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Flood Damage Analysis within the Readiness Management System

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14. ABSTRACT
The Readiness Management System (RMS) was developed for the Corps of Engineers Emergency Management offices. The system provides near real-time information for operation of Corps reservoir during flood emergencies. The RMS presented utilizes GIS technology for developing input data for hydrologic, hydraulic, and flood damage analysis programs. HEC has adapted flood damage programs for use in the RMS to provide near real-time estimates of flood damage for specific events. Existing programs HEC-DAMCAL and HEC-PBA were adapted for use in the RMS.

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Preface

This report describes application of the Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) programs used in the Omaha District, Corps of Engineers, Readiness Management System demonstration project below Oahe Dam on the Missouri River. The project applied Geographic Information System (GIS) data, processed and stored using the Geographic Resources Analysis Support System (GRASS), to generate much of the input data to the flood damage programs. The raster formatted data included land use (damage categories), reference flood, topographic, and damage reach boundary variables. The HEC-DAMCAL program used the data to develop, and store in HEC-DSS, elevation-damage and elevation-number of structure relationships by category and damage reach and elevation-crop area relationships by damage reach. These relationships were subsequently retrieved by the HEC-PBA program to generate urban and crop flood damage by damage reach, state, and congressional district boundary.

Thomas Johnson, on developmental assignment to HEC from the Omaha District, was the principal engineer on the project. Omaha District staff provided the GIS data. Staff from the Construction Engineering Research Laboratory (CERL), Corps of Engineers, assisted with the GRASS applications. Donna Lydon, Bob Carl, Dick Fong, and Marilyn Hurst from HEC assisted in various aspects of the study. Loshan Law was responsible for the final report preparation. Michael Burnham, Chief of the Planning Analysis Division, HEC, provided general guidance. Darryl Davis was Director of HEC during the conduct of the study.

Flood Damage Analysis within the Readiness Management System

1. Introduction

1.1. Readiness Management System

The Readiness Management System (RMS) was developed for the Corps of Engineers' Emergency Management offices. The system provides near real-time assessments of the impacts associated with rainfall-runoff, tributary inflows and the operation of Corps reservoirs during emergency situations. The RMS utilizes Geographic Information System (GIS) technology combined with hydrologic, hydraulic and flood damage programs. The system enables users to estimate effects of reservoir operation and tributary inflows on flow conditions for specific stream reaches given various operation scenarios.

The need for the RMS became evident because of an inability to assess downstream impacts during previous dam safety exercises performed by the Omaha District. The damages and/or benefits associated with various operation scenarios were estimated from generalized damage curves. At that time, there was no means of quickly modeling reservoir releases to estimate potential damages. As a result, the potential damages considered as part of the decision making process were crude and lacked adequate support.

Although decisions on reservoir operation are not made by a single entity, the advantages of having a single system as a basis for decision making are numerous. These advantages include:

- A common data base utilized by those involved in the decision making process provides more consistent results.
- More realistic estimates of impacts associated with various reservoir releases by modeling releases using a realistic flood damage model.
- Detailed graphics capabilities within the GIS allow decision makers to quickly visualize flood boundaries and areas impacted.
- Higher degree of confidence in decisions that are made because of increased reliability from using analytical techniques.
- Better documentation of the decision making process because all of the information used in the analysis is stored and can be retrieved at any time.

The primary advantage of having an RMS is the fact that all offices, both Federal and State, are using the same system as a basis for their actions. Once a system is accepted as the standard, it serves as a common basis for making decisions during an actual

emergency. The utilization of a standardized system also provides a means for checks and balances because everyone using it should be getting approximately the same results.

1.2. Flood Damage Analysis

The Hydrologic Engineering Center (HEC) adapted flood damage programs for use in the RMS primarily to provide near real-time estimates of flood damages for specific events. Some of the data needed to compute flood damages was developed using a Geographical Information System (GIS). The Geographic Resources Analysis Support System (GRASS), developed by the U.S. Army Corps of Engineers, Construction Engineering Research Laboratory (CERL), was chosen as the GIS software to be used in the RMS.

HEC used existing flood damage programs with some minor modifications. The Damage Reach Stage-Damage Calculation (HEC-DAMCAL) and Project Benefit Accomplishment (HEC-PBA) programs were adapted for use in the RMS. The Data Storage System (HEC-DSS) is also used in the RMS as a means of storing, manipulating and transferring information. The four major software components used in flood damage calculations are:

(1) The GRASS GIS package
(2) The HEC-DAMCAL program
(3) The HEC-DSS package
(4) The HEC-PBA program

Figure 1 is a schematic representation of the how the flood damage analysis components interact within the RMS. The following paragraphs describe the operation of each component.

(1) Geographic Resources Analysis Support System, GRASS was developed by the U.S. Army Corps of Engineers, Construction Engineering Research Laboratory (CERL). GRASS was chosen as the GIS software for the RMS and is useful for analyzing and displaying spatial data related to flood damage analysis. The program can be used to generate a data base file which contains information for each grid cell. The attributes listed in the data base file are necessary for calculating flood damages using the HEC-DAMCAL program.

(2) Damage Reach Stage-Damage Calculation, HEC-DAMCAL was developed in the mid 1970's as part of a family of computer programs designed to provide a systematic technique for managing and analyzing spatial data for use in water resources management investigations. The program accesses data stored in a grid cell data base. A more detailed description of how the HEC-DAMCAL program operates is contained in the DAMCAL users manual and is available from the Hydrologic Engineering Center (U.S. Army Corps of Engineers, February 1979).

HEC-DAMCAL has the ability to evaluate damages for existing or future land use conditions. The program also has the ability to evaluate damages associated with:

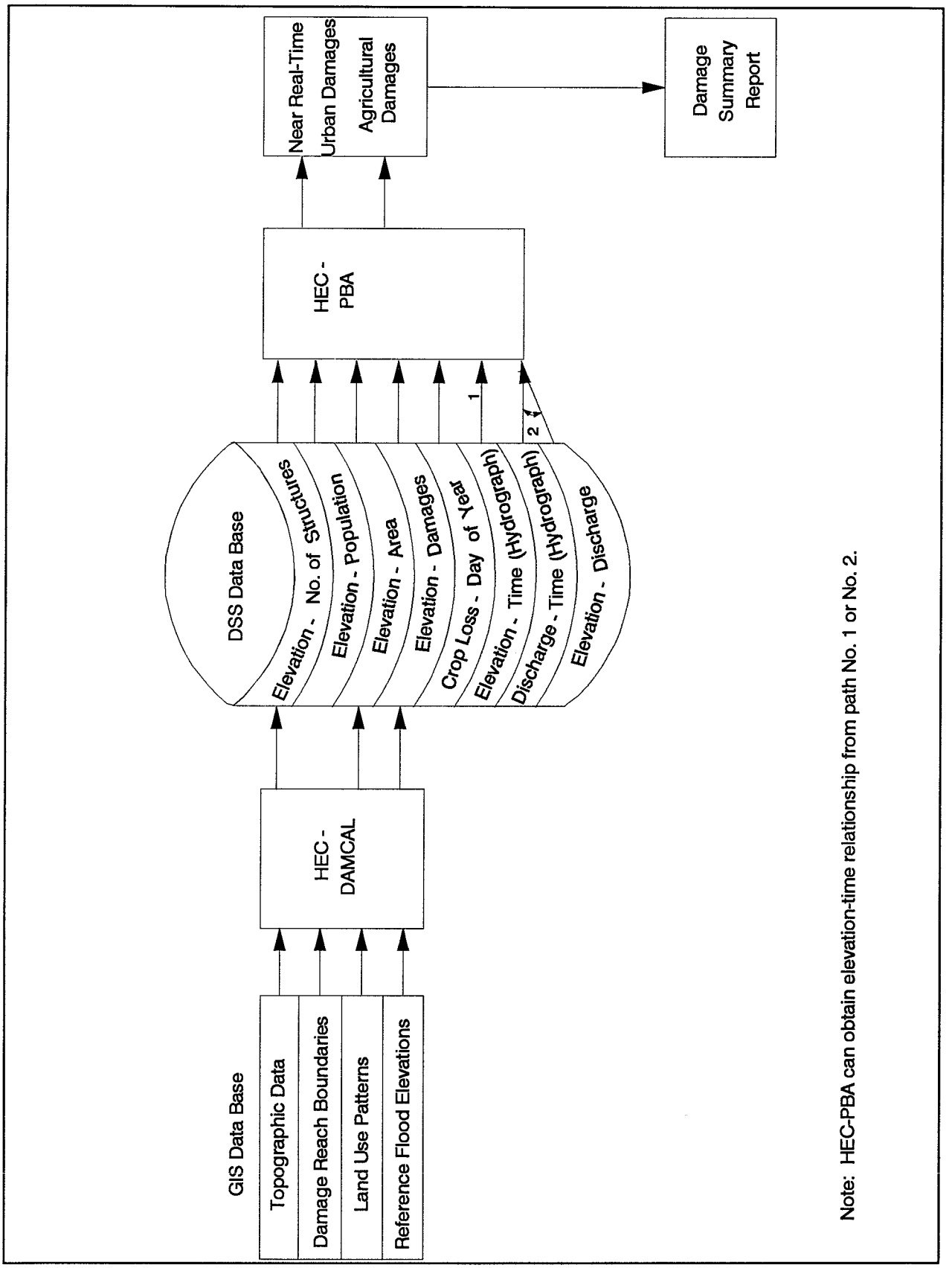


FIGURE 1 Flood Damage Package

- nonstructural alternatives such as flood plain management policies,
- flood proofing alternatives (raising structures or adding flood resistant materials to structures),
- permanent evacuation of structures in the floodplain, and
- any combination of the preceding.

