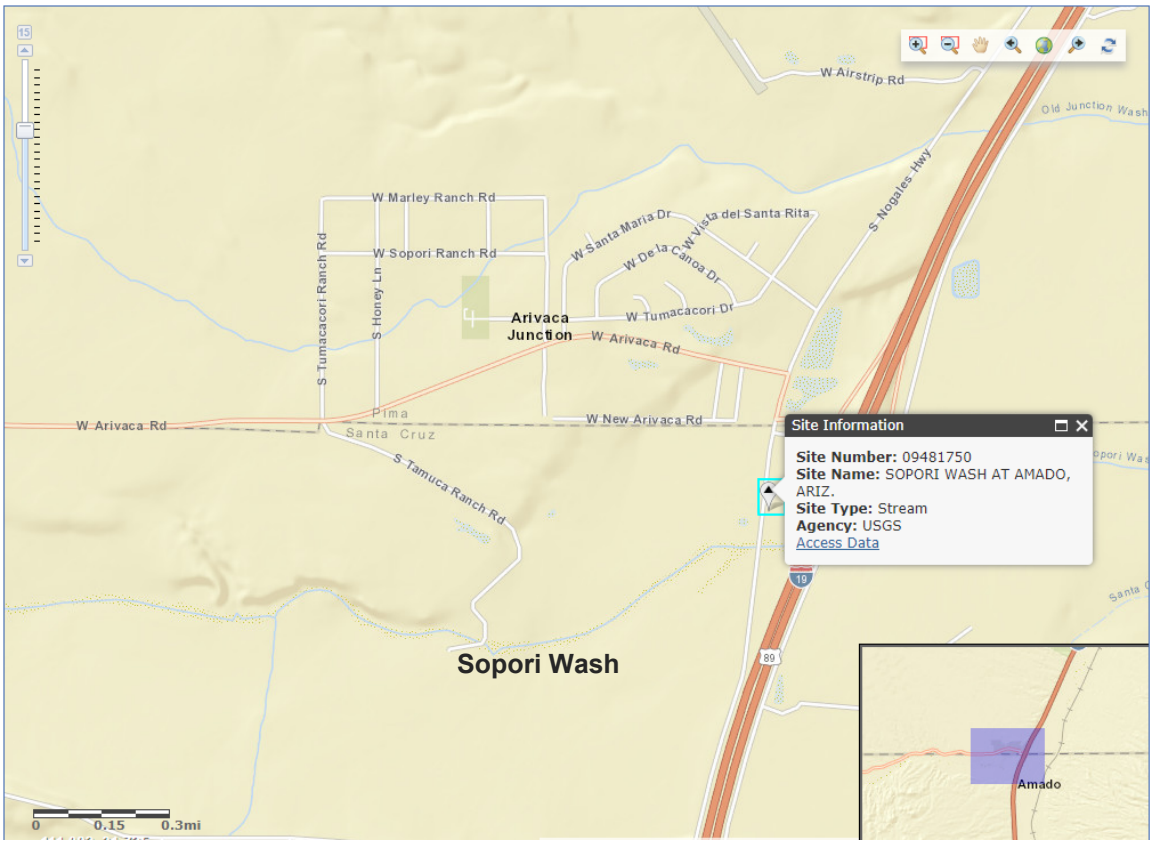
Weighted skew	(logs) =	0.05
Mean	(logs) =	3.35
Standard dev.	(logs) =	0.37

† Reliability of values in column is uncertain, and potential errors are large.

An analysis of the discharge and frequency data shown in the above figure confirms the above values using a generalize skew coefficient of -0.2, variance of generalized skew of 0.302 and not including the 1948 estimated discharge. No additional information related to the 1948 discharge (August 15, 1948) could be found. Including the 1948 discharge in the gage analysis would result in an estimated 100-year discharge of 25,100 cfs.

The figure below shows the location of the now inactive gage relative to the stream and nearby roads.

Reference: **Sopori Wash-Discharge & Recurrence Event Analysis**



SUMMARY OF DISCHARGE ESTIMATES AND COMPARISON TO FEMA DISCHARGES

The results of using the various listed methods and comparison to the values within the FIS-SCC[1] are summarized in the following table. All values shown are in cubic feet per second (cfs) unless otherwise noted.

Reference: **Sopori Wash-Discharge & Recurrence Event Analysis**

A	B	C	D	E	F	G	H	I
Interval (years)	**USGS 1994**	**USGS 2014**	**USGS Gage***	**FEMA 2011**	**FEMA 2011**	% Deviation	**USGS Low**	**USGS High**
	Method 1	**Method 2**	**Method 3**	**FIS-SCC[1]**	**FIS-PIMA[4]**	**Method 2**		
2	1,675	1,369	2,230	n/a	n/a	86.6%	183	2,555
5	3,818	3,465	4,610	n/a	n/a	61.5%	1,334	5,596
10	5,950	5,592	6,780	4,965	6,770	52.4%	2,662	8,522
25	9,406	9,241	10,200	n/a	n/a	45.8%	5,009	13,473
50	12,438	12,706	13,400	9,779	14,300	43.5%	7,179	18,233
100	16,231	16,809	17,100	12,338	19,900	42.6%	9,648	23,969
200	n/a	21,546	n/a	n/a	n/a	42.4%	12,411	30,682
500	n/a	29,075	n/a	19,044	47,860	43.2%	16,514	41,635

* period of gage: 1954-1958, 1967-1976, and 1978

Columns in the above table are explained herein:

A. This column contains the return interval (a.k.a. recurrence event) in years.

B. This is the estimated discharge when applying Method No.1 (USGS Regional Regression of 1994) for each available return period. Equations for the 200- and 500-year returns were not provided within this source.

C. This is the estimated discharge when applying Method No.2 (USGS Regional Regression of 2014) for each available return period.

D. This is the result of gage analysis (a.k.a. flood frequency analysis based on record data) for the inactive USGS Stream Gage 09481750.

E. Discharge values published with the current edition of the FIS-SCC[1].

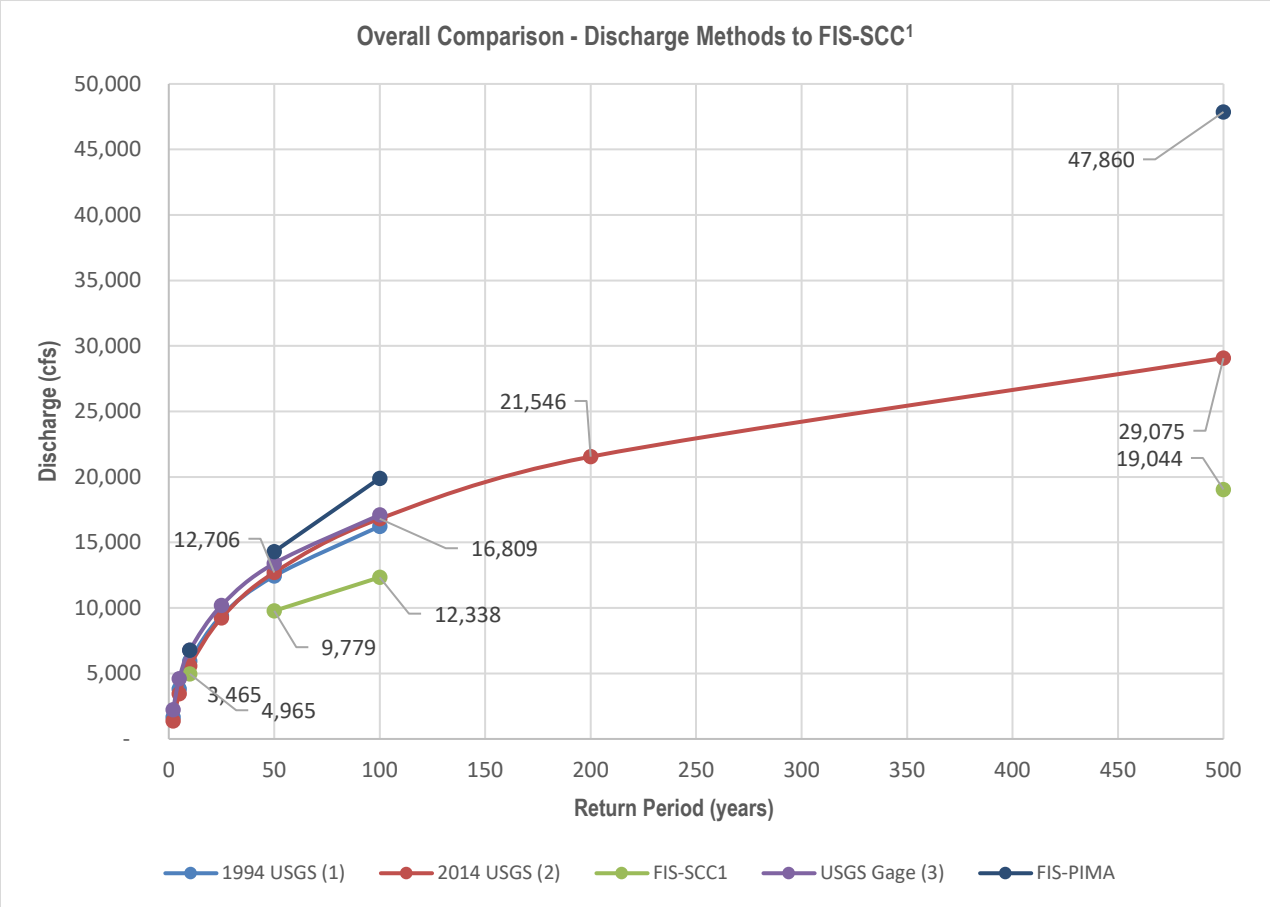
F. Discharge values published with the current edition of the FIS-PIMA[4].

G. The standard deviation associated with Method No.2 (USGS Regional Regression of 2014).

H. The lower limit (i.e., discharge) when applying the standard deviation to the result of Method No.2 (USGS Regional Regression of 2014).

I. The upper limit (i.e., discharge) when applying the standard deviation to the result of Method No.2 (USGS Regional Regression of 2014).

A graphical illustration of the above showing a direct comparison of Methods: 1, 2 and 3 to the FIS-SCC[1] discharges is shown in the following chart.



The above table and chart find close agreement between Methods 1, 2 and 3. However, it should be noted that Method No.3 is based on a limited duration of recorded data (24 years) and none of the recorded events exceeded the estimated 25-year recurrence event. All of the above methods include the potential for errors and therefore offer standard error of prediction factors. The factors included within Method No.2 are included within the final three columns of the table. These results suggest the discharge(s) within the FIS-SCC[1] may be low by comparison. It should also be noted that construction by the Arizona Department

of Transportation (plans dated 1973) may have resulted in changes to the hydraulic rating curve associated with the USGS gage station but no information if this adjustment was undertaken or completed to the gage.

ANANLYSIS OF THE SUBJECT STORM

To evaluate the reasonability of the hydrologic model developed as part of the SCC MapMod study, Stantec modified the effective hydrologic model (i.e., HEC-1) to include average rainfall depth across each of the 24 subbasins (i.e., 48A through 48X) and individual rainfall distribution as provided by Applied Weather Associates (author of the meteorological findings report – see Appendix B) for the subject storm (i.e., September 2, 2018). The results of this hydrologic model (see Appendix C) revision yielded a maximum discharge of 13,973 cfs. Therefore, when this result is compared to both the hydraulic analysis and meteorological analysis, it suggests that the effective hydrologic model may be underreporting discharge(s).

Hydraulic analysis of the resulting hydrograph revealed similar flood inundation limits to that produced in Scenario 5 (12,338 cfs).

RECOMMENDATIONS

Based on the above hydraulic analysis and review of available discharge methods/data, especially considering the difference between the effective discharges between the two Counties (i.e., Pima County and Santa Cruz County) there are several recommendations that Stantec would like to offer.

1. Monitoring
    a. Recommend installation of an ALERT streamflow gage at or near the previous USGS Gage station and share data with the National Weather Service (NWS), Pima County, and Santa Cruz County. It is assumed that the owner of the gage would be Santa Cruz County given the location of the previous gage.
2. Hydrology
    a. Recommend developing a new hydrologic model (i.e., HEC-HMS) of the Sopori Wash watershed and calibrate the model to a historic storm(s) during the period of when the USGS gage was active. Detailed analysis of the following storms is currently available and could be incorporated into the calibration if associated detailed streamflow gage data can be obtained.
        i. October 27-Nov 1, 1959
        ii. September 25-27, 1962
        iii. September 9-11, 1964
        iv. November 21-27, 1965
        v. December 17-22, 1967
        vi. December 16-20, 1968
        vii. September 3-8, 1970

viii. October 3-7, 1972

ix. October 6-10, 1977

b. Obtain approval of the final hydrologic model and resulting discharges from Pima County and Santa Cruz County.

3. Hydraulics

a. Recommend developing new terrain information of Sopori Wash and verify/locate all structures having the capacity to convey or affect the flow of runoff (e.g., Interstate 19 at Arivaca Road). The extent of the terrain needs to include both areas within Santa Cruz County and Pima County.

b. Develop a new hydraulic model, via HEC-RAS, based on the new terrain information and including all structures. The modeling approach will likely include both 1D (upstream and at bridge structures) and 2D elements (just upstream of West Frontage Road to account for flow north into Pima County) to account for the hydraulic complexities found to exist within and along Sopori Wash. The combination of methods is necessary given current known model limitations (i.e., 2D analysis at bridge structures).

4. Regulatory

a. Recommend submitting the hydrologic and/or hydraulic findings to FEMA via a Conditional Letter of Map Revision (CLOMR) based on new hydrology.

We sincerely appreciate the opportunity to provide these important findings to the Regional Flood Control District. If you have any questions, please feel free to call me at (520) 545-7440.

Regards,

Stantec Consulting Services Inc.

Joseph M. Alwin PE
Senior Project Engineer

Phone: (520) 545-7440
Fax: (520) 750-7470
Joe.Alwin@stantec.com

Registered Professional Engineer (Civil)
CERTIFICATE NO. 33412
JOSEPH M. ALWIN
Date Signed 4/8/19
ARIZONA U.S.A.
Expires 3/31/2020

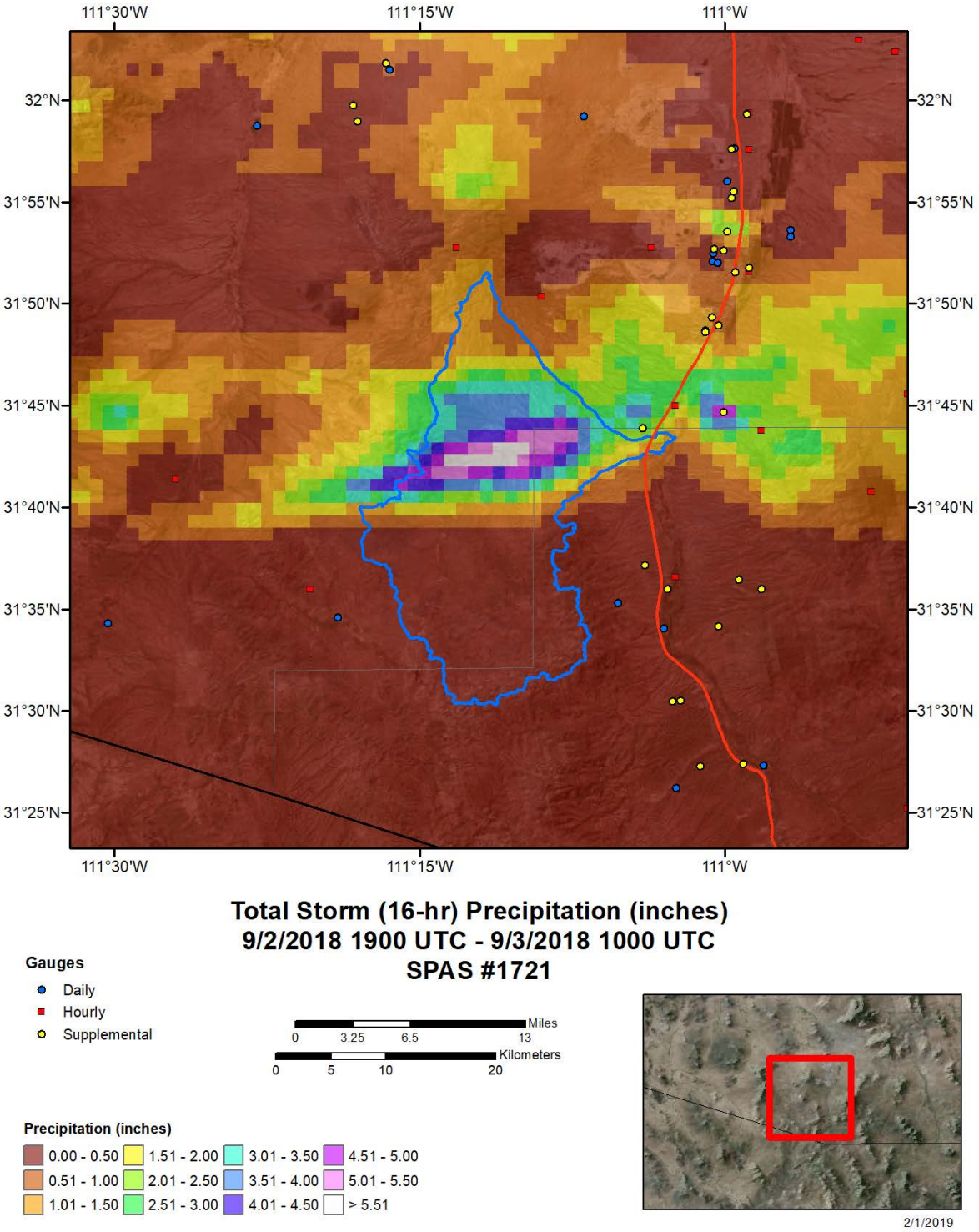
Attachment: Appendix A - References
Appendix B – Applied Weather Associates Meteorological Analysis Report
Appendix C – Modified HEC-1 Model (subject storm and support data)

jma v:\1813\active\181300905\reports\hydraulic_findings\let-sopori-wash_frequency_analysis_20190408-final.docx

Appendix B METEORLOGICAL FINDINGS REPORT

STORM PRECIPITATION ANALYSIS REPORT

Storm of September 2, 2018 1900 UTC – September 3, 2018 1000 UTC
Sopori Wash, AZ
SPAS Storm #1721



Prepared by:

Applied Weather Associates
P.O. Box 175
Monument, CO 80132
http://www.appliedweatherassociates.com/

For:

Stantec Consulting Services, Inc.
5151 E. Broadway Blvd, Suite 400
Tucson, Arizona 85711-3712

02/15/2019

Applied Weather Associates (AWA) strives to provide the highest-quality precipitation data available, but we cannot guarantee the accuracy or completeness of the input weather/radar data, so the results inherently carry a degree of uncertainty. While AWA has attempted to ensure that this documentation and the results of this analysis are as accurate and reliable as possible, we provide the information with the understanding that it is not guaranteed to be completely unequivocal. AWA does not assume liability for any damages caused by inaccuracies in these data and makes no warranty, expressed or implied, as to the utility of this information, nor does the fact of distribution constitute a warranty. Conclusions drawn from such information are the sole responsibility of the user.

For more information on SPAS, please visit http://www.appliedweatherassociates.com/

TABLE OF CONTENTS

ACRONYMS and ABBREVIATIONS 4
1. Introduction 5
1.1 Overview 5
1.2 Methodology 5
1.3 General Storm Information 6
2. Storm Discussion 6
3. Analysis Domain 7
4. Rain Gauge Data 8
4.1 Precipitation Gauge Data Sources 9
5. Radar Data 11
6. Basemap 14
7. Quality Control 16
7.1 General Quality Control Measures 16
8. Storm Analysis Results 19
9. Deliverables 27
10. Conclusions and Confidence in Results 28
11. References 29

LIST OF FIGURES

Figure 1: SPAS flow chart 6
Figure 2: SPAS 1721 analysis domain (purple outline) and the Sopori Wash basin of interest (blue). 8
Figure 3: a) U.S. radar locations and their radial extents b) Tucson (KEMX) radar coverage 13
Figure 4: Total storm grid based on default ZR relationship used as SPAS basemap. Blue outline shows the Sopori Wash basin of interest. 15
Figure 5: SPAS 1721 total storm precipitation for September 2, 2018 1900 UTC to September 3, 2018 1000 UTC. The Sopori Wash basin of is outlined in blue. 21
Figure 6: Mass curves for September 2, 2018 1900 UTC to September 3, 2018 1000 UTC at the storm center. 22
Figure 7: SPAS 1721 DAD image for September 2, 2018 1900 UTC to September 3, 2018 1000 UTC . 22
Figure 8: Spatially mapped 1-hour maximum point rainfall 23
Figure 9: Spatially mapped 2-hour maximum point rainfall 24
Figure 10: Spatially mapped 3-hour maximum point rainfall 24
Figure 11: Spatially mapped 6-hour maximum point rainfall 25
Figure 12: Spatially mapped 1-hour point AEP 25
Figure 13: Spatially mapped 2-hour point AEP 26

Figure 14: Spatially mapped 3-hour point AEP 26
Figure 15: Spatially mapped 4-hour point AEP 27

LIST OF TABLES

Table 1: General storm information. 6
Table 2: Types of precipitation gauge data used in this analysis 9
Table 3: NEXRAD radar sites used in analysis 12
Table 4: SPAS 1721 DAD table for September 2, 2018 1900 UTC to September 3, 2018 1000 UTC 23
Table 5: Deliverables provided with this analysis 27
Table 6: Pertinent GIS precipitation grid metadata 28

APPENDICES

Appendix A: Storm Precipitation Analysis System (SPAS) Description
Appendix B: Station Catalog Table

ACRONYMS AND ABBREVIATIONS

AEP	Annual Exceedance Probability
AGL	Above Ground Level
AP	Anomalous Propagation
ARI	Average Recurrence Interval
AWA	Applied Weather Associates
CoCoRaHS	Community Collaborative Rain, Hail, & Snow Network
DAD	Depth Area Duration
dBZ	Decibel Relative to Z
GUI	Graphical User Interface
MADIS	NCEP Meteorological Assimilation Data Ingest System
NADP	National Atmospheric Deposition Program
NCEI	National Centers for Environmental Information
NEXRAD	Next Generation Radar
NSSL	National Severe Storm Laboratory
NTN	National Trends Network
NWS	National Weather Service
PMP	Probable Maximum Precipitation
PCRFCD	Pima County Regional Flood Control District
QA	Quality Assurance
QC	Quality Control
R	Rainfall
RAWS	Remote Automated Weather Stations
SPAS	Storm Precipitation Analysis System
Stantec	Stantec Consulting Services Inc.
USGS	United States Geologic Survey
UTC	Coordinated Universal Time
WDSS-II	Warning Decision Support System – Integrated Information
Z	Reflectivity
ZR	Reflectivity-Rainfall Relationship

1. INTRODUCTION

1.1 Overview

This document describes the methodology and results of a detailed analysis of the storm precipitation in and around the region of Sopori Wash near Amado, Arizona on or about September 2, 2018. This storm was analyzed with Applied Weather Associates (AWA) propriety software program the Storm Precipitation Analysis System (SPAS), a hydrometeorological tool that defines precipitation data at high spatial and temporal resolutions for use in a variety of applications (Tomlinson et al., 2004; Tomlinson et al., 2006; Hultstrand et al., 2008). The approach taken by SPAS relies on precipitation gauge observations to provide quantification of the precipitation magnitudes, while relying on "basemaps" and optimized NEXRAD weather radar data to provide the spatial distribution of precipitation between gauges. SPAS has been used to analyze over 720 storm centers among highly varied meteorological and topographical settings in support of numerous local, state and federally-accepted studies, model calibrations, and in support of forensic meteorological investigations. SPAS has been through the Nuclear Regulatory Commission (NRC) software verification process and has been accepted by the NRC review to provide accurate representations of spatial and temporal rainfall accumulations and Depth Area Duration (DAD) analysis. In addition, the SPAS software has been accepted as accurate representations of rainfall accumulation in courts of law. Example Cases are listed in Section 10.

1.2 Methodology

SPAS is a state-of-the-science hydro-meteorological tool that produces several value-added benefits over traditional gauge-adjusted NEXRAD precipitation (e.g. National Weather Service Multi-Sensor Precipitation Estimates). SPAS utilizes statistical and meteorological methods of gauge-calibrated and gauge-adjusted radar-estimated precipitation to produce the high-quality gridded precipitation data. All SPAS analysis results have been accepted for use by Federal and state regulatory agencies and in courts of law in the development of Probable Maximum Precipitation (PMP) depths, model calibration/validation, and as accurate depictions of rainfall accumulations in space and time. Figure 1 shows the SPAS flowchart. Appendix A provides an in-depth description of the SPAS software and analysis methods.

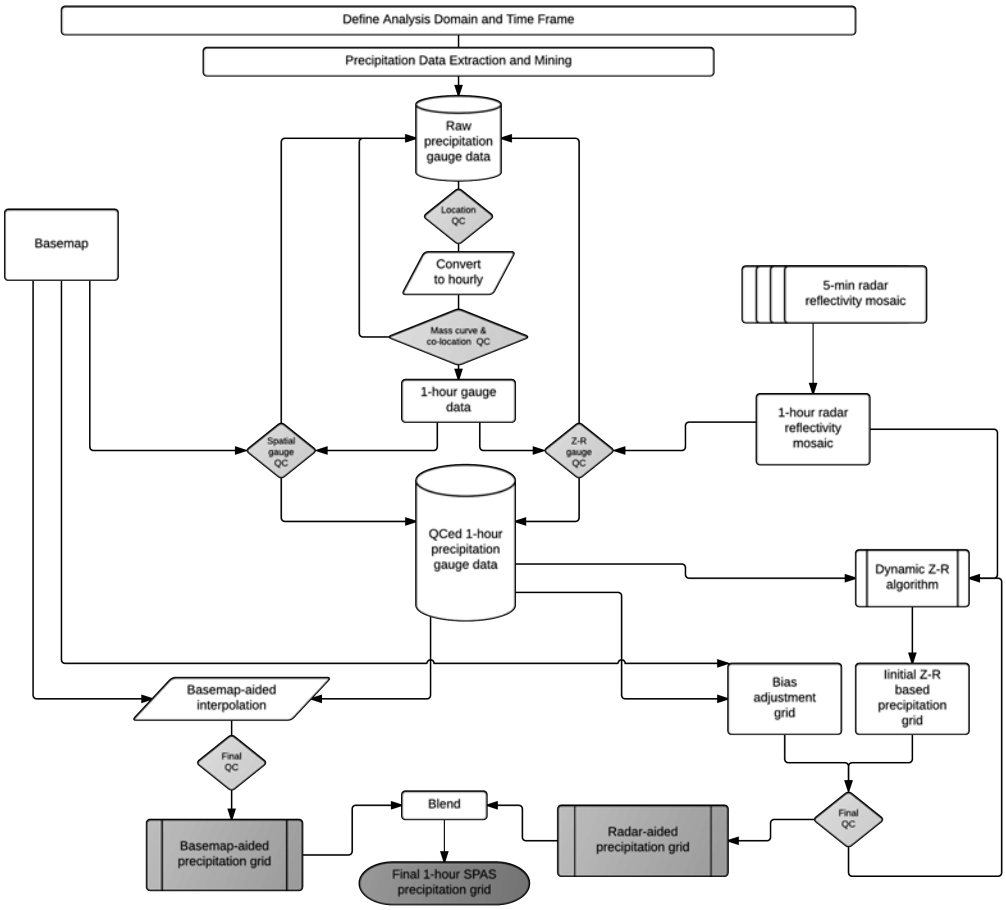


Figure 1: SPAS flow chart

1.3 General Storm Information

This storm analysis quantified the magnitude, spatial and temporal precipitation characteristics in the region around southern Arizona from September 2 through September 3, 2018. Table 1 represents some general information on this storm analysis.

Table 1: General storm information.

General location	Start date/time	End date/time	Duration (hours)	SPAS Storm No.	SPAS Version No.
Southern Arizona "Sopori Wash"	September 2 2018 1900 UTC	September 3 2018 1000 UTC	16	1721	10.0

2. STORM DISCUSSION

Arizona has a distinct bi-modal seasonal precipitation regime for much of the state, where general frontal winter storms bring precipitation from November through early March while the North American Monsoon (NAM) brings convective rainfall from early July through September (Kappel et al., 2013).

Thunderstorms are an almost daily occurrence once the NAM season sets in, usually starting in late June or early July. Often, the first indicator that severe convective weather will soon develop is the presence of a "Gulf Surge" of low-level moisture which often precedes storm development by several hours (Green and Pytlak, 2003). Most of the storms have a life cycle of less than three hours. Storm initiation generally occurs over the elevated terrain of the Mogollon Rim. Storms then move west and south reaching the lower deserts by early evening. Additionally, drainage winds and outflow boundaries associated with terrain and thunderstorm activity converge with hot, moist, and unstable air to initiate thunderstorms over the lower elevations (Wallace, 1999). Environments with exceptionally high atmospheric moisture levels combine with lift from a short wave trough or area of low pressure moving through the region to produce storms that can last longer and produce large amounts of rain (1-2 inches per hour for several hours) over the region.

3. ANALYSIS DOMAIN

It is important to establish a geographic region (that is the SPAS analysis domain) that completely encompassed the target area and contains enough rainfall data to adequately derive reliable radar-precipitation intensity relationships (ZR). A ZR relationship is an empirical formula that is used to estimate rainfall rates from reflectivity signal strength. The domain is defined by evaluating existing documentation on the storm as well as plotting and evaluating initial precipitation gauge data on a map. Effort is made to include as many hourly recording gauges as possible given their importance in timing for non-hourly gauges. The domain is created using a longitude-latitude (upper left to lower right corner) rectangular region. The domain analyzed for this storm was 32.10°N -111.70°W to 31.20°N -110.62°W as shown in purple in Figure 2. The Sopori Wash basin of interest is outlined in blue (Figure 2).

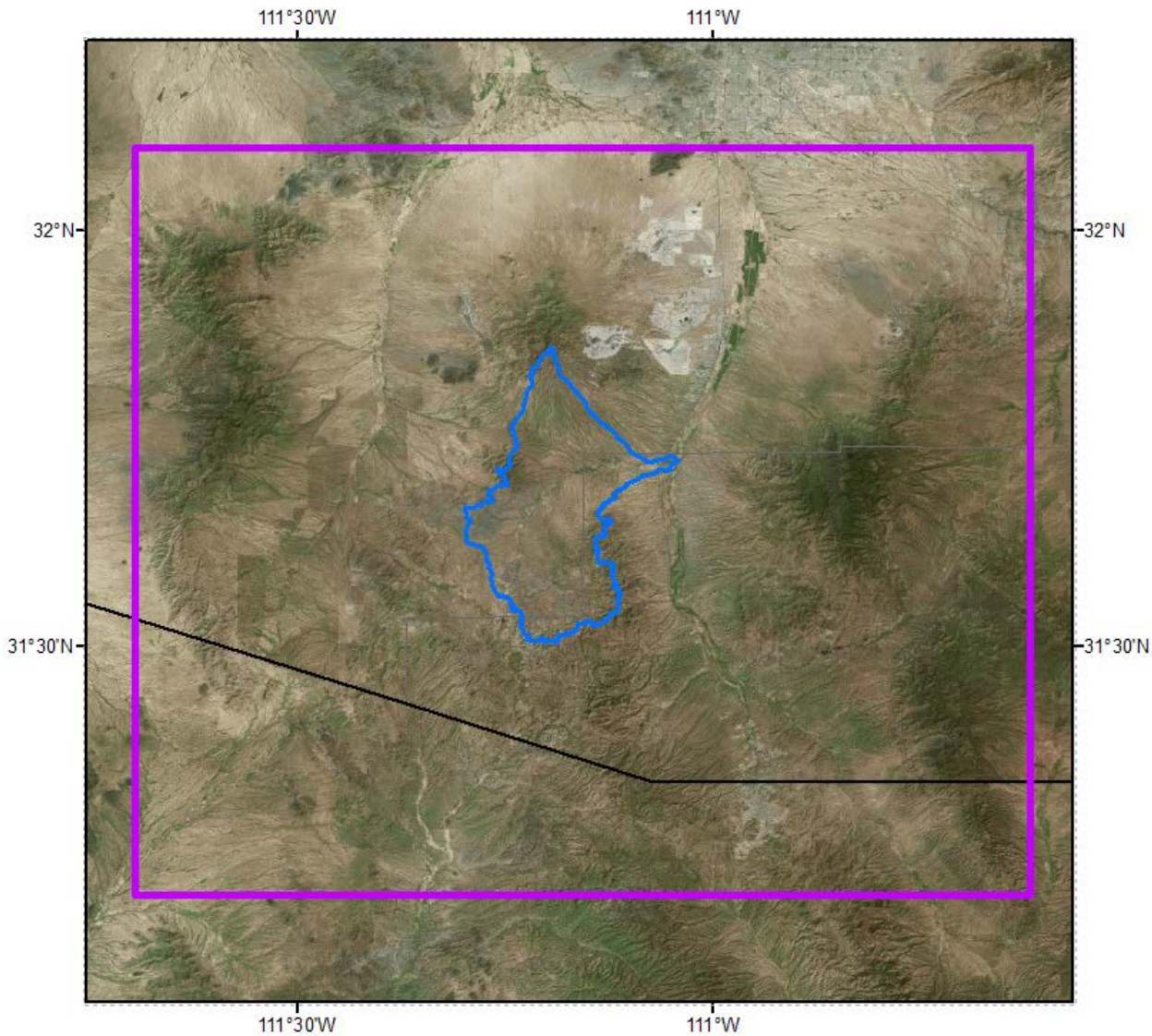


Figure 2: SPAS 1721 analysis domain (purple outline) and the Sopori Wash basin of interest (blue).

4. RAIN GAUGE DATA

The foundation of a SPAS analysis are quality controlled rain gauge observations. These are considered "ground truth" precipitation measurements. Table 2 summarizes the gauge data used in this analysis. A total of 91 gauges were used in this analysis. Those not used, due to quality or duplication issues, were labeled as omitted; for a complete station list for stations used see Appendix B.

Table 2: Types of precipitation gauge data used in this analysis

Gauge Type	Description	Abbreviation by Gauge Type	No. of stations
Hourly	Hourly gauges with complete or nearly complete, incremental hourly precipitation data	H	26
Hourly estimated	Hourly gauges with some estimated hourly values, but otherwise reliable	HE	0
Hourly pseudo	Hourly gauges with reliable temporal precipitation data, but the magnitude is questionable in relation to co-located daily or supplemental gauges	HP	1
Hourly estimated pseudo	Combination of hourly estimated and hourly pseudo	HEP	0
Daily	Daily gauges with complete data and known observation times	D	25
Daily estimated	Daily gauges with some or all estimated data	DE	0
Supplemental	Gauges with unknown or irregular observation times, but reliable precipitation data	S	36
Supplemental estimated	Gauges with estimated precipitation values based on other information such as radar, pre-existing total storm isohyetal maps or public storm reports	SE	3

For this analysis, AWA acquired, quality-controlled rain gauge data from the sources listed below. Although some of these sources are not considered official, if the precipitation data passed all of AWA's stringent quality assurance/quality control (QA/QC) tests (see Section 8.0 and Appendix A), then it was used in the analysis. A list of independent precipitation observation networks utilized in the analysis are listed in the section below.