Damage Reaches. HEC-DAMCAL operates on the assumption that all water surface profiles are parallel throughout a damage reach which is one of the basis for the reach delineation. Therefore, the user must evaluate a range of water surface profiles for a study area and define damage reaches that satisfy that criteria as nearly as possible while maintaining the economic detail desired for analysis. After the damage reach boundaries have been chosen, they are encoded into the grid cell data base by assigning each grid cell a damage reach identification number.

The program aggregates elevation-damage relationships from each grid cell within a damage reach to an index location. The index location can be anywhere in the reach. Total damages for a reach are reported based on elevations at the index location.

Reference Flood. In order to account for slope in the water surface profile of a reach, HEC-DAMCAL defines the relationship between flooding at each grid cell and flooding at the index location. This is done by use of the reference flood. The program assumes that all floods are spatially distributed the same as the reference flood. A reference flood is best defined by a hypothetical frequency flood event in the mid range of damage potential. Reference flood water surface elevations must also be encoded into the grid cell data base by assigning a water surface elevation for each cell. If a flood larger than the reference flood is to be analyzed, the reference flood boundaries must be extended to include the entire area of interest. Therefore, some grid cells may have a reference flood elevation which is actually lower than the ground elevation.

Computations. The user must develop an input file for HEC-DAMCAL which defines the format of the grid cell data base, composite damage functions for each land use category, and flood elevations at the index location for each damage reach. Composite damage functions define the potential structural and nonstructural damages for a range of flood depths for each land use category. Flood elevations at the index locations can be specified for single flood events such as the 50-, 10-, 2-, or 1-percent chance exceedance frequency events.

The program assigns a stage-damage relationship to a grid cell based on the land use (damage category) specified and the composite damage function for that particular land use. The stage is converted to elevation the grid cell by setting the zero stage equal to the first floor elevation of the structure. HEC-DAMCAL then aggregates the elevation-damage relationship of each cell by damage category to the index location by adjusting the elevation scale based on the difference in the reference flood elevations. The damages are reported separately for each land use. Land use categories can also be aggregated into a single elevation-damage relationship for the damage reach. If single flood events are specified, the program calculates damages for those events based on the water surface elevations at the index location.

If the user wants to determine what effect flood proofing would have on reducing damages within a reach, they need only specify the land use categories to be flood proofed

and the elevations at the index location below which no flood damage would occur. Similarly, the effects of removing contents (evacuation) can be estimated by specifying the land use categories to be evacuated.

HEC-DAMCAL also calculates elevation-area flooded relationships using the same techniques described previously. Total area flooded within a reach is likewise based on the water surface elevation for a given flood event at the index location. It should be noted that when a user specifies a damage category (land use) to be flood proofed, they are flood proofing all grid cells with that land use classification. Consequently, the area flooded should be determined for non flood proofing conditions.

Another item in which the user may be interested in is the number of structures in each land use category flooded by a single event. HEC-DAMCAL can calculate the elevation-structures flooded relationship by simply defining the average density (structures/developed area) and the percent of the total area that is developed, for each land use category. The number of structures flooded is also based on the flood elevation at the index location.

(3) Project Benefit Accomplishment, HEC-PBA was developed to determine damages prevented (benefits) by existing Corps projects. The program is currently undergoing modifications and has not yet been officially released. A detailed description of the program operation will be contained in the HEC-PBA users manual and will be available from the Hydrologic Engineering Center in the near future.

The HEC-PBA program enables the user to calculate damages to both urban and agricultural areas on a near real-time basis. The program accounts for damages which may have occurred from a previous flood event by using a "look-back" routine. By accounting for any previous damages and time to rebuild in an urban area, the program determines a more realistic value for damages from a single flood event. For agricultural areas the program accounts for previous flood events based on time required for the land to dry out and whether there is sufficient time to replant the crop. If the farmer has experienced a previous flood and replanted, the program also accounts for any reductions in the expected yield. The look-back time period can be several years or a few months, depending on the users preference.

Damage Reaches. HEC-PBA calculates damages based on damage reach definitions. The program does not perform calculations on individual grid cells. Damage reaches are often defined for urban areas and agricultural areas separately. HEC-PBA uses a special crop damage routine which analyzes agricultural damages differently than urban damages.

The damage reach definitions must also be consistent with jurisdictional boundaries. HEC-PBA is able to report damages based on several different boundary definitions such as community, State, County, and Congressional districts. The program aggregates damages for all of the reaches within a specified jurisdictional area. Therefore, it is important that damage reaches do not overlap a boundary line.

Crop Loss Functions. A significant advantage of the HEC-PBA program is its sophisticated crop damage analysis capabilities. The program accounts for the type of crop, planting season, growing season, time to harvest and average yield per acre. Crop damages are calculated based on the time of year that a flood occurs and duration of flooding. The

damage is based on a reduction in the expected yield caused by flooding. Dollar values are then assigned to the lost yield based on expected market values for the crop. Total damages also include losses associated with investments in crop production at the time of the flood.

The program uses crop loss functions to define the relationship between time of the year and potential impacts to crops should flooding occur. Each type of crop has a unique crop loss function. The relationship is based on the percentage of a crop that would be lost due to flooding for both the timing and duration aspects. The program does not account for the depth of flooding and its effects on different crops.

Computations. The user must develop an input file for HEC-PBA which defines the jurisdictional boundaries, damage reaches, crop characteristics, reconstruction time, and period of analysis. Crop loss functions for each crop must also be developed. HEC-PBA obtains the elevation-damage and elevation-area relationships from HEC-DAMCAL. The program is not intended to interface directly with the GIS data base.

HEC-PBA calculates damages using hydrograph data which specifies the flood elevation and time of year the flood occurs. If a hydrograph contains several months of data and more than one flood event exceeds the zero damage elevation, the user must specify the event for which damages are calculated by defining the starting and ending dates of the analysis. A look-back date can be specified prior to the starting date to account for previous events. This establishes the potential damage status at the beginning of the analysis.

Urban damage calculations are based on elevation-damage relationships and hydrograph information. Each damage category is analyzed separately within a damage reach. Agricultural crop damage calculation are based on elevation-area relationships, hydrograph information, and crop loss functions. Each crop type is analyzed separately within a damage reach.

The HEC-PBA program also calculates the number of structures flooded by a single event for each land use category. Closely related to the number of structures flooded is the number of people affected. However, the population affected depends a great deal on the time of day and the day of the week on which the flood occurs. HEC-PBA does not account for these population variations. The program does accept input of elevation-population relationships which are intended to represent a measure of people impacted by a flood.

(4) Data Storage System, HEC-DSS is used for the flood damage analysis within the RMS to transfer information from HEC-DAMCAL to HEC-PBA. The HEC-DSS utility programs used in conjunction with the flood damage programs are: DSSUTL, DSPLAY, REPGEN and DSSPD.

DSSUTL. The DSSUTL program provides a means of performing utility functions on data stored in HEC-DSS. These functions include tabulating, editing, copying, renaming, and deleting data. The program also offers the capability of formatting and copying data into an ASCII sequential file for transfer to another computer, or for use by a program without HEC-DSS capabilities.

DSPLAY. The DSPLAY program enables a graphical display of data contained in an HEC-DSS file. Time-series and paired data can both be displayed. Up to seven curves and six different y-scales may be displayed at one time. The program is useful for visualizing the data generated by HEC-DAMCAL to verify that the results are reasonable. It is also useful to view the crop loss functions to be used by HEC-PBA and verify that the curves are consistent and meaningful.

REPGEN. The report generator, REPGEN, is used to simplify and automate the production of routine reports. REPGEN provides for the retrieval and presentation of data from an HEC-DSS file or text file on a pre-specified, user defined, fixed format. The format is the equivalent of a blank form onto which variable information is entered in designated locations.

DSSPD. The DSSPD program provides a means of entering paired function data into an HEC-DSS file. The crop loss functions used in HEC-PBA are paired data functions that relate percent crop loss to days of the year. They can be entered into HEC-DSS using the DSSPD program.

2. System Installation

2.1. Directory and File Structure

The flood damage analysis package for the Omaha District RMS was set up with four directories. Each directory contains specific files. It is important that these directories be created prior to installation. The required directories are:

(1) HECEXE
(2) RMS
(3) DAMCAL
(4) PBA

(1) The **HECEXE** directory contains all of the executable versions of HEC programs. The HEC programs needed for flood damage computations within the RMS are;

- COED.EXE - Corps editor used for file editing.
- DAMCAL.EXE - Flood damage calculation model for GIS data.
- DRIVERS.EXE - File to manage display drivers.
- DSPLAY.EXE - DSS program for graphical displays.
- DSSPD.EXE - DSS program for entering paired data.
- DSSTS.EXE - DSS program for entering time series data.
- DSSUTL.EXE - DSS program for editing DSS records.

- MATHPK.EXE - Program for manipulating DSS records.

- PREPBA.EXE - Preprocessor program for PBA

- PBA.EXE - Flood damage and benefit calculations.

(2) The **RMS** directory contains all of the screen, macro and batch files necessary for operation of the RMS menu screens. All files with no extension are batch files that are substituted into one of the TEMP.BAT files when needed. Files with a BAT extension are normal batch files. Files with a MAC extension are macro files used by the PREADR program to evoke different responses when choices are made within the menu screens. Files with an SCN extension are screen files used by PREADR to display the menu screens.

(3) The **DAMCAL** directory contains the input and output files necessary for operation of the HEC-DAMCAL program. This directory also contains the HEC-DSS file and the macro and batch files used to reformat the DSS records. *It is essential that the names of these files always remain the same in order for the menu selections to operate properly.* The following is a list of the files in the DAMCAL directory:

- MISSOURI.DSS - HEC-DSS file which contains all of the DSS records output from HEC-DAMCAL and records to be used as input to HEC-PBA.
- MOAGRI.DC - Input file used by HEC-DAMCAL to compute damages in agricultural areas.
- MOAGRI.DCO - Output file from HEC-DAMCAL for agricultural areas.
- MOURBAN.DC - Input file used by HEC-DAMCAL to compute damages in urban areas.
- MOURBAN.DCO - Output file from HEC-DAMCAL for urban areas.

* - AGRISTAT.GDB - Grid cell data file containing attribute information for grid cells in agricultural areas.

* - URBSTAT.GDB - Grid cell database file containing attribute information for grid cells in urban areas.

* **NOTE** - The files with a GDB extension are generated on the workstation using the GIS. The RMS flood damage analysis package was developed to allow the GDB files to remain on the workstation and be accessed automatically through a local area network. If a network is not available, it will be necessary for these files to be copied and installed on the PC.

(3) The **PBA** directory contains the input and output files necessary for operation of the HEC-PBA Preprocessor and Analysis programs. *It is essential that the names of these files remain the same in order for the menu selections to operate properly.* The following is a list of files in the PBA directory;

- PREPBA.IN - Input file for the HEC-PBA Preprocessor program.
- PREPBA.OUT - Output file from the HEC-PBA Preprocessor program.
- PBA.IN - Input file for the HEC-PBA Analysis program.
- PBA.OUT - Output from the HEC-PBA Analysis program.

2.2. Installation Procedure

The installation procedure is generally similar to installation of other HEC products. As previously mentioned, the appropriate directories must be created prior to installation and files placed directly in those directories. The installation disks contains the same directories and files as will be needed on the PC. It is important that all files are copied from each directory on the disk to directories of the same name on the PC. The PKUNZIP program is used to decompress those files with a ZIP extension.

It will also be necessary to load GSS device drivers for producing graphical displays with the DSPLAY program. The installation instructions and diskettes are provided separately. The installation of drivers is menu driven and user friendly.

This product has minimum hardware requirements because of the amount of computing required. It may also be necessary to modify the AUTOEXEC.BAT and CONFIG.SYS files on the PC prior to beginning operation. The following sections describe the requirement and necessary modifications.

(1) Hardware Requirements. This product was developed using a 486/33C personal computer with 8 MB's of extended memory. The HEC-DAMCAL, MATHPK, and HEC-PBA programs all require extended memory. The programs will not operate properly if the EMM 386 memory manager is being used.

It is recommended that this product be installed on nothing less than a 386/25C computer with a math coprocessor and at least 3 MB's of extended memory. The DSPLAY program requires a minimum of 450K of resident memory, with the device drivers loaded, to operate properly. In most instances it will be necessary to have all network software unloaded while running DSPLAY. This product was designed to have the network software running only during operation of the HEC-DAMCAL program.

(2) AUTOEXEC.BAT Modifications. The AUTOEXEC.BAT file must contain the following statements:

PATH C:\HECEXE - The HECEXE directory must be listed in the path statement.

SET CGIPATH=C:\GSS - Statement to define the directory in which the device drivers are located.

(3) CONFIG.SYS Modifications. The CONFIG.SYS file must contain the following statements:

DEVICE=C:\DOS\ANSI.SYS - To allow display of the menu screens.

LASTDRIVE=Z - Needed if a fictitious drive is created to allow access to data on the workstation.

3. Flood Damage Computations

3.1. Overview of Computational Procedure

Calculation of the potential flood damage within the Readiness Management System (RMS) framework relies on the Geographic Information System (GIS) to provide input data for the HEC-DAMCAL program. HEC-DAMCAL generates relationships between water surface elevations and the damages, number of structures, and total area that could be flooded. These relationships are then applied to a particular flood event using the HEC-PBA program. The information is transferred to HEC-PBA from HEC-DAMCAL using HEC-DSS. HEC-DSS is also used to graphically view program inputs and outputs. Selected input for HEC-PBA is directly from HEC-DSS.

The Appendices contain examples of flood damage computations using the procedure described above. Examples of the data used during development of the flood damage analysis package is shown in Appendix B, for the HEC-DAMCAL program, and Appendix C, for the HEC-PBA program. The Appendices also contain example output results.

3.2. Input Requirements

There are three mechanisms for defining input for flood damage computations. Data from the GIS is used as input to HEC-DAMCAL. The HEC-DAMCAL and HEC-PBA programs both require instructions from an input file.

(1) GIS Data. The flood damage computations are determined based on data generated by the (GIS). The Geographic Resources Analysis Support System (GRASS), Version 4.0, was the GIS software used in this exercise.

The information, necessary for flood damage analysis, developed using the GIS are:

- Damage Reach Designations,
- Landuse Classification,
- Ground Elevations; and,
- Reference Flood Elevations.

GRASS uses the Relational Information Manager (RIM) to manage its data base. The HEC-DAMCAL program requires a data file in ASCII form which specifies the attributes listed above for each grid cell to be analyzed. After all of the necessary attribute maps have been created, GRASS is able to generate the data file using RIM.

Damage Reach Designations. The damage reaches were defined based on the largest possible flood boundary, corporate limits, reservation boundaries and county lines. The flood boundary that would result from failure of Oahe Dam was chosen to define the maximum possible flooded area. Information from the U.S. Census Bureau's TIGER files was used to define the city, county and reservation boundaries.

The damage reach boundaries were digitized using the v.digit program in GRASS. The flood boundary for dam failure was used as the base map. TIGER data was used to overlay the other boundaries. A new vector file was created which divided the flooded area into polygons which represent the damage reaches. A raster map was then generated using GRASS to label all of the grid cells within a polygon with the appropriate damage reach number. The area between Oahe Dam and Big Bend Dam includes 15 damage reaches, as defined in Table 1.

TABLE 1
Damage Reach Definitions

Reach	Reach Definition
1	Hughes County, upstream of Pierre.
2	Stanley County, upstream of Fort Pierre.
3	City of Pierre.
4	City of Fort Pierre.
5	Stanley County, Bad River, upstream of Fort Pierre.
6	Stanley County, downstream of Fort Pierre.
7	Hughes County, downstream of Pierre to Reservation.
8	Stanley County, downstream of Reach 6 to Reservation.
9	Lower Brule Reservation, Stanley County.
10	Crow Creek Reservation, Hughes County.
11	Lower Brule Reservation, Lyman County.
12	Crow Creek Reservation, Hyde County.
13	Crow Creek Reservation, Buffalo County.
14	City of Lower Brule.
15	City of Fort Thompson.

Landuse Classification. The landuse for this exercise was defined for urban areas and rural areas separately using different methods. It is important to realize that landuse classification can be done many different ways. The landuse classifications used during the development of the flood damage programs should be considered approximate and used for test purposes only. It is recommended that the landuse be reclassified by a qualified analysts to provide more meaningful flood damage computations.

Landuse for the urban areas, Pierre and Fort Pierre, was classified based on aerial photographs at a scale of 1" = 1000'. The photos were converted into GIS format at the Omaha District office. The v.digit program within GRASS was used to divide the urban area into polygons of similar landuse. The flood boundary for dam failure was used as the base map to define the outer edge. The aerial photos were used as a backdrop for the area. A new vector map was created which divided the urban areas into 12 different landuse types. A raster map was then generated from the vector map to label all of the grid cells within each polygon with the appropriate landuse category. The landuse categories for the urban areas are shown in Table 2.

TABLE 2
Urban Landuse Categories

Category	Category Type
1	Residential
2	Mobile Homes
3	Schools
4	Offices
5	Warehouses
6	Department Stores
7	Grocery Stores
8	Motels
9	Industrial
10	Recreation Areas / Golf Courses
11	Undeveloped Open Area
12	Water Bodies

The most difficult classification within the urban areas is for industrial and commercial properties. Categories 5, 6, 7 & 8 were chosen as being representative of typical commercial enterprises. It is important that landuse, and especially industrial and commercial areas, be verified by a qualified economist.

Landuse classification for rural areas was based on the National Oceanic and Atmospheric Administration (NOAA) Advanced Very High Resolution Radiometer (AVHRR) data for land cover characterization in the conterminous United States. The AVHRR data used was originally developed at a spatial resolution of 1 kilometer. Although the data is somewhat crude, it does distinguish between cropland and natural vegetation. The data are also collected frequently which also adds to its accuracy.

The original AVHRR data had 150 land cover categories. The data was reclassified using GRASS for the area within the flood boundary between Oahe and Big Bend Dams. It is necessary to distinguish between cropland and undeveloped land for flood damage computations. Therefore, the land cover was reclassified into 4 categories, as listed in Table 3.

TABLE 3
Rural Landuse Categories

Category	Category Type
1	Cropland
2	Grassland
3	Woodland
4	Water

Ground Elevations. The topographic data, which defines the ground elevations within the study area, was developed at the Omaha District office. The data was not modified prior to being used in the flood damage analysis. It was evident that the data does contain some errors. It is recommended that the topographic data be verified in regard to its relationship with the landuse.

Reference Flood Elevations. The reference flood information was developed using the GIS and HEC-2 output. There are several different floods that could be used to represent the reference flood. The flood elevations associated with a release of 200,000 cfs from Lake Oahe and a pool level of 1423 ft msl at Lake Sharpe was chosen as the reference flood for testing purposes.