4.1 Precipitation Gauge Data Sources

Automated Surface Observing System (ASOS)
Iowa State University provides an online interface which allows for the hourly download of ASOS data per state. Choosing Texas ASOS in the dropdown Network, an interactive map of available data stations are presented from which you can choose to download data from. Hourly data are formatted incrementally and represents the precipitation recorded between observation times per the ASOS download description guide.
https://mesonet.agron.iastate.edu/request/download.phtml?network=AZ_ASOS

National Atmospheric Deposition Program (NADP)
The NADP provides multiple datasets from which to choose. For the purpose of retrieving daily precipitation data, the National Trends Network (NTN) dataset was chosen. A site list of all NTN stations is provided including a handful located in Texas. Daily data are retrieved and formatted with a timestamp and type of precipitation, being it rain or snow.
http://nadp.slh.wisc.edu/data/

Remote Automated Weather Stations (RAWS)
The Western Regional Climate Center uses an interactive map with clickable station locations to retrieve data. After choosing an individual station in the region, a Daily Summary Time Series is used to specify start and end dates as well as Precipitation as the meteorological element. Only “Complete Data” was chosen which requires all observations for the day or the element is considered missing per RAWS documentation.
https://raws.dri.edu/index.html

United States Geologic Survey (USGS)

Using a bounding latitude/longitude box and Precipitation Total as the meteorological parameter, USGS returns surface-water daily data for the nation. Data retrieved was downloaded in two formats. The first format was in 15-minute increments and displayed as accumulated values. This station data was marked "A" approved for publication per USGS documentation. The second format downloaded was daily rainfall data from rain gauge stations in the area. This station data has been marked "P" for provisional data subject to revision per USGS documentation. Data are provisional and subject to revision until they have been thoroughly reviewed and received final approval.
https://waterdata.usgs.gov/nwis/dv?referred_module=sw&search_criteria=lat_long_bounding_box&submitted_form=introduction

National Centers for Environmental Information (NCEI)

Both daily and hourly precipitation data were downloaded from the NCEI's interactive map interface online. Hourly and Daily data layers are available using the Time-Related Maps. Using the Hourly Precipitation Layer along with the Rectangle Tool, hourly data was retrieved in comma separated value format. Station Name, Data Flags and Standard Units were chosen for output options. Daily data was also downloaded using the same process and the GHCN Daily Layer.
https://gis.ncdc.noaa.gov/maps/ncei#app=cdo

NCEP Meteorological Assimilation Data Ingest System (MADIS)

MADIS ingests data from both NOAA and non-NOAA providers and outputs numerous datasets. The following datasets had station data used available specifically for this study: HADS, APRXWXNET, LCRA, and RAWS. Hourly and daily data have been downloaded and used in this analysis. While AWA can query this data directly, it can be found online through multiple resources.
https://madis.ncep.noaa.gov/

Weather Underground

Five-minute precipitation data was provided to AWA in an Excel spreadsheet for multiple stations located in the area. Accumulated precipitation in millimeters was converted to inches and the total for the duration of the SPAS analysis was used as supplemental data. Historical weather data can be found on Weather Underground's website by entering a City, ZIP Code, or Airport Code along with dates of reference.
https://www.wunderground.com/history/

Community Collaborative Rain, Hail, & Snow Network (CoCoRaHS)

Daily precipitation data from this resource is provided by volunteers across the nation who report observations using rain gauge specified by CoCoRaHS. Observations are recorded on the CoCoRaHS website and is used by the National Weather Service.
https://www.cocorahs.org/

Arizona Rain Log

Rainlog.org is a cooperative rainfall network for Arizona with most gauges located at individuals' homes and data reported daily. Daily precipitation data was downloaded from this website through their interactive map. Choosing a date range and clicking on a specific site brings up a year-to-date table with the gauge

readings. Observation times for daily data were not provided so data gathered was used as supplemental data.
https://rainlog.org/map;dateStart=2018-09-03

Pima County Regional Flood Control District ALERT Network
The PIMA ALERT network consists of rainfall data from remote automated sensors. Using the interactive map, nine different time intervals from 10-minute to 30-days can be chosen to retrieve rainfall data. AWA downloaded 1-hour rainfall data in CSV form using the historic date range interface for Arizona.
https://alertmap.rfcd.pima.gov/Gmap/Gmap.html

5. RADAR DATA

A fundamental requirement for radar-estimated precipitation is a high-quality radar mosaic, which is a seamless collection of concurrent weather radar data from individual radar sites covering the domain; however, in some cases a single radar is enough (i.e., for a small area size storm event such as a thunderstorm). SPAS utilizes NCEI 5-minute Level II NEXRAD radar reflectivity data in units of dBZ. NCEI accesses, mosaics, quality-controls and re-formats NEXRAD radar data from NOAA using a version of WDSS-II from the National Severe Storm Laboratory (NSSL). WDSS-II imposes several quality control algorithms to remove non-precipitation artifacts from the base Level–II radar data. Upon completing all QC, the radar data are re-projected from its native polar coordinate projection into a longitude-latitude Cartesian grid for processing in SPAS. The logic associated with this transformation is embedded in WDSS-II code and uses a nearest-neighbor technique, which literature has shown to cause the lowest root-mean-square errors (Zhang, 2005). During 2008-09, the NEXRAD (WSR-88D) radars were upgraded to produce data with increased spatial resolution, called super resolution. The earlier legacy resolution data provided reflectivity at 1.0 degree azimuthal by 1 km range resolution, which results in a latitude-longitude resolution of approximately 1-km^2. Meanwhile, the upgraded super resolution data provides radar reflectivity at 0.5 degree azimuthal by 250 m range resolution, which results in a latitude-longitude resolution of approximately 0.25-km. The results of this storm analysis are at a spatial resolution of 1-km^2 (0.38 mi^2).

The use of rain gauge data and optimized radar information builds on the strengths of each data set to provide the most accurate representation of the rainfall accumulation possible. The rain gauge data provide ground truth at individual points and are used to optimize the reflectivity values from the radar. The radar data provides excellent information on the spatial coverage of rainfall between rain gauges. Then, once the radar data are optimized to fit the ground truth rain gauge observations, an adjustment is applied to the entire domain to optimize the radar data and produce an accurate reflectivity that is converted into an accumulation. See Figure 3 for a map of the U.S. radar locations and a zoomed in region around Sopori Wash basin and the region of interest. Table 3 lists the radar sites whose data was used in the 5-minute radar mosaics for this analysis.

Table 3: NEXRAD radar sites used in analysis

Radar(s)	Outages during analysis
Mosaic dominated by: - **Tucson AZ (KEMX)** - **Phoenix AZ (KIWA)** - **Yuma AZ (KYUX)**	None

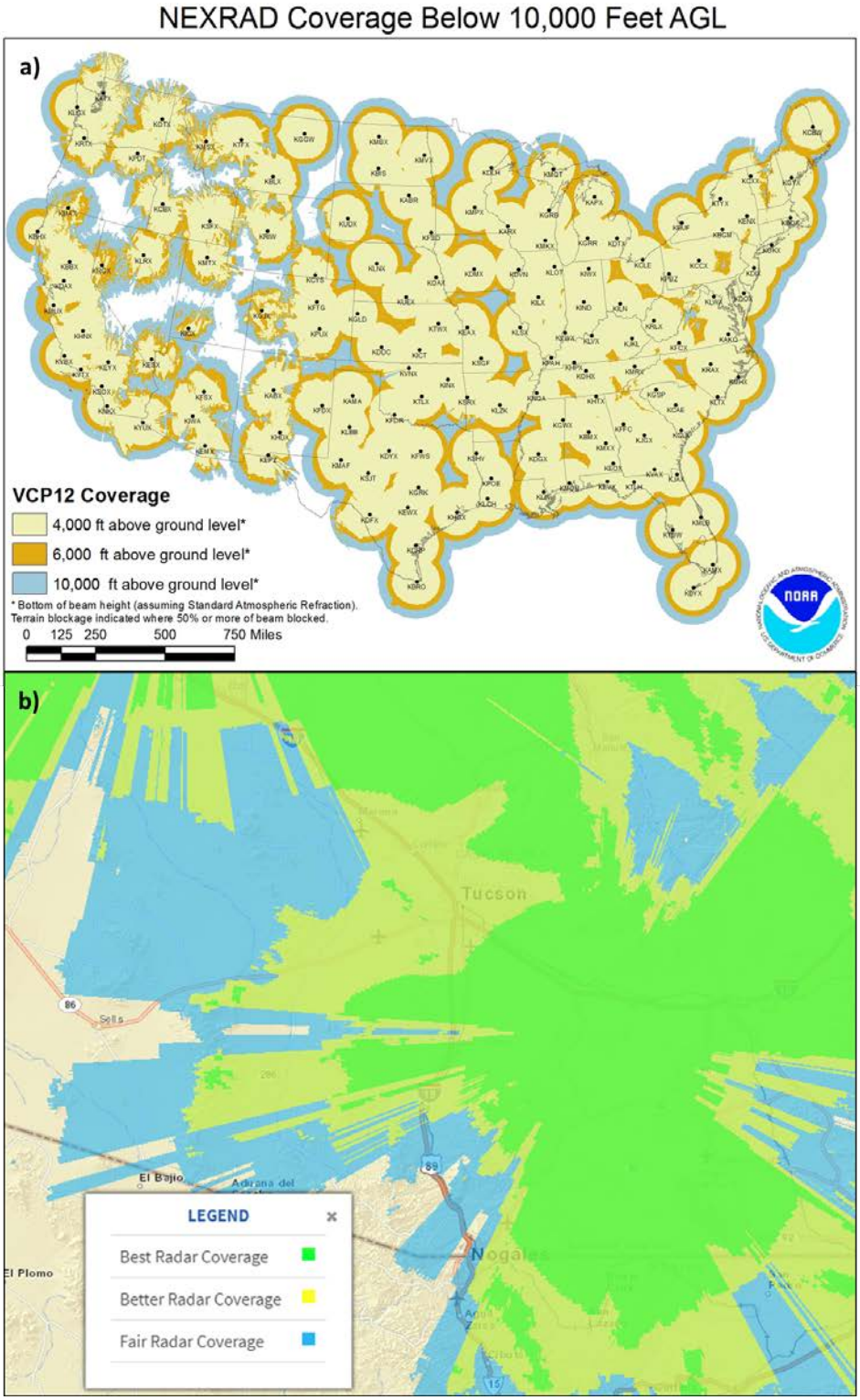


Figure 3: a) U.S. radar locations and their radial extents of coverage below 10,000 feet above ground level (AGL). Each U.S. radar covers an approximate 285 mile (460 km) radial extent over which the radar can detect precipitation. b) Tucson (KEMX) radar coverage across region of interest is within "Best Radar", "Better Radar", and "Fair Radar" coverage.

6. BASEMAP

"Basemaps" are independent grids of spatially distributed weather or climate variables that are used to govern the spatial patterns of the hourly precipitation in the absence of radar data. Sometimes referred to as "climatologically-aided" interpolation, the basemap and gauge precipitation are combined to produce seamless grids of precipitation. Even if radar data are available, independent grids of hourly precipitation are produced using the basemap to provide a non-radar influenced result for QA/QC purposes. Basemaps are particularly helpful in complex terrain where orographic enhancement and micro-climates need to be resolved. The most common basemaps used in SPAS are PRISM mean monthly/annual precipitation, individual monthly precipitation grids, or precipitation frequency grids (e.g., 100-year 24-hour). In flat terrain, basemaps do not provide a significant improvement in quantifying the spatial patterns because terrain does not influence the precipitation gradients. Therefore, basemaps are often developed from pre-existing (hand-drawn) isohyetal patterns, composite radar imagery or a blend of both. In rare cases, across flat terrain with dense gauge data, a basemap is not used at all. For this analysis, a total storm grid based on a default convective ZR of $z=300R^{1.4}$ relationship was used as the basemap (Figure 4).

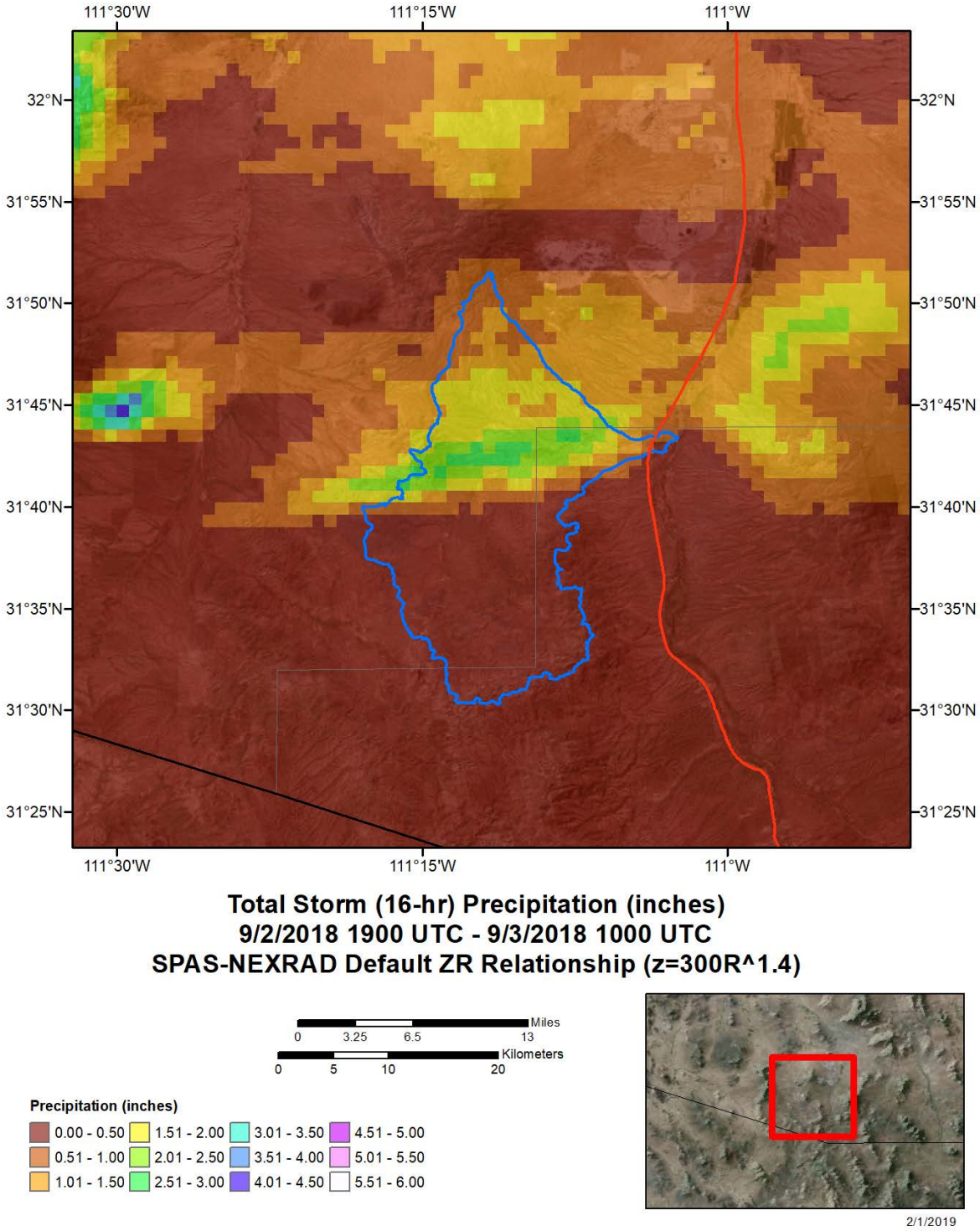


Figure 4: Total storm grid based on default ZR relationship used as SPAS basemap. Blue outline shows the Sopori Wash basin of interest.

7. QUALITY CONTROL

7.1 General Quality Control Measures

Although AWA considers rain gauge data "ground truth," we recognize gauges themselves suffer from inaccuracies. AWA takes several steps to ensure the rain gauge data are accurate and representative. Exhaustive quality control measures are taken throughout the SPAS process. The QA/QC steps include:

- Spatial Check
  - A visual inspection of the spatially interpolated total storm gauge values helped identify suspicious values.
- Mass Curve Check
  - Mass curve plots (time versus accumulated precipitation) for every gauge (plus the nearest four others) were created and evaluated for inconsistencies in timing and magnitude.
- Elevation Check
  - All gauges with elevations that deviated from a high-resolution DEM were flagged and checked for correct coordinates.
- Statistical Check
  - Precipitation values (at gauges with reliable radar data) that differed more than a pre-defined set of standard deviations from the established Z-R relationship were identified and checked.
- Intensity Check
  - The spatial patterns and magnitudes of the maximum storm intensities at various durations (usually at 1-, 6-, 12-, and 24-hours) were evaluated and verified against surrounding stations and published reports.
- SPAS vs. gauge precipitation evaluation
  - Comparing SPAS-calculated precipitation to observed point precipitation depths at the rain gauge locations provided an objective measure of the consistency, accuracy and bias. Any large differences were evaluated and resolved.

Generally, when comparing SPAS-calculated precipitation to observed point precipitation depths at the rain gauge locations, SPAS is usually within 5% of the observed precipitation (see Appendix B). Less-than-perfect correlations between SPAS precipitation depths and observed precipitation at gauged locations could be the result of any number of issues, including:

- Point versus area
  - A rain gauge observation represents a much smaller area than the area sampled by the radar. The area that the radar samples is approximately 1-km^2 (the native non-dual polarization radar resolution which was used in this analysis) whereas a rain gauge only samples a point, approximately 8.0×10^{-9} km^2. Furthermore, the radar

data represent an average reflectivity (Z) over the grid cell, when in fact the reflectivity can vary across the 1-km^2 grid cell. Therefore, a radar-derived precipitation value for a grid cell and a gauge-measured (point) precipitation depth may vary.

- Gauge measurement inaccuracies
  - Precipitation gauges, shielded or unshielded, can inherently underestimate total precipitation due to wind under-catch, wetting, and evaporation. The general rule-of-thumb is 1% of the precipitation is lost for every 1 mph. Therefore, a 10-mph wind can cause up to 10% error (under-catch) (Guo et al., 2001; Duchon and Essenberg, 2001; Ciach, 2003; Tokay et al., 2010). Tipping buckets miss a small amount of precipitation during each tip of the bucket due to the bucket travel and tip time. As precipitation intensities increase, the volumetric loss of precipitation due to tipping tends to increase. The amount of volumetric loss varies depending on whether the individual gauge is dynamically calibrated versus statically calibrated. Dynamically calibrated gauges are able to adjust to the rainfall accumulation pattern as it occurs and therefore provide better accuracy for a given rainfall accumulation event. Smaller tipping buckets can have higher volumetric losses due to higher tip frequencies, but on the other hand capture higher precision timing. Given the uncertainty, AWA makes no attempt to adjust for under-catch other than removing stations that are clearly inconsistent for reasons we believe associated with wind under-catch. No adjustment for undercatch is consistent with NWS procedures.
- Radar calibration
  - NEXRAD radars calibrate reflectivity every volume scan using an internally generated test. The test determines changes in internal variables such as beam power and path loss of the receiver signal processor since the last off-line calibration. If this value becomes large, it is likely that there is a radar calibration error that will translate into less reliable precipitation estimates. The calibration test is supposed to maintain a reflectivity precision of one dBZ. A one dBZ error can result in an error in reflectivity of up to 17% using the default Z-R relationship $Z=300R^{1.4}$. Higher calibration errors will result in higher R_{spas} errors. However, SPAS performs correlations each hour to minimize this calibration issue. The NWS generally keeps their radars well calibrated, so this error is generally negligible. If there were an error in the calibration, the reflectivity-to-rain-rate algorithm generated by SPAS can help to overcome this.
- Attenuation
  - Attenuation is the reduction in power of the radar beam's energy as it travels from the antenna to the target and back. It is caused by the absorption and the scattering of power from the beam by precipitation. Attenuation can result in errors in Z as large as 1 dBZ especially when the radar beam is sampling a large area of heavy

precipitation. In some cases, precipitation can be so intense (>12 inches/hour) that individual storm cells become "opaque" and the radar beam is totally attenuated. However, with sufficient gauge data (20-30 stations minimum) density, SPAS QA/QC and interpolation algorithms overcome attenuation issues.

- Range effects
  - The curvature of the Earth and radar beam refraction result in the radar beam becoming more elevated above the surface with increasing range. With the increased elevation of the radar beam comes a decrease in Z values due to the radar beam not sampling the main precipitation portion of the cloud (i.e., "over topping" the precipitation and/or cloud altogether). Additionally, as the radar beam gets further from the radar, it naturally samples a larger and larger area, therefore amplifying point versus area differences.
- Radar Beam Occultation/Ground Clutter
  - Radar occultation (beam blockage) results when the radar beam's energy intersects terrain features such as mountains or buildings. The result is an increase in radar reflectivity values that can result in higher than normal precipitation estimates. The processing algorithms account for these issues, but SPAS uses GIS spatial interpolation functions to infill areas suffering from poor or no radar coverage.
- Anomalous Propagation (AP)
  - AP is false reflectivity echoes produced by unusual rates of refraction in the atmosphere. WDSS-II algorithms remove most of the AP and false echoes. However, in extreme cases the air near the ground may be so cold and dense that a radar beam that starts out moving upward is bent all the way down to the ground. This produces erroneously strong echoes at large distances from the radar. Again, equipped with sufficient gauge data, the SPAS bias corrections will overcome AP issues.

SPAS is designed to overcome these short-comings by optimizing radar data for defining the spatial patterns and relative magnitudes of precipitation but allowing measured precipitation values ("ground truth") at gauges to govern the magnitudes. When necessary and justified, the observed precipitation values at gauges are adjusted up (or down) so that the SPAS gridded results after combining rain gauge and radar optimizing are consistent with observed gauge values. A very large difference exists between an accepted rain gauge observation and a SPAS produced grid-cell depth when an erroneous gauge value was included, mis-located gauge information is used, and/or when an incomplete data record exists at the gauge. In these cases, the gauge may be removed or adjusted to correct the known error. No station data were adjusted for the Sopori Wash analysis (SPAS 1721).

8. STORM ANALYSIS RESULTS

This analysis was based on 91 hourly stations, daily data, and supplemental station data and 5-minute radar data. The SPAS analysis was completed for a total of 16-hours, with the storm occurring in less than 6-hours. We have a good degree of confidence for the storm total, hourly, and sub-hourly results. The spatial pattern is dependent on the radar data, gauge data, and basemap. The 16-hour rainfall total storm image is shown in Figure 5. There is a good degree of confidence with the timing based on the hourly stations near the storm center (Figure 6).

The accurate, high-resolution precipitation grids produced by SPAS allow for a variety of data to be created for use in hydrologic design and calibration. The hourly grids were used to perform a depth-area-duration (DAD) analysis, an objective three-dimensional perspective of the storms precipitation in time and space conveyed through a table and plot (Figure 7 and Table 4). The DAD data are a crucial input for probable maximum precipitation (PMP) studies.

An average recurrence interval (ARI) is sometimes also known as 'return period'. It is the average number of years that it is predicted will pass before an event of a given magnitude occurs at a given location. An annual exceedance probability (AEP) is the probability of an event occurring in any given year. For example, a 1% AEP means there is a 1% chance in any given year of the event occurring. This means that on average 1 event of this size will occur every 100 years. Therefore, 1% AEP is equal to a 100-year ARI, a 2% AEP is a 50-year ARI, and a 10% AEP is a 10-year ARI. For this storm analysis, AEP grids for the 1-hour, 2-hour, 3-hour, and 6-hour maximum rainfall over the SPAS domain were created utilizing the hourly SPAS gridded rainfall and NOAA Atlas 14 precipitation frequency grids (Bonnin et al., 2011). Because the beginning of the rainfall period for a select duration is not identical across the area, the maximum rainfall grids and AEP grids do not characterize rainfall at any particular point in time, but rather within the whole event.

The maximum 1-hour precipitation at each grid cell that occurred within the 16-hour storm analysis is shown in Figure 8, an average value of 0.26-inches fell with a minimum of 0-inches and a maximum of 3.35-inches. The maximum 2-hour precipitation at each grid cell that occurred within the 16-hour storm analysis is shown in Figure 9, an average value of 0.37-inches fell with a minimum of 0-inches and a maximum of 5.48-inches. The maximum 3-hour precipitation at each grid cell that occurred within the 16-hour storm analysis is shown in Figure 10, an average value of 0.41-inches fell with a minimum of 0-inches and a maximum of 6.00-inches. The maximum 6-hour precipitation at each grid cell that occurred within the 16-hour storm analysis is shown in Figure 11, an average value of 0.46-inches fell with a minimum of 0-inches and a maximum of 6.05-inches.

The 1-hour AEP for the SPAS domain is shown in Figure 12, the average point AEP is 1.8-years with a minimum of 1-year and a maximum of 502-years. The 2-hour AEP for the SPAS

domain is shown in Figure 13, the average point AEP is 8.4-years with a minimum of 1-year and a maximum greater than 1000-years. The 3-hour AEP for the SPAS domain is shown in Figure 14, the average point AEP is 10.4-years with a minimum of 1-year and a maximum greater than 1000-years. The 6-hour AEP for the SPAS domain is shown in Figure 15, the average point AEP is 7.6-years with a minimum of 1-year and a maximum greater than 1000-years.

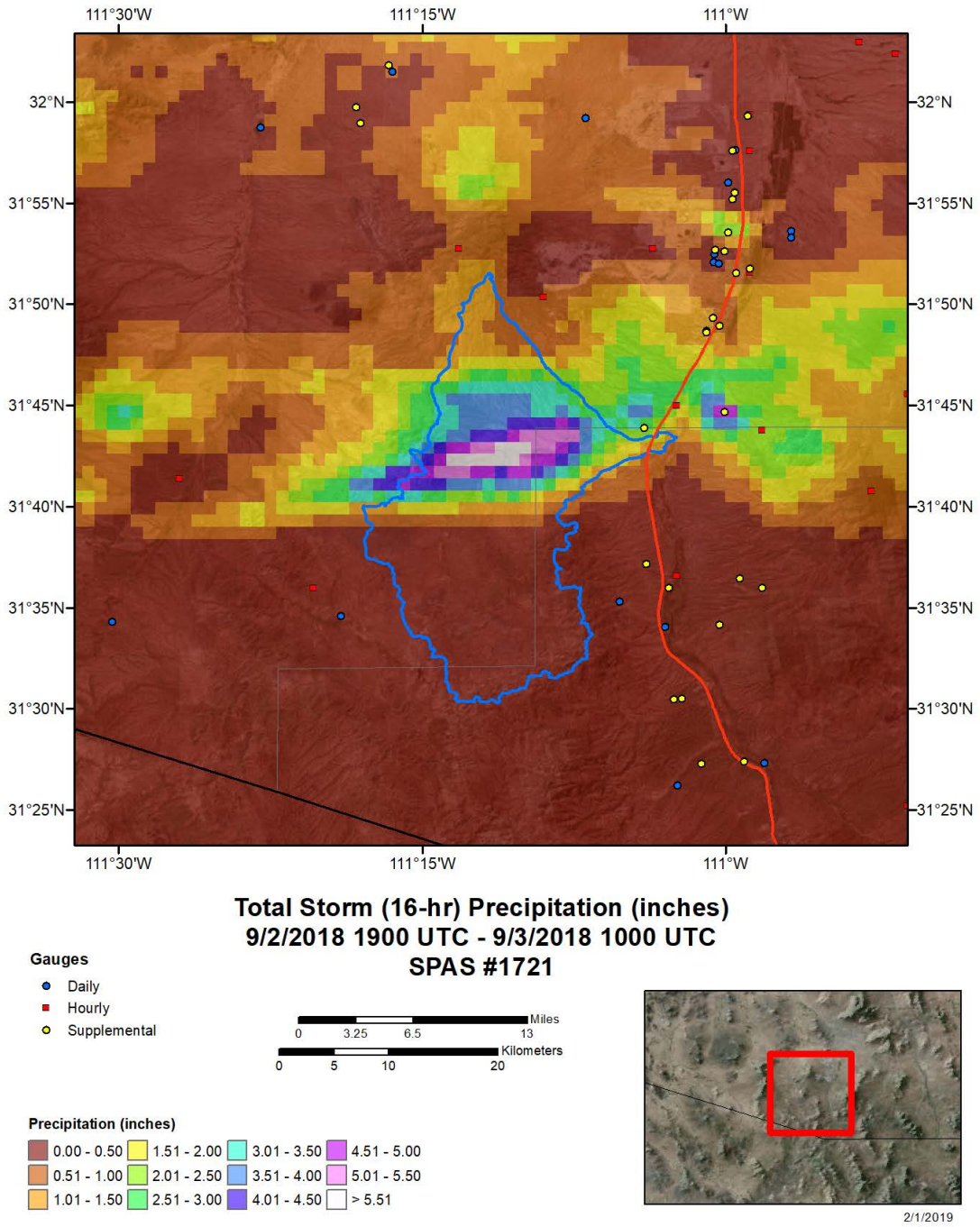


Figure 5: SPAS 1721 total storm precipitation for September 2, 2018 1900 UTC to September 3, 2018 1000 UTC. The Sopori Wash basin of is outlined in blue.

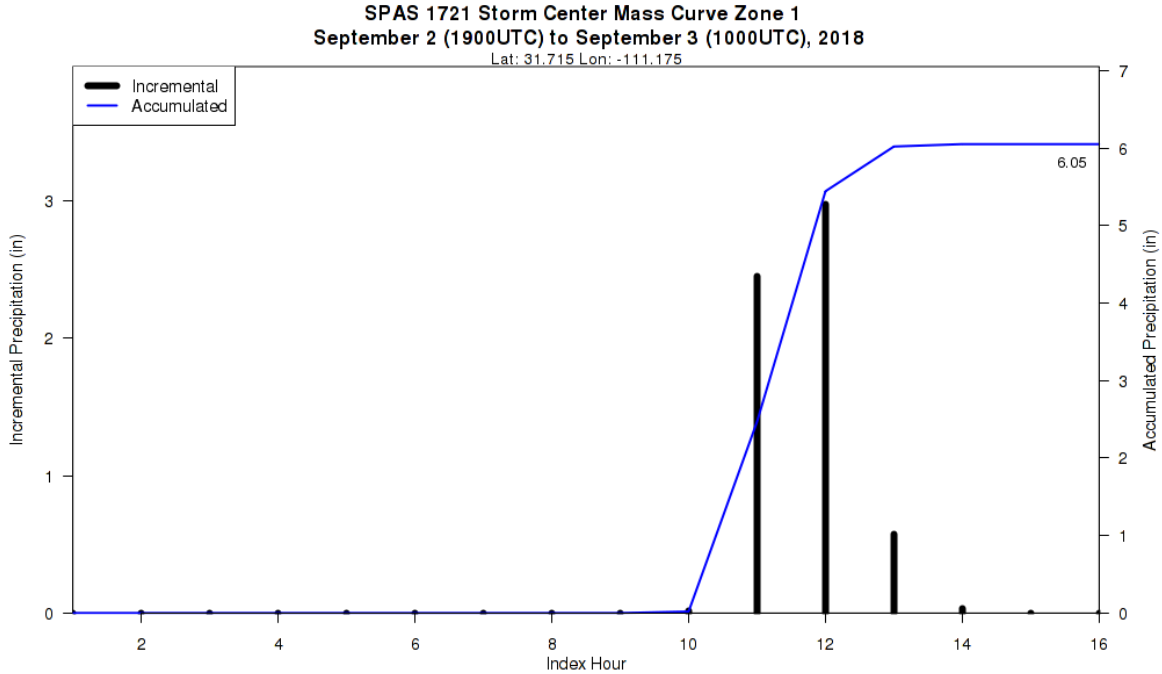


Figure 6: Mass curves for September 2, 2018 1900 UTC to September 3, 2018 1000 UTC at the storm center.