A vector file was created using the v.digit program in GRASS. The flood boundary for dam failure was used as the base map and a vector map showing the HEC-2 cross section locations was used as an overlay. The cross section locations were digitized onto the base map along with some intermediate sections. The sections were labeled with the water surface elevations calculated by HEC-2. A raster map was generated from the vector map which labeled those grid cells that fell along the labeled lines. A surface contour algorithm was then used to assign values to the grid cells between cross sections.

The result is a data file in ASCII form which defines the damage reach, landuse classification, ground elevation, and reference flood elevation for each grid cell in the study area. Separate data files are created for urban and rural areas because they are analyzed separately. The data files generated by GRASS are in free format and cannot be used directly by HEC-DAMCAL. A shell script was written which converts the data file into a fixed format for use in HEC-DAMCAL.

(2) HEC-DAMCAL Input. The HEC-DAMCAL program requires input from two sources: the GIS and an input file. The input file contains the following types of information:

- Job Control Information,
- Grid Cell Data File Definitions,
- Depth-damage Functions,
- Structure and Content Values,
- Landuse Densities,
- Damage Reach Information; and,
- Single Event Flood Elevations (optional).

Job control information specifies the number of reaches to be analyzed, number of landuse conditions and output specifications. Definitions for the data file includes the size of the file (rows and columns), number of grid cells, physical size of the grid cells (acres) and how the data file is formatted.

Depth-damage functions define the potential damage to structures and contents as a percentage of their value for a range of flood depths. Structure values are specified in terms of an average for the particular land use type. Content values can be specified in dollars or as a percentage of the structure value. Landuse density is specified based on the average number of structures per grid cell for a particular landuse type.

Damage reach information includes a reach label, elevation of the reference flood at the index location and the range of elevation values to be analyzed. Damages for single flood events can be analyzed by specifying the flood elevations at the index location for each event.

A more detailed description of the format and definitions of input records for HEC-DAMCAL is contained in the DAMCAL User's Manual, dated February 1979, and is available from the Hydrologic Engineering Center, Davis, California.

(3) HEC-PBA Input. The HEC-PBA program is separated into two different programs known as the Preprocessor and the Analysis programs. Each program requires different input data. The advantage of having the program divided is that normally the Preprocessor only needs to be run once, unless the landuse crop functions, or other conditions change. If there are no changes, the Analysis program can analyze several different flood events.

The Preprocessor program uses the following data stored in HEC-DSS:

- Elevation-Damage Relationships,
- Elevation-Area Relationships,
- Elevation-Structures Relationships,
- Crop Loss Functions; and,
- Flood Hydrographs.

The elevation-damage, area and structures relationships are output from HEC-DAMCAL. The crop loss functions define the potential crop losses for each crop type throughout the entire year. They are put into HEC-DSS format using DSSPD, which was developed for entering paired data. Flood hydrographs are usually input to HEC-DSS by a rainfall-runoff model such as HEC-1.

The Preprocessor program requires the following information in its input file:

- Job Control Information,
- Boundary Definitions,
- Crop Production and Market Statistics,
- Damage Reach Information; and,
- Project Information (optional).

Job control information specifies the type of output desired. Boundary definitions are used to aggregate damages within specified political boundaries such as communities, Counties, Corps Districts, Congressional Districts and Flood Control Districts. These boundaries do not necessarily correspond to damage reach boundaries. There may be several damage reaches within a single political boundary.

Crop production and market statistics specify the planting dates, average annual yield, average market price and harvest costs for each crop type. The spatial distribution of crops must also be specified. The distribution is usually specified as a percentage of the total cropland being planted in a particular crop within each damage reach; however, the actual area planted in a particular crop can also be specified.

Damage reach information specifies a label for the reach, the political boundaries within the reach and the appropriate hydrographs for the reach. The flood stage must also be specified as the elevation at which damages begin within each reach. It is important that the damage reach designations be exactly the same as those defined in the HEC-DAMCAL program.

Project information for levees and/or reservoirs may be specified if the user is interested in analyzing both with- and without-project conditions. The program allocates benefits to one or several projects based on a reduction in damages and a weighting scheme defined by the user.

The Analysis program requires little input. The following is a list of the necessary input:

- Job Specifications,
- Period of Analysis,
- Project Benefit Allocations for Reservoirs (optional); and,
- Summary Report Table Selection.

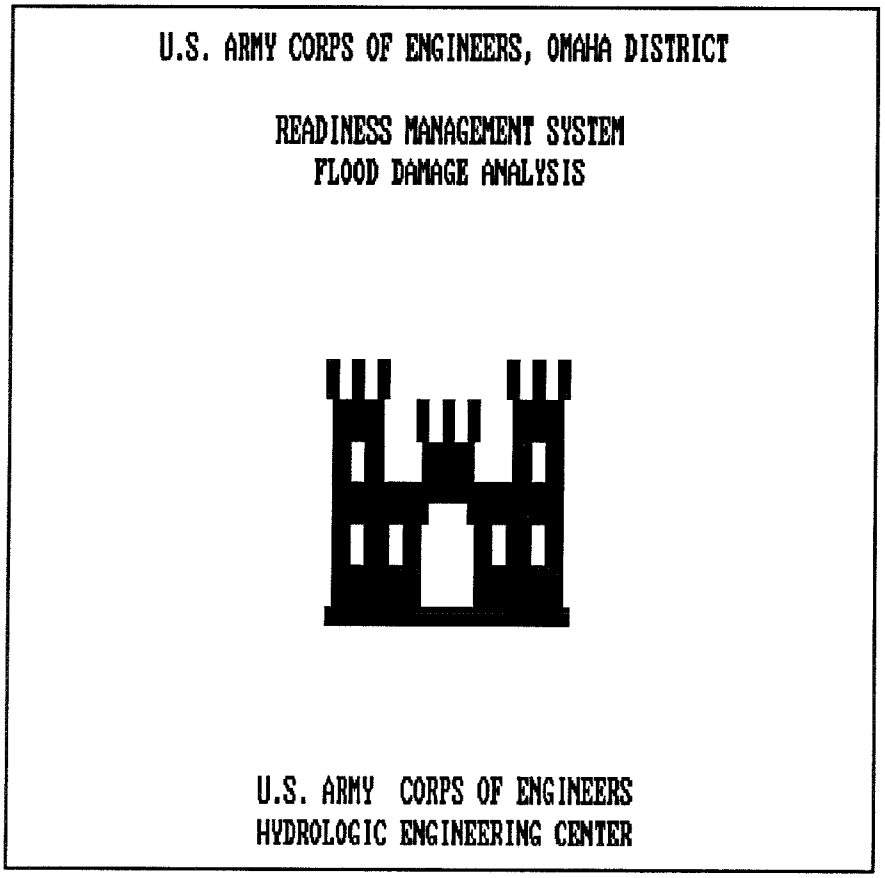
Job specifications define output options and allow for adjustment of crop market values using price index factors. The period of analysis is specified by beginning date, ending date and look-back date. Project benefit allocation for reservoir is specified as a percentage of the total benefits for each project. Summary report table selection can be based on any of the political boundaries and/or damage reach boundaries.

A more detailed description of the format and input records for both the Preprocessor and the Analysis programs will be contained in the HEC-PBA User's Manual. The manual is expected to be published in the Fall of 1992. It will be available from the Hydrologic Engineering Center, Davis, California.

3.3. Program Operation

This section describes how the flood damage programs are operated. The process has been automated by using screens, macros and batch files to create a menu driven interface which makes it easy to use. The screens are shown in this section along with brief definitions of each command.

Screen 1 - Banner

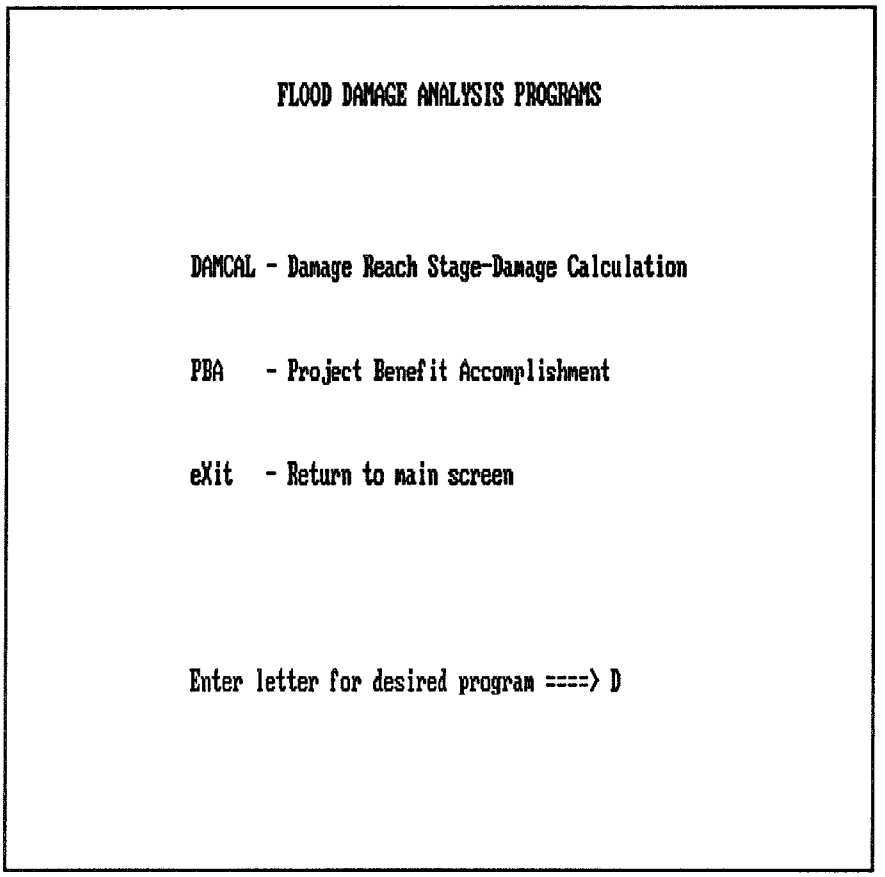


The following commands can be used with this screen:

<ENTER> - Continue to the next screen.