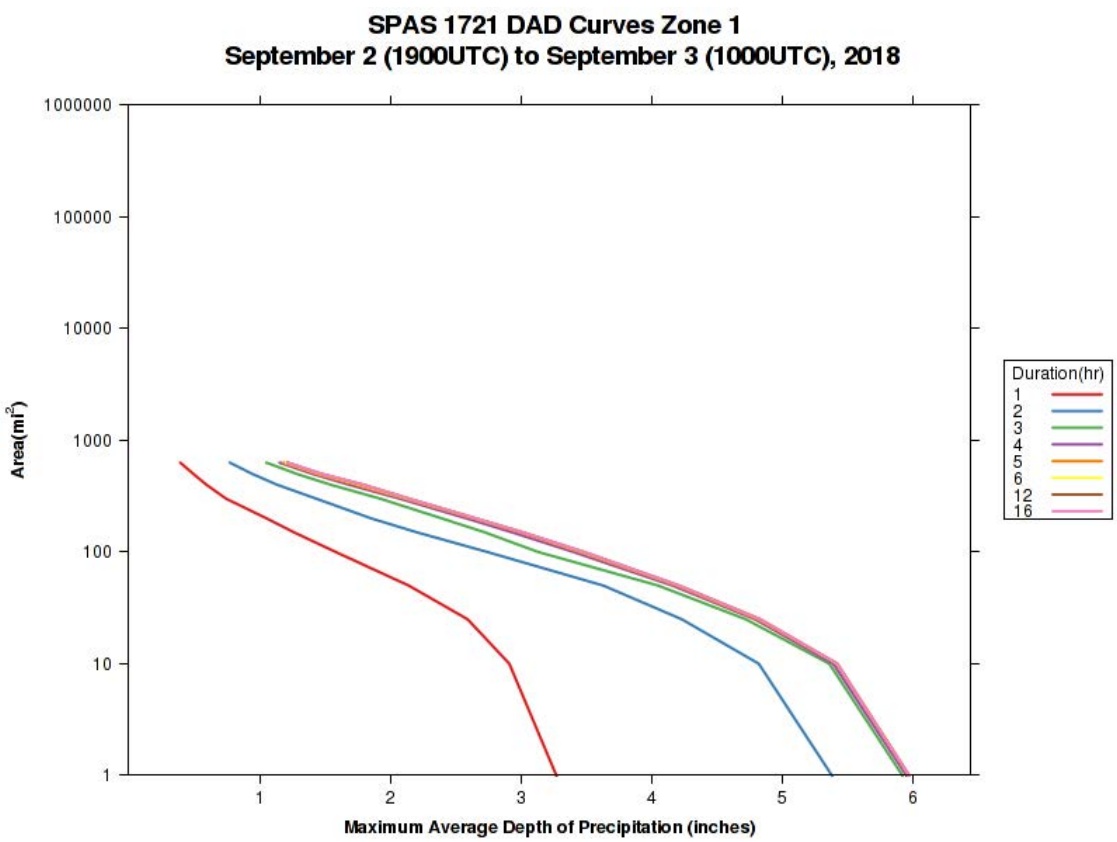


Figure 7: SPAS 1721 DAD image for September 2, 2018 1900 UTC to September 3, 2018 1000 UTC

Table 4: SPAS 1721 DAD table for September 2, 2018 1900 UTC to September 3, 2018 1000 UTC

SPAS 1720 DAD Table MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)								
	Duration (hours)							
areasqmi	1	2	3	4	5	6	12	Total
0.4	3.35	5.48	6.00	6.03	6.05	6.05	6.05	6.05
1	3.27	5.38	5.92	5.95	5.97	5.97	5.97	5.97
10	2.91	4.82	5.36	5.39	5.42	5.42	5.42	5.42
25	2.59	4.23	4.72	4.79	4.81	4.83	4.83	4.83
50	2.14	3.63	4.05	4.16	4.19	4.21	4.21	4.21
100	1.58	2.74	3.13	3.40	3.45	3.47	3.48	3.48
150	1.26	2.20	2.72	2.93	2.99	3.01	3.01	3.01
200	1.05	1.85	2.39	2.58	2.63	2.65	2.65	2.65
300	0.74	1.43	1.92	2.07	2.11	2.13	2.14	2.14
400	0.59	1.13	1.54	1.68	1.73	1.77	1.79	1.79
500	0.49	0.94	1.28	1.40	1.43	1.46	1.47	1.47
630	0.39	0.77	1.05	1.15	1.18	1.20	1.21	1.21

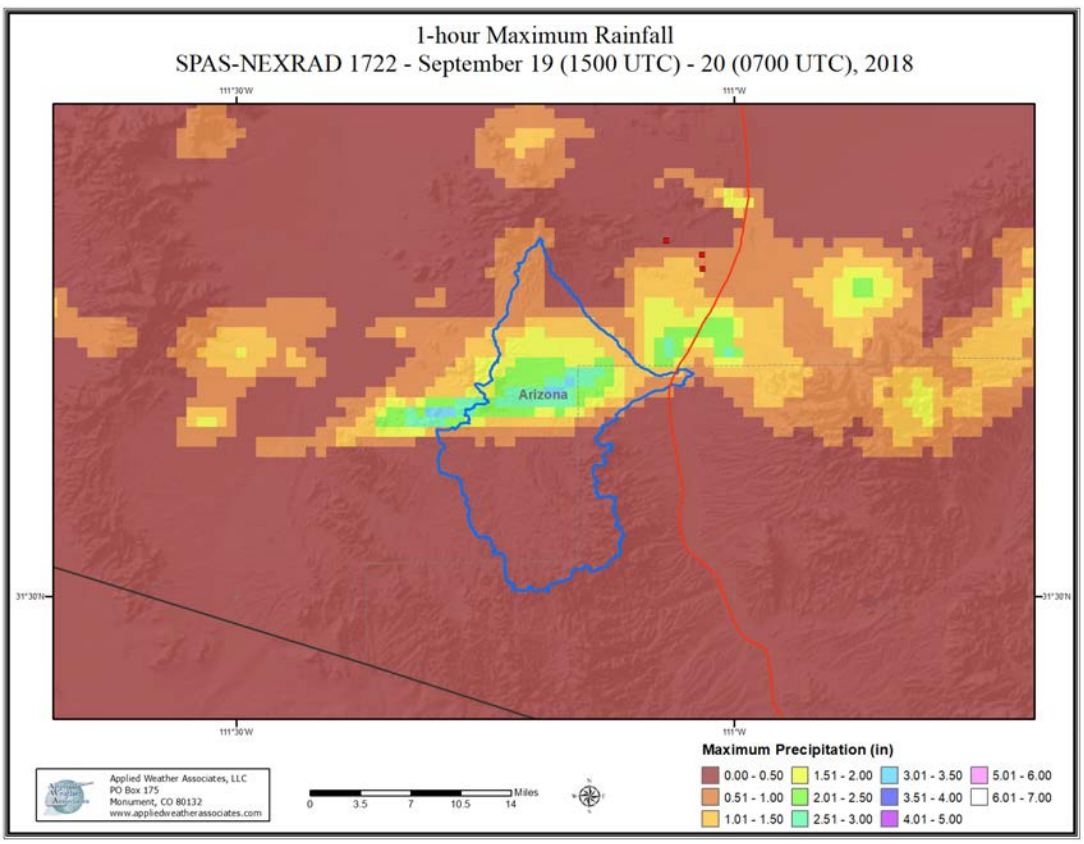


Figure 8: Spatially mapped 1-hour maximum point rainfall

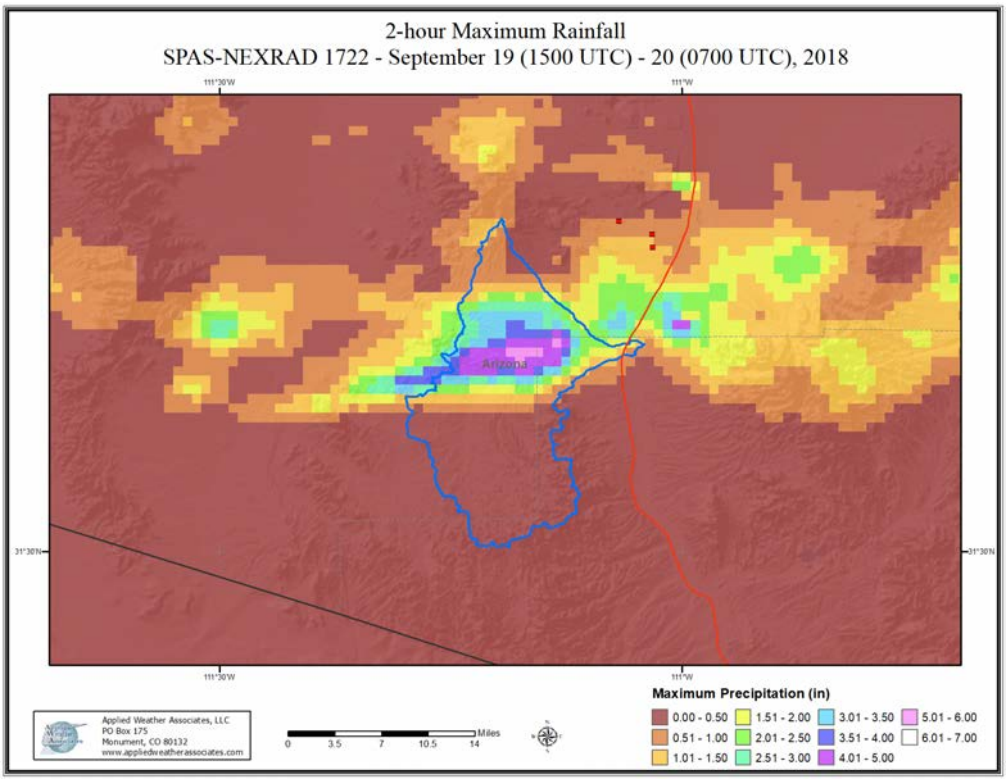


Figure 9: Spatially mapped 2-hour maximum point rainfall

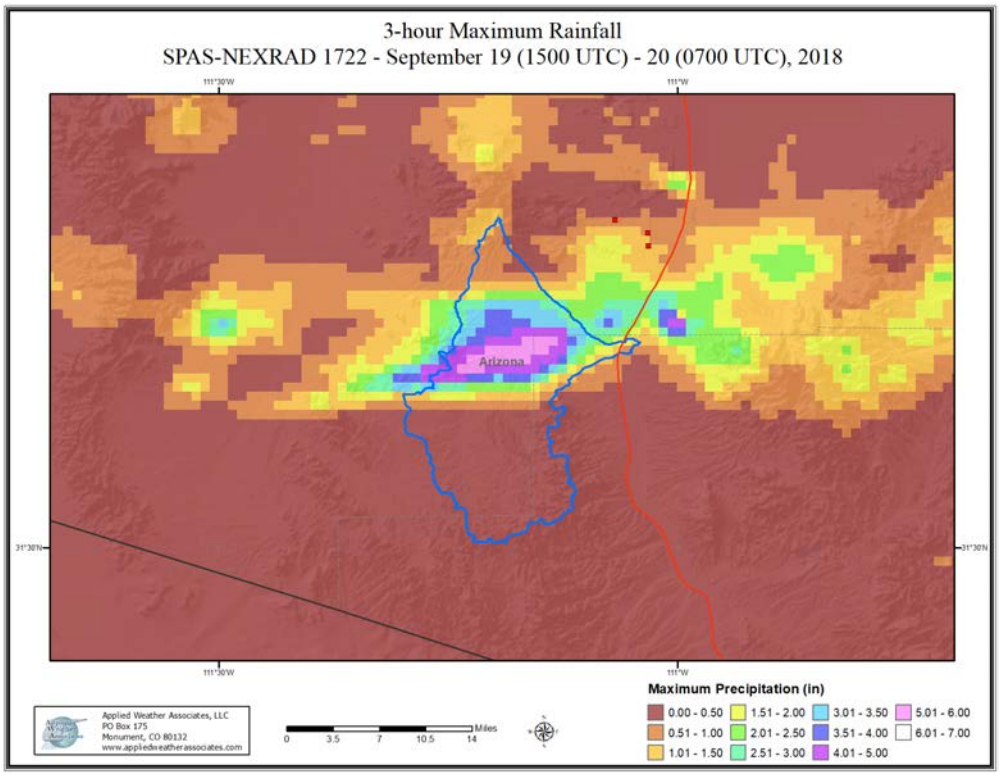


Figure 10: Spatially mapped 3-hour maximum point rainfall

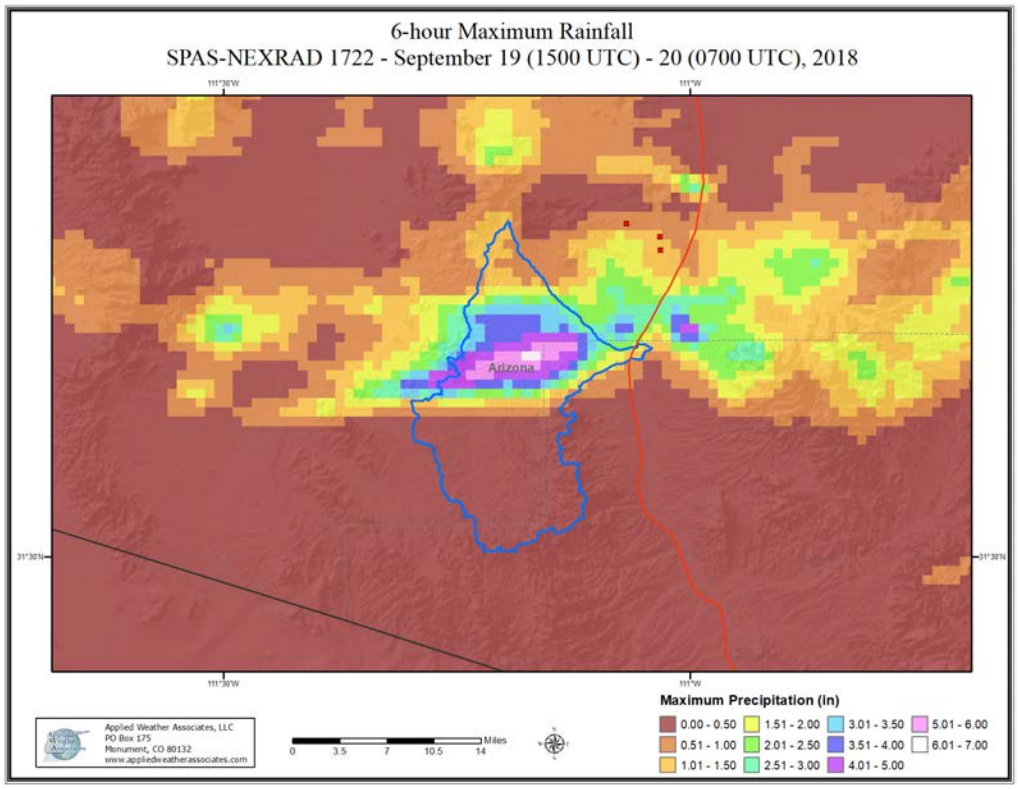


Figure 11: Spatially mapped 6-hour maximum point rainfall

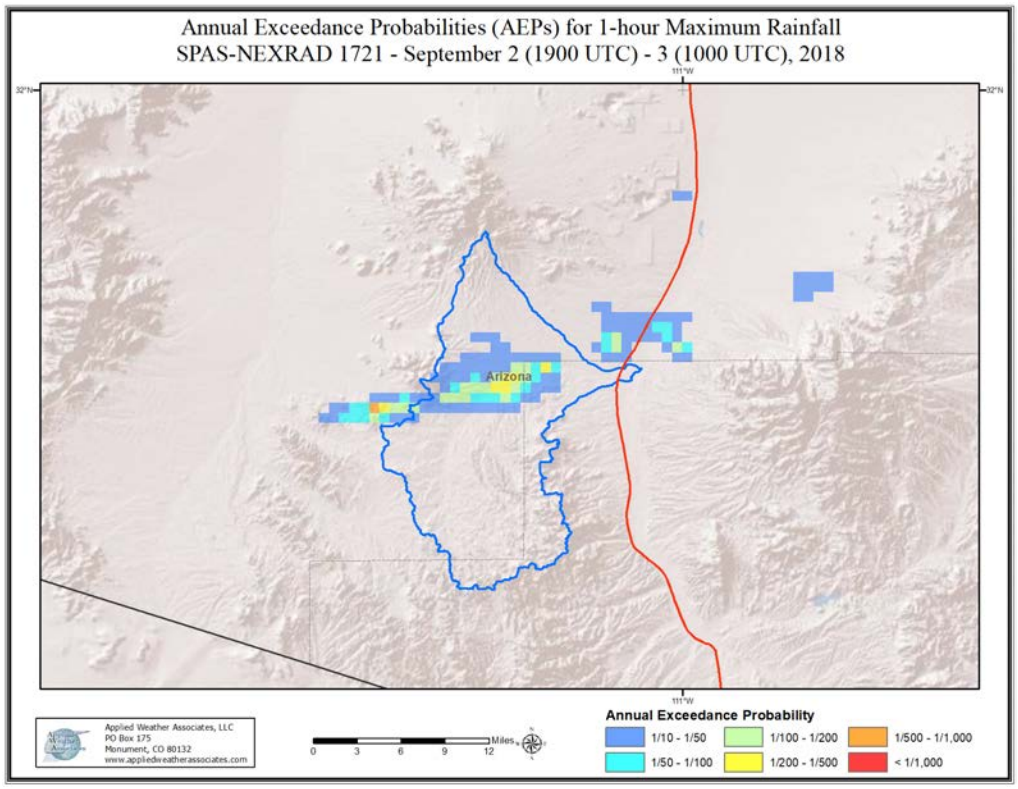


Figure 12: Spatially mapped 1-hour point AEP

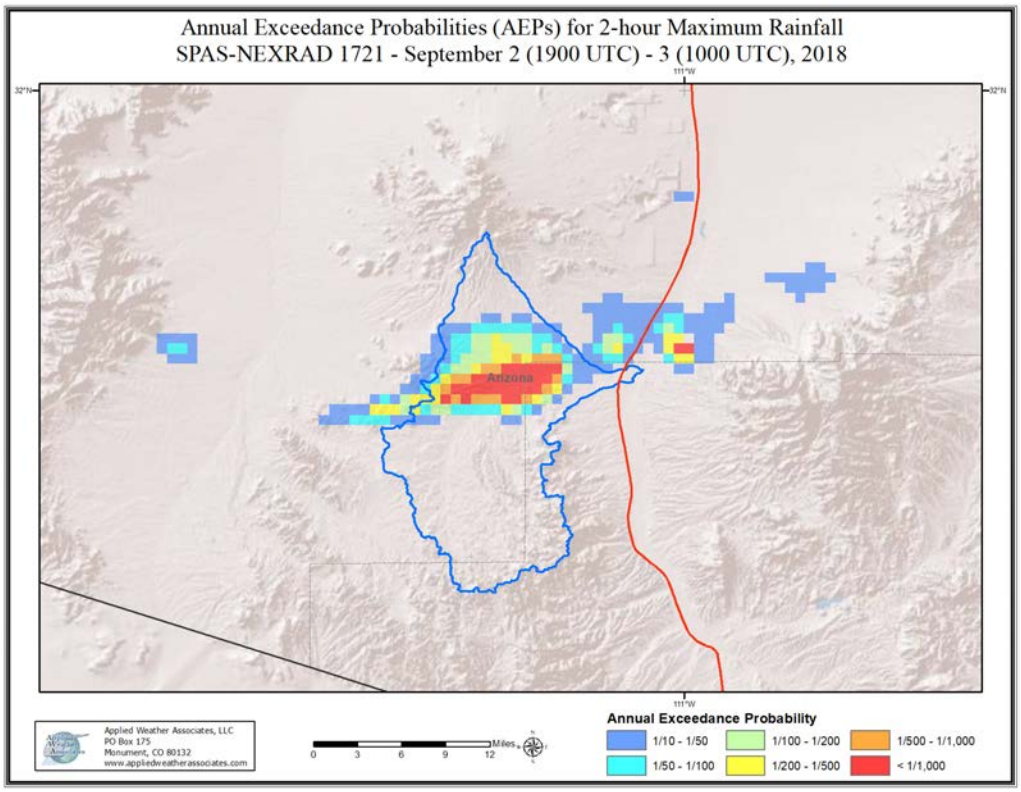


Figure 13: Spatially mapped 2-hour point AEP

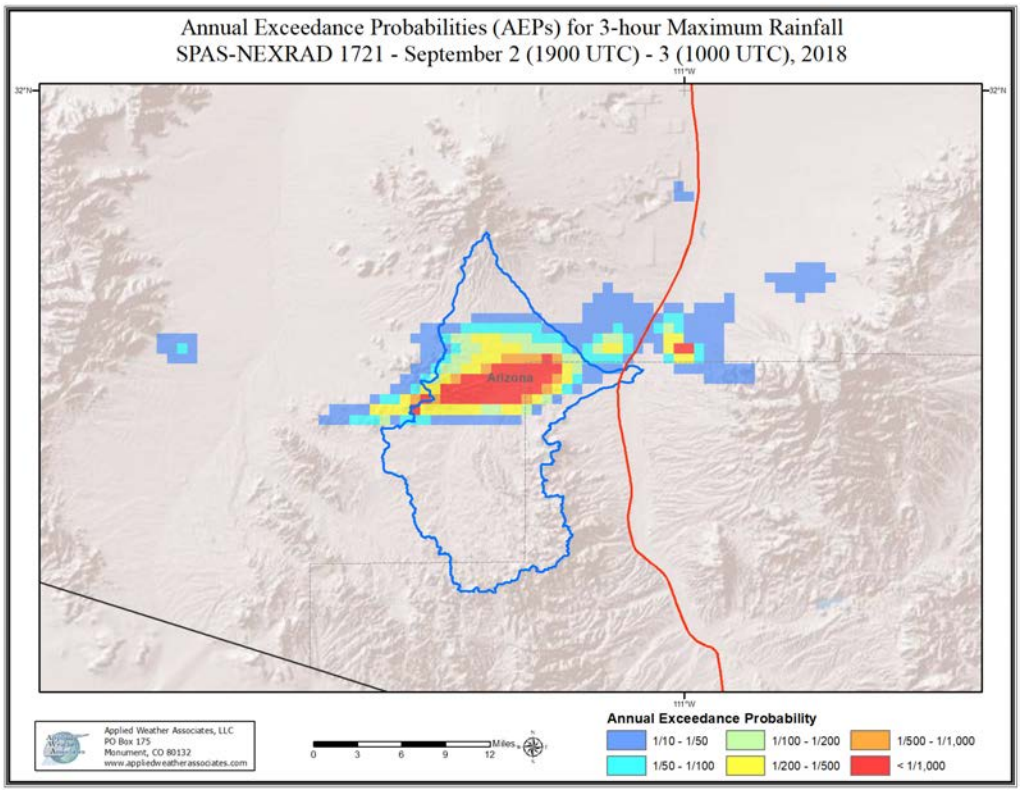


Figure 14: Spatially mapped 3-hour point AEP

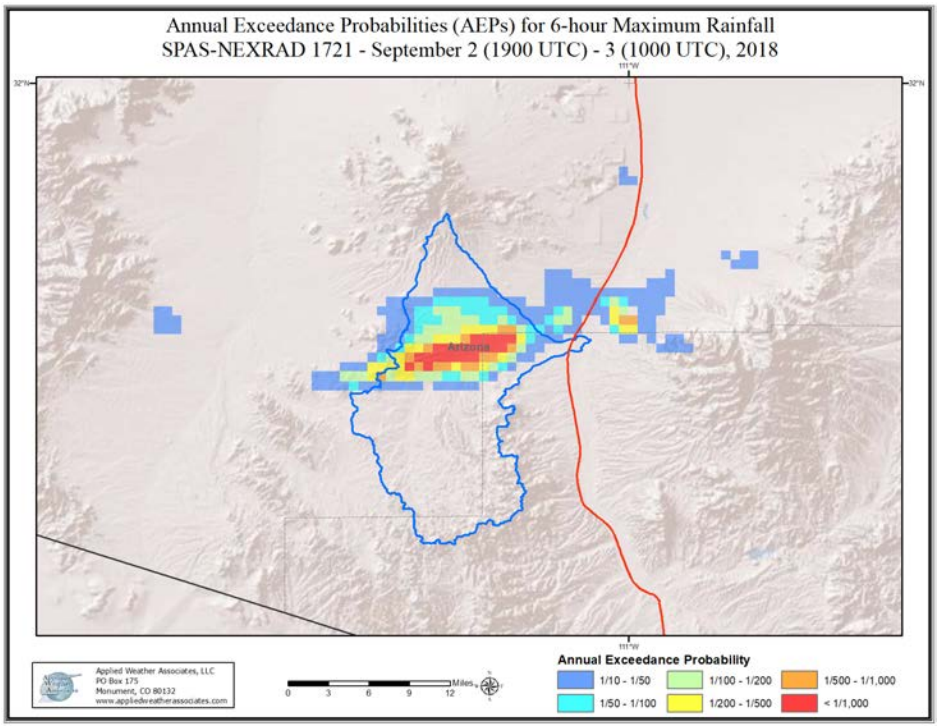


Figure 15: Spatially mapped 6-hour point AEP

9. DELIVERABLES

The accurate, high-resolution precipitation grids produced by SPAS allow for a variety of output to be created and provided as part of the storm analysis and the SPAS deliverables provided are listed in Table 5. The deliverables are contained in separate files associated with the final storm deliverable package.

Table 5: Deliverables provided with this analysis

Included	Item	Description
Yes	Final report	This report.
Yes	Depth-Area-Duration (DAD) analysis	An objective three-dimensional perspective of the storms precipitation in time and space conveyed through a table and plot.
Yes	Total storm precipitation map	A color-shaded precipitation map created in a GIS and output in both .png and .pdf formats. (Figure 5)
Yes	Mass curves	Precipitation time series and/or mass curves (at 5-60 minutes time intervals) at specified locations. (Figure 6)
Yes	Rain gauge data summary	Summary of gauge data containing station id, name, latitude, longitude, gauge type, precipitation, etc.
No	Basin average precipitation summary files	Basin average precipitation at 5-min to 1-hour time intervals in .txt files.
Yes	GIS shapefiles of precipitation	5-min to 1-hour ESRI shapefiles of precipitation.
Yes	GIS ASCII precipitation grids	5-min and 1-hour ESRI ASCII grids of precipitation either clipped to a basin or domain-wide.
Yes	Total storm precipitation grid	ESRI ASCII grid of the precipitation for the entire analysis domain.
Yes	Incremental precipitation grids	5-minute to 1-hour ESRI ASCII grids of precipitation.
Yes	Average Recurrence Interval of storm precipitation	Storm precipitation return periods for 24-hour duration as a map (.png/.pdf) and/or ESRI ASCII grids or shapefiles.

The primary output of this storm analysis was gridded 5-minute rainfall as ESRI ASCII grids, which are contained in a .tar file named: **5min_ppt_spas1721_grids.tar**. Each grid represents the total 5-minute rainfall ending at the specified date/time of the file. For instance, 5min_ppt_spas1721_0001_20180902_1805_UTC.asc contains the total 5-minute precipitation for the period 09/02/2018 1800 UTC through 09/12/2018 1805 UTC; 2018 is the year, 09 is the month, 02 is the day, 18 is the hour, and 05 is the ending minute. There are 136 5-minute grids and 1 total storm grid (0005min_ppt_spas1721_sum.asc.gz). Pertinent metadata for all the grids is provided in Table 5.

Table 6: Pertinent GIS precipitation grid metadata

Projection	Datum	Resolution	Grid cell counts	Domain	Grid cell units
"Geographic" Latitude-Longitude	WGS84	1 km^2 (0.38 mi^2)	rows: 108 cols: 90	north: 32.10N south: 31.20N west: -111.70W east: -110.62W	Inches (floating point)

10. CONCLUSIONS AND CONFIDENCE IN RESULTS

This analysis was based on 91 hourly stations, daily data, supplemental station data, and optimized-gauge corrected radar data. AWA has a high degree of confidence for the station-based storm total results. The spatial pattern is dependent on the coverage of the radar data, gauge data, and basemap (based on total storm precipitation from default ZR relationship ($300R^{1.4}$)). Each of these factors was well represented by the data used in this analysis and included complete NEXRAD coverage with no outages or beam blockage issues. There is a high degree of confidence in the timing based on the hourly stations near the storm center. Some daily stations were used as supplemental stations to correct timing issues (See Appendix A for additional storm analysis). Based on AWA experience analyzing more than 720 extreme rainfall events, AWA's opinion is that the radar did an excellent job depicting the relative patterns and temporal distribution of rainfall. The SPAS program was able to utilize 91 rain gauge observations and optimize the radar data, again resulting in an excellent, highly confident overall SPAS analysis. The September 2-3, 2018 rainfall resulted in point rainfall accumulations with an ARI greater than 1000-years. The SPAS DAD values provide valuable spatial and temporal information representing the overall storm event and analysis process

11. REFERENCES

Baeck ML, Smith J.A., 1998. "Rainfall Estimation by the WSR-88D for Heavy Rainfall Events", Weather and Forecasting: Vol. 13, No. 2, pp. 416–436.

Bonnin, G.M., Todd, D., Lin, B., Parzybok, T., Yekta, M., and D. Riley, 2011: Precipitation Frequency Atlas of the United States, Volume 1 Version 5.0: Semiarid Southwest (Arizona, Southeast California, Nevada, New Mexico, Utah), NOAA Atlas 14, Volumes 1, NOAA,

National Weather Service, Silver Spring, Maryland. http://hdsc.nws.noaa.gov/hdsc/pfds/

Ciach, G.J., 2003: Local Random Errors in Tipping-Bucket Rain Gauge Measurements. J. Atmos. Oceanic Technol., 20, 752–759.

Clarke, Beth, Chad Kudym and Bruce Rindahl, 2009. "Gauge-Adjusted Radar Rainfall Estimation and Basin Averaged Rainfall for Use in Local Flash Flood Prediction and Runoff Modeling", In. Proc. of the 23rd Conference on Hydrology, Phoenix, AZ, January 10-16, 2009.

Dickens, J., 2003. "On the Retrieval of Drop Size Distribution by Vertically Pointing Radar", American Meteorological Society 32nd Radar Meteorology Conference, Albuquerque, NM, October 2005.

Duchon, C.E., and G.R. Essenberg, 2001: Comparative Rainfall Observations from Pit and Above Ground Rain Gauges with and without Wind Shields, Water Resources Research, Vol. 37, N. 12, 3253-3263.

Faulkner, Ellen, Terry Hampton, Richard M. Rudolph, and Edward M. Tomlinson, 2004. "Technological Updates for PMP and PMF – Can They Provide Value for Dam Safety Improvements?", Association of State Dam Safety Officials Annual Conference, Phoenix, Arizona, September 26-30, 2004.

Green, G.D., and E.S. Pytlak, 2003: Severe Weather Outbreak over Phoenix Arizona on July 14, 2002, Tucson National Weather Service Office, 7pp.

Guo, J. C. Y., Urbonas, Ben, and Stewart, Kevin, 2001. Rain Catch under Wind and Vegetal Effects. ASCE, Journal of Hydrologic Engineering, Vol. 6, No. 1.

Hartzell, C.L., and A.B. Super, 2000: Development of a WSR-88D based Snow Accumulation Algorithm for Quantitative Precipitation Estimates over southwestern Oregon. Preprints, 16th International Conference on Interactive Information and Processing Systems (IIPS) for Meteorology, Oceanography and Hydrology, American Meteorological Society, Long Beach, CA, pp 373-376.

Hultstrand, D.M., T.W. Parzybok, E.M. Tomlinson and W.B. Kappel, 2008. "Advanced Spatial and Temporal Rainfall Analyses for Use in Watershed Models", In U.S. Geological Survey Scientific Investigations Report: Proceedings of the Third Interagency Conference on Research in the Watersheds, Estes Park, CO, September 8-11 2008.

Hunter, Richard D. and Ross K. Meentemeyer, 2005. "Climatologically Aided Mapping of Daily Precipitation and Temperature". Journal of Applied Meteorology, October 2005, Vol. 44, pp. 1501-1510.

Hunter, Steven M., 1999. "Determining WSR-88D Precipitation Algorithm Performance Using The Stage III Precipitation Processing System", Next Generation Weather Radar Program, WSR-88D Operational Support Facility, Norman, OK.

Kappel, W.D., Hultstrand, D.M., Muhlestein, G.A., Steinhilber, K., McGlone, D., E.M. Tomlinson, and T. Parzybok. July 2013: Probable Maximum Precipitation Study for Arizona. Prepared for the Arizona Dept. of Water Resources, Dam Safety Division.

R.M. Iverson, D.L. George, K. Allstadt, M.E. Reid, B.D. Collins, J.W. Vallance, S.P. Schilling, J.W. Godt, C.M. Cannon, C.S. Magirl, R.L. Baum, J.A. Coe, W.H. Schulz, J.B. Bower, Landslide mobility and hazards: implications of the 2014 Oso disaster, Earth and Planetary Science Letters, Volume 412, 15 February 2015, Pages 197-208, ISSN 0012-821X, http://dx.doi.org/10.1016/j.epsl.2014.12.020.

Lakshmanan, V. and M. Valente, 2004. "Quality control of radar reflectivity data using satellite data and surface observations", 20th Int'l Conf. on Inter. Inf. Proc. Sys. (IIPS) for Meteor., Ocean., and Hydr., Amer. Meteor. Soc., Seattle, CD-ROM, 12.2.

Martner, B.E, and Vladimir Dubovskiy, 2005: Z-R Relations from Raindrop Disdrometers: Sensitivity To Regression Methods And DSD Data Refinements. 32nd Radar Meteorology Conference, Albuquerque, NM, October, 2005.

Neilson-Gammon, J.W., September, 2017: Personal Communication

Parzybok, Tye W., and Edward M. Tomlinson, 2006. "A New System for Analyzing Precipitation from Storms", Hydro Review, Vol. XXV, No. 3, 58-65.

Parzybok, Tye W., Douglas M. Hultstrand, Edward M. Tomlinson, Ph.D. and William D Kappel, 2009. "How Six Recent Extreme Pacific Northwest Storms Compare to Historical Storms in HMR 57", Western Regional ASDSO Conference, Coeur d'Alene, Idaho, May 3-6, 2009.

Rudolph, Richard M, Ellen Faulkner, Terry Hampton, Edward Tomlinson, 2004: Old Problems and New Technologies: Spatial Analysis Adds Value to Dam Safety Studies, proceedings of Association of Dam Safety Officials Annual Conference, Technical Session I, Phoenix, Arizona.

Tokay, A., P.G. Bashor, and V.L. McDowell, 2010: Comparison of Rain Gauge Measurements in the Mid-Atlantic Region. J. Hydrometeor., 11, 553-565.

Tomlinson, E.M., W.D. Kappel, T.W. Parzybok, B. Rappolt, 2006. "Use of NEXRAD Weather Radar Data with the Storm Precipitation Analysis System (SPAS) to Provide High Spatial Resolution Hourly Rainfall Analyses for Runoff Model Calibration and Validation", ASDSO Annual Conference, Boston, MA.

Tomlinson, Edward and Tye Parzybok, 2004: Storm Precipitation Analysis System (SPAS), proceedings of Association of Dam Safety Officials Annual Conference, Technical Session II, Phoenix, Arizona.

U.S. Weather Bureau, 1946: Manual for Depth-Area-Duration analysis of storm precipitation. Cooperative Studies Technical Paper No. 1, U.S. Department of Commerce, Weather Bureau, Washington, D.C., 73pp.

Wallace, C.E, Maddox, R.A., and K.W. Howard, 1999: Summertime Convective Storm Environments in Central Arizona: Local Observations, Weather and Forecasting, Vol. 14, 994-1001.

Zhang, Jian, Kenneth Howard and J.J. Gourley, 2005: Constructing Three-Dimensional Multiple-Radar Reflectivity Mosaics: Examples of Convective Storms and Stratiform Rain Echoes, J. of Atmospheric and Oceanic Technology, 22, 30-42.

Appendix C MODIFIED HEC-1 MODEL – SUBJECT STORM

	Rainfall, ending at (UTC):					INCREMENTAL RAINFALL (inches)																							
						48A	48B	48C	48G	48D	48F	48E	48H	48J	48I	48K	48M	48L	48N	48P	48O	48R	48Q	48T	48S	48U	48V	48W	48X	
cnt	year	mon	day	hour	min	SB1	SB2	SB3	SB4	SB5	SB6	SB7	SB8	SB9	SB10	SB11	SB12	SB13	SB14	SB15	SB16	SB17	SB18	SB19	SB20	SB21	SB22	SB23	SB24	Basin
1	2018	9	2	18	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	2018	9	2	18	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	2018	9	2	18	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	2018	9	2	18	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	2018	9	2	18	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	2018	9	2	18	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7	2018	9	2	18	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	2018	9	2	18	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9	2018	9	2	18	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	2018	9	2	18	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11	2018	9	2	18	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12	2018	9	2	19	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13	2018	9	2	19	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	2018	9	2	19	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	2018	9	2	19	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	2018	9	2	19	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17	2018	9	2	19	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	2018	9	2	19	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19	2018	9	2	19	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	2018	9	2	19	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21	2018	9	2	19	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	2018	9	2	19	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23	2018	9	2	19	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	2018	9	2	20	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25	2018	9	2	20	5	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
26	2018	9	2	20	10	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
27	2018	9	2	20	15	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
28	2018	9	2	20	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29	2018	9	2	20	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	2018	9	2	20	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31	2018	9	2	20	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
32	2018	9	2	20	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
33	2018	9	2	20	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
34	2018	9	2	20	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
35	2018	9	2	20	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
36	2018	9	2	21	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
37	2018	9	2	21	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
38	2018	9	2	21	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
39	2018	9	2	21	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
40	2018	9	2	21	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
41	2018	9	2	21	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
42	2018	9	2	21	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
43	2018	9	2	21	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
44	2018	9	2	21	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
45	2018	9	2	21	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
46	2018	9	2	21	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
47	2018	9	2	21	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
48	2018	9	2	22	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	Rainfall, ending at (UTC):					INCREMENTAL RAINFALL (inches)																							
						48A	48B	48C	48G	48D	48F	48E	48H	48J	48I	48K	48M	48L	48N	48P	48O	48R	48Q	48T	48S	48U	48V	48W	48X	
cnt	year	mon	day	hour	min	SB1	SB2	SB3	SB4	SB5	SB6	SB7	SB8	SB9	SB10	SB11	SB12	SB13	SB14	SB15	SB16	SB17	SB18	SB19	SB20	SB21	SB22	SB23	SB24	Basin
49	2018	9	2	22	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	2018	9	2	22	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
51	2018	9	2	22	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52	2018	9	2	22	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
53	2018	9	2	22	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
54	2018	9	2	22	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	2018	9	2	22	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56	2018	9	2	22	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
57	2018	9	2	22	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
58	2018	9	2	22	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
59	2018	9	2	22	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	2018	9	2	23	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
61	2018	9	2	23	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	2018	9	2	23	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
63	2018	9	2	23	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	2018	9	2	23	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
65	2018	9	2	23	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66	2018	9	2	23	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
67	2018	9	2	23	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
68	2018	9	2	23	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
69	2018	9	2	23	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	2018	9	2	23	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
71	2018	9	2	23	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
72	2018	9	3	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
73	2018	9	3	0	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
74	2018	9	3	0	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
75	2018	9	3	0	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
76	2018	9	3	0	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
77	2018	9	3	0	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
78	2018	9	3	0	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
79	2018	9	3	0	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
80	2018	9	3	0	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
81	2018	9	3	0	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
82	2018	9	3	0	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
83	2018	9	3	0	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
84	2018	9	3	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
85	2018	9	3	1	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
86	2018	9	3	1	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
87	2018	9	3	1	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
88	2018	9	3	1	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
89	2018	9	3	1	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	2018	9	3	1	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
91	2018	9	3	1	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
92	2018	9	3	1	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
93	2018	9	3	1	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
94	2018	9	3	1	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
95	2018	9	3	1	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
96	2018	9	3	2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	Rainfall, ending at (UTC):					INCREMENTAL RAINFALL (inches)																							
						48A	48B	48C	48G	48D	48F	48E	48H	48J	48I	48K	48M	48L	48N	48P	48O	48R	48Q	48T	48S	48U	48V	48W	48X	
cnt	year	mon	day	hour	min	SB1	SB2	SB3	SB4	SB5	SB6	SB7	SB8	SB9	SB10	SB11	SB12	SB13	SB14	SB15	SB16	SB17	SB18	SB19	SB20	SB21	SB22	SB23	SB24	Basin
97	2018	9	3	2	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.001
98	2018	9	3	2	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.001
99	2018	9	3	2	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.001	0.000	0.000	0.000	0.001	0.001
100	2018	9	3	2	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.001
101	2018	9	3	2	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.000	0.000	0.001	0.000	0.000	0.001
102	2018	9	3	2	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.000	0.000	0.001	0.000	0.000	0.001
103	2018	9	3	2	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.001
104	2018	9	3	2	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.001
105	2018	9	3	2	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.001
106	2018	9	3	2	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.001
107	2018	9	3	2	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.001
108	2018	9	3	3	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.001
109	2018	9	3	3	5	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.004	0.001	0.002	0.002	0.002	0.001	0.001	0.002	0.004	0.006	0.007	0.007	0.006	0.002
110	2018	9	3	3	10	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.005	0.001	0.002	0.002	0.003	0.002	0.007	0.003	0.003	0.006	0.008	0.007	0.006	0.002
111	2018	9	3	3	15	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.004	0.001	0.002	0.002	0.002	0.002	0.005	0.003	0.004	0.005	0.008	0.007	0.006	0.002
112	2018	9	3	3	20	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.002	0.004	0.001	0.001	0.002	0.002	0.002	0.006	0.003	0.004	0.006	0.007	0.007	0.006	0.002
113	2018	9	3	3	25	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.002	0.005	0.001	0.001	0.002	0.003	0.002	0.005	0.003	0.004	0.005	0.008	0.007	0.006	0.002
114	2018	9	3	3	30	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.004	0.001	0.002	0.002	0.002	0.002	0.005	0.004	0.004	0.006	0.008	0.007	0.006	0.002
115	2018	9	3	3	35	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.004	0.001	0.002	0.002	0.002	0.001	0.003	0.006	0.004	0.005	0.008	0.006	0.006	0.002
116	2018	9	3	3	40	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.004	0.001	0.001	0.002	0.002	0.001	0.004	0.007	0.004	0.005	0.008	0.009	0.028	0.003
117	2018	9	3	3	45	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.004	0.002	0.002	0.002	0.002	0.002	0.004	0.005	0.004	0.005	0.008	0.011	0.031	0.003
118	2018	9	3	3	50	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.004	0.002	0.002	0.002	0.002	0.002	0.003	0.029	0.053	0.006	0.079	0.188	0.080	0.009
119	2018	9	3	3	55	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.007	0.004	0.016	0.011	0.035	0.128	0.021	0.135	0.563	0.476	0.020
120	2018	9	3	4	0	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.019	0.013	0.013	0.037	0.105	0.250	0.109	0.387	0.100	0.180	0.031
121	2018	9	3	4	5	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.003	0.001	0.002	0.004	0.031	0.117	0.132	0.040	0.044	0.011	0.028	0.008	0.002	0.026
122	2018	9	3	4	10	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.006	0.001	0.002	0.011	0.009	0.022	0.006	0.049	0.145	0.108	0.141	0.040	0.004	0.025	0.015	0.006	0.043
123	2018	9	3	4	15	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.004	0.001	0.002	0.011	0.014	0.128	0.083	0.049	0.109	0.025	0.121	0.039	0.013	0.017	0.017	0.017	0.042
124	2018	9	3	4	20	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.004	0.001	0.002	0.019	0.006	0.104	0.157	0.021	0.072	0.015	0.104	0.102	0.036	0.041	0.037	0.023	0.037
125	2018	9	3	4	25	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.029	0.003	0.025	0.084	0.022	0.016	0.005	0.061	0.160	0.076	0.083	0.034	0.022	0.022
126	2018	9	3	4	30	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.039	0.003	0.031	0.078	0.098	0.011	0.002	0.034	0.129	0.046	0.057	0.061	0.047	0.022
127	2018	9	3	4	35	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.004	0.001	0.007	0.045	0.008	0.079	0.139	0.259	0.124	0.022	0.019	0.126	0.097	0.077	0.056	0.061	0.045
128	2018	9	3	4	40	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.052	0.005	0.133	0.223	0.265	0.176	0.052	0.061	0.210	0.159	0.184	0.088	0.035	0.065
129	2018	9	3	4	45	0.001	0.001	0.001	0.002	0.001	0.002	0.001	0.002	0.010	0.004	0.016	0.066	0.010	0.077	0.117	0.242	0.215	0.096	0.074	0.172	0.114	0.113	0.060	0.027	0.065
130	2018	9	3	4	50	0.001	0.001	0.002	0.002	0.001	0.002	0.001	0.003	0.013	0.004	0.014	0.149	0.009	0.067	0.122	0.282	0.244	0.084	0.135	0.175	0.076	0.080	0.060	0.030	0.079
131	2018	9	3	4	55	0.004	0.005	0.004	0.007	0.008	0.010	0.014	0.013	0.019	0.010	0.018	0.199	0.019	0.101	0.113	0.386	0.271	0.113	0.160	0.189	0.050	0.091	0.052	0.035	0.099
132	2018	9	3	5	0	0.018	0.016	0.012	0.011	0.020	0.021	0.023	0.022	0.034	0.020	0.034	0.256	0.032	0.176	0.184	0.325	0.350	0.180	0.145	0.157	0.067	0.092	0.082	0.048	0.119
133	2018	9	3	5	5	0.004	0.002	0.001	0.001	0.002	0.004	0.004	0.003	0.017	0.006	0.016	0.135	0.015	0.136	0.151	0.326	0.380	0.126	0.113	0.129	0.041	0.043	0.042	0.016	0.095
134	2018	9	3	5	10	0.007	0.003	0.001	0.001	0.002	0.006	0.006	0.004	0.020	0.005	0.006	0.044	0.018	0.178	0.138	0.203	0.312	0.050	0.122	0.122	0.043	0.029	0.019	0.011	0.077
135	2018	9	3	5	15	0.008	0.004	0.002	0.002	0.003	0.006	0.008	0.005	0.011	0.004	0.003	0.043	0.016	0.133	0.106	0.122	0.225	0.046	0.113	0.131	0.030	0.029	0.006	0.006	0.061
136	2018	9	3	5	20	0.007	0.005	0.002	0.002	0.004	0.004	0.006	0.005	0.006	0.002	0.004	0.060	0.004	0.068	0.106	0.117	0.172	0.083	0.098	0.087	0.029	0.030	0.004	0.004	0.051
137	2018	9	3	5	25	0.007	0.005	0.001	0.001	0.004	0.005	0.007	0.005	0.004	0.004	0.014	0.107	0.005	0.056	0.114	0.108	0.125	0.089	0.107	0.091	0.033	0.025	0.005	0.003	0.051
138	2018	9	3	5	30	0.004	0.003	0.001	0.001	0.003	0.002	0.004	0.003	0.005	0.004	0.025	0.186	0.008	0.077	0.070	0.150	0.080	0.018	0.081	0.081	0.029	0.018	0.006	0.002	0.047
139	2018	9	3	5	35	0.004	0.002	0.001	0.001	0.001	0.009	0.003	0.004	0.013	0.016	0.045	0.260	0.015	0.098	0.090	0.266	0.095	0.037	0.091	0.080	0.020	0.014	0.004	0.002	0.065
140	2018	9	3	5	40	0.003	0.002	0.001	0.001	0.001	0.009	0.004	0.004	0.019	0.017	0.090	0.267	0.014	0.169	0.117	0.270	0.111	0.037	0.083	0.078	0.027	0.016	0.006	0.002	0.074
141	2018	9	3	5	45	0.004	0.002	0.001	0.001	0.001	0.013	0.005	0.005	0.025	0.015	0.056	0.218	0.015	0.151	0.163	0.222	0.104	0.031	0.084	0.076	0.036	0.018	0.005	0.002	0.066
142	2018	9	3	5	50	0.005	0.003	0.002	0.002	0.002	0.012	0.005	0.004	0.021	0.012	0.027	0.205	0.020	0.111	0.081	0.139	0.056	0.011	0.047	0.112	0.053	0.038	0.008	0.003	0.047
143	2018	9	3	5	55	0.006	0.003	0.001	0.001	0.002	0.012	0.006	0.004	0.016	0.009	0.029	0.174	0.018	0.084	0.068	0.107	0.048	0.012	0.028	0.059	0.026	0.023	0.004	0.002	0.037
144	2018	9	3	6	0	0.007	0.003	0.001	0.001	0.002	0.012	0.005	0.004	0.011	0.009	0.038	0.155	0.017	0.094	0.053	0.070	0.040	0.012	0.018	0.046	0.018	0.019	0.007	0.002	0.032

	Rainfall, ending at (UTC):					INCREMENTAL RAINFALL (inches)																							
						48A	48B	48C	48G	48D	48F	48E	48H	48J	48I	48K	48M	48L	48N	48P	48O	48R	48Q	48T	48S	48U	48V	48W	48X	
cnt	year	mon	day	hour	min	SB1	SB2	SB3	SB4	SB5	SB6	SB7	SB8	SB9	SB10	SB11	SB12	SB13	SB14	SB15	SB16	SB17	SB18	SB19	SB20	SB21	SB22	SB23	SB24	Basin
145	2018	9	3	6	5	0.008	0.004	0.001	0.001	0.003	0.010	0.006	0.005	0.014	0.008	0.043	0.159	0.011	0.058	0.059	0.049	0.025	0.019	0.012	0.030	0.021	0.013	0.009	0.007	0.027
146	2018	9	3	6	10	0.006	0.003	0.001	0.001	0.003	0.006	0.005	0.004	0.010	0.007	0.041	0.205	0.014	0.054	0.032	0.063	0.023	0.019	0.009	0.031	0.022	0.012	0.005	0.005	0.028
147	2018	9	3	6	15	0.006	0.003	0.001	0.001	0.003	0.006	0.005	0.004	0.013	0.007	0.030	0.116	0.014	0.053	0.025	0.113	0.024	0.019	0.008	0.008	0.010	0.007	0.005	0.003	0.025
148	2018	9	3	6	20	0.005	0.002	0.001	0.000	0.002	0.005	0.003	0.003	0.006	0.006	0.018	0.081	0.008	0.043	0.026	0.123	0.024	0.011	0.006	0.009	0.008	0.006	0.005	0.003	0.021
149	2018	9	3	6	25	0.003	0.002	0.000	0.000	0.001	0.006	0.003	0.002	0.006	0.006	0.010	0.053	0.004	0.035	0.021	0.111	0.035	0.004	0.004	0.012	0.008	0.005	0.003	0.003	0.017
150	2018	9	3	6	30	0.002	0.001	0.001	0.001	0.001	0.004	0.002	0.001	0.002	0.003	0.003	0.019	0.003	0.023	0.016	0.057	0.076	0.011	0.007	0.018	0.006	0.005	0.001	0.001	0.015
151	2018	9	3	6	35	0.001	0.001	0.001	0.001	0.001	0.003	0.002	0.001	0.002	0.003	0.002	0.008	0.003	0.021	0.016	0.037	0.061	0.014	0.015	0.021	0.004	0.007	0.002	0.001	0.013
152	2018	9	3	6	40	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.011	0.009	0.008	0.032	0.022	0.024	0.017	0.002	0.003	0.003	0.002	0.009
153	2018	9	3	6	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.005	0.007	0.003	0.015	0.023	0.022	0.012	0.001	0.003	0.003	0.002	0.006
154	2018	9	3	6	50	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.001	0.010	0.023	0.021	0.005	0.001	0.001	0.002	0.001	0.005
155	2018	9	3	6	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.009	0.022	0.020	0.002	0.001	0.001	0.002	0.002	0.005
156	2018	9	3	7	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.022	0.019	0.001	0.000	0.000	0.001	0.002	0.004
157	2018	9	3	7	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.002	0.020	0.008	0.000	0.000	0.000	0.000	0.000	0.003
158	2018	9	3	7	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.007	0.025	0.005	0.000	0.000	0.000	0.000	0.000	0.003
159	2018	9	3	7	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.002	0.004	0.011	0.005	0.000	0.000	0.000	0.000	0.000	0.002
160	2018	9	3	7	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.003	0.004	0.006	0.004	0.000	0.000	0.000	0.000	0.000	0.002
161	2018	9	3	7	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.002	0.003	0.004	0.003	0.001	0.000	0.000	0.000	0.000	0.001
162	2018	9	3	7	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.001	0.002	0.001	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.001
163	2018	9	3	7	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.002	0.001	0.008	0.002	0.003	0.003	0.001	0.001	0.000	0.000	0.000	0.002
164	2018	9	3	7	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.007	0.004	0.006	0.004	0.001	0.000	0.000	0.000	0.000	0.002
165	2018	9	3	7	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.005	0.009	0.006	0.001	0.000	0.000	0.000	0.000	0.002
166	2018	9	3	7	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.005	0.012	0.009	0.001	0.000	0.000	0.000	0.000	0.002
167	2018	9	3	7	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.010	0.008	0.001	0.000	0.000	0.000	0.000	0.002
168	2018	9	3	8	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.008	0.005	0.000	0.000	0.000	0.000	0.000	0.001
169	2018	9	3	8	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
170	2018	9	3	8	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
171	2018	9	3	8	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.001
172	2018	9	3	8	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.001
173	2018	9	3	8	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
174	2018	9	3	8	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.001
175	2018	9	3	8	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.007	0.001	0.000	0.000	0.000	0.000	0.000	0.001
176	2018	9	3	8	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.001
177	2018	9	3	8	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
178	2018	9	3	8	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
179	2018	9	3	8	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
180	2018	9	3	9	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
181	2018	9	3	9	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
182	2018	9	3	9	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
183	2018	9	3	9	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
184	2018	9	3	9	20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
185	2018	9	3	9	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
186	2018	9	3	9	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
187	2018	9	3	9	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
188	2018	9	3	9	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
189	2018	9	3	9	45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
190	2018	9	3	9	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
191	2018	9	3	9	55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
192	2018	9	3	10	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	Rainfall, ending at (UTC):	INCREMENTAL RAINFALL (inches)																							
		48A	48B	48C	48G	48D	48F	48E	48H	48J	48I	48K	48M	48L	48N	48P	48O	48R	48Q	48T	48S	48U	48V	48W	48X	
cnt	year mon day hour min	SB1	SB2	SB3	SB4	SB5	SB6	SB7	SB8	SB9	SB10	SB11	SB12	SB13	SB14	SB15	SB16	SB17	SB18	SB19	SB20	SB21	SB22	SB23	SB24	Basin
	Subbasin Totals	0.154	0.109	0.071	0.073	0.102	0.202	0.160	0.141	0.344	0.215	0.634	3.444	0.368	2.643	2.841	4.766	4.047	1.860	2.548	3.278	1.407	1.929	1.649	1.281	

```
1****************************************                                                  ****************************************
 *                                      *                                                  *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                                                  *          609 SECOND STREET           *
 *                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   25MAR19  TIME  17:56:58  *                                                  *           (916) 756-1104             *
 *                                      *                                                  *                                      *
 ****************************************                                                  ****************************************


                                                X     X  XXXXXXX   XXXXX           X
                                                X     X  X        X     X         XX
                                                X     X  X        X                X
                                                XXXXXXX  XXXX     X        XXXXX   X
                                                X     X  X        X                X
                                                X     X  X        X     X          X
                                                X     X  XXXXXXX   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 -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

1                                                   HEC-1 INPUT                                                   PAGE  1

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

             1          ID    Sopori Wash - Special Event Study
             2          ID    Date of Event - September 2, 2018
             3          ID
             4          ID    The effective (FIS) model was used as a basis of the analysis. Only the
             5          ID    precipitation input data was revised to reflect the actual storm on a
             6          ID    subbasin-by-subbasin basis using data provided by AWA.
             7          ID      Date of analysis - March 24, 2019
             8          ID      Modeler: Joseph M. Alwin, P.E.
             9          ID      Stantec Consulting Services Inc.
            10          ID      Tucson, Arizona 85711
            11          ID
            12          ID    Santa Cruz County - FIRM Map Modernization Study    Filename:  SOP500YR.IH1
            13          ID    Hydrologic Analysis for 500-year Recurrence Event      Project#  006-08-012
            14          ID
            15          ID         C.L.Williams, Inc.
            16          ID         Lakeside, Arizona
            17          ID         Modeled by Joseph M. Alwin, P.E.
            18          ID
            19          ID        Model Basis:
            20          ID           ----> SOPORI WASH <----
            21          ID           EXISTING CONDITIONS - CONSIDERS FUTURE DEVELOPMENT
            22          ID           State Standard Hydrologic Methodology supplemented by:
            23          ID              Arizona Department of Transportation Methodology (1993)
            24          ID              500-year recurrence event
            25          ID              Green & Ampt Loss Rate Method
            26          ID              NMIN = 2 (Computational Interval)
            27          ID              NOAA 14 Rainfall input: Storm Duration = 24 hours
            28          ID                 Point Rainfall Reduction Factor = 0.568
            29          ID              Clark Unit Hydrograph
            30          ID                 Time of Concentration; Desert/Mountain Equation (ADOT, 4-1)
            31          ID              Modified Puls normal depth channel routing
            32          ID              Slope Correction per FCDMC, Drainage Design Manual, Vol. 1
            33          ID                 Figure 5.4
            34          ID              Time-area relationship; HEC-1 Default unless noted in KM Record
            35          ID           Rainfall excess parameters reflect EXISTING landuse conditions
            36          ID
            37          ID        Modeling date- March 1, 2007
            38          ID           Preliminary Analysis
            39          ID                 Routing channel sections are preliminary estimates
            40          ID           - March 21, 2007
            41          ID                 Revised Soil Parameters & Routing Sections
            42          ID           - April 14, 2007
            43          ID                Revised rainfall duration
            44          ID
            45          IO       3
                        *DIAGRAM
            46          IT       5 09SEP18    1805     240                     2000
                        *

            47          KK     48A
            48          KM  Flows to Concentration Point C001L
            49          KM  Basin Slope did not require adjustment
            50          KM  Desert/Rangeland Time-Area Relationship
            51          KO                                     21
            52          BA  6.3734
1                                                   HEC-1 INPUT                                                   PAGE  2
```

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

  53          PB   0.154
  54          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  55          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  56          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
  57          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  58          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  59          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  60          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  61          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  62          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  63          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  64          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001
  65          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.002   0.002   0.004   0.004
  66          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001
  67          PI   0.004   0.018   0.004   0.007   0.008   0.007   0.007   0.004   0.004   0.003
  68          PI   0.004   0.005   0.006   0.007   0.008   0.006   0.006   0.005   0.003   0.002
  69          PI   0.001   0.001   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000
  70          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  71          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  72          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  73          PI   0.000   0.000
  74          LG    0.23    0.35    4.45    0.35    18.2
  75          UC   2.143   1.388
  76          UA       0       3       5       8      12      20      43      75      90      96
  77          UA     100
              *

  78          KK     48B
  79          KM  Flows to Concentration Point C001R
  80          KM  Basin Slope did not require adjustment
  81          KM  Desert/Rangeland Time-Area Relationship
  82          KO                                     21
  83          BA  10.142
  84          PB   0.109
  85          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  86          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  87          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
  88          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  89          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  90          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  91          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  92          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  93          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  94          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
  95          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001
  96          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.002   0.002   0.004   0.004
  97          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001
  98          PI   0.005   0.016   0.002   0.003   0.004   0.005   0.005   0.003   0.002   0.002
  99          PI   0.002   0.003   0.003   0.003   0.004   0.003   0.003   0.002   0.002   0.001
 100          PI   0.001   0.001   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000
 101          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 102          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 103          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 104          PI   0.000   0.000
 105          LG    0.21    0.35    4.80    0.29    19.5
```



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

 106          UC   2.580   1.422
 107          UA       0       3       5       8      12      20      43      75      90      96
 108          UA     100
              *

 109          KK    C002
 110          KM  Combines 48A and 48B
 111          HC       2
              *

 112          KK  001002
 113          KM  Channel Routing from C001 to C003C
 114          KM  Length = 21,824 feet
 115          KM  Change in Elev = 3725-3600
 116          KM  Slope Correction not Applied
 117          KO                                     22
 118          RS      45    FLOW      -1
 119          RC    .035    .030    .035   21824  0.0057
 120          RX       0     220     340     350     360     380     478     744
 121          RY    3680    3640    3640    3630    3630    3640    3640    3680
              *

 122          KK     48C
 123          KM  Flows to Concentration Point
 124          KM  Basin Slope required adjustment
 125          KO                                     21
 126          BA  3.9934
 127          PB   0.071
 128          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 129          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 130          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 131          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 132          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 133          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
```

```
 134          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 135          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 136          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 137          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 138          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001
 139          PI   0.001   0.000   0.000   0.001   0.001   0.001   0.002   0.002   0.004   0.004
 140          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.002
 141          PI   0.004   0.012   0.001   0.001   0.002   0.002   0.001   0.001   0.001   0.001
 142          PI   0.001   0.002   0.001   0.001   0.001   0.001   0.001   0.001   0.000   0.001
 143          PI   0.001   0.001   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000
 144          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 145          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 146          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 147          PI   0.000   0.000
 148          LG    0.18    0.35    4.50    0.33    29.3
 149          UC   1.684   1.044
 150          UA       0       3       5       8      12      20      43      75      90      96
 151          UA     100
              *
1                                          HEC-1 INPUT                                          PAGE  4

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


 152          KK    R48C
 153          KM  Channel Routing of 48C through 48D
 154          KM  Length = 11,487 feet
 155          KM  Change in Elev = 4075-3915
 156          KM  Slope Correction not Applied
 157          KO                                   22
 158          RS      19    FLOW      -1
 159          RC    .035    .030    .035   11487  0.0139
 160          RX       0     333     363     373     380     390     445    1012
 161          RY    4000    3960    3960    3950    3950    3960    3960    4000
              *

 162          KK     48D
 163          KM
 164          KM  Basin Slope did not require adjustment
 165          KM  Desert/Rangeland Time-Area Relationship
 166          KO                                   21
 167          BA  0.9409
 168          PB   0.102
 169          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 170          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 171          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 172          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 173          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 174          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 175          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 176          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 177          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 178          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 179          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001
 180          PI   0.001   0.000   0.000   0.001   0.001   0.001   0.002   0.002   0.004   0.004
 181          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001
 182          PI   0.008   0.020   0.002   0.002   0.003   0.004   0.004   0.003   0.001   0.001
 183          PI   0.001   0.002   0.002   0.002   0.003   0.003   0.003   0.002   0.001   0.001
 184          PI   0.001   0.001   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000
 185          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 186          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 187          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 188          PI   0.000   0.000
 189          LG    0.22    0.35    4.70    0.30    21.7
 190          UC   1.204   0.989
 191          UA       0       3       5       8      12      20      43      75      90      96
 192          UA     100
              *

 193          KK   C48CD
 194          KM  Combines routed 48C and 48D
 195          HC       2
              *
1                                          HEC-1 INPUT                                          PAGE  5

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


 196          KK   R40CD
 197          KM  Channel Routing of C48CD through 48E
 198          KM  Length = 12,743 feet
 199          KM  Change in Elev = 3915-3760
 200          KM  Slope Correction not Applied
 201          KO                                   22
 202          RS      21    FLOW      -1
 203          RC    .035    .030    .035   12743  0.0122
 204          RX       0     587     750     759     790     800     901    1264
 205          RY    3840    3800    3800    3786    3786    3800    3800    3840
              *

 206          KK     48E
 207          KM  Flows to Concentration Point C002L
 208          KM  Basin Slope did not require adjustment
 209          KM  Desert/Rangeland Time-Area Relationship
 210          KO                                   21
```

```
 211          BA  0.9190
 212          PB   0.160
 213          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 214          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 215          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 216          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 217          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 218          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 219          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 220          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 221          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 222          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 223          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001
 224          PI   0.001   0.000   0.001   0.001   0.001   0.001   0.002   0.002   0.004   0.004
 225          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001
 226          PI   0.014   0.023   0.004   0.006   0.008   0.006   0.007   0.004   0.003   0.004
 227          PI   0.005   0.005   0.006   0.005   0.006   0.005   0.005   0.003   0.003   0.002
 228          PI   0.002   0.001   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000
 229          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 230          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 231          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 232          PI   0.000   0.000
 233          LG    0.28    0.35    4.15    0.39     6.4
 234          UC   1.220   1.015
 235          UA       0       3       5       8      12      20      43      75      90      96
 236          UA     100
              *

 237          KK    C002
 238          KM  Combines Routed C48CD and 48E
 239          HC       2
              *
1                                          HEC-1 INPUT                                          PAGE  6

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


 240          KK  002003
 241          KM  Channel Routing of C002 to C003R
 242          KM  Length = 24,833 feet
 243          KM  Change in Elev = 3760-3600
 244          KM  Slope Correction not Applied
 245          KO                                      22
 246          RS      52    FLOW      -1
 247          RC    .035    .030    .035   24833  0.0064
 248          RX       0     220     340     350     360     380     478     744
 249          RY    3680    3640    3640    3630    3630    3640    3640    3680
              *

 250          KK     48F
 251          KM  Flows to Concentration Point C002L
 252          KM  Basin Slope did not require adjustment
 253          KM  Desert/Rangeland Time-Area Relationship
 254          KO                                      21
 255          BA  6.5335
 256          PB   0.202
 257          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 258          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 259          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 260          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 261          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 262          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 263          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 264          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 265          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 266          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 267          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001
 268          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.002   0.002   0.004   0.004
 269          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.002   0.002
 270          PI   0.010   0.021   0.004   0.006   0.006   0.004   0.005   0.002   0.009   0.009
 271          PI   0.013   0.012   0.012   0.012   0.010   0.006   0.006   0.005   0.006   0.004
 272          PI   0.003   0.001   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000
 273          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 274          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 275          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 276          PI   0.000   0.000
 277          LG    0.22    0.35    4.15    0.41     3.9
 278          UC   2.143   1.100
 279          UA       0       3       5       8      12      20      43      75      90      96
 280          UA     100
              *

 281          KK     48G
 282          KM
 283          KM  Basin Slope required adjustment
 284          KM  Desert/Rangeland Time-Area Relationship
 285          KO                                      21
 286          BA  3.5359
 287          PB   0.073
 288          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 289          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
1                                          HEC-1 INPUT                                          PAGE  7

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

```
 290          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 291          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 292          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 293          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 294          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 295          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 296          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 297          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 298          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001
 299          PI   0.001   0.000   0.000   0.001   0.001   0.001   0.002   0.002   0.004   0.004
 300          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.002   0.002
 301          PI   0.007   0.011   0.001   0.001   0.002   0.002   0.001   0.001   0.001   0.001
 302          PI   0.001   0.002   0.001   0.001   0.001   0.001   0.001   0.000   0.000   0.001
 303          PI   0.001   0.001   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000
 304          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 305          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 306          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 307          PI   0.000   0.000
 308          LG    0.19    0.35    4.65    0.30    33.4
 309          UC   1.697   1.169
 310          UA       0       3       5       8      12      20      43      75      90      96
 311          UA     100
              *

 312          KK    R48G
 313          KM  Channel Routing of 48G through 48H
 314          KM  Length = 37,583 feet
 315          KM  Change in Elev = 4000-3600
 316          KM  Slope Correction not Applied
 317          KO                                   22
 318          RS      63    FLOW      -1
 319          RC    .035    .030    .035   37583  0.0106
 320          RX       0     343     440     453     761     780     898    1460
 321          RY    3760    3720    3720    3690    3700    3720    3720    3760
              *

 322          KK     48H
 323          KM  Flows to Concentration Point C003R
 324          KM  Basin Slope did not require adjustment
 325          KM  Desert/Rangeland Time-Area Relationship
 326          KO                                   21
 327          BA  6.1511
 328          PB   0.141
 329          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 330          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 331          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 332          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 333          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 334          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 335          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 336          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 337          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 338          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 339          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001
 340          PI   0.001   0.000   0.000   0.001   0.001   0.001   0.002   0.002   0.004   0.004
1                                          HEC-1 INPUT                                                PAGE  8

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

 341          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.002   0.003
 342          PI   0.013   0.022   0.003   0.004   0.005   0.005   0.005   0.003   0.004   0.004
 343          PI   0.005   0.004   0.004   0.004   0.005   0.004   0.004   0.003   0.002   0.001
 344          PI   0.001   0.001   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000
 345          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 346          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 347          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 348          PI   0.000   0.000
 349          LG    0.29    0.35    4.35    0.38     6.7
 350          UC   2.671   1.875
 351          UA       0       3       5       8      12      20      43      75      90      96
 352          UA     100
              *

 353          KK    C003
 354          KM  Combines Routed C001, Routed C002, Routed 48G, 48H and 48F
 355          HC       5
              *

 356          KK  003004
 357          KM  Channel Routing for C003 to 48I
 358          KM  Length = 10,255 feet
 359          KM  Change in Elev = 3600-3530
 360          KM  Slope Correction not Applied
 361          KO                                   22
 362          RS      22    FLOW      -1
 363          RC    .035    .030    .035   10255  0.0068
 364          RX       0     437     510     524     530     560    1727    2182
 365          RY    3560    3520    3520    3480    3480    3520    3520    3560
              *

 366          KK     48I
 367          KM  Flows to Concentration Point
 368          KM  Basin Slope did not require adjustment
 369          KM  Desert/Rangeland Time-Area Relationship
 370          KO                                   21
```

```
 371          BA  4.8498
 372          PB   0.215
 373          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 374          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 375          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 376          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 377          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 378          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 379          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 380          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 381          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 382          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 383          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001
 384          PI   0.001   0.001   0.001   0.002   0.001   0.001   0.002   0.002   0.004   0.004
 385          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.004   0.004
 386          PI   0.010   0.020   0.006   0.005   0.004   0.002   0.004   0.004   0.016   0.017
 387          PI   0.015   0.012   0.009   0.009   0.008   0.007   0.007   0.006   0.006   0.003
 388          PI   0.003   0.001   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000
 389          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
1                                                HEC-1 INPUT                                                PAGE  9

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

 390          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 391          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 392          PI   0.000   0.000
 393          LG    0.25    0.35    4.00    0.45     0.6
 394          UC   2.476   1.576
 395          UA       0       3       5       8      12      20      43      75      90      96
 396          UA     100
              *

 397          KK    C004
 398          KM  Combines Routed C003, and 48I
 399          HC       2
              *

 400          KK  004005
 401          KM  Channel Routing for C004 to C005C
 402          KM  Length = 11,354 feet
 403          KM  Change in Elev = 3530-3470
 404          KM  Slope Correction not Applied
 405          KO                                      22
 406          RS      24    FLOW      -1
 407          RC    .035    .030    .035   11354  0.0053
 408          RX       0     571     630     642     650     680     727     817
 409          RY    3540    3500    3500    3492    3492    3500    3500    3540
              *

 410          KK     48K
 411          KM  Flows to Concentration Point C005L
 412          KM  Basin Slope did not require adjustment
 413          KM  Desert/Rangeland Time-Area Relationship
 414          KO                                      21
 415          BA  10.184
 416          PB   0.634
 417          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 418          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 419          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 420          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 421          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 422          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 423          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 424          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 425          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 426          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 427          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.002   0.002
 428          PI   0.002   0.002   0.002   0.002   0.002   0.002   0.002   0.002   0.004   0.004
 429          PI   0.002   0.002   0.002   0.002   0.001   0.001   0.007   0.002   0.016   0.014
 430          PI   0.018   0.034   0.016   0.006   0.003   0.004   0.014   0.025   0.045   0.090
 431          PI   0.056   0.027   0.029   0.038   0.043   0.041   0.030   0.018   0.010   0.003
 432          PI   0.002   0.001   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000
 433          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 434          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 435          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 436          PI   0.000   0.000
 437          LG    0.32    0.35    4.25    0.39     0.2
 438          UC   3.131   1.696
1                                                HEC-1 INPUT                                                PAGE 10

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

 439          UA       0       3       5       8      12      20      43      75      90      96
 440          UA     100
              *

 441          KK     48J
 442          KM  Flows to Concentration Point C005R
 443          KM  Basin Slope did not require adjustment
 444          KM  Desert/Rangeland Time-Area Relationship
 445          KO                                      21
 446          BA  4.3425
 447          PB   0.344
 448          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 449          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
```

```
 450          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 451          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 452          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 453          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 454          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 455          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 456          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 457          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 458          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001
 459          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.002   0.002   0.004   0.004
 460          PI   0.001   0.006   0.004   0.004   0.001   0.001   0.004   0.001   0.010   0.013
 461          PI   0.019   0.034   0.017   0.020   0.011   0.006   0.004   0.005   0.013   0.019
 462          PI   0.025   0.021   0.016   0.011   0.014   0.010   0.013   0.006   0.006   0.002
 463          PI   0.002   0.001   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000
 464          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 465          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 466          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 467          PI   0.000   0.000
 468          LG    0.30    0.35    4.00    0.45     0.0
 469          UC   2.642   2.154
 470          UA       0       3       5       8      12      20      43      75      90      96
 471          UA     100
              *