" X " - Exit the flood damage analysis.

Screen 2 - Flood Damage Program Choice



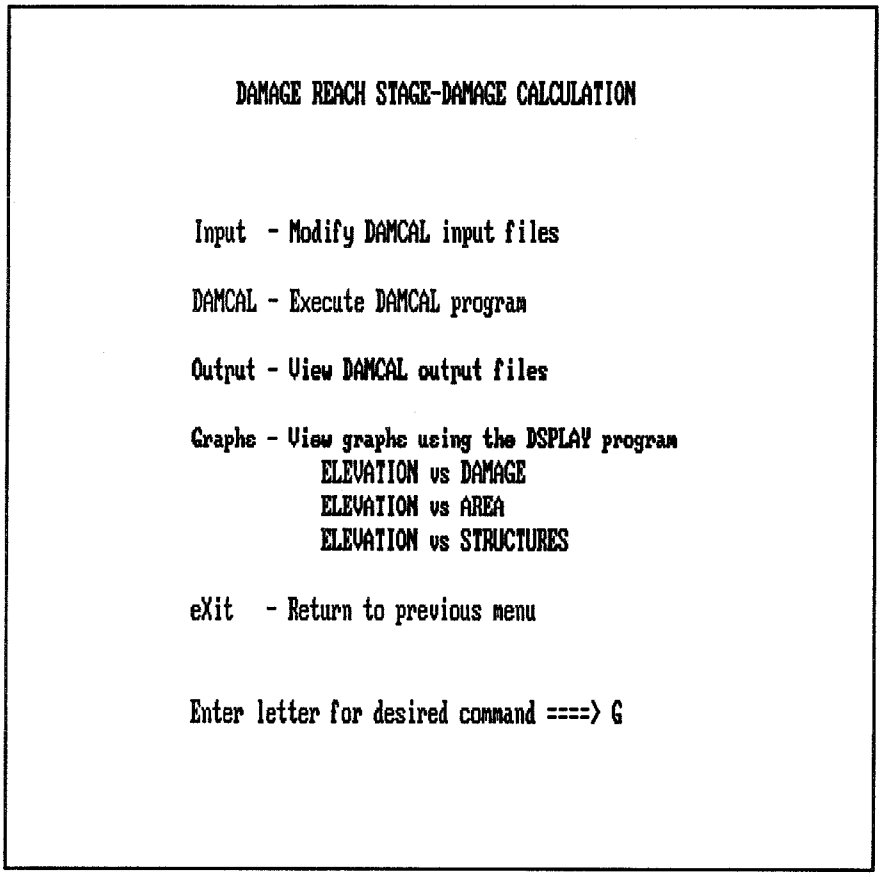
The following commands can be used with this screen:

" D " - Choose the HEC-DAMCAL program options. From there the user is able to perform the operations necessary for executing the HEC-DAMCAL program.

" P " - Choose the HEC-PBA program options. From there the user is able to perform the operations necessary for executing the HEC-PBA program.

" X " - Exit to the Banner screen.

Screen 3 - Selections for executing the HEC-DAMCAL Program



The following commands can be used with this screen:

" I " - Allows the user to edit the input files for HEC-DAMCAL using the COED editor. The user chooses the input for urban areas or agricultural areas.

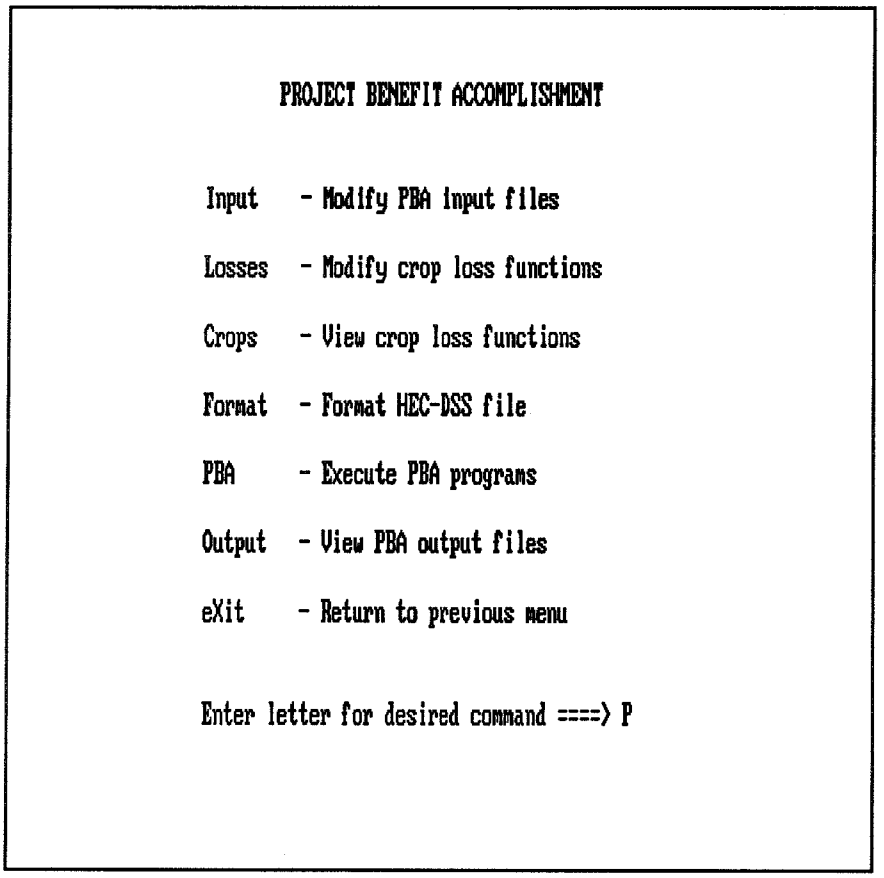
" D " - Executes the HEC-DAMCAL program. The user chooses to compute urban damages or agricultural damages.

" O " - Allows the user to view the HEC-DAMCAL output files using the LIST program. The user chooses to view output for urban areas or agricultural areas.

" G " - Executes the DSPLAY program to allow the elevation-damage, area or structures relationships to be viewed graphically. The user must specify the river name, reach number, landuse type (URBAN or AGRICULTURAL) and landuse condition (EXISTING, FUTURE or MODIFIED). All entries must be UPPERCASE.

" X " - Exits to the Program Selection screen.

Screen 4 - Selections for executing the HEC-PBA Program



The following commands can be used with this screen:

" I " - Allows the user to edit the HEC-PBA input files using the COED editor. The user must specify input for the Preprocessor program or input for the Analysis program.

" L " - Allows the user to edit the crop loss functions using the DSSUTL program. New crop loss functions must be entered externally using the DSSPD program.

" C " - Executes the DSPLAY program to allow crop loss functions to be viewed graphically. The user must specify the crop type. All entries must be UPPERCASE.

" F " - Reformats the HEC-DSS file using HEC-MATHPK.

" P " - Execute the HEC-PBA program. The user must choose the Preprocessor or Analysis program.

" O " - Allows the user to view the HEC-PBA output files using the LIST program.

" X " - Exits to the Program Selection screen.

3.4. Output Capabilities

There are two types of output from the flood damage computations. They are Damage Summary Reports and Graphical Displays. HEC-DAMCAL generates output in HEC-DSS format which can be viewed graphically. HEC-PBA provides only Damage Summary Reports.

(1) Damage Summary Reports. Both the HEC-DAMCAL and HEC-PBA programs provide summary reports. The reports can be viewed on the screen or printed out for documentation purposes.

The output from HEC-DAMCAL lists the stage-damage, elevation-damage, elevation-structures and elevation-area relationships in tabular form for all of the landuse categories and for each damage reach. The program also lists total the damage, structures flooded, and area flooded for single flood events if that option is used. The HEC-DAMCAL output tends to be lengthy because it restates many of the input definitions.

The output from HEC-PBA comes in two forms, the Preprocessor output and the Analysis output. Normally, once the Preprocessor output is verified, there is no need to generate another report unless some function or conditions change. The most meaningful output, in terms of summary reports, comes from the Analysis program. It lists the damage values for each damage reach, each damage categories (land-use) category, and each boundary specified. The Analysis output lists urban and agricultural damages separately. The program also defines damages throughout the range of elevations (zones) defined by the hydrographs for both with- and without-project conditions.

(2) Graphical Displays. Output from the HEC-DAMCAL program is best interpreted by viewing it graphically. The elevation-damage, area and structures flooded relationships can all be viewed using the DSPLAY program. Graphical displays are useful for detecting anomalies in the results. The DSPLAY program is limited to 7 curves per plot, and in some cases all of the damage categories (land use) categories cannot be viewed.

It is useful to view the crop loss functions used by HEC-PBA graphically. If these functions do not appear to be similar in form to the typical crop loss function, the HEC-PBA program will not provide meaningful results. The flood hydrographs can also be viewed to verify beginning and ending dates to be used in the analysis.