 472          KK    C005
 473          KM  Combines Routed C004, 48K and 48J
 474          HC       3
              *

 475          KK  005006
 476          KM  Channel Routing for C005 to C006C
 477          KM  Length = 10,122 feet
 478          KM  Change in Elev = 3470-3410
 479          KM  Slope Correction not Applied
 480          KO                                      22
 481          RS      21    FLOW      -1
 482          RC    .035    .030    .035   10122  0.0059
 483          RX       0     259     389     505    1862    2012    2070    2107
 484          RY    3460    3420    3380    3360    3360    3380    3420    3460
              *
```



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

 485          KK     48L
 486          KM  Flows to Concentration Point C006R
 487          KM  Basin Slope did not require adjustment
 488          KM  Desert/Rangeland Time-Area Relationship
 489          KO                                      21
 490          BA  25.275
 491          PB   0.368
 492          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 493          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 494          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 495          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 496          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 497          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 498          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 499          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 500          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 501          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 502          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001
 503          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.002   0.002   0.004   0.004
 504          PI   0.001   0.009   0.014   0.006   0.003   0.003   0.008   0.005   0.010   0.009
 505          PI   0.019   0.032   0.015   0.018   0.016   0.004   0.005   0.008   0.015   0.014
 506          PI   0.015   0.020   0.018   0.017   0.011   0.014   0.014   0.008   0.004   0.003
 507          PI   0.003   0.001   0.001   0.001   0.000   0.000   0.000   0.000   0.000   0.000
 508          PI   0.000   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 509          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 510          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 511          PI   0.000   0.000
 512          LG    0.23    0.35    4.35    0.38    15.1
 513          UC   3.563   1.875
 514          UA       0       3       5       8      12      20      43      75      90      96
 515          UA     100
              *

 516          KK     48M
 517          KM  Flows to Concentration Point C006L
 518          KM  Basin Slope did not require adjustment
 519          KM  Desert/Rangeland Time-Area Relationship
 520          KO                                      21
 521          BA  7.7409
 522          PB   3.444
 523          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 524          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 525          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 526          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 527          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 528          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 529          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 530          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 531          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 532          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
```

```
 533          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.004   0.005
 534          PI   0.004   0.004   0.005   0.004   0.004   0.004   0.004   0.004   0.004   0.005
 535          PI   0.003   0.011   0.011   0.019   0.029   0.039   0.045   0.052   0.066   0.149
 536          PI   0.199   0.256   0.135   0.044   0.043   0.060   0.107   0.186   0.260   0.267
1                                          HEC-1 INPUT                                                    PAGE 12

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

 537          PI   0.218   0.205   0.174   0.155   0.159   0.205   0.116   0.081   0.053   0.019
 538          PI   0.008   0.001   0.001   0.001   0.000   0.000   0.001   0.002   0.002   0.001
 539          PI   0.001   0.002   0.004   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 540          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 541          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 542          PI   0.000   0.000
 543          LG    0.28    0.35    4.15    0.40     6.8
 544          UC   4.031   2.143
 545          UA       0       3       5       8      12      20      43      75      90      96
 546          UA     100
              *

 547          KK    C006
 548          KM  Combines Routed C005, 48L and 48M
 549          HC       3
              *

 550          KK  006007
 551          KM  Channel Routing of C006 to C007C
 552          KM  Length = 24,092 feet
 553          KM  Change in Elev = 3410-3275
 554          KM  Slope Correction not Applied
 555          KO                                   22
 556          RS      50    FLOW      -1
 557          RC    .035    .030    .035   24092  0.0056
 558          RX       0    1263    1340    1351    1360    1380    1485    1535
 559          RY    3340    3300    3300    3268    3268    3300    3300    3340
              *

 560          KK     48N
 561          KM  Flows to Concentration Point C007R
 562          KM  Basin Slope did not require adjustment
 563          KM  Desert/Rangeland Time-Area Relationship
 564          KO                                   21
 565          BA  10.645
 566          PB   2.643
 567          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 568          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 569          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 570          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 571          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 572          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 573          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 574          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 575          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 576          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 577          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.002   0.002
 578          PI   0.002   0.001   0.001   0.002   0.002   0.001   0.002   0.002   0.004   0.004
 579          PI   0.002   0.022   0.128   0.104   0.025   0.031   0.079   0.133   0.077   0.067
 580          PI   0.101   0.176   0.136   0.178   0.133   0.068   0.056   0.077   0.098   0.169
 581          PI   0.151   0.111   0.084   0.094   0.058   0.054   0.053   0.043   0.035   0.023
 582          PI   0.021   0.011   0.005   0.001   0.001   0.000   0.000   0.000   0.001   0.001
 583          PI   0.001   0.001   0.002   0.003   0.001   0.000   0.000   0.000   0.000   0.000
 584          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 585          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
1                                          HEC-1 INPUT                                                    PAGE 13

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

 586          PI   0.000   0.000
 587          LG    0.26    0.35    4.00    0.44     3.7
 588          UC   2.677   1.611
 589          UA       0       3       5       8      12      20      43      75      90      96
 590          UA     100
              *

 591          KK     48O
 592          KM  Flows to Concentration Point C007L
 593          KM  Basin Slope required adjustment
 594          KM  Desert/Rangeland Time-Area Relationship
 595          KO                                   21
 596          BA  9.4279
 597          PB   4.766
 598          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 599          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 600          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 601          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 602          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 603          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 604          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 605          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 606          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 607          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 608          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.002   0.003
 609          PI   0.002   0.002   0.003   0.002   0.002   0.002   0.002   0.002   0.004   0.013
 610          PI   0.031   0.049   0.049   0.021   0.022   0.098   0.259   0.265   0.242   0.282
 611          PI   0.386   0.325   0.326   0.203   0.122   0.117   0.108   0.150   0.266   0.270
```

```
 612          PI   0.222   0.139   0.107   0.070   0.049   0.063   0.113   0.123   0.111   0.057
 613          PI   0.037   0.008   0.003   0.001   0.001   0.001   0.001   0.001   0.002   0.003
 614          PI   0.002   0.002   0.008   0.007   0.002   0.000   0.000   0.000   0.000   0.000
 615          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 616          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 617          PI   0.000   0.000
 618          LG    0.30    0.36    5.10    0.25     6.7
 619          UC   2.495   1.410
 620          UA       0       3       5       8      12      20      43      75      90      96
 621          UA     100
              *

 622          KK    C007
 623          KM  Combines Routed C006, 48M and 48O
 624          HC       3
              *

 625          KK  007008
 626          KM  Channel Routing of C007 to C008C
 627          KM  Length = 6,770 feet
 628          KM  Change in Elev = 3275-3220
 629          KM  Slope Correction not Applied
 630          KO                                  22
 631          RS      14    FLOW      -1
 632          RC    .035    .030    .035    6770  0.0081
 633          RX       0    1135    1490    1506    1520    1550    2152    2332
 634          RY    3400    3360    3360    3325    3325    3360    3360    3400
              *
1                                          HEC-1 INPUT                                                PAGE 14

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


 635          KK     48Q
 636          KM
 637          KM  Basin Slope did not require adjustment
 638          KM  Desert/Rangeland Time-Area Relationship
 639          KO                                  21
 640          BA  10.018
 641          PB   1.860
 642          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 643          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 644          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 645          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 646          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 647          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 648          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 649          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 650          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 651          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.002   0.002   0.002   0.002
 652          PI   0.002   0.002   0.002   0.002   0.002   0.002   0.002   0.003   0.001   0.007
 653          PI   0.005   0.006   0.005   0.005   0.003   0.004   0.004   0.003   0.011   0.037
 654          PI   0.132   0.108   0.025   0.015   0.005   0.002   0.022   0.052   0.096   0.084
 655          PI   0.113   0.180   0.126   0.050   0.046   0.083   0.089   0.018   0.037   0.037
 656          PI   0.031   0.011   0.012   0.012   0.019   0.019   0.019   0.011   0.004   0.011
 657          PI   0.014   0.022   0.023   0.023   0.022   0.022   0.020   0.025   0.011   0.006
 658          PI   0.004   0.002   0.003   0.006   0.009   0.012   0.010   0.008   0.002   0.002
 659          PI   0.003   0.003   0.002   0.004   0.007   0.006   0.001   0.000   0.000   0.000
 660          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 661          PI   0.000   0.000
 662          LG    0.26    0.38    5.60    0.21     6.2
 663          UC   2.283   1.244
 664          UA       0       3       5       8      12      20      43      75      90      96
 665          UA     100
              *

 666          KK    R48Q
 667          KM  Channel Routing of 48Q through 48R
 668          KM  Length = 33,216 feet
 669          KM  Change in Elev = 3560-3220
 670          KM  Slope Correction not Applied
 671          KO                                  22
 672          RS      55    FLOW      -1
 673          RC    .035    .030    .035   33216  0.0102
 674          RX       0    1135    1490    1495    1545    1550    2152    2332
 675          RY    3400    3360    3360    3325    3325    3360    3360    3400
              *

 676          KK     48R
 677          KM  Flows to Concentration Point C008L
 678          KM  Basin Slope did not require adjustment
 679          KM  Desert/Rangeland Time-Area Relationship
 680          KO                                  21
 681          BA  12.042
 682          PB   4.047
 683          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 684          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
1                                          HEC-1 INPUT                                                PAGE 15

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

 685          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 686          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 687          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 688          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
```

```
689          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
690          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
691          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
692          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.001
693          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.002
694          PI   0.002   0.002   0.002   0.002   0.001   0.001   0.002   0.002   0.016   0.013
695          PI   0.117   0.145   0.109   0.072   0.016   0.011   0.124   0.176   0.215   0.244
696          PI   0.271   0.350   0.380   0.312   0.225   0.172   0.125   0.080   0.095   0.111
697          PI   0.104   0.056   0.048   0.040   0.025   0.023   0.024   0.024   0.035   0.076
698          PI   0.061   0.032   0.015   0.010   0.009   0.002   0.002   0.007   0.004   0.004
699          PI   0.003   0.001   0.002   0.004   0.005   0.005   0.002   0.002   0.001   0.000
700          PI   0.001   0.001   0.001   0.002   0.002   0.003   0.000   0.000   0.000   0.000
701          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
702          PI   0.000   0.000
703          LG    0.33    0.35    4.15    0.39     1.9
704          UC   3.337   2.133
705          UA       0       3       5       8      12      20      43      75      90      96
706          UA     100
             *

707          KK     48P
708          KM  Flows to Concentration Point C008R
709          KM  Basin Slope did not require adjustment
710          KM  Desert/Rangeland Time-Area Relationship
711          KO                                     21
712          BA  4.4504
713          PB   2.841
714          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
715          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
716          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
717          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
718          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
719          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
720          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
721          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
722          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
723          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
724          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.002   0.002
725          PI   0.002   0.002   0.002   0.002   0.002   0.002   0.002   0.002   0.007   0.019
726          PI   0.004   0.006   0.083   0.157   0.084   0.078   0.139   0.223   0.117   0.122
727          PI   0.113   0.184   0.151   0.138   0.106   0.106   0.114   0.070   0.090   0.117
728          PI   0.163   0.081   0.068   0.053   0.059   0.032   0.025   0.026   0.021   0.016
729          PI   0.016   0.009   0.007   0.003   0.001   0.000   0.000   0.000   0.000   0.001
730          PI   0.001   0.001   0.001   0.002   0.002   0.001   0.001   0.000   0.000   0.000
731          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
732          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
733          PI   0.000   0.000
734          LG    0.31    0.35    4.00    0.44     7.2
735          UC   1.998   1.388
736          UA       0       3       5       8      12      20      43      75      90      96
737          UA     100
             *
```



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

738          KK    C008
739          KM  Combines Routed C007, Routed 48Q, 48R and 48P
740          HC       4
             *

741          KK  008009
742          KM  Channel Routing of C008 to C009C
743          KM  Length = 17,585 feet
744          KM  Change in Elev = 3220-3110
745          KM  Slope Correction not Applied
746          KO                                     22
747          RS      37    FLOW      -1
748          RC    .035    .030    .035   17585  0.0063
749          RX       0    1515    1615    1715    2503    2568    2608    3256
750          RY    3100    3060    3050    3040    3040    3050    3060    3100
             *

751          KK     48S
752          KM  Flows to Concentration Point C009R
753          KM  Basin Slope did not require adjustment
754          KM  Desert/Rangeland Time-Area Relationship
755          KO                                     21
756          BA  3.6634
757          PB   3.278
758          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
759          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
760          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
761          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
762          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
763          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
764          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
765          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
766          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
767          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.000
768          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.004   0.003
769          PI   0.004   0.004   0.004   0.004   0.004   0.004   0.004   0.053   0.128   0.250
770          PI   0.044   0.040   0.039   0.102   0.160   0.129   0.126   0.210   0.172   0.175
771          PI   0.189   0.157   0.129   0.122   0.131   0.087   0.091   0.081   0.080   0.078
```

```
 772          PI   0.076   0.112   0.059   0.046   0.030   0.031   0.008   0.009   0.012   0.018
 773          PI   0.021   0.017   0.012   0.005   0.002   0.001   0.000   0.000   0.000   0.000
 774          PI   0.001   0.001   0.001   0.001   0.001   0.001   0.001   0.000   0.000   0.000
 775          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 776          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 777          PI   0.000   0.000
 778          LG    0.23    0.35    4.15    0.39    11.5
 779          UC   2.159   1.563
 780          UA       0       3       5       8      12      20      43      75      90      96
 781          UA     100
              *
1                                          HEC-1 INPUT                                          PAGE 17

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


 782          KK     48T
 783          KM  Flows to Concentration Point C009L
 784          KM  Basin Slope did not require adjustment
 785          KM  Desert/Rangeland Time-Area Relationship
 786          KO                                      21
 787          BA  20.775
 788          PB   2.548
 789          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 790          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 791          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 792          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 793          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 794          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 795          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 796          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 797          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 798          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.002   0.002   0.002   0.002
 799          PI   0.002   0.002   0.002   0.002   0.002   0.002   0.002   0.002   0.002   0.003
 800          PI   0.003   0.003   0.003   0.004   0.006   0.007   0.005   0.029   0.035   0.105
 801          PI   0.040   0.141   0.121   0.104   0.061   0.034   0.019   0.061   0.074   0.135
 802          PI   0.160   0.145   0.113   0.122   0.113   0.098   0.107   0.081   0.091   0.083
 803          PI   0.084   0.047   0.028   0.018   0.012   0.009   0.008   0.006   0.004   0.007
 804          PI   0.015   0.024   0.022   0.021   0.020   0.019   0.008   0.005   0.005   0.004
 805          PI   0.003   0.002   0.003   0.004   0.006   0.009   0.008   0.005   0.001   0.001
 806          PI   0.001   0.001   0.001   0.000   0.001   0.001   0.000   0.000   0.000   0.000
 807          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 808          PI   0.000   0.000
 809          LG    0.31    0.35    4.25    0.38     0.1
 810          UC   4.429   3.167
 811          UA       0       3       5       8      12      20      43      75      90      96
 812          UA     100
              *

 813          KK    C009
 814          KM  Combines Routed C008, 48S and 48T
 815          HC       3
              *

 816          KK  009010
 817          KM  Channel Routing of C009 to C010C
 818          KM  Length = 6,830 feet
 819          KM  Change in Elev = 3110-3060
 820          KM  Slope Correction not Applied
 821          KO                                      22
 822          RS      14    FLOW      -1
 823          RC    .035    .030    .035    6830  0.0073
 824          RX       0    1515    1615    1715    2503    2568    2608    3256
 825          RY    3100    3060    3050    3040    3040    3050    3060    3100
              *
1                                          HEC-1 INPUT                                          PAGE 18

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


 826          KK     48U
 827          KM
 828          KM  Basin Slope did not require adjustment
 829          KM  Desert/Rangeland Time-Area Relationship
 830          KO                                      21
 831          BA  1.2475
 832          PB   1.407
 833          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 834          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 835          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 836          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 837          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 838          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 839          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 840          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 841          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 842          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 843          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.006   0.006
 844          PI   0.005   0.006   0.005   0.006   0.005   0.005   0.005   0.006   0.021   0.109
 845          PI   0.011   0.004   0.013   0.036   0.076   0.046   0.097   0.159   0.114   0.076
 846          PI   0.050   0.067   0.041   0.043   0.030   0.029   0.033   0.029   0.020   0.027
 847          PI   0.036   0.053   0.026   0.018   0.021   0.022   0.010   0.008   0.008   0.006
 848          PI   0.004   0.002   0.001   0.001   0.001   0.000   0.000   0.000   0.000   0.000
 849          PI   0.000   0.000   0.001   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 850          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
```

```
 851          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 852          PI   0.000   0.000
 853          LG    0.32    0.35    4.00    0.43     4.9
 854          UC   1.279   1.011
 855          UA       0       3       5       8      12      20      43      75      90      96
 856          UA     100
              *

 857          KK    R48U
 858          KM  Channel Routing of 48U through 48V
 859          KM  Length = 10,675 feet
 860          KM  Change in Elev = 3300-3120
 861          KM  Slope Correction not Applied
 862          KO                                      22
 863          RS      15    FLOW      -1
 864          RC    .035    .030    .035   10675  0.0169
 865          RX       0     205     514     697     710     880    1179    1272
 866          RY    3200    3160    3150    3140    3140    3150    3160    3200
              *

 867          KK     48V
 868          KM
 869          KM  Basin Slope did not require adjustment
 870          KM  Desert/Rangeland Time-Area Relationship
 871          KO                                      21
 872          BA  1.6295
 873          PB   1.929
 874          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 875          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
1                                          HEC-1 INPUT                                                PAGE 19

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

 876          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 877          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 878          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 879          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 880          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 881          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 882          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 883          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 884          PI   0.001   0.001   0.000   0.000   0.000   0.000   0.000   0.000   0.007   0.008
 885          PI   0.008   0.007   0.008   0.008   0.008   0.008   0.008   0.079   0.135   0.387
 886          PI   0.028   0.025   0.017   0.041   0.083   0.057   0.077   0.184   0.113   0.080
 887          PI   0.091   0.092   0.043   0.029   0.029   0.030   0.025   0.018   0.014   0.016
 888          PI   0.018   0.038   0.023   0.019   0.013   0.012   0.007   0.006   0.005   0.005
 889          PI   0.007   0.003   0.003   0.001   0.001   0.000   0.000   0.000   0.000   0.000
 890          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 891          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 892          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 893          PI   0.000   0.000
 894          LG    0.27    0.35    4.10    0.39     0.8
 895          UC   1.461   0.960
 896          UA       0       3       5       8      12      20      43      75      90      96
 897          UA     100
              *

 898          KK   C48UV
 899          KM  Combines Routed 48U and 48V
 900          HC       2
              *

 901          KK  RC48UV
 902          KM  Channel Routing of C48UV through 48W
 903          KM  Length = 8,745 feet
 904          KM  Change in Elev = 3120-3060
 905          KM  Slope Correction not Applied
 906          KO                                      22
 907          RS      18    FLOW      -1
 908          RC    .035    .030    .035    8745  0.0069
 909          RX       0    1515    1615    1715    2503    2568    2608    3256
 910          RY    3100    3060    3050    3040    3040    3050    3060    3100
              *

 911          KK     48W
 912          KM  Flows to Concentration Point C010R
 913          KM  Basin Slope did not require adjustment
 914          KM  Desert/Rangeland Time-Area Relationship
 915          KO                                      21
 916          BA  1.1274
 917          PB   1.649
 918          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 919          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 920          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 921          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 922          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 923          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 924          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
1                                          HEC-1 INPUT                                                PAGE 20

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

 925          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 926          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 927          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
```

```
 928          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.007   0.007
 929          PI   0.007   0.007   0.007   0.007   0.006   0.009   0.011   0.188   0.563   0.100
 930          PI   0.008   0.015   0.017   0.037   0.034   0.061   0.056   0.088   0.060   0.060
 931          PI   0.052   0.082   0.042   0.019   0.006   0.004   0.005   0.006   0.004   0.006
 932          PI   0.005   0.008   0.004   0.007   0.009   0.005   0.005   0.005   0.003   0.001
 933          PI   0.002   0.003   0.003   0.002   0.002   0.001   0.000   0.000   0.000   0.000
 934          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 935          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 936          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 937          PI   0.000   0.000
 938          LG    0.35    0.38    5.40    0.21     0.0
 939          UC   1.281   0.852
 940          UA       0       3       5       8      12      20      43      75      90      96
 941          UA     100
              *

 942          KK    C010
 943          KM  Combines Routed C009, R48UV and 48W
 944          HC       3
              *

 945          KK  010011
 946          KM  Channel Routing of C010 Tto C011
 947          KM  Length = 5,848 feet
 948          KM  Change in Elev = 3060-3020
 949          KM  Slope Correction not Applied
 950          KO                                     22
 951          RS      12    FLOW      -1
 952          RC    .035    .030    .035    5848  0.0068
 953          RX       0     150    1600    1637    1640    1700    2500    2673
 954          RY    3080    3050    3050    3040    3040    3050    3050    3080
              *

 955          KK     48X
 956          KM  Flows to Concentration Point C011L
 957          KM  Basin Slope did not require adjustment
 958          KM  Desert/Rangeland Time-Area Relationship
 959          KO                                     21
 960          BA  0.7830
 961          PB   1.281
 962          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 963          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 964          PI   0.000   0.000   0.000   0.000   0.001   0.001   0.001   0.000   0.000   0.000
 965          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 966          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 967          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 968          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 969          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 970          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 971          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.001   0.000
 972          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.006   0.006
 973          PI   0.006   0.006   0.006   0.006   0.006   0.028   0.031   0.080   0.476   0.180
1                                            HEC-1 INPUT                                                PAGE 21

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

 974          PI   0.002   0.006   0.017   0.023   0.022   0.047   0.061   0.035   0.027   0.030
 975          PI   0.035   0.048   0.016   0.011   0.006   0.004   0.003   0.002   0.002   0.002
 976          PI   0.002   0.003   0.002   0.002   0.007   0.005   0.003   0.003   0.003   0.001
 977          PI   0.001   0.002   0.002   0.001   0.002   0.002   0.000   0.000   0.000   0.000
 978          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 979          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 980          PI   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
 981          PI   0.000   0.000
 982          LG    0.35    0.38    6.40    0.15     0.0
 983          UC   1.128   0.690
 984          UA       0       3       5       8      12      20      43      75      90      96
 985          UA     100
              *

 986          KK    C011
 987          KM  Combines Routed C010 and 48X
 988          HC       2
 989          KO                                     22
 990          ZW    A=C011 C=FLOW
              *
 991          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    47         48A
                 .
                 .
    78           .         48B
                 .           .
                 .           .
   109        C002............
                 V
                 V
   112      001002
                 .
```

```
            .
122         .        48C
            .          V
            .          V
152         .       R48C
            .          .
            .          .
162         .          .        48D
            .          .          .
            .          .          .
193         .      C48CD...........
            .          V
            .          V
196         .      R40CD
            .          .
            .          .
206         .          .        48E
            .          .          .
            .          .          .
237         .       C002...........
            .          V
            .          V
240         .     002003
            .          .
            .          .
250         .          .        48F
            .          .          .
            .          .          .
281         .          .          .        48G
            .          .          .          V
            .          .          .          V
312         .          .          .       R48G
            .          .          .          .
            .          .          .          .
322         .          .          .          .        48H
            .          .          .          .          .
            .          .          .          .          .
353       C003.............................................
            V
            V
356     003004
            .
            .
366         .        48I
            .          .
            .          .
397       C004...........
            V
            V
400     004005
            .
            .
410         .        48K
            .          .
            .          .
441         .          .        48J
            .          .          .
            .          .          .
472       C005......................
            V
            V
475     005006
            .
            .
485         .        48L
            .          .
            .          .
516         .          .        48M
            .          .          .
            .          .          .
547       C006......................
            V
            V
550     006007
            .
            .
560         .        48N
            .          .
            .          .
591         .          .        48O
            .          .          .
            .          .          .
622       C007......................
            V
            V
625     007008
            .
            .
635         .        48Q
            .          V
            .          V
666         .       R48Q
            .          .
            .          .
676         .          .        48R
```

```
                .          .          .
                .          .          .
   707          .          .          .         48P
                .          .          .           .
                .          .          .           .
   738        C008.....................................
                V
                V
   741      008009
                .
                .
   751          .         48S
                .           .
                .           .
   782          .           .         48T
                .          .           .
                .          .           .
   813        C009........................
                V
                V
   816      009010
                .
                .
   826          .         48U
                .           V
                .           V
   857          .        R48U
                .           .
                .           .
   867          .           .         48V
                .          .           .
                .          .           .
   898          .       C48UV............
                .           V
                .           V
   901          .      RC48UV
                .           .
                .           .
   911          .           .         48W
                .          .           .
                .          .           .
   942        C010........................
                V
                V
   945      010011
                .
                .
   955          .         48X
                .           .
                .           .
   986        C011............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************                                                    ****************************************
 *                                      *                                                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                                                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                                                    *          609 SECOND STREET           *
 *                                      *                                                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   25MAR19  TIME  17:56:58  *                                                    *           (916) 756-1104             *
 *                                      *                                                    *                                      *
 ****************************************                                                    ****************************************
```

Sopori Wash - Special Event Study
Date of Event - September 2, 2018

The effective (FIS) model was used as a basis of the analysis. Only the precipitation input data was revised to reflect the actual storm on a subbasin-by-subbasin basis using data provided by AWA.
Date of analysis - March 24, 2019
Modeler: Joseph M. Alwin, P.E.
Stantec Consulting Services Inc.
Tucson, Arizona 85711

Santa Cruz County - FIRM Map Modernization Study Filename: SOP500YR.IH1
Hydrologic Analysis for 500-year Recurrence Event Project# 006-08-012

C.L.Williams, Inc.
Lakeside, Arizona
Modeled by Joseph M. Alwin, P.E.

Model Basis:
----> SOPORI WASH <----
EXISTING CONDITIONS - CONSIDERS FUTURE DEVELOPMENT
State Standard Hydrologic Methodology supplemented by:
Arizona Department of Transportation Methodology (1993)
500-year recurrence event
Green & Ampt Loss Rate Method
NMIN = 2 (Computational Interval)
NOAA 14 Rainfall input: Storm Duration = 24 hours
Point Rainfall Reduction Factor = 0.568

```
                                 Clark Unit Hydrograph
                                    Time of Concentration; Desert/Mountain Equation (ADOT, 4-1)
                                 Modified Puls normal depth channel routing
                                 Slope Correction per FCDMC, Drainage Design Manual, Vol. 1
                                    Figure 5.4
                                 Time-area relationship; HEC-1 Default unless noted in KM Record
                              Rainfall excess parameters reflect EXISTING landuse conditions

                           Modeling date- March 1, 2007
                              Preliminary Analysis
                                    Routing channel sections are preliminary estimates
                              - March 21, 2007
                                    Revised Soil Parameters & Routing Sections
                              - April 14, 2007
                                   Revised rainfall duration


 45 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           5  MINUTES IN COMPUTATION INTERVAL
                      IDATE      9SEP18  STARTING DATE
                      ITIME        1805  STARTING TIME
                         NQ         240  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     10SEP18  ENDING DATE
                     NDTIME        1400  ENDING TIME
                      ICENT          20  CENTURY MARK

                  COMPUTATION INTERVAL     .08 HOURS
                       TOTAL TIME BASE   19.92 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


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


           **************
           *            *
 47 KK     *       48A  *
           *            *
           **************
                         Flows to Concentration Point C001L
                         Basin Slope did not require adjustment
                         Desert/Rangeland Time-Area Relationship

 51 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS


              SUBBASIN RUNOFF DATA

 52 BA          SUBBASIN CHARACTERISTICS
                      TAREA        6.37  SUBBASIN AREA

                PRECIPITATION DATA

 53 PB                STORM         .15  BASIN TOTAL PRECIPITATION

 54 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .02       .00       .01       .01       .01       .01       .00       .00       .00
                     .00       .01       .01       .01       .01       .01       .01       .00       .00       .00
                     .00       .00       .00       .00
```

```
 74 LG          GREEN AND AMPT LOSS RATE
                      STRTL         .23  STARTING LOSS
                        DTH         .35  MOISTURE DEFICIT
                       PSIF        4.45  WETTING FRONT SUCTION
                      XKSAT         .35  HYDRAULIC CONDUCTIVITY
                      RTIMP       18.20  PERCENT IMPERVIOUS AREA

 75 UC          CLARK UNITGRAPH
                         TC        2.14  TIME OF CONCENTRATION
                          R        1.39  STORAGE COEFFICIENT

 76 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                       .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                    100.0

                                                                  ***

                                                          UNIT HYDROGRAPH PARAMETERS
                                                    CLARK   TC=  2.14 HR,       R=  1.39 HR
                                                   SNYDER   TP=  1.80 HR,      CP=   .80

                                                              UNIT HYDROGRAPH
                                                        105 END-OF-PERIOD ORDINATES
                 17.       49.       78.       99.      115.      136.      161.      186.      216.      248.
                295.      361.      441.      601.      823.     1061.     1335.     1616.     1784.     1848.
               1887.     1873.     1831.     1782.     1724.     1662.     1581.     1489.     1402.     1321.
               1244.     1171.     1103.     1039.      978.      921.      867.      817.      769.      724.
                682.      642.      605.      570.      536.      505.      476.      448.      422.      397.
                374.      352.      332.      312.      294.      277.      261.      246.      231.      218.
                205.      193.      182.      171.      161.      152.      143.      135.      127.      120.
                113.      106.      100.       94.       89.       83.       79.       74.       70.       66.
                 62.       58.       55.       52.       49.       46.       43.       41.       38.       36.
                 34.       32.       30.       28.       27.       25.       24.       22.       21.       20.
                 19.       17.       16.       16.       15.

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

                        HYDROGRAPH AT STATION      48A

    TOTAL RAINFALL =     .15, TOTAL LOSS =     .13, TOTAL EXCESS =     .03

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                              (CFS)
+      35.     13.58                    18.          6.          6.           6.
                           (INCHES)    .026        .028        .028         .028
                            (AC-FT)      9.          9.          9.           9.

                           CUMULATIVE AREA =    6.37 SQ MI


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


            **************
            *            *
 78 KK      *       48B  *
            *            *
            **************
                          Flows to Concentration Point C001R
                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

 82 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS


              SUBBASIN RUNOFF DATA

 83 BA          SUBBASIN CHARACTERISTICS
                      TAREA       10.14  SUBBASIN AREA

                PRECIPITATION DATA

 84 PB                STORM         .11  BASIN TOTAL PRECIPITATION

 85 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .02       .00       .00       .00       .01       .01       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00

  105 LG          GREEN AND AMPT LOSS RATE
                        STRTL         .21  STARTING LOSS
                          DTH         .35  MOISTURE DEFICIT
                         PSIF        4.80  WETTING FRONT SUCTION
                        XKSAT         .29  HYDRAULIC CONDUCTIVITY
                        RTIMP       19.50  PERCENT IMPERVIOUS AREA

  106 UC          CLARK UNITGRAPH
                           TC        2.58  TIME OF CONCENTRATION
                            R        1.42  STORAGE COEFFICIENT

  107 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                         .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                      100.0

                                                                  ***

                                                        UNIT HYDROGRAPH PARAMETERS
                                                   CLARK   TC=  2.58 HR,       R=  1.42 HR
                                                  SNYDER   TP=  2.14 HR,      CP=   .88

                                                              UNIT HYDROGRAPH
                                                        110 END-OF-PERIOD ORDINATES
                 22.       64.      103.      134.      156.      176.      201.      231.      262.      295.
                334.      373.      427.      507.      594.      732.      971.     1247.     1536.     1873.
               2229.     2524.     2679.     2744.     2789.     2767.     2696.     2627.     2548.     2460.
               2377.     2269.     2140.     2018.     1903.     1795.     1693.     1596.     1506.     1420.
               1339.     1263.     1191.     1123.     1059.      999.      942.      888.      838.      790.
                745.      703.      663.      625.      589.      556.      524.      494.      466.      440.
                415.      391.      369.      348.      328.      309.      292.      275.      259.      245.
                231.      218.      205.      193.      182.      172.      162.      153.      144.      136.
                128.      121.      114.      108.      102.       96.       90.       85.       80.       76.
                 71.       67.       64.       60.       56.       53.       50.       47.       45.       42.
                 40.       37.       35.       33.       31.       30.       28.       26.       25.       23.

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

                          HYDROGRAPH AT STATION      48B

    TOTAL RAINFALL =     .11, TOTAL LOSS =     .09, TOTAL EXCESS =     .02

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+      37.     13.67                  21.          7.          7.           7.
                        (INCHES)      .019        .021        .021         .021
                         (AC-FT)       10.         11.         11.          11.

                         CUMULATIVE AREA =   10.14 SQ MI


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


            **************
            *            *
  109 KK    *      C002  *
            *            *
            **************
                           Combines 48A and 48B

  111 HC          HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                          HYDROGRAPH AT STATION     C002

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+      72.     13.67                  38.         13.         13.          13.
                        (INCHES)      .022        .024        .024         .024
                         (AC-FT)       19.         21.         21.          21.

                         CUMULATIVE AREA =   16.52 SQ MI
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 112 KK     *    001002  *
            *            *
            **************
                          Channel Routing from C001 to C003C
                          Length = 21,824 feet
                          Change in Elev = 3725-3600
                          Slope Correction not Applied

 117 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

 118 RS          STORAGE ROUTING
                       NSTPS          45  NUMBER OF SUBREACHES
                        ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

 119 RC          NORMAL DEPTH CHANNEL
                         ANL        .035  LEFT OVERBANK N-VALUE
                        ANCH        .030  MAIN CHANNEL N-VALUE
                         ANR        .035  RIGHT OVERBANK N-VALUE
                       RLNTH      21824.  REACH LENGTH
                         SEL       .0057  ENERGY SLOPE
                       ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 121 RY        ELEVATION   3680.00   3640.00   3640.00   3630.00   3630.00   3640.00   3640.00   3680.00
 120 RX        DISTANCE        .00    220.00    340.00    350.00    360.00    380.00    478.00    744.00

                                                                  ***

                                         COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00     18.39     47.19     86.39    194.13    563.81    975.63   1429.62   1925.76   2464.05
            OUTFLOW        .00    209.06    770.76   1747.32   3533.46  10601.63  22479.94  38711.13  59225.00  84070.67
          ELEVATION    3630.00   3632.63   3635.26   3637.89   3640.53   3643.16   3645.79   3648.42   3651.05   3653.68

            STORAGE    3044.50   3667.11   4331.87   5038.79   5787.87   6579.10   7412.49   8288.03   9205.73  10165.59
            OUTFLOW  113350.40 147193.50 185744.30 229155.50 277584.50 331191.00 390135.80 454580.10 524684.60 600610.60
          ELEVATION    3656.32   3658.95   3661.58   3664.21   3666.84   3669.47   3672.11   3674.74   3677.37   3680.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO   600611.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION   001002

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+      72.     14.67                  38.         13.         13.          13.
                        (INCHES)     .022        .024        .024         .024
                         (AC-FT)      19.         21.         21.          21.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        0.     14.58                   0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3630.90     14.67               3630.48     3630.16     3630.16      3630.16

                        CUMULATIVE AREA =   16.52 SQ MI



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


            **************
            *            *
 122 KK     *       48C  *
```

```
*           *
**************
              Flows to Concentration Point
              Basin Slope required adjustment

125 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        240  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .083  TIME INTERVAL IN HOURS


             SUBBASIN RUNOFF DATA

126 BA          SUBBASIN CHARACTERISTICS
                      TAREA       3.99  SUBBASIN AREA

                PRECIPITATION DATA

127 PB                STORM        .07  BASIN TOTAL PRECIPITATION

128 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00

148 LG          GREEN AND AMPT LOSS RATE
                      STRTL        .18  STARTING LOSS
                        DTH        .35  MOISTURE DEFICIT
                       PSIF       4.50  WETTING FRONT SUCTION
                      XKSAT        .33  HYDRAULIC CONDUCTIVITY
                      RTIMP      29.30  PERCENT IMPERVIOUS AREA

149 UC          CLARK UNITGRAPH
                         TC       1.68  TIME OF CONCENTRATION
                          R       1.04  STORAGE COEFFICIENT

150 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                       .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                    100.0

                                                          ***

                                                UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  1.68 HR,       R=  1.04 HR
                                         SNYDER   TP=  1.39 HR,      CP=   .81

                                                     UNIT HYDROGRAPH
                                                 79 END-OF-PERIOD ORDINATES
                18.       52.       77.       95.      117.      143.      172.      206.      259.      331.
               478.      703.      965.     1260.     1454.     1533.     1548.     1508.     1453.     1391.
              1313.     1217.     1123.     1037.      957.      884.      816.      753.      696.      642.
               593.      547.      505.      467.      431.      398.      367.      339.      313.      289.
               267.      246.      227.      210.      194.      179.      165.      153.      141.      130.
               120.      111.      102.       94.       87.       81.       74.       69.       63.       59.
                54.       50.       46.       43.       39.       36.       33.       31.       29.       26.
                24.       22.       21.       19.       18.       16.       15.       14.       13.

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

                       HYDROGRAPH AT STATION      48C

    TOTAL RAINFALL =     .07, TOTAL LOSS =     .05, TOTAL EXCESS =     .02

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+      17.     12.33                 8.          3.          3.          3.
                        (INCHES)     .019        .021        .021        .021
                         (AC-FT)      4.          4.          4.          4.

                        CUMULATIVE AREA =    3.99 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
```

```
            **************
            *            *
 152 KK     *      R48C  *
            *            *
            **************
                          Channel Routing of 48C through 48D
                          Length = 11,487 feet
                          Change in Elev = 4075-3915
                          Slope Correction not Applied

 157 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .083  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

 158 RS          STORAGE ROUTING
                       NSTPS         19  NUMBER OF SUBREACHES
                        ITYP       FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC      -1.00  INITIAL CONDITION
                           X        .00 WORKING R AND D COEFFICIENT

 159 RC          NORMAL DEPTH CHANNEL
                         ANL       .035  LEFT OVERBANK N-VALUE
                        ANCH       .030  MAIN CHANNEL N-VALUE
                         ANR       .035  RIGHT OVERBANK N-VALUE
                       RLNTH     11487.  REACH LENGTH
                         SEL      .0139  ENERGY SLOPE
                       ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 161 RY        ELEVATION   4000.00   3960.00   3960.00   3950.00   3950.00   3960.00   3960.00   4000.00
 160 RX        DISTANCE        .00    333.00    363.00    373.00    380.00    390.00    445.00   1012.00

                                                                  ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00      6.68     17.02     31.01     61.20    167.69    315.26    503.93    733.69   1004.54
            OUTFLOW        .00    215.94    777.21   1737.76   3396.34   9048.30  19462.61  35357.86  57520.69  86712.09
          ELEVATION    3950.00   3952.63   3955.26   3957.89   3960.53   3963.16   3965.79   3968.42   3971.05   3973.68

            STORAGE    1316.48   1669.51   2063.63   2498.84   2975.14   3492.53   4051.01   4650.58   5291.24   5972.99
            OUTFLOW  123660.70 169065.00 223597.50 287907.20 362622.90 448355.10 545698.10 655231.60 777521.50 913125.20
          ELEVATION    3976.32   3978.95   3981.58   3984.21   3986.84   3989.47   3992.11   3994.74   3997.37   4000.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO   913125.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION     R48C

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+      17.     12.75                   8.          3.          3.           3.
                       (INCHES)      .019        .021        .021         .021
                        (AC-FT)        4.          4.          4.           4.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        0.     12.58                   0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3950.20     12.75               3950.10     3950.03     3950.03      3950.03

                        CUMULATIVE AREA =    3.99 SQ MI


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


            **************
            *            *
 162 KK     *       48D  *
            *            *
```

```
**************

                Basin Slope did not require adjustment
                Desert/Rangeland Time-Area Relationship

 166 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


              SUBBASIN RUNOFF DATA

 167 BA          SUBBASIN CHARACTERISTICS
                       TAREA         .94  SUBBASIN AREA

                 PRECIPITATION DATA

 168 PB                STORM         .10  BASIN TOTAL PRECIPITATION

 169 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .01       .02       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00

 189 LG          GREEN AND AMPT LOSS RATE
                       STRTL         .22  STARTING LOSS
                         DTH         .35  MOISTURE DEFICIT
                        PSIF        4.70  WETTING FRONT SUCTION
                       XKSAT         .30  HYDRAULIC CONDUCTIVITY
                       RTIMP       21.70  PERCENT IMPERVIOUS AREA

 190 UC          CLARK UNITGRAPH
                          TC        1.20  TIME OF CONCENTRATION
                           R         .99  STORAGE COEFFICIENT

 191 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                        .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                     100.0

                                                                  ***

                                                        UNIT HYDROGRAPH PARAMETERS
                                                  CLARK   TC=  1.20 HR,       R=   .99 HR
                                                 SNYDER   TP=  1.03 HR,      CP=   .69

                                                            UNIT HYDROGRAPH
                                                        72 END-OF-PERIOD ORDINATES
                  6.       17.       25.       33.       44.       58.       79.      129.      212.      313.
                387.      413.      414.      401.      381.      354.      325.      299.      275.      252.
                232.      213.      196.      180.      166.      152.      140.      129.      118.      109.
                100.       92.       84.       78.       71.       65.       60.       55.       51.       47.
                 43.       39.       36.       33.       31.       28.       26.       24.       22.       20.
                 18.       17.       16.       14.       13.       12.       11.       10.        9.        9.
                  8.        7.        7.        6.        6.        5.        5.        4.        4.        4.
                  3.        3.

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

                        HYDROGRAPH AT STATION      48D

    TOTAL RAINFALL =     .10, TOTAL LOSS =     .08, TOTAL EXCESS =     .02

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+       5.     12.17                 2.          1.          1.          1.
                        (INCHES)      .021        .022        .022        .022
                         (AC-FT)       1.          1.          1.          1.

                         CUMULATIVE AREA =     .94 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
```

```
            **************
            *            *
 193 KK     *     C48CD  *
            *            *
            **************
                          Combines routed 48C and 48D

 195 HC          HYDROGRAPH COMBINATION
                       ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                         HYDROGRAPH AT STATION    C48CD

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+      21.     12.67                  10.          3.          3.           3.
                        (INCHES)      .020        .021        .021         .021
                         (AC-FT)        5.          6.          6.           6.

                         CUMULATIVE AREA =    4.93 SQ MI



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


            **************
            *            *
 196 KK     *     R40CD  *
            *            *
            **************
                          Channel Routing of C48CD through 48E
                          Length = 12,743 feet
                          Change in Elev = 3915-3760
                          Slope Correction not Applied

 201 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


              HYDROGRAPH ROUTING DATA

 202 RS          STORAGE ROUTING
                       NSTPS          21  NUMBER OF SUBREACHES
                        ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

 203 RC          NORMAL DEPTH CHANNEL
                         ANL        .035  LEFT OVERBANK N-VALUE
                        ANCH        .030  MAIN CHANNEL N-VALUE
                         ANR        .035  RIGHT OVERBANK N-VALUE
                       RLNTH      12743.  REACH LENGTH
                         SEL       .0122  ENERGY SLOPE
                       ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                       CROSS-SECTION DATA
                         --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 205 RY        ELEVATION   3840.00   3800.00   3800.00   3786.00   3786.00   3800.00   3800.00   3840.00
 204 RX        DISTANCE        .00    587.00    750.00    759.00    790.00    800.00    901.00   1264.00

                                                                  ***

                                       COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00     27.38     57.96     91.75    128.75    185.33    478.60    828.00   1233.50   1695.13
            OUTFLOW        .00    938.37   2931.01   5729.50   9271.46  13704.28  28039.44  53105.21  88440.90 134461.20
          ELEVATION    3786.00   3788.84   3791.68   3794.53   3797.37   3800.21   3803.05   3805.89   3808.74   3811.58

            STORAGE    2212.88   2786.75   3416.73   4102.83   4845.06   5643.40   6497.86   7408.44   8375.13   9397.95
            OUTFLOW  191777.40 261064.50 343017.30 438332.80 547702.90 671809.80 811326.20 966913.301139222.001328891.00
          ELEVATION    3814.42   3817.26   3820.10   3822.95   3825.79   3828.63   3831.47   3834.31   3837.16   3840.00


*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO  1328891.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

      ***             ***             ***             ***             ***
```

```
                        HYDROGRAPH AT STATION    R40CD

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                           (CFS)
+      21.     13.08                 10.          3.          3.           3.
                        (INCHES)    .020        .021        .021         .021
                         (AC-FT)      5.          6.          6.           6.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        0.     13.00                  0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3786.06     13.08             3786.03     3786.01     3786.01      3786.01

                        CUMULATIVE AREA =    4.93 SQ MI


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


            **************
            *            *
  206 KK    *       48E  *
            *            *
            **************
                         Flows to Concentration Point C002L
                         Basin Slope did not require adjustment
                         Desert/Rangeland Time-Area Relationship

  210 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


               SUBBASIN RUNOFF DATA

  211 BA          SUBBASIN CHARACTERISTICS
                        TAREA         .92  SUBBASIN AREA

                  PRECIPITATION DATA

  212 PB                STORM         .16  BASIN TOTAL PRECIPITATION

  213 PI            INCREMENTAL PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .01       .02       .00       .01       .01       .01       .01       .00       .00       .00
                        .01       .01       .01       .00       .01       .00       .00       .00       .00       .00
                        .00       .00       .00       .00

  233 LG          GREEN AND AMPT LOSS RATE
                        STRTL         .28  STARTING LOSS
                          DTH         .35  MOISTURE DEFICIT
                         PSIF        4.15  WETTING FRONT SUCTION
                        XKSAT         .39  HYDRAULIC CONDUCTIVITY
                        RTIMP        6.40  PERCENT IMPERVIOUS AREA

  234 UC          CLARK UNITGRAPH
                           TC        1.22  TIME OF CONCENTRATION
                            R        1.01  STORAGE COEFFICIENT

  235 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                         .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                       100.0

                                                                  ***

                                                        UNIT HYDROGRAPH PARAMETERS
                                                   CLARK   TC=  1.22 HR,       R=  1.01 HR
                                                 SNYDER   TP=  1.04 HR,      CP=   .68
```

```
                                                    UNIT HYDROGRAPH
                                                 74 END-OF-PERIOD ORDINATES
                 6.       16.       23.       31.       41.       54.       74.      118.      191.      285.
               361.      393.      398.      386.      369.      345.      317.      292.      269.      248.
               229.      211.      194.      179.      165.      152.      140.      129.      118.      109.
               101.       93.       85.       79.       72.       67.       61.       57.       52.       48.
                44.       41.       38.       35.       32.       29.       27.       25.       23.       21.
                19.       18.       16.       15.       14.       13.       12.       11.       10.        9.
                 9.        8.        7.        7.        6.        6.        5.        5.        4.        4.
                 4.        3.        3.        3.

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

                        HYDROGRAPH AT STATION      48E

    TOTAL RAINFALL =     .16, TOTAL LOSS =     .15, TOTAL EXCESS =     .01

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+       2.     12.83                    1.          0.          0.          0.
                       (INCHES)      .010        .010        .010        .010
                        (AC-FT)        0.          0.          0.          0.

                       CUMULATIVE AREA =     .92 SQ MI


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


            **************
            *            *
  237 KK    *      C002  *
            *            *
            **************
                         Combines Routed C48CD and 48E

  239 HC          HYDROGRAPH COMBINATION
                       ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                        HYDROGRAPH AT STATION     C002

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+      23.     13.08                   11.          4.          4.          4.
                       (INCHES)      .018        .019        .019        .019
                        (AC-FT)        6.          6.          6.          6.

                       CUMULATIVE AREA =    5.85 SQ MI


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


            **************
            *            *
  240 KK    *    002003  *
            *            *
            **************
                         Channel Routing of C002 to C003R
                         Length = 24,833 feet
                         Change in Elev = 3760-3600
                         Slope Correction not Applied

  245 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

  246 RS          STORAGE ROUTING
                       NSTPS          52  NUMBER OF SUBREACHES
                        ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT
```

```
 247 RC          NORMAL DEPTH CHANNEL
                       ANL        .035  LEFT OVERBANK N-VALUE
                      ANCH        .030  MAIN CHANNEL N-VALUE
                       ANR        .035  RIGHT OVERBANK N-VALUE
                     RLNTH      24833.  REACH LENGTH
                       SEL       .0064  ENERGY SLOPE
                     ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 249 RY        ELEVATION   3680.00   3640.00   3640.00   3630.00   3630.00   3640.00   3640.00   3680.00
 248 RX        DISTANCE        .00    220.00    340.00    350.00    360.00    380.00    478.00    744.00

                                                          ***

                                         COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00     20.92     53.69     98.31    220.90    641.54   1110.15   1626.73   2191.27   2803.78
            OUTFLOW        .00    221.52    816.72   1851.50   3744.14  11233.76  23820.33  41019.32  62756.34  89083.46
          ELEVATION    3630.00   3632.63   3635.26   3637.89   3640.53   3643.16   3645.79   3648.42   3651.05   3653.68

            STORAGE    3464.26   4172.71   4929.13   5733.52   6585.87   7486.20   8434.49   9430.75  10474.98  11567.17
            OUTFLOW  120109.00 155970.00 196819.50 242819.10 294135.70 350938.50 413398.00 481684.80 555969.40 636422.50
          ELEVATION    3656.32   3658.95   3661.58   3664.21   3666.84   3669.47   3672.11   3674.74   3677.37   3680.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO   636423.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION   002003

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+      22.     14.25                  11.          4.          4.           4.
                       (INCHES)      .018        .019        .019         .019
                        (AC-FT)        6.          6.          6.           6.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        0.     14.17                   0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3630.27     14.25               3630.13     3630.04     3630.04      3630.04

                       CUMULATIVE AREA =    5.85 SQ MI



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


            **************
            *            *
 250 KK     *       48F  *
            *            *
            **************
                          Flows to Concentration Point C002L
                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

 254 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS


              SUBBASIN RUNOFF DATA

 255 BA          SUBBASIN CHARACTERISTICS
                      TAREA        6.53  SUBBASIN AREA

                 PRECIPITATION DATA

 256 PB               STORM         .20  BASIN TOTAL PRECIPITATION

 257 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .01       .02       .00       .01       .01       .00       .01       .00       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .00       .01       .00
                    .00       .00       .00       .00

 277 LG          GREEN AND AMPT LOSS RATE
                      STRTL         .22  STARTING LOSS
                        DTH         .35  MOISTURE DEFICIT
                       PSIF        4.15  WETTING FRONT SUCTION
                      XKSAT         .41  HYDRAULIC CONDUCTIVITY
                      RTIMP        3.90  PERCENT IMPERVIOUS AREA

 278 UC          CLARK UNITGRAPH
                         TC        2.14  TIME OF CONCENTRATION
                          R        1.10  STORAGE COEFFICIENT

 279 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                       .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                    100.0

                                                                  ***

                                                        UNIT HYDROGRAPH PARAMETERS
                                                  CLARK   TC=  2.14 HR,       R=  1.10 HR
                                                 SNYDER   TP=  1.75 HR,      CP=   .91

                                                            UNIT HYDROGRAPH
                                                        87 END-OF-PERIOD ORDINATES
                 22.       63.       98.      124.      144.      168.      198.      229.      264.      302.
                358.      439.      537.      736.     1012.     1306.     1642.     1982.     2175.     2232.
               2256.     2215.     2139.     2057.     1966.     1872.     1756.     1628.     1509.     1399.
               1297.     1202.     1114.     1033.      958.      888.      823.      763.      707.      656.
                608.      563.      522.      484.      449.      416.      386.      358.      331.      307.
                285.      264.      245.      227.      210.      195.      181.      168.      155.      144.
                133.      124.      115.      106.       99.       91.       85.       79.       73.       67.
                 63.       58.       54.       50.       46.       43.       40.       37.       34.       32.
                 29.       27.       25.       23.       22.       20.       19.

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

                        HYDROGRAPH AT STATION      48F

    TOTAL RAINFALL =     .20, TOTAL LOSS =     .19, TOTAL EXCESS =     .01

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+      12.     13.58                   5.          2.          2.           2.
                       (INCHES)      .007        .008        .008         .008
                        (AC-FT)        3.          3.          3.           3.

                       CUMULATIVE AREA =    6.53 SQ MI


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


            **************
            *            *
 281 KK     *       48G  *
            *            *
            **************

                         Basin Slope required adjustment
                         Desert/Rangeland Time-Area Relationship

 285 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS


               SUBBASIN RUNOFF DATA

 286 BA          SUBBASIN CHARACTERISTICS
                      TAREA        3.54  SUBBASIN AREA

                 PRECIPITATION DATA

 287 PB               STORM         .07  BASIN TOTAL PRECIPITATION
```

```
288 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00

308 LG          GREEN AND AMPT LOSS RATE
                      STRTL         .19  STARTING LOSS
                        DTH         .35  MOISTURE DEFICIT
                       PSIF        4.65  WETTING FRONT SUCTION
                      XKSAT         .30  HYDRAULIC CONDUCTIVITY
                      RTIMP       33.40  PERCENT IMPERVIOUS AREA

309 UC          CLARK UNITGRAPH
                         TC        1.70  TIME OF CONCENTRATION
                          R        1.17  STORAGE COEFFICIENT

310 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                       .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                    100.0

                                                          ***

                                                UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  1.70 HR,       R=  1.17 HR
                                         SNYDER   TP=  1.43 HR,      CP=   .77

                                                     UNIT HYDROGRAPH
                                                 87 END-OF-PERIOD ORDINATES
                 14.       41.       61.       76.       93.      114.      138.      165.      207.      264.
                377.      551.      758.      993.     1162.     1241.     1265.     1246.     1209.     1166.
               1111.     1041.      970.      903.      841.      783.      729.      679.      632.      589.
                548.      510.      475.      443.      412.      384.      357.      333.      310.      288.
                269.      250.      233.      217.      202.      188.      175.      163.      152.      141.
                132.      123.      114.      106.       99.       92.       86.       80.       74.       69.
                 65.       60.       56.       52.       49.       45.       42.       39.       36.       34.
                 32.       29.       27.       26.       24.       22.       21.       19.       18.       17.
                 15.       14.       13.       13.       12.       11.       10.

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

                        HYDROGRAPH AT STATION      48G

    TOTAL RAINFALL =     .07, TOTAL LOSS =     .05, TOTAL EXCESS =     .02

  PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+      17.     12.33                     9.          3.          3.          3.
                        (INCHES)      .022        .024        .024        .024
                         (AC-FT)        4.          5.          5.          5.

                        CUMULATIVE AREA =    3.54 SQ MI


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


            **************
            *            *
312 KK      *      R48G  *
            *            *
            **************
                          Channel Routing of 48G through 48H
                          Length = 37,583 feet
                          Change in Elev = 4000-3600
                          Slope Correction not Applied

317 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS
```

```
                HYDROGRAPH ROUTING DATA

  318 RS          STORAGE ROUTING
                        NSTPS          63  NUMBER OF SUBREACHES
                         ITYP        FLOW  TYPE OF INITIAL CONDITION
                        RSVRIC       -1.00  INITIAL CONDITION
                             X         .00 WORKING R AND D COEFFICIENT

  319 RC          NORMAL DEPTH CHANNEL
                          ANL        .035  LEFT OVERBANK N-VALUE
                         ANCH        .030  MAIN CHANNEL N-VALUE
                          ANR        .035  RIGHT OVERBANK N-VALUE
                        RLNTH      37583.  REACH LENGTH
                          SEL       .0106  ENERGY SLOPE
                        ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                            --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  321 RY        ELEVATION   3760.00   3720.00   3720.00   3690.00   3700.00   3720.00   3720.00   3760.00
  320 RX        DISTANCE        .00    343.00    440.00    453.00    761.00    780.00    898.00   1460.00

                                                                  ***

                                         COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00    182.90    731.59   1631.80   2637.37   3659.15   4697.12   5751.30   6821.68   8585.68
            OUTFLOW        .00   1605.97  10197.28  31505.90  68837.40 116676.30 173815.20 239437.90 312946.80 405755.70
          ELEVATION    3690.00   3693.68   3697.37   3701.05   3704.74   3708.42   3712.11   3715.79   3719.47   3723.16

            STORAGE   10709.58  13098.47  15752.33  18671.17  21854.98  25303.77  29017.54  32996.29  37240.02  41748.71
            OUTFLOW  520946.90 657267.40 815690.90 997406.401203649.001435653.001694637.001981801.002298321.002645385.00
          ELEVATION    3726.84   3730.53   3734.21   3737.90   3741.58   3745.26   3748.95   3752.63   3756.32   3760.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO  2645385.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                          HYDROGRAPH AT STATION     R48G

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+      17.     13.83                    9.          3.          3.           3.
                        (INCHES)      .022        .024        .024         .024
                         (AC-FT)        4.          5.          5.           5.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        0.     13.75                    0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3690.04     13.83               3690.02     3690.00     3690.00      3690.00

                        CUMULATIVE AREA =    3.54 SQ MI



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


            **************
            *            *
  322 KK    *       48H  *
            *            *
            **************
                          Flows to Concentration Point C003R
                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

  326 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


                SUBBASIN RUNOFF DATA

  327 BA          SUBBASIN CHARACTERISTICS
                        TAREA        6.15  SUBBASIN AREA

                  PRECIPITATION DATA
```

```
 328 PB                STORM         .14  BASIN TOTAL PRECIPITATION

 329 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .01       .02       .00       .00       .01       .01       .01       .00       .00       .00
                      .01       .00       .00       .00       .01       .00       .00       .00       .00       .00
                      .00       .00       .00       .00

 349 LG          GREEN AND AMPT LOSS RATE
                       STRTL         .29  STARTING LOSS
                         DTH         .35  MOISTURE DEFICIT
                        PSIF        4.35  WETTING FRONT SUCTION
                       XKSAT         .38  HYDRAULIC CONDUCTIVITY
                       RTIMP        6.70  PERCENT IMPERVIOUS AREA

 350 UC          CLARK UNITGRAPH
                          TC        2.67  TIME OF CONCENTRATION
                           R        1.88  STORAGE COEFFICIENT

 351 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                        .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                     100.0

                                                                  ***

                                                       UNIT HYDROGRAPH PARAMETERS
                                                 CLARK   TC=  2.67 HR,       R=  1.88 HR
                                                SNYDER   TP=  2.24 HR,      CP=   .75

                                                            UNIT HYDROGRAPH
                                                       140 END-OF-PERIOD ORDINATES
                 10.       29.       47.       62.       72.       82.       94.      108.      122.      138.
                155.      174.      195.      228.      269.      309.      395.      525.      651.      794.
                959.     1124.     1251.     1318.     1357.     1385.     1382.     1361.     1339.     1312.
               1281.     1251.     1210.     1158.     1108.     1060.     1014.      970.      928.      887.
                849.      812.      777.      743.      710.      680.      650.      622.      595.      569.
                544.      520.      498.      476.      455.      436.      417.      399.      381.      365.
                349.      334.      319.      305.      292.      279.      267.      256.      244.      234.
                224.      214.      205.      196.      187.      179.      171.      164.      157.      150.
                143.      137.      131.      125.      120.      115.      110.      105.      100.       96.
                 92.       88.       84.       80.       77.       74.       70.       67.       64.       62.
                 59.       56.       54.       52.       49.       47.       45.       43.       41.       40.
                 38.       36.       35.       33.       32.       30.       29.       28.       26.       25.
                 24.       23.       22.       21.       20.       19.       19.       18.       17.       16.
                 16.       15.       14.       14.       13.       12.       12.       11.       11.       10.

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

                        HYDROGRAPH AT STATION      48H

    TOTAL RAINFALL =     .14, TOTAL LOSS =     .13, TOTAL EXCESS =     .01

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                                     (CFS)
+       9.     13.83                    5.          2.          2.          2.
                            (INCHES)      .008        .009        .009        .009
                             (AC-FT)       3.          3.          3.          3.

                            CUMULATIVE AREA =    6.15 SQ MI


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


            **************
            *            *
 353 KK     *      C003  *
            *            *
            **************
                          Combines Routed C001, Routed C002, Routed 48G, 48H and 48F

 355 HC          HYDROGRAPH COMBINATION
                       ICOMP           5  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                        HYDROGRAPH AT STATION     C003
```

```
  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+     123.     14.33                   69.         23.         23.          23.
                        (INCHES)      .017        .018        .018         .018
                         (AC-FT)       34.         37.         37.          37.

                         CUMULATIVE AREA =   38.59 SQ MI



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


            **************
            *            *
  356 KK    *    003004  *
            *            *
            **************
                          Channel Routing for C003 to 48I
                          Length = 10,255 feet
                          Change in Elev = 3600-3530
                          Slope Correction not Applied

  361 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

  362 RS          STORAGE ROUTING
                        NSTPS          22  NUMBER OF SUBREACHES
                         ITYP        FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC       -1.00  INITIAL CONDITION
                            X         .00 WORKING R AND D COEFFICIENT

  363 RC          NORMAL DEPTH CHANNEL
                          ANL        .035  LEFT OVERBANK N-VALUE
                         ANCH        .030  MAIN CHANNEL N-VALUE
                          ANR        .035  RIGHT OVERBANK N-VALUE
                        RLNTH      10255.  REACH LENGTH
                          SEL       .0068  ENERGY SLOPE
                        ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                       CROSS-SECTION DATA
                           --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  365 RY        ELEVATION   3560.00   3520.00   3520.00   3480.00   3480.00   3520.00   3520.00   3560.00
  364 RX        DISTANCE        .00    437.00    510.00    524.00    530.00    560.00   1727.00   2182.00

                                                                  ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00      8.24     21.08     38.50     60.52     87.12    118.32    154.11    194.49    239.46
            OUTFLOW        .00    244.53    848.15   1865.95   3369.48   5427.04   8103.44  11460.40  15557.04  20450.27
          ELEVATION    3480.00   3484.21   3488.42   3492.63   3496.84   3501.05   3505.26   3509.47   3513.68   3517.89

            STORAGE     914.42   2286.17   3750.98   5308.87   6959.83   8703.85  10540.95  12471.11  14494.35  16610.65
            OUTFLOW   42109.55 131195.70 273099.70 462209.80 696292.30 974396.801296227.001661872.002071665.002526106.00
          ELEVATION    3522.10   3526.31   3530.53   3534.74   3538.95   3543.16   3547.37   3551.58   3555.79   3560.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO  2526106.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                         HYDROGRAPH AT STATION   003004

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+     123.     14.75                   69.         22.         22.          22.
                        (INCHES)      .017        .018        .018         .018
                         (AC-FT)       34.         37.         37.          37.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        0.     14.58                    0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
```

```
+   (FEET)      (HR)
   3482.12     14.75               3481.18     3480.39     3480.39      3480.39

                       CUMULATIVE AREA =   38.59 SQ MI



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


            **************
            *            *
 366 KK     *       48I  *
            *            *
            **************
                          Flows to Concentration Point
                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

 370 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


               SUBBASIN RUNOFF DATA

 371 BA          SUBBASIN CHARACTERISTICS
                       TAREA        4.85  SUBBASIN AREA

                 PRECIPITATION DATA

 372 PB                STORM         .22  BASIN TOTAL PRECIPITATION

 373 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .01       .02       .01       .01       .00       .00       .00       .00       .02       .02
                       .02       .01       .01       .01       .01       .01       .01       .01       .01       .00
                       .00       .00       .00       .00

 393 LG          GREEN AND AMPT LOSS RATE
                       STRTL         .25  STARTING LOSS
                         DTH         .35  MOISTURE DEFICIT
                        PSIF        4.00  WETTING FRONT SUCTION
                       XKSAT         .45  HYDRAULIC CONDUCTIVITY
                       RTIMP         .60  PERCENT IMPERVIOUS AREA

 394 UC          CLARK UNITGRAPH
                          TC        2.48  TIME OF CONCENTRATION
                           R        1.58  STORAGE COEFFICIENT

 395 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                         .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                      100.0

                                                                  ***

                                                        UNIT HYDROGRAPH PARAMETERS
                                                  CLARK   TC=  2.48 HR,       R=  1.58 HR
                                                 SNYDER   TP=  2.07 HR,      CP=   .80

                                                          UNIT HYDROGRAPH
                                                     119 END-OF-PERIOD ORDINATES
                 10.       29.       47.       61.       70.       80.       92.      107.      121.      138.
                157.      177.      208.      249.      296.      388.      518.      646.      797.      964.
               1112.     1197.     1233.     1260.     1257.     1231.     1205.     1174.     1139.     1103.
               1055.     1001.      950.      901.      854.      810.      768.      729.      691.      656.
                622.      590.      560.      531.      503.      477.      453.      430.      407.      386.
                366.      348.      330.      313.      297.      281.      267.      253.      240.      228.
                216.      205.      194.      184.      175.      166.      157.      149.      141.      134.
                127.      121.      114.      109.      103.       98.       93.       88.       83.       79.
                 75.       71.       67.       64.       61.       58.       55.       52.       49.       47.
                 44.       42.       40.       38.       36.       34.       32.       31.       29.       27.
                 26.       25.       23.       22.       21.       20.       19.       18.       17.       16.
                 15.       15.       14.       13.       12.       12.       11.       11.       10.

       ***             ***             ***             ***             ***
```

```
                        HYDROGRAPH AT STATION      48I

     TOTAL RAINFALL =     .22, TOTAL LOSS =     .21, TOTAL EXCESS =     .00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+       1.     13.83                  1.          0.          0.           0.
                       (INCHES)      .001        .001        .001         .001
                        (AC-FT)        0.          0.          0.           0.

                       CUMULATIVE AREA =    4.85 SQ MI


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


            **************
            *            *
  397 KK    *      C004  *
            *            *
            **************
                          Combines Routed C003, and 48I

  399 HC          HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                        HYDROGRAPH AT STATION     C004

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+     124.     14.67                 69.         23.         23.          23.
                       (INCHES)      .015        .016        .016         .016
                        (AC-FT)       34.         37.         37.          37.

                       CUMULATIVE AREA =   43.44 SQ MI


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


            **************
            *            *
  400 KK    *    004005  *
            *            *
            **************
                          Channel Routing for C004 to C005C
                          Length = 11,354 feet
                          Change in Elev = 3530-3470
                          Slope Correction not Applied

  405 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


                HYDROGRAPH ROUTING DATA

  406 RS          STORAGE ROUTING
                        NSTPS          24  NUMBER OF SUBREACHES
                         ITYP        FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC       -1.00  INITIAL CONDITION
                            X         .00 WORKING R AND D COEFFICIENT

  407 RC          NORMAL DEPTH CHANNEL
                          ANL        .035  LEFT OVERBANK N-VALUE
                         ANCH        .030  MAIN CHANNEL N-VALUE
                          ANR        .035  RIGHT OVERBANK N-VALUE
                        RLNTH      11354.  REACH LENGTH
                          SEL       .0053  ENERGY SLOPE
                        ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                           --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  409 RY        ELEVATION   3540.00   3500.00   3500.00   3492.00   3492.00   3500.00   3500.00   3540.00
  408 RX        DISTANCE        .00    571.00    630.00    642.00    650.00    680.00    727.00    817.00
```

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	9.64	28.00	55.11	155.63	295.01	461.89	656.25	878.11	1127.46
OUTFLOW	.00	186.87	794.71	1970.71	5374.38	11997.19	21675.69	34597.44	50994.93	71111.70
ELEVATION	3492.00	3494.53	3497.05	3499.58	3502.11	3504.63	3507.16	3509.68	3512.21	3514.74
STORAGE	1404.30	1708.63	2040.45	2399.77	2786.57	3200.87	3642.66	4111.94	4608.71	5132.97
OUTFLOW	95192.54	123479.90	156212.30	193624.30	235945.70	283402.20	336215.30	394602.30	458777.10	528955.60
ELEVATION	3517.26	3519.79	3522.32	3524.84	3527.37	3529.90	3532.42	3534.95	3537.47	3540.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 528956.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION 004005

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	19.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 123.	15.33	69.	22.	22.	22.
		(INCHES) .015	.016	.016	.016
		(AC-FT) 34.	37.	37.	37.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	19.92-HR
+ (AC-FT)	(HR)				
0.	15.25	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	19.92-HR
+ (FEET)	(HR)				
3493.67	15.33	3492.93	3492.30	3492.30	3492.30

CUMULATIVE AREA = 43.44 SQ MI

*** ***

```
              **************
              *            *
  410 KK      *       48K  *
              *            *
              **************
                     Flows to Concentration Point C005L
                     Basin Slope did not require adjustment
                     Desert/Rangeland Time-Area Relationship

  414 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


                SUBBASIN RUNOFF DATA

  415 BA          SUBBASIN CHARACTERISTICS
                        TAREA       10.18  SUBBASIN AREA

                  PRECIPITATION DATA

  416 PB                STORM         .63  BASIN TOTAL PRECIPITATION

  417 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .01       .00       .02       .01
                       .02       .03       .02       .01       .00       .00       .01       .03       .05       .09
                       .06       .03       .03       .04       .04       .04       .03       .02       .01       .00
                       .00       .00       .00       .00

  437 LG          GREEN AND AMPT LOSS RATE
```

```
                    STRTL         .32  STARTING LOSS
                      DTH         .35  MOISTURE DEFICIT
                     PSIF        4.25  WETTING FRONT SUCTION
                    XKSAT         .39  HYDRAULIC CONDUCTIVITY
                    RTIMP         .20  PERCENT IMPERVIOUS AREA

 438 UC          CLARK UNITGRAPH
                       TC        3.13  TIME OF CONCENTRATION
                        R        1.70  STORAGE COEFFICIENT

 439 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                      .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                   100.0

                                                          ***

                                                   UNIT HYDROGRAPH PARAMETERS
                                            CLARK   TC=  3.13 HR,       R=  1.70 HR
                                           SNYDER   TP=  2.59 HR,      CP=   .89

                                                      UNIT HYDROGRAPH
                                                 132 END-OF-PERIOD ORDINATES
              15.       45.       73.       98.      117.      132.      146.      161.      181.      203.
             223.      246.      273.      301.      326.      371.      433.      493.      566.      711.
             908.     1096.     1296.     1531.     1780.     2017.     2182.     2254.     2297.     2338.
            2334.     2285.     2236.     2187.     2131.     2069.     2010.     1945.     1863.     1774.
            1689.     1608.     1531.     1457.     1388.     1321.     1258.     1197.     1140.     1085.
            1033.      984.      937.      892.      849.      808.      769.      732.      697.      664.
             632.      602.      573.      545.      519.      494.      471.      448.      427.      406.
             387.      368.      350.      334.      318.      302.      288.      274.      261.      248.
             237.      225.      214.      204.      194.      185.      176.      168.      160.      152.
             145.      138.      131.      125.      119.      113.      108.      103.       98.       93.
              89.       84.       80.       76.       73.       69.       66.       63.       60.       57.
              54.       52.       49.       47.       44.       42.       40.       38.       37.       35.
              33.       32.       30.       29.       27.       26.       25.       23.       22.       21.
              20.       19.

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

                        HYDROGRAPH AT STATION      48K

    TOTAL RAINFALL =     .63, TOTAL LOSS =     .63, TOTAL EXCESS =     .00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+       3.     14.33                  1.          0.          0.          0.
                       (INCHES)      .001        .001        .001        .001
                        (AC-FT)        1.          1.          1.          1.