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

The following documents were used as references during the writing of this report. Most of the material in these documents was summarized in various ways with few if any word for word quotations. Therefore, footnotes were not used in the text to reference specific documents.

1. GRASS, Geographic Resources Analysis Support System, Version 4.0, User's Reference Manual, July 1991, U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, Champaign, Illinois.

2. DAMCAL, Damage Reach Stage-Damage Calculation, User's Manual, February 1979, U.S. Army Corps of Engineers, Hydrologic Engineering Center, Davis, California.

3. HECDSS, User's Guide and Utility Program Manuals, December 1990, U.S. Army Corps of Engineers, Hydrologic Engineering Center, Davis, California.

4. COED, Corps of Engineers Editor, User's Manual, February 1987, U.S. Army Corps of Engineers, Hydrologic Engineering Center, Davis, California.

5. PREAD, Functions, Macros, Menus and Screens, User Information, September 1990, U.S. Army Corps of Engineers, Hydrologic Engineering Center, Davis, California.

6. PBA, Project Benefit Accomplishment Package, Draft User's Manual, October 1991, U.S. Army Corps of Engineers, Hydrologic Engineering Center, Davis, California.

7. PE&RS, Photogrammetric Engineering & Remote Sensing, Development of a Land-Cover Characteristics Database for the Conterminous U.S., November 1991, American Society for Photogrammetry and Remote Sensing.

8. South Dakota, Agricultural Statistics, Livestock • Crops • Prices, 1991-1992, South Dakota Agricultural Statistics Service, Sioux Falls, South Dakota.

APPENDIX B

STUDY EXAMPLE

APPENDIX B

STUDY EXAMPLE

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APPENDIX B

STUDY EXAMPLE

B-1. Study Description

The study area includes all of the property from Oahe Dam to Big Bend Dam in South Dakota, that lies within the flood boundary that would result from failure of Oahe Dam. The sample data was developed at the Hydrologic Engineering Center (HEC) with the exception of the flood boundary, the original AVHRR data and the Digital Elevation Model (DEM), which were developed at the Omaha District office.

The flood event analyzed was based on a release of 200,000 cfs from Lake Oahe with a pool elevation of 1423 ft msl at Lake Sharpe. All of the damage reaches, as defined in Table 1, were analyzed with the exception of reaches 5, 14 and 15. These reaches were excluded because of a lack of data.

B-2. Input Data

(1) Economic data for Urban Areas

Economic input data generated using the GIS is shown in Appendix B Section 1. The original data file generated by GRASS is in a free format. A shell script titled "form" is used to reformat the data into a fixed format as shown in the Appendix. The user simply types:

form [Input filename] [Output filename] to reformat the data base file.

Structure and content values were estimated using little information. As stated in section III, it is essential that the landuse classification, including all of the necessary economic data, be verified by a qualified economist to ensure more accurate results. The data developed at HEC is intended to be used for test purposes only. The composite damage functions, which define the depth-damage relationships, for the urban land use categories described in Table 2 were obtained from the Economics Branch of Planning Division at the Omaha District office. The functions were modified to include depths greater than 10 feet by a simple linear extrapolation. The composite damage functions, structure and content values are listed in the HEC-DAMCAL input file in Appendix B Section 2 and summarized in the HEC-DAMCAL output file in Appendix B Section 3.

(2) Economic Data for Agricultural Areas

The South Dakota Agricultural Statistics Service and South Dakota State University were contacted to obtain information on crop planting dates, crop production statistics, harvest costs and market values. The information provided was based on the 1990-1991

crop year, and was used to develop all of the necessary data for flood damage computations.

Crop loss functions were developed based on the average planting and harvest dates for the study area. Crop densities were based on production statistics for each county. It was found that 87 percent of the entire area was comprised of combinations of wheat, corn oats and sorghum. Soybeans and sunflowers comprised the other 13 percent and were neglected in this analysis. The crop loss functions used in the analysis are shown with the HEC-PBA input in Appendix D Section 2.

Market statistics, crop prices and yields, for the crops mentioned above were based on average values for the entire state. Harvest costs were estimated based on information from the Agricultural Economics Department at South Dakota State University. Harvest costs were based on average fees charged by commercial harvesters. Hauling fees were also included. The economic data for agricultural areas used in the analysis is listed in the HEC-PBA Preprocessor input file in Appendix C Section 1 and is summarized in the HEC-PBA Preprocessor output file in Appendix D Section 4.

(3) Flood Hydrographs

A simple triangular hydrograph with a peak stage of 1435 ft msl and a duration of 7 days was used to calculate damages in the cities of Pierre and Fort Pierre, as well as the agricultural areas upstream. Another simplified hydrograph with a peak stage of 1423 ft msl and a duration of 7 days was used to calculate damages for the agricultural areas around Lake Sharpe. The hydrographs are shown in Appendix D Section 3 with the input data for HEC-PBA.

B-3. Output Data

(1) Output from HEC-DAMCAL

Sample output from the HEC-DAMCAL program is shown in Appendix C Section 1. The report generated by the program is shown along with examples of the elevation-damage, elevation-area and elevation-structures flooded relationships. The plots shown in Appendix C Section 4 were generated using the DSPLAY program. The HEC-DAMCAL results were reviewed to confirm that the program is operating properly and writing the elevation relationships to HEC-DSS properly. The results were not thoroughly reviewed for accuracy because of the limitations in the accuracy of the input data.

(2) Output from HEC-PBA

Sample output from the HEC-PBA program is shown in Appendix D Section 4. The Preprocessor output summarizes all of the original input data from its input file and from HEC-DSS. The Preprocessor output does not list flood damage values. These are listed in the output from the HEC-PBA Analysis program. The Analysis output lists damages by reaches and specific boundaries. Damages are listed for agricultural areas and urban areas separately for both with- and without-project conditions. There is no graphical output from HEC-PBA.

The results from HEC-PBA were verified by comparison with output from HEC-DAMCAL for single flood events. The results were not reviewed for accuracy in terms of providing meaningful estimates of damages because of the inaccuracies in the input data. The program will provide more meaningful results when better data is used.

APPENDIX C

HEC-DAMCAL DATA

APPENDIX C

HEC-DAMCAL DATA

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Figures

APPENDIX C

HEC-DAMCAL DATA

C-1. GRASS Output

Grid Cell Data Base File - Urban Areas

Column	Row	R	LU	GND	REFD
42	5	3	12	85	96.1
43	5	3	12	93	96.1
44	5	3	12	101	96.1
45	5	3	12	111	96.1
46	5	3	12	119	96.1
47	5	3	12	127	96.1
48	5	3	12	130	96.1
49	5	3	11	129	96.1
50	5	3	11	128	96.1
51	5	3	11	127	96.1
52	5	3	11	126	96.1
53	5	3	11	125	96.1
54	5	3	11	123	96.1
55	5	3	11	122	96.1
56	5	3	11	121	96.1
57	5	3	11	120	96.1
58	5	3	11	121	96.1
59	5	3	11	126	96.1
60	5	3	11	132	96.1
61	5	3	11	136	96.1
62	5	3	11	140	96.1
63	5	3	11	146	96.1
64	5	3	11	151	96.1
65	5	3	11	155	96.1
66	5	3	11	160	96.1
67	5	3	-1	165	96.1
42	6	3	12	85	96.1
43	6	3	12	93	96.1
44	6	3	12	101	96.1
45	6	3	12	111	96.1
46	6	3	12	119	96.1
47	6	3	12	127	96.1
48	6	3	12	130	96.1
49	6	3	11	129	96.1
50	6	3	11	128	96.1
51	6	3	11	126	96.1
52	6	3	11	125	96.1
53	6	3	11	123	96.1
54	6	3	11	122	96.1
55	6	3	11	120	96.1
56	6	3	11	119	96.1
57	6	3	11	117	96.1
58	6	3	11	119	96.1
59	6	3	11	123	96.1
60	6	3	11	129	96.1
62	6	3	11	138	96.1
63	6	3	11	144	96.1
64	6	3	11	148	96.1
66	6	3	11	157	96.1
67	6	3	11	163	96.0
42	7	3	12	85	96.0
43	7	3	12	93	96.0
44	7	3	12	101	96.0
45	7	3	12	111	96.0
46	7	3	12	119	96.0
47	7	3	12	127	96.0
48	7	3	12	130	96.0
49	7	3	11	129	96.0
50	7	3	11	127	96.0
51	7	3	11	125	96.0
52	7	3	11	124	96.0
53	7	3	11	122	96.0
55	7	3	-1	119	96.0
59	7	3	11	121	96.1
60	7	3	11	127	96.1
61	7	3	-1	131	96.1
63	7	3	11	142	96.1
64	7	3	11	146	96.1
43	8	3	12	93	96.0
44	8	3	12	101	96.0
45	8	3	12	111	96.0
46	8	3	12	119	96.0
47	8	3	12	127	96.0
48	8	3	12	130	96.0
49	8	3	12	128	96.0
50	8	3	11	127	96.0
51	8	3	11	124	96.0
59	8	3	11	119	96.1
60	8	3	11	125	96.1
61	8	3	11	129	96.1
43	9	3	12	93	96.0
44	9	3	12	101	96.0
45	9	3	12	111	96.0
46	9	3	12	119	96.0
47	9	3	12	127	96.0
48	9	3	12	130	96.0
49	9	3	12	128	96.0
50	9	3	11	126	96.0
51	9	3	11	124	96.0
52	9	3	11	122	96.0
53	9	3	11	120	96.0
60	9	3	11	123	96.1
61	9	3	-1	127	96.1
43	10	3	12	93	96.0
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
196	125	3	12	42	89.6
197	125	3	12	42	89.6
9999	99999	99	99	999	999.9