                        CUMULATIVE AREA =   10.18 SQ MI


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


            **************
            *            *
 441 KK     *       48J  *
            *            *
            **************
                         Flows to Concentration Point C005R
                         Basin Slope did not require adjustment
                         Desert/Rangeland Time-Area Relationship

 445 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


              SUBBASIN RUNOFF DATA

 446 BA          SUBBASIN CHARACTERISTICS
                       TAREA        4.34  SUBBASIN AREA

                 PRECIPITATION DATA

 447 PB                STORM         .34  BASIN TOTAL PRECIPITATION

 448 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .01       .00       .00       .00       .00       .00       .00       .01       .01
                    .02       .03       .02       .02       .01       .01       .00       .00       .01       .02
                    .03       .02       .02       .01       .01       .01       .01       .01       .01       .00
                    .00       .00       .00       .00

468 LG          GREEN AND AMPT LOSS RATE
                      STRTL         .30  STARTING LOSS
                        DTH         .35  MOISTURE DEFICIT
                       PSIF        4.00  WETTING FRONT SUCTION
                      XKSAT         .45  HYDRAULIC CONDUCTIVITY
                      RTIMP         .00  PERCENT IMPERVIOUS AREA

469 UC          CLARK UNITGRAPH
                         TC        2.64  TIME OF CONCENTRATION
                          R        2.15  STORAGE COEFFICIENT

470 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                       .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                    100.0

                                                          ***

                                                 UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  2.64 HR,       R=  2.15 HR
                                         SNYDER   TP=  2.24 HR,      CP=   .68

                                                      UNIT HYDROGRAPH
                                                157 END-OF-PERIOD ORDINATES
                  6.       18.       29.       39.       46.       52.       59.       68.       78.       88.
                100.      112.      126.      148.      175.      205.      264.      347.      426.      520.
                629.      734.      807.      844.      872.      888.      885.      875.      864.      850.
                834.      816.      790.      760.      732.      704.      677.      651.      627.      603.
                580.      558.      537.      516.      497.      478.      460.      442.      426.      409.
                394.      379.      365.      351.      337.      325.      312.      300.      289.      278.
                268.      257.      248.      238.      229.      220.      212.      204.      196.      189.
                182.      175.      168.      162.      156.      150.      144.      139.      133.      128.
                123.      119.      114.      110.      106.      102.       98.       94.       91.       87.
                 84.       81.       78.       75.       72.       69.       66.       64.       61.       59.
                 57.       55.       53.       51.       49.       47.       45.       43.       42.       40.
                 39.       37.       36.       34.       33.       32.       31.       29.       28.       27.
                 26.       25.       24.       23.       22.       22.       21.       20.       19.       19.
                 18.       17.       16.       16.       15.       15.       14.       14.       13.       13.
                 12.       12.       11.       11.       10.       10.       10.        9.        9.        9.
                  8.        8.        8.        7.        7.        7.        7.

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

                        HYDROGRAPH AT STATION      48J

    TOTAL RAINFALL =     .34, TOTAL LOSS =     .34, TOTAL EXCESS =     .00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+       0.       .00                    0.          0.          0.           0.
                       (INCHES)      .000        .000        .000         .000
                        (AC-FT)        0.          0.          0.           0.

                        CUMULATIVE AREA =    4.34 SQ MI


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


            **************
            *            *
 472 KK     *      C005  *
            *            *
            **************
                         Combines Routed C004, 48K and 48J

 474 HC          HYDROGRAPH COMBINATION
                      ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

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

                        HYDROGRAPH AT STATION     C005

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+     125.     15.33                   70.         23.         23.          23.
                       (INCHES)      .011        .012        .012         .012
```

```
                        (AC-FT)       35.         38.         38.          38.

                        CUMULATIVE AREA =   57.97 SQ MI



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


            **************
            *            *
 475 KK     *    005006  *
            *            *
            **************
                         Channel Routing for C005 to C006C
                         Length = 10,122 feet
                         Change in Elev = 3470-3410
                         Slope Correction not Applied

 480 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

 481 RS          STORAGE ROUTING
                       NSTPS          21  NUMBER OF SUBREACHES
                        ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

 482 RC          NORMAL DEPTH CHANNEL
                         ANL        .035  LEFT OVERBANK N-VALUE
                        ANCH        .030  MAIN CHANNEL N-VALUE
                         ANR        .035  RIGHT OVERBANK N-VALUE
                       RLNTH      10122.  REACH LENGTH
                         SEL       .0059  ENERGY SLOPE
                       ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                         CROSS-SECTION DATA
                           --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 484 RY        ELEVATION   3460.00   3420.00   3380.00   3360.00   3360.00   3380.00   3420.00   3460.00
 483 RX        DISTANCE        .00    259.00    389.00    505.00   1862.00   2012.00   2070.00   2107.00

                                                                  ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00   1702.42   3490.45   5364.09   7322.23   9328.34  11364.70  13431.32  15528.19  17655.31
            OUTFLOW        .00  83149.39 266402.50 528685.50 867203.901294086.001788348.002346840.002967137.003647326.00
          ELEVATION    3360.00   3365.26   3370.53   3375.79   3381.05   3386.32   3391.58   3396.84   3402.11   3407.37

            STORAGE   19812.68  22000.31  24221.33  26488.58  28803.47  31165.99  33576.14  36033.93  38539.35  41092.40
            OUTFLOW 4385862.005181477.006030799.006935263.007896164.008913127.009985936.00******************************
          ELEVATION    3412.63   3417.90   3423.16   3428.42   3433.68   3438.95   3444.21   3449.47   3454.74   3460.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO 13538540.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION   005006

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+     125.     15.58                  70.         23.         23.          23.
                       (INCHES)      .011        .012        .012         .012
                        (AC-FT)       35.         37.         37.          37.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        0.     15.42                   0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3360.01     15.33               3360.00     3360.00     3360.00      3360.00

                        CUMULATIVE AREA =   57.97 SQ MI
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
485 KK    *       48L  *
          *            *
          **************
                       Flows to Concentration Point C006R
                       Basin Slope did not require adjustment
                       Desert/Rangeland Time-Area Relationship

489 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS


             SUBBASIN RUNOFF DATA

490 BA          SUBBASIN CHARACTERISTICS
                      TAREA       25.27  SUBBASIN AREA

                PRECIPITATION DATA

491 PB                STORM         .37  BASIN TOTAL PRECIPITATION

492 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .01       .01       .01       .00       .00       .01       .01       .01       .01
                     .02       .03       .02       .02       .02       .00       .00       .01       .02       .01
                     .02       .02       .02       .02       .01       .01       .01       .01       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00

512 LG          GREEN AND AMPT LOSS RATE
                      STRTL         .23  STARTING LOSS
                        DTH         .35  MOISTURE DEFICIT
                       PSIF        4.35  WETTING FRONT SUCTION
                      XKSAT         .38  HYDRAULIC CONDUCTIVITY
                      RTIMP       15.10  PERCENT IMPERVIOUS AREA

513 UC          CLARK UNITGRAPH
                         TC        3.56  TIME OF CONCENTRATION
                          R        1.88  STORAGE COEFFICIENT

514 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                        .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                     100.0

                                                          ***

                                                UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  3.56 HR,       R=  1.88 HR
                                         SNYDER   TP=  2.95 HR,      CP=   .90

                                                     UNIT HYDROGRAPH
                                               147 END-OF-PERIOD ORDINATES
               30.       88.      144.      198.      241.      274.      301.      328.      358.      397.
              439.      480.      520.      569.      624.      677.      727.      811.      930.     1049.
             1163.     1364.     1706.     2090.     2457.     2839.     3294.     3788.     4260.     4699.
             4951.     5034.     5114.     5190.     5192.     5104.     5001.     4903.     4799.     4680.
             4556.     4437.     4314.     4157.     3976.     3803.     3638.     3480.     3328.     3184.
             3045.     2913.     2786.     2665.     2549.     2438.     2332.     2231.     2134.     2041.
             1952.     1868.     1786.     1709.     1634.     1563.     1495.     1430.     1368.     1309.
             1252.     1197.     1145.     1096.     1048.     1002.      959.      917.      877.      839.
              803.      768.      734.      702.      672.      643.      615.      588.      562.      538.
              515.      492.      471.      450.      431.      412.      394.      377.      361.      345.
              330.      316.      302.      289.      276.      264.      253.      242.      231.      221.
              212.      202.      194.      185.      177.      169.      162.      155.      148.      142.
              136.      130.      124.      119.      114.      109.      104.       99.       95.       91.
               87.       83.       80.       76.       73.       70.       67.       64.       61.       58.
               56.       53.       51.       49.       47.       45.       43.

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

                        HYDROGRAPH AT STATION      48L
```

```
    TOTAL RAINFALL =     .37, TOTAL LOSS =     .31, TOTAL EXCESS =     .06

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                             (CFS)
+     229.     14.50                132.         44.         44.          44.
                         (INCHES)      .049        .054        .054         .054
                          (AC-FT)       66.         72.         72.          72.

                          CUMULATIVE AREA =   25.27 SQ MI


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


            **************
            *            *
  516 KK    *       48M  *
            *            *
            **************
                          Flows to Concentration Point C006L
                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

  520 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


               SUBBASIN RUNOFF DATA

  521 BA          SUBBASIN CHARACTERISTICS
                        TAREA        7.74  SUBBASIN AREA

                  PRECIPITATION DATA

  522 PB                STORM        3.44  BASIN TOTAL PRECIPITATION

  523 PI            INCREMENTAL PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .01       .00       .00       .00       .00       .00       .00       .00
                        .00       .01       .01       .02       .03       .04       .05       .05       .07       .15
                        .20       .26       .13       .04       .04       .06       .11       .19       .26       .27
                        .22       .20       .17       .15       .16       .20       .12       .08       .05       .02
                        .01       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00

  543 LG          GREEN AND AMPT LOSS RATE
                        STRTL         .28  STARTING LOSS
                          DTH         .35  MOISTURE DEFICIT
                         PSIF        4.15  WETTING FRONT SUCTION
                        XKSAT         .40  HYDRAULIC CONDUCTIVITY
                        RTIMP        6.80  PERCENT IMPERVIOUS AREA

  544 UC          CLARK UNITGRAPH
                           TC        4.03  TIME OF CONCENTRATION
                            R        2.14  STORAGE COEFFICIENT

  545 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                         .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                       100.0

                                                                  ***

                                                        UNIT HYDROGRAPH PARAMETERS
                                                   CLARK   TC=  4.03 HR,       R=  2.14 HR
                                                  SNYDER   TP=  3.35 HR,      CP=   .90

                                                                UNIT HYDROGRAPH
                                                        167 END-OF-PERIOD ORDINATES
                          7.       21.       34.       47.       59.       68.       75.       82.       88.       95.
                        104.      114.      124.      133.      144.      156.      169.      181.      193.      211.
                        238.      266.      294.      321.      375.      463.      554.      641.      726.      828.
                        947.     1062.     1173.     1274.     1331.     1351.     1370.     1389.     1400.     1390.
                       1365.     1342.     1319.     1295.     1267.     1237.     1209.     1182.     1150.     1109.
                       1067.     1026.      987.      950.      913.      878.      845.      813.      782.      752.
```

```
              723.      696.      669.      644.      619.      595.      573.      551.      530.      510.
              490.      472.      454.      436.      420.      404.      388.      373.      359.      345.
              332.      320.      307.      296.      284.      274.      263.      253.      243.      234.
              225.      217.      208.      200.      193.      185.      178.      172.      165.      159.
              153.      147.      141.      136.      131.      126.      121.      116.      112.      108.
              103.      100.       96.       92.       89.       85.       82.       79.       76.       73.
               70.       67.       65.       62.       60.       58.       56.       53.       51.       49.
               48.       46.       44.       42.       41.       39.       38.       36.       35.       33.
               32.       31.       30.       29.       28.       27.       26.       25.       24.       23.
               22.       21.       20.       19.       19.       18.       17.       17.       16.       15.
               15.       14.       14.       13.       13.       12.       12.

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

                        HYDROGRAPH AT STATION      48M

    TOTAL RAINFALL =    3.44, TOTAL LOSS =    1.91, TOTAL EXCESS =    1.54

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+    2026.     15.00                1109.        358.        358.         358.
                       (INCHES)     1.331       1.428       1.428        1.428
                        (AC-FT)      550.        590.        590.         590.

                       CUMULATIVE AREA =    7.74 SQ MI


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


            **************
            *            *
  547 KK    *      C006  *
            *            *
            **************
                          Combines Routed C005, 48L and 48M

  549 HC          HYDROGRAPH COMBINATION
                       ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                        HYDROGRAPH AT STATION     C006

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+    2349.     15.00                1304.        425.        425.         425.
                       (INCHES)      .133        .144        .144         .144
                        (AC-FT)      647.        699.        699.         699.

                       CUMULATIVE AREA =   90.98 SQ MI


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


            **************
            *            *
  550 KK    *    006007  *
            *            *
            **************
                          Channel Routing of C006 to C007C
                          Length = 24,092 feet
                          Change in Elev = 3410-3275
                          Slope Correction not Applied

  555 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


              HYDROGRAPH ROUTING DATA

  556 RS          STORAGE ROUTING
                       NSTPS          50  NUMBER OF SUBREACHES
                        ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT
```

```
557 RC          NORMAL DEPTH CHANNEL
                       ANL        .035  LEFT OVERBANK N-VALUE
                      ANCH        .030  MAIN CHANNEL N-VALUE
                       ANR        .035  RIGHT OVERBANK N-VALUE
                     RLNTH      24092.  REACH LENGTH
                       SEL       .0056  ENERGY SLOPE
                     ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                         --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
559 RY        ELEVATION   3340.00   3300.00   3300.00   3268.00   3268.00   3300.00   3300.00   3340.00
558 RX        DISTANCE        .00   1263.00   1340.00   1351.00   1360.00   1380.00   1485.00   1535.00

                                                          ***

                                        COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

           STORAGE        .00     22.71     53.12     91.21    137.01    190.50    251.68    320.55    397.12    732.45
           OUTFLOW        .00    269.73    853.95   1741.86   2963.19   4551.23   6539.12   8959.21  11842.89  17919.57
         ELEVATION    3268.00   3271.79   3275.58   3279.37   3283.16   3286.95   3290.74   3294.53   3298.32   3302.11

           STORAGE    1472.98   2474.23   3736.20   5258.88   7042.27   9086.38  11391.20  13956.74  16782.99  19869.96
           OUTFLOW   34813.09  63613.95 106167.10 164337.00 239925.70 334666.40 450229.30 588227.60 750223.50 937751.00
         ELEVATION    3305.90   3309.69   3313.47   3317.26   3321.05   3324.84   3328.63   3332.42   3336.21   3340.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO   937751.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION   006007

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+    2345.     15.42                1304.        409.        409.         409.
                       (INCHES)      .133        .139        .139         .139
                        (AC-FT)      647.        674.        674.         674.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        2.     15.42                   1.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3281.24     15.42               3277.19     3270.98     3270.98      3270.98

                       CUMULATIVE AREA =   90.98 SQ MI



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


            **************
            *            *
  560 KK    *       48N  *
            *            *
            **************
                          Flows to Concentration Point C007R
                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

  564 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


               SUBBASIN RUNOFF DATA

  565 BA          SUBBASIN CHARACTERISTICS
                       TAREA       10.65  SUBBASIN AREA

                  PRECIPITATION DATA

  566 PB               STORM        2.64  BASIN TOTAL PRECIPITATION

  567 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .02       .13       .10       .03       .03       .08       .13       .08       .07
                    .10       .18       .14       .18       .13       .07       .06       .08       .10       .17
                    .15       .11       .08       .09       .06       .05       .05       .04       .04       .02
                    .02       .01       .01       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00

 587 LG          GREEN AND AMPT LOSS RATE
                      STRTL         .26  STARTING LOSS
                        DTH         .35  MOISTURE DEFICIT
                       PSIF        4.00  WETTING FRONT SUCTION
                      XKSAT         .44  HYDRAULIC CONDUCTIVITY
                      RTIMP        3.70  PERCENT IMPERVIOUS AREA

 588 UC          CLARK UNITGRAPH
                         TC        2.68  TIME OF CONCENTRATION
                          R        1.61  STORAGE COEFFICIENT

 589 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                       .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                    100.0

                                                          ***

                                                   UNIT HYDROGRAPH PARAMETERS
                                            CLARK   TC=  2.68 HR,       R=  1.61 HR
                                           SNYDER   TP=  2.23 HR,      CP=   .83

                                                      UNIT HYDROGRAPH
                                                 123 END-OF-PERIOD ORDINATES
                19.       57.       93.      122.      143.      162.      183.      210.      238.      268.
               302.      338.      377.      439.      521.      598.      762.     1016.     1262.     1538.
              1859.     2179.     2427.     2552.     2617.     2662.     2646.     2590.     2536.     2472.
              2399.     2330.     2241.     2132.     2024.     1922.     1825.     1733.     1646.     1563.
              1484.     1409.     1338.     1271.     1207.     1146.     1088.     1033.      981.      932.
               885.      840.      798.      757.      719.      683.      648.      616.      585.      555.
               527.      501.      475.      451.      429.      407.      387.      367.      349.      331.
               314.      298.      283.      269.      256.      243.      230.      219.      208.      197.
               187.      178.      169.      160.      152.      145.      137.      130.      124.      118.
               112.      106.      101.       96.       91.       86.       82.       78.       74.       70.
                67.       63.       60.       57.       54.       51.       49.       46.       44.       42.
                40.       38.       36.       34.       32.       31.       29.       28.       26.       25.
                24.       22.       21.

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

                        HYDROGRAPH AT STATION      48N

    TOTAL RAINFALL =    2.64, TOTAL LOSS =    2.10, TOTAL EXCESS =     .54

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                       6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                             (CFS)
+    1290.     13.75                  583.        185.        185.         185.
                         (INCHES)     .509        .536        .536         .536
                          (AC-FT)     289.        304.        304.         304.

                         CUMULATIVE AREA =   10.65 SQ MI


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


            **************
            *            *
 591 KK     *       48O  *
            *            *
            **************
                          Flows to Concentration Point C007L
                          Basin Slope required adjustment
                          Desert/Rangeland Time-Area Relationship

 595 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .083  TIME INTERVAL IN HOURS


              SUBBASIN RUNOFF DATA

 596 BA          SUBBASIN CHARACTERISTICS
```

```
                    TAREA        9.43  SUBBASIN AREA

                PRECIPITATION DATA

597 PB              STORM        4.77  BASIN TOTAL PRECIPITATION

598 PI            INCREMENTAL PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                    .03       .05       .05       .02       .02       .10       .26       .26       .24       .28
                    .39       .32       .33       .20       .12       .12       .11       .15       .27       .27
                    .22       .14       .11       .07       .05       .06       .11       .12       .11       .06
                    .04       .01       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .01       .01       .00

618 LG          GREEN AND AMPT LOSS RATE
                    STRTL         .30  STARTING LOSS
                      DTH         .36  MOISTURE DEFICIT
                     PSIF        5.10  WETTING FRONT SUCTION
                    XKSAT         .25  HYDRAULIC CONDUCTIVITY
                    RTIMP        6.70  PERCENT IMPERVIOUS AREA

619 UC          CLARK UNITGRAPH
                       TC        2.49  TIME OF CONCENTRATION
                        R        1.41  STORAGE COEFFICIENT

620 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                      .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                   100.0

                                                          ***

                                                UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  2.49 HR,       R=  1.41 HR
                                         SNYDER   TP=  2.07 HR,      CP=   .86

                                                     UNIT HYDROGRAPH
                                              109 END-OF-PERIOD ORDINATES
                 21.       62.      100.      129.      150.      169.      195.      226.      255.      289.
                329.      366.      430.      517.      603.      788.     1065.     1328.     1639.     1993.
               2322.     2512.     2578.     2637.     2630.     2563.     2499.     2425.     2341.     2261.
               2158.     2034.     1917.     1807.     1703.     1606.     1513.     1427.     1345.     1267.
               1195.     1126.     1061.     1001.      943.      889.      838.      790.      744.      702.
                661.      623.      588.      554.      522.      492.      464.      437.      412.      389.
                366.      345.      325.      307.      289.      273.      257.      242.      228.      215.
                203.      191.      180.      170.      160.      151.      142.      134.      126.      119.
                112.      106.      100.       94.       89.       84.       79.       74.       70.       66.
                 62.       59.       55.       52.       49.       46.       44.       41.       39.       37.
                 34.       32.       31.       29.       27.       26.       24.       23.       21.

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

                        HYDROGRAPH AT STATION      48O

    TOTAL RAINFALL =    4.77, TOTAL LOSS =    1.94, TOTAL EXCESS =    2.83

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                              (CFS)
+    5893.     13.42                2736.        858.        858.         858.
                         (INCHES)     2.698       2.810       2.810        2.810
                          (AC-FT)     1357.       1413.       1413.        1413.

                         CUMULATIVE AREA =    9.43 SQ MI


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


            **************
            *            *
 622 KK     *      C007  *
            *            *
            **************
                       Combines Routed C006, 48M and 48O

 624 HC          HYDROGRAPH COMBINATION
                    ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

     ***             ***             ***             ***             ***
```

```
                        HYDROGRAPH AT STATION     C007

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+    7496.     13.58                4455.       1452.       1452.        1452.
                       (INCHES)      .373        .404        .404         .404
                        (AC-FT)     2209.       2391.       2391.        2391.

                        CUMULATIVE AREA =  111.05 SQ MI



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


            **************
            *            *
  625 KK    *    007008  *
            *            *
            **************
                          Channel Routing of C007 to C008C
                          Length = 6,770 feet
                          Change in Elev = 3275-3220
                          Slope Correction not Applied

  630 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

  631 RS          STORAGE ROUTING
                        NSTPS          14  NUMBER OF SUBREACHES
                         ITYP        FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC       -1.00  INITIAL CONDITION
                            X         .00 WORKING R AND D COEFFICIENT

  632 RC          NORMAL DEPTH CHANNEL
                          ANL        .035  LEFT OVERBANK N-VALUE
                         ANCH        .030  MAIN CHANNEL N-VALUE
                          ANR        .035  RIGHT OVERBANK N-VALUE
                        RLNTH       6770.  REACH LENGTH
                          SEL       .0081  ENERGY SLOPE
                        ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                           --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  634 RY        ELEVATION   3400.00   3360.00   3360.00   3325.00   3325.00   3360.00   3360.00   3400.00
  633 RX        DISTANCE        .00   1135.00   1490.00   1506.00   1520.00   1550.00   2152.00   2332.00

                                                                  ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00     10.18     23.54     40.09     59.82     82.73    108.82    138.09    170.55    285.01
            OUTFLOW        .00    579.24   1867.25   3829.15   6520.67  10008.64  14361.11  19645.17  25926.26  34803.75
          ELEVATION    3325.00   3328.95   3332.89   3336.84   3340.79   3344.74   3348.68   3352.63   3356.58   3360.53

            STORAGE     959.32   1713.23   2546.75   3459.88   4452.62   5524.97   6676.93   7908.49   9219.66  10610.44
            OUTFLOW   89976.59 191517.50 334499.50 518204.70 743077.301010057.001320336.001675242.002076186.002524624.00
          ELEVATION    3364.47   3368.42   3372.37   3376.31   3380.26   3384.21   3388.16   3392.10   3396.05   3400.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO  2524624.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION   007008

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+    7487.     13.67                4455.       1447.       1447.        1447.
                       (INCHES)      .373        .402        .402         .402
                        (AC-FT)     2209.       2381.       2381.        2381.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        5.     13.67                   3.          1.          1.           1.
```

```
  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3341.88     13.67               3337.36     3329.31     3329.31      3329.31

                        CUMULATIVE AREA =  111.05 SQ MI



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


            **************
            *            *
  635 KK    *       48Q  *
            *            *
            **************

                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

  639 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


              SUBBASIN RUNOFF DATA

  640 BA          SUBBASIN CHARACTERISTICS
                        TAREA       10.02  SUBBASIN AREA

                  PRECIPITATION DATA

  641 PB                STORM        1.86  BASIN TOTAL PRECIPITATION

  642 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                       .00       .01       .00       .00       .00       .00       .00       .00       .01       .04
                       .13       .11       .03       .01       .00       .00       .02       .05       .10       .08
                       .11       .18       .13       .05       .05       .08       .09       .02       .04       .04
                       .03       .01       .01       .01       .02       .02       .02       .01       .00       .01
                       .01       .02       .02       .02       .02       .02       .02       .02       .01       .01
                       .00       .00       .00       .01       .01       .01       .01       .01       .00       .00
                       .00       .00       .00       .00       .01       .01       .00

  662 LG          GREEN AND AMPT LOSS RATE
                        STRTL         .26  STARTING LOSS
                          DTH         .38  MOISTURE DEFICIT
                         PSIF        5.60  WETTING FRONT SUCTION
                        XKSAT         .21  HYDRAULIC CONDUCTIVITY
                        RTIMP        6.20  PERCENT IMPERVIOUS AREA

  663 UC          CLARK UNITGRAPH
                           TC        2.28  TIME OF CONCENTRATION
                            R        1.24  STORAGE COEFFICIENT

  664 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                          .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                       100.0

                                                                  ***

                                                        UNIT HYDROGRAPH PARAMETERS
                                                   CLARK   TC=  2.28 HR,       R=  1.24 HR
                                                  SNYDER   TP=  1.89 HR,      CP=   .88

                                                          UNIT HYDROGRAPH
                                                   97 END-OF-PERIOD ORDINATES
                    28.       81.      128.      163.      190.      219.      255.      294.      337.      387.
                   436.      520.      633.      780.     1056.     1410.     1787.     2222.     2666.     2952.
                  3063.     3133.     3116.     3024.     2932.     2827.     2718.     2593.     2439.     2281.
                  2133.     1995.     1866.     1745.     1632.     1526.     1427.     1334.     1248.     1167.
                  1091.     1021.      955.      893.      835.      781.      730.      683.      639.      597.
                   558.      522.      488.      457.      427.      399.      374.      349.      327.      306.
                   286.      267.      250.      234.      219.      204.      191.      179.      167.      156.
                   146.      137.      128.      120.      112.      105.       98.       91.       86.       80.
                    75.       70.       65.       61.       57.       53.       50.       47.       44.       41.
                    38.       36.       33.       31.       29.       27.       26.
```

```
      ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION      48Q

     TOTAL RAINFALL =    1.86, TOTAL LOSS =    1.56, TOTAL EXCESS =     .30

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+     789.     12.92                 315.         98.         98.          98.
                       (INCHES)      .292        .303        .303         .303
                        (AC-FT)      156.        162.        162.         162.

                        CUMULATIVE AREA =   10.02 SQ MI


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


            **************
            *            *
  666 KK    *      R48Q  *
            *            *
            **************
                          Channel Routing of 48Q through 48R
                          Length = 33,216 feet
                          Change in Elev = 3560-3220
                          Slope Correction not Applied

  671 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

  672 RS          STORAGE ROUTING
                        NSTPS          55  NUMBER OF SUBREACHES
                         ITYP        FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC       -1.00  INITIAL CONDITION
                            X         .00 WORKING R AND D COEFFICIENT

  673 RC          NORMAL DEPTH CHANNEL
                          ANL        .035  LEFT OVERBANK N-VALUE
                         ANCH        .030  MAIN CHANNEL N-VALUE
                          ANR        .035  RIGHT OVERBANK N-VALUE
                        RLNTH      33216.  REACH LENGTH
                          SEL       .0102  ENERGY SLOPE
                        ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                           --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  675 RY        ELEVATION   3400.00   3360.00   3360.00   3325.00   3325.00   3360.00   3360.00   3400.00
  674 RX        DISTANCE        .00   1135.00   1490.00   1495.00   1545.00   1550.00   2152.00   2332.00

                                                                  ***

                                         COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00    152.19    307.78    466.76    629.14    794.91    964.08   1136.64   1312.60   1878.78
            OUTFLOW        .00   2282.62   6774.29  12567.20  19304.66  26794.46  34920.96  43609.94  52811.65  64267.33
          ELEVATION    3325.00   3328.95   3332.89   3336.84   3340.79   3344.74   3348.68   3352.63   3356.58   3360.53

            STORAGE    5187.15   8886.12  12975.67  17455.81  22326.53  27587.84  33239.74  39282.23  45715.30  52538.96
            OUTFLOW  127511.00 242509.60 403759.30 610474.40 863168.901162911.001511048.001909082.002358602.002861250.00
          ELEVATION    3364.47   3368.42   3372.37   3376.31   3380.26   3384.21   3388.16   3392.10   3396.05   3400.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO  2861250.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION     R48Q

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+     780.     13.75                 315.         98.         98.          98.
                       (INCHES)      .292        .303        .303         .303
                        (AC-FT)      156.        162.        162.         162.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
```

```
                                    6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        1.     13.75                 0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                    6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3326.35     13.75            3325.54     3325.17     3325.17      3325.17

                       CUMULATIVE AREA =   10.02 SQ MI



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


            **************
            *            *
  676 KK    *       48R  *
            *            *
            **************
                          Flows to Concentration Point C008L
                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

  680 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


               SUBBASIN RUNOFF DATA

  681 BA          SUBBASIN CHARACTERISTICS
                        TAREA       12.04  SUBBASIN AREA

                  PRECIPITATION DATA

  682 PB                STORM        4.05  BASIN TOTAL PRECIPITATION

  683 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .02       .01
                       .12       .15       .11       .07       .02       .01       .12       .18       .22       .24
                       .27       .35       .38       .31       .22       .17       .13       .08       .10       .11
                       .10       .06       .05       .04       .03       .02       .02       .02       .04       .08
                       .06       .03       .02       .01       .01       .00       .00       .01       .00       .00
                       .00       .00       .00       .00       .01       .01       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00

  703 LG          GREEN AND AMPT LOSS RATE
                        STRTL         .33  STARTING LOSS
                          DTH         .35  MOISTURE DEFICIT
                         PSIF        4.15  WETTING FRONT SUCTION
                        XKSAT         .39  HYDRAULIC CONDUCTIVITY
                        RTIMP        1.90  PERCENT IMPERVIOUS AREA

  704 UC          CLARK UNITGRAPH
                           TC        3.34  TIME OF CONCENTRATION
                            R        2.13  STORAGE COEFFICIENT

  705 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                          .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                       100.0

                                                                  ***

                                                        UNIT HYDROGRAPH PARAMETERS
                                                   CLARK   TC=  3.34 HR,       R=  2.13 HR
                                                  SNYDER   TP=  2.78 HR,      CP=   .80

                                                                UNIT HYDROGRAPH
                                                        161 END-OF-PERIOD ORDINATES
                 13.       40.       65.       89.      108.      122.      135.      148.      164.      185.
                204.      223.      246.      272.      297.      322.      363.      420.      475.      528.
                645.      824.      998.     1165.     1364.     1597.     1821.     2037.     2171.     2224.
               2272.     2319.     2325.     2291.     2257.     2224.     2184.     2136.     2090.     2046.
               1986.     1911.     1837.     1767.     1699.     1634.     1571.     1511.     1453.     1398.
               1344.     1293.     1243.     1195.     1150.     1106.     1063.     1022.      983.      946.
```

```
              909.      875.      841.      809.      778.      748.      719.      692.      665.      640.
              615.      592.      569.      547.      526.      506.      487.      468.      450.      433.
              416.      400.      385.      370.      356.      342.      329.      317.      305.      293.
              282.      271.      260.      250.      241.      232.      223.      214.      206.      198.
              191.      183.      176.      169.      163.      157.      151.      145.      139.      134.
              129.      124.      119.      115.      110.      106.      102.       98.       94.       91.
               87.       84.       81.       78.       75.       72.       69.       66.       64.       61.
               59.       57.       55.       52.       50.       49.       47.       45.       43.       42.
               40.       38.       37.       36.       34.       33.       32.       30.       29.       28.
               27.       26.       25.       24.       23.       22.       21.       21.       20.       19.
               18.

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

                        HYDROGRAPH AT STATION      48R

    TOTAL RAINFALL =    4.05, TOTAL LOSS =    2.33, TOTAL EXCESS =    1.72

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+    3762.     13.83                1965.        642.        642.         642.
                        (INCHES)    1.517       1.645       1.645        1.645
                         (AC-FT)     974.       1056.       1056.        1056.

                        CUMULATIVE AREA =   12.04 SQ MI


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


            **************
            *            *
  707 KK    *       48P  *
            *            *
            **************
                          Flows to Concentration Point C008R
                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

  711 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


               SUBBASIN RUNOFF DATA

  712 BA          SUBBASIN CHARACTERISTICS
                        TAREA        4.45  SUBBASIN AREA

                  PRECIPITATION DATA

  713 PB                STORM        2.84  BASIN TOTAL PRECIPITATION

  714 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .01       .02
                       .00       .01       .08       .16       .08       .08       .14       .22       .12       .12
                       .11       .18       .15       .14       .11       .11       .11       .07       .09       .12
                       .16       .08       .07       .05       .06       .03       .03       .03       .02       .02
                       .02       .01       .01       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00

  734 LG          GREEN AND AMPT LOSS RATE
                        STRTL         .31  STARTING LOSS
                          DTH         .35  MOISTURE DEFICIT
                         PSIF        4.00  WETTING FRONT SUCTION
                        XKSAT         .44  HYDRAULIC CONDUCTIVITY
                        RTIMP        7.20  PERCENT IMPERVIOUS AREA

  735 UC          CLARK UNITGRAPH
                           TC        2.00  TIME OF CONCENTRATION
                            R        1.39  STORAGE COEFFICIENT

  736 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
```

```
                    .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                 100.0

                                                          ***

                                                UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  2.00 HR,       R=  1.39 HR
                                         SNYDER   TP=  1.67 HR,      CP=   .76

                                                     UNIT HYDROGRAPH
                                              104 END-OF-PERIOD ORDINATES
                13.       37.       57.       73.       86.      103.      122.      143.      168.      198.
               244.      297.      411.      579.      762.      971.     1167.     1280.     1331.     1349.
              1327.     1296.     1259.     1219.     1164.     1096.     1032.      972.      916.      862.
               812.      765.      720.      678.      639.      601.      566.      533.      502.      473.
               445.      419.      395.      372.      350.      330.      311.      293.      275.      259.
               244.      230.      217.      204.      192.      181.      170.      160.      151.      142.
               134.      126.      119.      112.      105.       99.       93.       88.       83.       78.
                73.       69.       65.       61.       58.       54.       51.       48.       45.       43.
                40.       38.       36.       34.       32.       30.       28.       26.       25.       23.
                22.       21.       20.       18.       17.       16.       15.       15.       14.       13.
                12.       11.       11.       10.

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

                        HYDROGRAPH AT STATION      48P

     TOTAL RAINFALL =    2.84, TOTAL LOSS =    2.15, TOTAL EXCESS =     .69

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+     752.     13.08                   316.         98.         98.          98.
                        (INCHES)      .659        .682        .682         .682
                         (AC-FT)      156.        162.        162.         162.

                        CUMULATIVE AREA =    4.45 SQ MI


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


            **************
            *            *
  738 KK    *      C008  *
            *            *
            **************
                          Combines Routed C007, Routed 48Q, 48R and 48P

  740 HC          HYDROGRAPH COMBINATION
                        ICOMP           4  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

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

                        HYDROGRAPH AT STATION     C008

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+   12581.     13.67                  7030.       2285.       2285.        2285.
                        (INCHES)      .475        .513        .513         .513
                         (AC-FT)     3486.       3762.       3762.        3762.

                        CUMULATIVE AREA =  137.56 SQ MI


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


            **************
            *            *
  741 KK    *    008009  *
            *            *
            **************
                          Channel Routing of C008 to C009C
                          Length = 17,585 feet
                          Change in Elev = 3220-3110
                          Slope Correction not Applied

  746 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
```

```
                    TIMINT        .083  TIME INTERVAL IN HOURS


              HYDROGRAPH ROUTING DATA

  747 RS          STORAGE ROUTING
                       NSTPS          37  NUMBER OF SUBREACHES
                        ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

  748 RC          NORMAL DEPTH CHANNEL
                         ANL        .035  LEFT OVERBANK N-VALUE
                        ANCH        .030  MAIN CHANNEL N-VALUE
                         ANR        .035  RIGHT OVERBANK N-VALUE
                       RLNTH      17585.  REACH LENGTH
                         SEL       .0063  ENERGY SLOPE
                       ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                           --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  750 RY        ELEVATION   3100.00   3060.00   3050.00   3040.00   3040.00   3050.00   3060.00   3100.00
  749 RX        DISTANCE        .00   1515.00   1615.00   1715.00   2503.00   2568.00   2608.00   3256.00

                                                                  ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00   1037.80   2142.03   3312.68   4546.27   5836.37   7182.82   8621.51  10268.94  12134.07
            OUTFLOW        .00  21353.73  68619.69 136615.10 228668.30 341164.30 472682.40 621515.30 792330.80 987647.70
          ELEVATION    3040.00   3043.16   3046.32   3049.47   3052.63   3055.79   3058.95   3062.11   3065.26   3068.42

            STORAGE   14216.91  16517.45  19035.69  21771.64  24725.29  27896.64  31285.69  34892.45  38716.91  42759.07
            OUTFLOW 1209289.001459058.001738677.002049795.002393998.002772822.003187758.003640260.004131748.004663634.00
          ELEVATION    3071.58   3074.74   3077.90   3081.05   3084.21   3087.37   3090.53   3093.69   3096.84   3100.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO  4663634.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION   008009

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+   12509.     14.33                7026.       2257.       2257.        2257.
                       (INCHES)      .475        .506        .506         .506
                        (AC-FT)     3484.       3715.       3715.        3715.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
       16.     14.33                   9.          3.          3.           3.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3041.85     14.33               3041.04     3040.33     3040.33      3040.33

                        CUMULATIVE AREA =  137.56 SQ MI



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


            **************
            *            *
  751 KK    *       48S  *
            *            *
            **************
                         Flows to Concentration Point C009R
                         Basin Slope did not require adjustment
                         Desert/Rangeland Time-Area Relationship

  755 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


              SUBBASIN RUNOFF DATA

  756 BA          SUBBASIN CHARACTERISTICS
                       TAREA        3.66  SUBBASIN AREA
```

```
                PRECIPITATION DATA

  757 PB                STORM        3.28  BASIN TOTAL PRECIPITATION

  758 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .05       .13       .25
                       .04       .04       .04       .10       .16       .13       .13       .21       .17       .17
                       .19       .16       .13       .12       .13       .09       .09       .08       .08       .08
                       .08       .11       .06       .05       .03       .03       .01       .01       .01       .02
                       .02       .02       .01       .01       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00

  778 LG          GREEN AND AMPT LOSS RATE
                        STRTL         .23  STARTING LOSS
                          DTH         .35  MOISTURE DEFICIT
                         PSIF        4.15  WETTING FRONT SUCTION
                        XKSAT         .39  HYDRAULIC CONDUCTIVITY
                        RTIMP       11.50  PERCENT IMPERVIOUS AREA

  779 UC          CLARK UNITGRAPH
                           TC        2.16  TIME OF CONCENTRATION
                            R        1.56  STORAGE COEFFICIENT

  780 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                         .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                      100.0

                                                          ***

                                                   UNIT HYDROGRAPH PARAMETERS
                                            CLARK   TC=  2.16 HR,       R=  1.56 HR
                                           SNYDER   TP=  1.81 HR,      CP=   .74

                                                      UNIT HYDROGRAPH
                                                 116 END-OF-PERIOD ORDINATES
                   9.       25.       40.       51.       59.       70.       83.       96.      112.      129.
                 152.      186.      223.      302.      417.      538.      678.      825.      922.      966.
                 994.      995.      978.      957.      932.      905.      869.      823.      781.      740.
                 702.      665.      631.      598.      567.      537.      510.      483.      458.      434.
                 412.      390.      370.      351.      333.      315.      299.      283.      269.      255.
                 242.      229.      217.      206.      195.      185.      175.      166.      158.      149.
                 142.      134.      127.      121.      114.      109.      103.       98.       92.       88.
                  83.       79.       75.       71.       67.       64.       60.       57.       54.       51.
                  49.       46.       44.       42.       39.       37.       35.       34.       32.       30.
                  29.       27.       26.       24.       23.       22.       21.       20.       19.       18.
                  17.       16.       15.       14.       14.       13.       12.       12.       11.       10.
                  10.        9.        9.        8.        8.        8.

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

                        HYDROGRAPH AT STATION      48S

    TOTAL RAINFALL =    3.28, TOTAL LOSS =    2.07, TOTAL EXCESS =    1.21

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                           (CFS)
+     968.     12.83                450.        142.        142.         142.
                        (INCHES)    1.142       1.199       1.199        1.199
                         (AC-FT)     223.        234.        234.         234.

                         CUMULATIVE AREA =    3.66 SQ MI


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


            **************
            *            *
  782 KK    *       48T  *
            *            *
            **************
                           Flows to Concentration Point C009L
                           Basin Slope did not require adjustment
                           Desert/Rangeland Time-Area Relationship

  786 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
```

```
                QSCAL          0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        240  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .083  TIME INTERVAL IN HOURS


          SUBBASIN RUNOFF DATA

787 BA      SUBBASIN CHARACTERISTICS
                TAREA      20.77  SUBBASIN AREA

            PRECIPITATION DATA

788 PB          STORM       2.55  BASIN TOTAL PRECIPITATION

789 PI        INCREMENTAL PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .01       .01       .01       .03       .04       .10
                .04       .14       .12       .10       .06       .03       .02       .06       .07       .13
                .16       .14       .11       .12       .11       .10       .11       .08       .09       .08
                .08       .05       .03       .02       .01       .01       .01       .01       .00       .01
                .02       .02       .02       .02       .02       .02       .01       .01       .01       .00
                .00       .00       .00       .00       .01       .01       .01       .01       .00       .00
                .00       .00       .00       .00       .00       .00       .00

809 LG      GREEN AND AMPT LOSS RATE
                STRTL        .31  STARTING LOSS
                  DTH        .35  MOISTURE DEFICIT
                 PSIF       4.25  WETTING FRONT SUCTION
                XKSAT        .38  HYDRAULIC CONDUCTIVITY
                RTIMP        .10  PERCENT IMPERVIOUS AREA

810 UC      CLARK UNITGRAPH
                  TC       4.43  TIME OF CONCENTRATION
                   R       3.17  STORAGE COEFFICIENT

811 UA      ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                  .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
               100.0

                                                  ***

                                          UNIT HYDROGRAPH PARAMETERS
                                     CLARK   TC=  4.43 HR,       R=  3.17 HR
                                   SNYDER   TP=  3.72 HR,      CP=   .75

                                              UNIT HYDROGRAPH
                                         235 END-OF-PERIOD ORDINATES
             12.       35.       58.       80.      101.      120.      133.      146.      158.      169.
            182.      198.      217.      235.      252.      270.      290.      314.      337.      360.
            382.      415.      463.      514.      564.      612.      684.      813.      973.     1129.
           1280.     1432.     1615.     1824.     2028.     2227.     2421.     2557.     2622.     2672.
           2720.     2767.     2796.     2789.     2764.     2739.     2715.     2691.     2659.     2621.
           2585.     2549.     2514.     2467.     2405.     2343.     2282.     2223.     2165.     2109.
           2054.     2001.     1949.     1898.     1849.     1801.     1754.     1708.     1664.     1621.
           1579.     1538.     1498.     1459.     1421.     1384.     1348.     1313.     1279.     1246.
           1213.     1182.     1151.     1121.     1092.     1064.     1036.     1009.      983.      958.
            933.      908.      885.      862.      839.      818.      796.      776.      756.      736.
            717.      698.      680.      662.      645.      628.      612.      596.      581.      566.
            551.      537.      523.      509.      496.      483.      471.      458.      446.      435.
            424.      413.      402.      391.      381.      371.      362.      352.      343.      334.
            326.      317.      309.      301.      293.      285.      278.      271.      264.      257.
            250.      244.      237.      231.      225.      219.      214.      208.      203.      197.
            192.      187.      182.      178.      173.      169.      164.      160.      156.      152.
            148.      144.      140.      137.      133.      130.      126.      123.      120.      117.
            114.      111.      108.      105.      102.      100.       97.       95.       92.       90.
             87.       85.       83.       81.       79.       77.       75.       73.       71.       69.
             67.       65.       64.       62.       60.       59.       57.       56.       54.       53.
             52.       50.       49.       48.       46.       45.       44.       43.       42.       41.
             40.       39.       38.       37.       36.       35.       34.       33.       32.       31.
             30.       30.       29.       28.       27.       27.       26.       25.       25.       24.
             23.       23.       22.       22.       21.

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

                        HYDROGRAPH AT STATION      48T

   TOTAL RAINFALL =    2.55, TOTAL LOSS =    2.15, TOTAL EXCESS =     .40

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
```

```
+    1080.     14.83                  688.        227.        227.         227.
                        (INCHES)      .308        .338        .338         .338
                         (AC-FT)      341.        374.        374.         374.

                         CUMULATIVE AREA =   20.77 SQ MI



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


            **************
            *            *
  813 KK    *      C009  *
            *            *
            **************
                          Combines Routed C008, 48S and 48T

  815 HC          HYDROGRAPH COMBINATION
                        ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                          HYDROGRAPH AT STATION     C009

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                           (CFS)
+   13993.     14.33                 8050.       2627.       2627.        2627.
                        (INCHES)      .462        .500        .500         .500
                         (AC-FT)     3992.       4324.       4324.        4324.

                         CUMULATIVE AREA =  162.00 SQ MI



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


            **************
            *            *
  816 KK    *    009010  *
            *            *
            **************
                          Channel Routing of C009 to C010C
                          Length = 6,830 feet
                          Change in Elev = 3110-3060
                          Slope Correction not Applied

  821 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


                HYDROGRAPH ROUTING DATA

  822 RS          STORAGE ROUTING
                        NSTPS          14  NUMBER OF SUBREACHES
                         ITYP        FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC       -1.00  INITIAL CONDITION
                            X         .00 WORKING R AND D COEFFICIENT

  823 RC          NORMAL DEPTH CHANNEL
                          ANL        .035  LEFT OVERBANK N-VALUE
                         ANCH        .030  MAIN CHANNEL N-VALUE
                          ANR        .035  RIGHT OVERBANK N-VALUE
                        RLNTH       6830.  REACH LENGTH
                          SEL       .0073  ENERGY SLOPE
                        ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                            --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  825 RY        ELEVATION   3100.00   3060.00   3050.00   3040.00   3040.00   3050.00   3060.00   3100.00
  824 RX        DISTANCE        .00   1515.00   1615.00   1715.00   2503.00   2568.00   2608.00   3256.00

                                                                  ***

                                         COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00    403.08    831.96   1286.64   1765.77   2266.84   2789.80   3348.59   3988.45   4712.86
            OUTFLOW        .00  22986.08  73865.20 147058.40 246148.40 367244.10 508815.80 669026.00 852899.101063147.00
          ELEVATION    3040.00   3043.16   3046.32   3049.47   3052.63   3055.79   3058.95   3062.11   3065.26   3068.42

            STORAGE    5521.84   6415.36   7393.45   8456.09   9603.28  10835.03  12151.34  13552.20  15037.62  16607.59
```

```
          OUTFLOW 1301731.001570593.001871587.002206489.002577003.002984786.003431441.003918533.004447592.005020137.00
        ELEVATION    3071.58   3074.74   3077.90   3081.05   3084.21   3087.37   3090.53   3093.69   3096.84   3100.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO  5020137.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION   009010

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+   13965.     14.50                8048.       2611.       2611.        2611.
                       (INCHES)      .462        .497        .497         .497
                        (AC-FT)     3991.       4298.       4298.        4298.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
       17.     14.50                  10.          3.          3.           3.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3041.92     14.50               3041.11     3040.36     3040.36      3040.36

                        CUMULATIVE AREA =  162.00 SQ MI



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


            **************
            *            *
  826 KK    *       48U  *
            *            *
            **************

                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

  830 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


               SUBBASIN RUNOFF DATA

  831 BA          SUBBASIN CHARACTERISTICS
                        TAREA        1.25  SUBBASIN AREA

                  PRECIPITATION DATA

  832 PB                STORM        1.41  BASIN TOTAL PRECIPITATION

  833 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .01       .01
                       .00       .01       .00       .01       .00       .00       .00       .01       .02       .11
                       .01       .00       .01       .04       .08       .05       .10       .16       .11       .08
                       .05       .07       .04       .04       .03       .03       .03       .03       .02       .03
                       .04       .05       .03       .02       .02       .02       .01       .01       .01       .01
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00

  853 LG          GREEN AND AMPT LOSS RATE
                        STRTL         .32  STARTING LOSS
                          DTH         .35  MOISTURE DEFICIT
                         PSIF        4.00  WETTING FRONT SUCTION
                        XKSAT         .43  HYDRAULIC CONDUCTIVITY
                        RTIMP        4.90  PERCENT IMPERVIOUS AREA

  854 UC          CLARK UNITGRAPH
```

```
                        TC        1.28  TIME OF CONCENTRATION
                         R        1.01  STORAGE COEFFICIENT

  855 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                        .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                     100.0

                                                                  ***

                                                        UNIT HYDROGRAPH PARAMETERS
                                                  CLARK   TC=  1.28 HR,       R=  1.01 HR
                                                 SNYDER   TP=  1.10 HR,      CP=   .71

                                                            UNIT HYDROGRAPH
                                                        74 END-OF-PERIOD ORDINATES
                 7.       21.       30.       40.       53.       67.       90.      134.      213.      328.
               446.      517.      535.      527.      510.      483.      448.      413.      380.      350.
               322.      297.      273.      252.      232.      213.      196.      181.      167.      153.
               141.      130.      120.      110.      102.       93.       86.       79.       73.       67.
                62.       57.       52.       48.       45.       41.       38.       35.       32.       29.
                27.       25.       23.       21.       20.       18.       17.       15.       14.       13.
                12.       11.       10.        9.        9.        8.        7.        7.        6.        6.
                 5.        5.        4.        4.

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

                        HYDROGRAPH AT STATION      48U

    TOTAL RAINFALL =    1.41, TOTAL LOSS =    1.34, TOTAL EXCESS =     .07

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+      22.     11.92                     9.          3.          3.          3.
                        (INCHES)      .067        .069        .069        .069
                         (AC-FT)        4.          5.          5.          5.

                        CUMULATIVE AREA =    1.25 SQ MI


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


            **************
            *            *
  857 KK    *      R48U  *
            *            *
            **************
                          Channel Routing of 48U through 48V
                          Length = 10,675 feet
                          Change in Elev = 3300-3120
                          Slope Correction not Applied

  862 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

  863 RS          STORAGE ROUTING
                       NSTPS          15  NUMBER OF SUBREACHES
                        ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

  864 RC          NORMAL DEPTH CHANNEL
                         ANL        .035  LEFT OVERBANK N-VALUE
                        ANCH        .030  MAIN CHANNEL N-VALUE
                         ANR        .035  RIGHT OVERBANK N-VALUE
                       RLNTH      10675.  REACH LENGTH
                         SEL       .0169  ENERGY SLOPE
                       ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  866 RY        ELEVATION   3200.00   3160.00   3150.00   3140.00   3140.00   3150.00   3160.00   3200.00
  865 RX        DISTANCE        .00    205.00    514.00    697.00    710.00    880.00   1179.00   1272.00

                                                                  ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00     53.20    192.66    418.40    752.06   1233.44   1863.41   2612.99   3388.02   4181.25
            OUTFLOW        .00   2028.65  11312.46  31830.61  73966.09 139256.20 231412.00 360092.30 521250.00 709623.40
          ELEVATION    3140.00   3143.16   3146.32   3149.47   3152.63   3155.79   3158.95   3162.11   3165.26   3168.42
```

```
          STORAGE    4992.69   5822.34   6670.20   7536.26   8420.53   9323.01  10243.69  11182.59  12139.69  13114.99
          OUTFLOW  923786.101162757.001425831.001712485.002022330.002355073.002710497.003088444.003488801.003911507.00
        ELEVATION    3171.58   3174.74   3177.90   3181.05   3184.21   3187.37   3190.53   3193.69   3196.84   3200.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO  3911507.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION     R48U

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                         (CFS)
+      21.     12.25                  9.          3.          3.           3.
                       (INCHES)      .067        .069        .069         .069
                        (AC-FT)        4.          5.          5.           5.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        0.     12.08                  0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3140.03     12.17               3140.01     3140.00     3140.00      3140.00

                       CUMULATIVE AREA =    1.25 SQ MI



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


            **************
            *            *
  867 KK    *       48V  *
            *            *
            **************

                         Basin Slope did not require adjustment
                         Desert/Rangeland Time-Area Relationship

  871 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


               SUBBASIN RUNOFF DATA

  872 BA          SUBBASIN CHARACTERISTICS
                        TAREA        1.63  SUBBASIN AREA

                  PRECIPITATION DATA

  873 PB                STORM        1.93  BASIN TOTAL PRECIPITATION

  874 PI            INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .01       .01
                       .01       .01       .01       .01       .01       .01       .01       .08       .14       .39
                       .03       .02       .02       .04       .08       .06       .08       .18       .11       .08
                       .09       .09       .04       .03       .03       .03       .02       .02       .01       .02
                       .02       .04       .02       .02       .01       .01       .01       .01       .00       .00
                       .01       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00

  894 LG          GREEN AND AMPT LOSS RATE
                        STRTL         .27  STARTING LOSS
                          DTH         .35  MOISTURE DEFICIT
                         PSIF        4.10  WETTING FRONT SUCTION
                        XKSAT         .39  HYDRAULIC CONDUCTIVITY
                        RTIMP         .80  PERCENT IMPERVIOUS AREA
```

```
  895 UC          CLARK UNITGRAPH
                          TC        1.46  TIME OF CONCENTRATION
                           R         .96  STORAGE COEFFICIENT

  896 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                        .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                     100.0

                                                                  ***

                                                         UNIT HYDROGRAPH PARAMETERS
                                                   CLARK   TC=  1.46 HR,       R=   .96 HR
                                                  SNYDER   TP=  1.21 HR,      CP=   .78

                                                             UNIT HYDROGRAPH
                                                         72 END-OF-PERIOD ORDINATES
                   9.       25.       38.       48.       60.       76.       92.      121.      169.      258.
                 387.      533.      643.      693.      699.      676.      649.      613.      568.      521.
                 478.      438.      401.      368.      337.      309.      284.      260.      238.      219.
                 200.      184.      168.      154.      142.      130.      119.      109.      100.       92.
                  84.       77.       71.       65.       59.       54.       50.       46.       42.       38.
                  35.       32.       30.       27.       25.       23.       21.       19.       18.       16.
                  15.       14.       12.       11.       10.       10.        9.        8.        7.        7.
                   6.        6.

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

                          HYDROGRAPH AT STATION      48V

      TOTAL RAINFALL =    1.93, TOTAL LOSS =    1.69, TOTAL EXCESS =     .24

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+     129.     11.83                  42.         13.         13.          13.
                        (INCHES)     .239        .239        .239         .239
                         (AC-FT)      21.         21.         21.          21.

                         CUMULATIVE AREA =    1.63 SQ MI


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


             **************
             *            *
  898 KK     *     C48UV  *
             *            *
             **************
                           Combines Routed 48U and 48V

  900 HC          HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                          HYDROGRAPH AT STATION    C48UV

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+     146.     11.83                  51.         15.         15.          15.
                        (INCHES)     .164        .165        .165         .165
                         (AC-FT)      25.         25.         25.          25.

                         CUMULATIVE AREA =    2.88 SQ MI


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


             **************
             *            *
  901 KK     *    RC48UV  *
             *            *
             **************
                           Channel Routing of C48UV through 48W
                           Length = 8,745 feet
                           Change in Elev = 3120-3060
                           Slope Correction not Applied

  906 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
```

```
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

  907 RS          STORAGE ROUTING
                       NSTPS          18  NUMBER OF SUBREACHES
                        ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

  908 RC          NORMAL DEPTH CHANNEL
                         ANL        .035  LEFT OVERBANK N-VALUE
                        ANCH        .030  MAIN CHANNEL N-VALUE
                         ANR        .035  RIGHT OVERBANK N-VALUE
                       RLNTH       8745.  REACH LENGTH
                         SEL       .0069  ENERGY SLOPE
                       ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                           --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  910 RY        ELEVATION   3100.00   3060.00   3050.00   3040.00   3040.00   3050.00   3060.00   3100.00
  909 RX        DISTANCE        .00   1515.00   1615.00   1715.00   2503.00   2568.00   2608.00   3256.00

                                                                  ***

                                                COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00    516.10   1065.23   1647.39   2260.86   2902.42   3572.01   4287.46   5106.73   6034.26
            OUTFLOW        .00  22347.45  71812.99 142972.60 239309.60 357040.80 494679.20 650438.30 829202.801033609.00
          ELEVATION    3040.00   3043.16   3046.32   3049.47   3052.63   3055.79   3058.95   3062.11   3065.26   3068.42

            STORAGE    7070.05   8214.11   9466.43  10827.01  12295.86  13872.97  15558.34  17351.97  19253.88  21264.04
            OUTFLOW 1265564.001526957.001819589.002145185.002505406.002901859.003336104.003809664.004324024.004880662.00
          ELEVATION    3071.58   3074.74   3077.90   3081.05   3084.21   3087.37   3090.53   3093.69   3096.84   3100.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO  4880662.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                         HYDROGRAPH AT STATION   RC48UV

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+     145.     12.17                   51.         15.         15.          15.
                        (INCHES)      .164        .165        .165         .165
                         (AC-FT)       25.         25.         25.          25.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                      6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
        0.     12.17                    0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                      6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3040.02     12.08               3040.01     3040.00     3040.00      3040.00

                        CUMULATIVE AREA =    2.88 SQ MI



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


            **************
            *            *
  911 KK    *       48W  *
            *            *
            **************
                          Flows to Concentration Point C010R
                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

  915 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


               SUBBASIN RUNOFF DATA
```

```
916 BA          SUBBASIN CHARACTERISTICS
                      TAREA        1.13  SUBBASIN AREA

                PRECIPITATION DATA

917 PB                STORM        1.65  BASIN TOTAL PRECIPITATION

918 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .01       .01
                      .01       .01       .01       .01       .01       .01       .01       .19       .56       .10
                      .01       .01       .02       .04       .03       .06       .06       .09       .06       .06
                      .05       .08       .04       .02       .01       .00       .00       .01       .00       .01
                      .00       .01       .00       .01       .01       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00

938 LG          GREEN AND AMPT LOSS RATE
                      STRTL         .35  STARTING LOSS
                        DTH         .38  MOISTURE DEFICIT
                       PSIF        5.40  WETTING FRONT SUCTION
                      XKSAT         .21  HYDRAULIC CONDUCTIVITY
                      RTIMP         .00  PERCENT IMPERVIOUS AREA

939 UC          CLARK UNITGRAPH
                         TC        1.28  TIME OF CONCENTRATION
                          R         .85  STORAGE COEFFICIENT

940 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                        .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                     100.0

                                                          ***

                                                UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  1.28 HR,       R=   .85 HR
                                         SNYDER   TP=  1.07 HR,      CP=   .78

                                                     UNIT HYDROGRAPH
                                                 64 END-OF-PERIOD ORDINATES
                  8.       22.       32.       42.       55.       69.       93.      138.      219.      339.
                461.      532.      545.      532.      508.      475.      435.      394.      357.      324.
                294.      266.      242.      219.      199.      180.      163.      148.      134.      122.
                110.      100.       91.       82.       75.       68.       61.       56.       50.       46.
                 41.       38.       34.       31.       28.       25.       23.       21.       19.       17.
                 16.       14.       13.       12.       11.       10.        9.        8.        7.        6.
                  6.        5.        5.        4.

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

                        HYDROGRAPH AT STATION      48W

    TOTAL RAINFALL =    1.65, TOTAL LOSS =    1.41, TOTAL EXCESS =     .24

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+     112.     10.92                     29.          9.          9.           9.
                        (INCHES)      .240        .240        .240         .240
                         (AC-FT)       14.         14.         14.          14.

                        CUMULATIVE AREA =    1.13 SQ MI



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


            **************
            *            *
  942 KK    *      C010  *
            *            *
            **************
                          Combines Routed C009, R48UV and 48W

  944 HC          HYDROGRAPH COMBINATION
                        ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

      ***             ***             ***             ***             ***
```

```
                        HYDROGRAPH AT STATION     C010

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                            (CFS)
+   13989.     14.50                8070.       2635.       2635.        2635.
                        (INCHES)      .452        .490        .490         .490
                         (AC-FT)     4002.       4338.       4338.        4338.

                        CUMULATIVE AREA =  166.01 SQ MI


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


            **************
            *            *
  945 KK    *    010011  *
            *            *
            **************
                          Channel Routing of C010 Tto C011
                          Length = 5,848 feet
                          Change in Elev = 3060-3020
                          Slope Correction not Applied

  950 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

  951 RS          STORAGE ROUTING
                        NSTPS          12  NUMBER OF SUBREACHES
                         ITYP        FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC       -1.00  INITIAL CONDITION
                            X         .00 WORKING R AND D COEFFICIENT

  952 RC          NORMAL DEPTH CHANNEL
                          ANL        .035  LEFT OVERBANK N-VALUE
                         ANCH        .030  MAIN CHANNEL N-VALUE
                          ANR        .035  RIGHT OVERBANK N-VALUE
                        RLNTH       5848.  REACH LENGTH
                          SEL       .0068  ENERGY SLOPE
                        ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                     CROSS-SECTION DATA
                           --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  954 RY        ELEVATION   3080.00   3050.00   3050.00   3040.00   3040.00   3050.00   3050.00   3080.00
  953 RX        DISTANCE        .00    150.00   1600.00   1637.00   1640.00   1700.00   2500.00   2673.00

                                                                  ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00      3.73     13.24     28.52     49.56    235.33    904.31   1579.70   2261.50   2949.70
            OUTFLOW        .00    126.10    683.93   1903.48   3978.51  10002.26  52030.58 124287.60 221154.20 339899.60
          ELEVATION    3040.00   3042.11   3044.21   3046.32   3048.42   3050.53   3052.63   3054.74   3056.84   3058.95

            STORAGE    3644.31   4345.32   5052.75   5766.57   6486.80   7213.44   7946.49   8685.94   9431.80  10184.06
            OUTFLOW  478788.60 636587.80 812363.101005376.001215028.001440819.001682328.001939195.002211109.002497797.00
          ELEVATION    3061.05   3063.16   3065.26   3067.37   3069.47   3071.58   3073.68   3075.79   3077.89   3080.00


 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO  2497797.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION   010011

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                            (CFS)
+   13973.     14.75                8069.       2621.       2621.        2621.
                        (INCHES)      .452        .487        .487         .487
                         (AC-FT)     4001.       4313.       4313.        4313.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     19.92-HR
+  (AC-FT)      (HR)
       25.     14.75                  14.          4.          4.           4.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
```

```
                                    6-HR       24-HR       72-HR     19.92-HR
+   (FEET)      (HR)
   3050.73     14.75               3049.53     3043.61     3043.61      3043.61

                        CUMULATIVE AREA =  166.01 SQ MI



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


            **************
            *            *
 955 KK     *       48X  *
            *            *
            **************
                          Flows to Concentration Point C011L
                          Basin Slope did not require adjustment
                          Desert/Rangeland Time-Area Relationship

 959 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .083  TIME INTERVAL IN HOURS


              SUBBASIN RUNOFF DATA

 960 BA          SUBBASIN CHARACTERISTICS
                       TAREA         .78  SUBBASIN AREA

                 PRECIPITATION DATA

 961 PB                STORM        1.28  BASIN TOTAL PRECIPITATION

 962 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .01       .01
                      .01       .01       .01       .01       .01       .03       .03       .08       .48       .18
                      .00       .01       .02       .02       .02       .05       .06       .03       .03       .03
                      .03       .05       .02       .01       .01       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .01       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00

 982 LG          GREEN AND AMPT LOSS RATE
                       STRTL         .35  STARTING LOSS
                         DTH         .38  MOISTURE DEFICIT
                        PSIF        6.40  WETTING FRONT SUCTION
                       XKSAT         .15  HYDRAULIC CONDUCTIVITY
                       RTIMP         .00  PERCENT IMPERVIOUS AREA

 983 UC          CLARK UNITGRAPH
                          TC        1.13  TIME OF CONCENTRATION
                           R         .69  STORAGE COEFFICIENT

 984 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                        .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                     100.0

                                                          ***

                                                UNIT HYDROGRAPH PARAMETERS
                                         CLARK   TC=  1.13 HR,       R=   .69 HR
                                       SNYDER   TP=   .94 HR,      CP=   .82

                                                     UNIT HYDROGRAPH
                                                53 END-OF-PERIOD ORDINATES
                 8.       20.       30.       40.       53.       73.      110.      186.      302.      405.
               453.      451.      426.      394.      354.      314.      278.      247.      219.      194.
               172.      152.      135.      119.      106.       94.       83.       74.       65.       58.
                51.       45.       40.       36.       32.       28.       25.       22.       19.       17.
                15.       14.       12.       11.        9.        8.        7.        7.        6.        5.
                 5.        4.        4.

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

                          HYDROGRAPH AT STATION      48X
```

```
     TOTAL RAINFALL =    1.28, TOTAL LOSS =    1.14, TOTAL EXCESS =     .14

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+      64.     10.83                 12.          4.          4.           4.
                        (INCHES)     .141        .141        .141         .141
                         (AC-FT)       6.          6.          6.           6.

                         CUMULATIVE AREA =     .78 SQ MI



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


            **************
            *            *
  986 KK    *      C011  *
            *            *
            **************
                          Combines Routed C010 and 48X

  989 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .083  TIME INTERVAL IN HOURS


  988 HC          HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                          HYDROGRAPH AT STATION     C011

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     19.92-HR
+   (CFS)       (HR)
                          (CFS)
+   13973.     14.75                8069.       2624.       2624.        2624.
                        (INCHES)     .450        .486        .486         .486
                         (AC-FT)    4001.       4319.       4319.        4319.

                         CUMULATIVE AREA =  166.79 SQ MI

    -----DSS---ZOPEN:  New File Opened,  File: H1DSS.DSS
                      Unit:  71;  DSS Version: 6-JG
 -----DSS---ZWRITE Unit  71; Vers.    1:  /C011/C011/FLOW/09SEP2018/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    1:  /C011/C011/FLOW/10SEP2018/5MIN//
1
                                                        RUNOFF SUMMARY
                                                   FLOW IN CUBIC FEET PER SECOND
                                                 TIME IN HOURS,  AREA IN SQUARE MILES

                                       PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
          OPERATION       STATION      FLOW     PEAK                                          AREA      STAGE     MAX STAGE
+                                                          6-HOUR     24-HOUR     72-HOUR

          HYDROGRAPH AT
+                            48A        35.   13.58          18.          6.          6.       6.37

          HYDROGRAPH AT
+                            48B        37.   13.67          21.          7.          7.      10.14

          2 COMBINED AT
+                           C002        72.   13.67          38.         13.         13.      16.52

          ROUTED TO
+                         001002        72.   14.67          38.         13.         13.      16.52
+                                                                                                        3630.90       14.67

          HYDROGRAPH AT
+                            48C        17.   12.33           8.          3.          3.       3.99

          ROUTED TO
+                           R48C        17.   12.75           8.          3.          3.       3.99
+                                                                                                        3950.20       12.75

          HYDROGRAPH AT
+                            48D         5.   12.17           2.          1.          1.        .94

          2 COMBINED AT
+                          C48CD        21.   12.67          10.          3.          3.       4.93

          ROUTED TO
```

+	R40CD	21.	13.08	10.	3.	3.	4.93		
+								3786.06	13.08
HYDROGRAPH AT									
+	48E	2.	12.83	1.	0.	0.	.92		
2 COMBINED AT									
+	C002	23.	13.08	11.	4.	4.	5.85		
ROUTED TO									
+	002003	22.	14.25	11.	4.	4.	5.85		
+								3630.27	14.25
HYDROGRAPH AT									
+	48F	12.	13.58	5.	2.	2.	6.53		
HYDROGRAPH AT									
+	48G	17.	12.33	9.	3.	3.	3.54		
ROUTED TO									
+	R48G	17.	13.83	9.	3.	3.	3.54		
+								3690.04	13.83
HYDROGRAPH AT									
+	48H	9.	13.83	5.	2.	2.	6.15		
5 COMBINED AT									
+	C003	123.	14.33	69.	23.	23.	38.59		
ROUTED TO									
+	003004	123.	14.75	69.	22.	22.	38.59		
+								3482.12	14.75
HYDROGRAPH AT									
+	48I	1.	13.83	1.	0.	0.	4.85		
2 COMBINED AT									
+	C004	124.	14.67	69.	23.	23.	43.44		
ROUTED TO									
+	004005	123.	15.33	69.	22.	22.	43.44		
+								3493.67	15.33
HYDROGRAPH AT									
+	48K	3.	14.33	1.	0.	0.	10.18		
HYDROGRAPH AT									
+	48J	0.	.00	0.	0.	0.	4.34		
3 COMBINED AT									
+	C005	125.	15.33	70.	23.	23.	57.97		
ROUTED TO									
+	005006	125.	15.58	70.	23.	23.	57.97		
+								3360.01	15.33
HYDROGRAPH AT									
+	48L	229.	14.50	132.	44.	44.	25.27		
HYDROGRAPH AT									
+	48M	2026.	15.00	1109.	358.	358.	7.74		
3 COMBINED AT									
+	C006	2349.	15.00	1304.	425.	425.	90.98		
ROUTED TO									
+	006007	2345.	15.42	1304.	409.	409.	90.98		
+								3281.24	15.42
HYDROGRAPH AT									
+	48N	1290.	13.75	583.	185.	185.	10.65		
HYDROGRAPH AT									
+	48O	5893.	13.42	2736.	858.	858.	9.43		
3 COMBINED AT									
+	C007	7496.	13.58	4455.	1452.	1452.	111.05		
ROUTED TO									
+	007008	7487.	13.67	4455.	1447.	1447.	111.05		
+								3341.88	13.67
HYDROGRAPH AT									
+	48Q	789.	12.92	315.	98.	98.	10.02		
ROUTED TO									
+	R48Q	780.	13.75	315.	98.	98.	10.02		
+								3326.35	13.75
HYDROGRAPH AT									
+	48R	3762.	13.83	1965.	642.	642.	12.04		
HYDROGRAPH AT									
+	48P	752.	13.08	316.	98.	98.	4.45		

```
          4 COMBINED AT
+                         C008     12581.   13.67        7030.       2285.       2285.     137.56

          ROUTED TO
+                       008009     12509.   14.33        7026.       2257.       2257.     137.56
+                                                                                                    3041.85       14.33

          HYDROGRAPH AT
+                          48S       968.   12.83         450.        142.        142.       3.66

          HYDROGRAPH AT
+                          48T      1080.   14.83         688.        227.        227.      20.77

          3 COMBINED AT
+                         C009     13993.   14.33        8050.       2627.       2627.     162.00

          ROUTED TO
+                       009010     13965.   14.50        8048.       2611.       2611.     162.00
+                                                                                                    3041.92       14.50

          HYDROGRAPH AT
+                          48U        22.   11.92           9.          3.          3.       1.25

          ROUTED TO
+                         R48U        21.   12.25           9.          3.          3.       1.25
+                                                                                                    3140.03       12.17

          HYDROGRAPH AT
+                          48V       129.   11.83          42.         13.         13.       1.63

          2 COMBINED AT
+                        C48UV       146.   11.83          51.         15.         15.       2.88

          ROUTED TO
+                       RC48UV       145.   12.17          51.         15.         15.       2.88
+                                                                                                    3040.02       12.08

          HYDROGRAPH AT
+                          48W       112.   10.92          29.          9.          9.       1.13

          3 COMBINED AT
+                         C010     13989.   14.50        8070.       2635.       2635.     166.01

          ROUTED TO
+                       010011     13973.   14.75        8069.       2621.       2621.     166.01
+                                                                                                    3050.73       14.75

          HYDROGRAPH AT
+                          48X        64.   10.83          12.          4.          4.        .78

          2 COMBINED AT
+                         C011     13973.   14.75        8069.       2624.       2624.     166.79


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


    -----DSS---ZCLOSE Unit:  71,   File: H1DSS.DSS
               Pointer Utilization:   .25
               Number of Records:      2
               File Size:     13.9  Kbytes
               Percent Inactive:    .0
```