Grid Cell Data Base - Rural Areas

Column	Row	R	LU	GND	REFD
281	7	1	3	181	-1.0
275	8	1	3	181	210.0
276	8	1	3	181	210.0
277	8	1	3	181	210.0
278	8	1	3	181	210.0
279	8	1	3	181	210.0
280	8	1	3	181	210.0
281	8	1	3	181	210.0
282	8	1	3	181	210.0
283	8	1	3	181	210.0
284	8	1	3	181	210.0
273	9	1	4	179	210.0
274	9	1	4	180	210.0
275	9	1	3	181	210.0
276	9	1	3	181	210.0
277	9	1	3	181	210.0
278	9	1	3	181	210.0
279	9	1	3	181	210.0
280	9	1	3	181	210.0
281	9	1	3	181	210.0
282	9	1	3	181	210.0
283	9	1	3	181	210.0
284	9	1	3	181	210.0
270	10	1	4	175	210.0
271	10	1	4	176	210.0
272	10	1	4	177	210.0
273	10	1	4	179	210.0
274	10	1	4	180	210.0
275	10	1	3	181	210.0
276	10	1	3	181	210.0
277	10	1	3	181	210.0
278	10	1	3	181	210.0
279	10	1	3	181	210.0
280	10	1	3	181	210.0
281	10	1	3	181	210.0
282	10	1	3	181	210.0
283	10	1	3	181	210.0
284	10	1	3	181	210.0
285	10	1	3	181	210.0
286	10	1	-1	-1	-1.0
268	11	1	4	170	210.0
269	11	1	4	171	210.0
270	11	1	4	173	210.0
271	11	1	4	175	210.0
272	11	1	4	177	210.0
273	11	1	4	178	210.0
274	11	1	4	180	210.0
275	11	1	3	181	210.0
276	11	1	3	181	210.0
277	11	1	3	181	210.0
278	11	1	3	181	210.0
279	11	1	3	181	210.0
280	11	1	3	181	210.0
281	11	1	3	181	210.0
282	11	1	3	181	210.0
283	11	1	3	181	210.0
284	11	1	3	181	210.0
285	11	1	3	181	210.0
286	11	1	3	181	210.0
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269	12	1	3	168	210.0
270	12	1	3	171	210.0
271	12	1	3	173	210.0
272	12	1	3	175	210.0
273	12	1	3	177	210.0
274	12	1	3	179	210.0
275	12	1	3	181	210.0
276	12	1	3	181	210.0
277	12	1	3	181	210.0
278	12	1	3	181	210.0
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282	12	1	3	181	210.0
283	12	1	3	181	210.0
284	12	1	3	181	210.0
285	12	1	3	181	210.0
286	12	1	3	181	210.0
266	13	1	3	160	210.0
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272	13	1	3	174	210.0
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280	13	1	3	181	210.0
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282	13	1	3	181	210.0
283	13	1	3	181	210.0
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285	13	1	3	181	210.0
286	13	1	3	181	210.0
263	14	2	-1	-1	-1.0
264	14	2	3	152	210.0
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270	14	1	3	168	210.0
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272	14	1	3	173	210.0
273	14	1	3	176	210.0
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275	14	1	3	181	210.0
276	14	1	3	181	210.0
277	14	1	3	181	210.0
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
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1339	807	11	1	181	150.0
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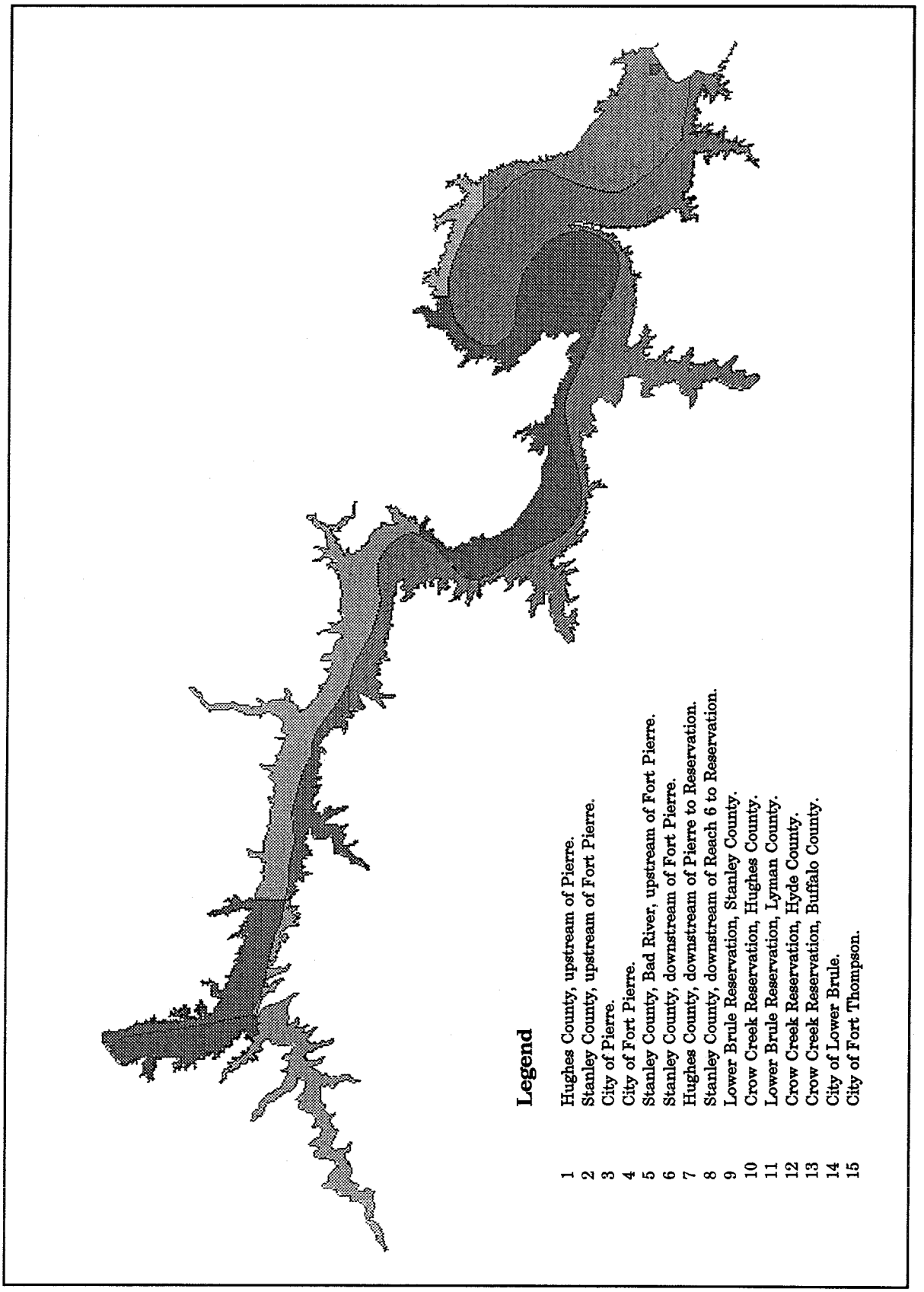

FIGURE C-1. Damage Reach Boundaries

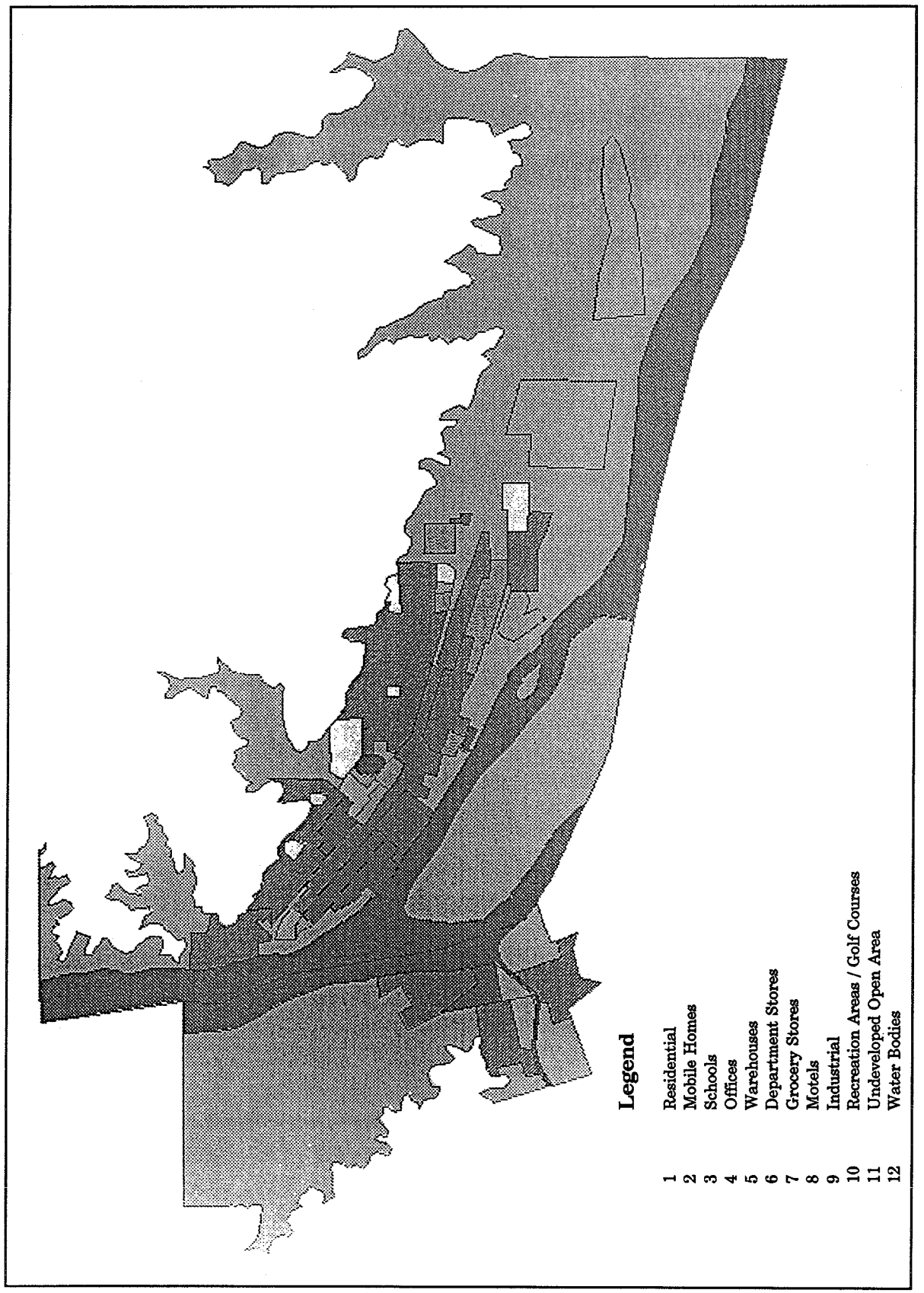

FIGURE C-2. Urban Landuse Pattern

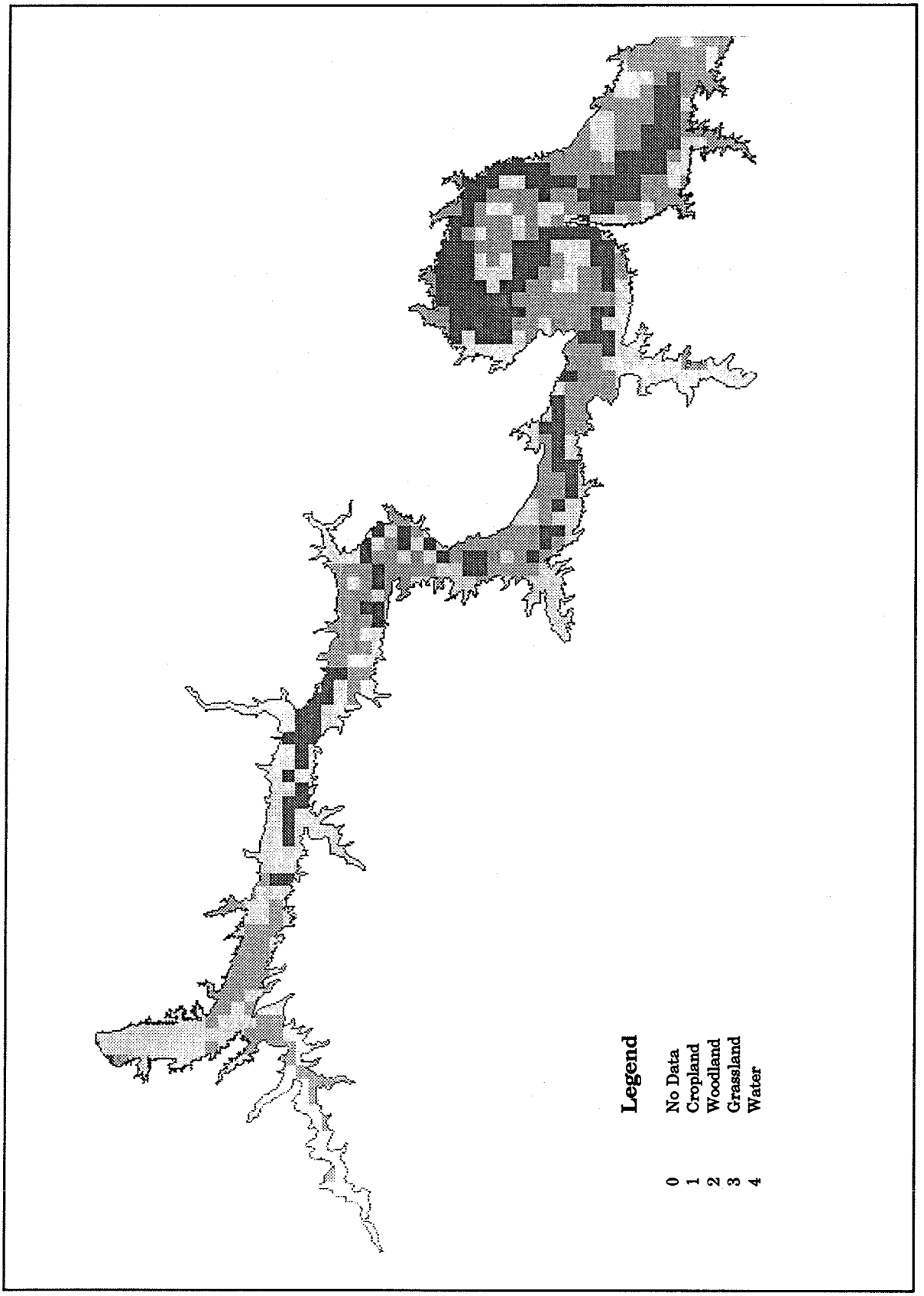

FIGURE C-3. Rural Landuse Pattern

1004

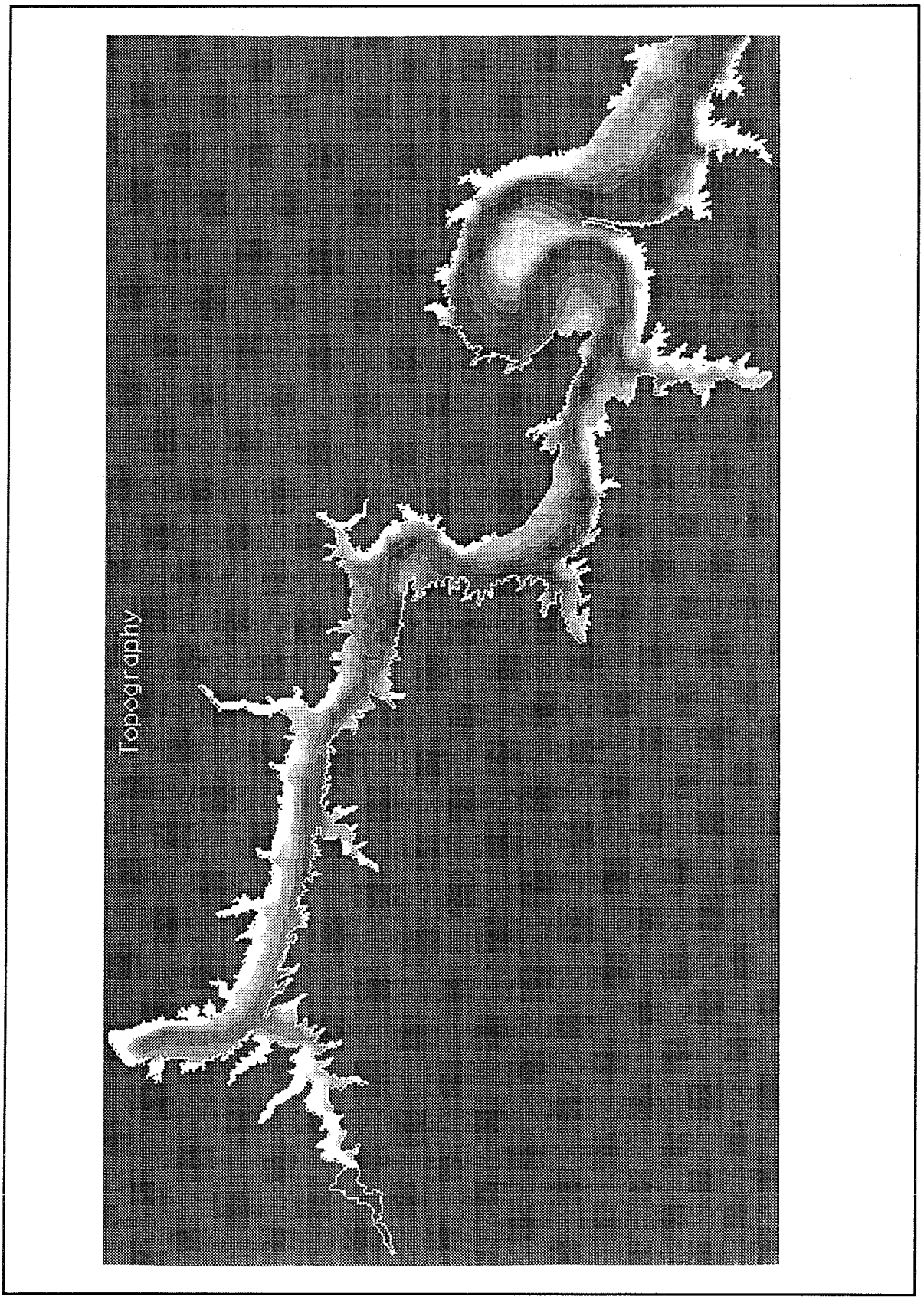

FIGURE C-4. Topographic Definition

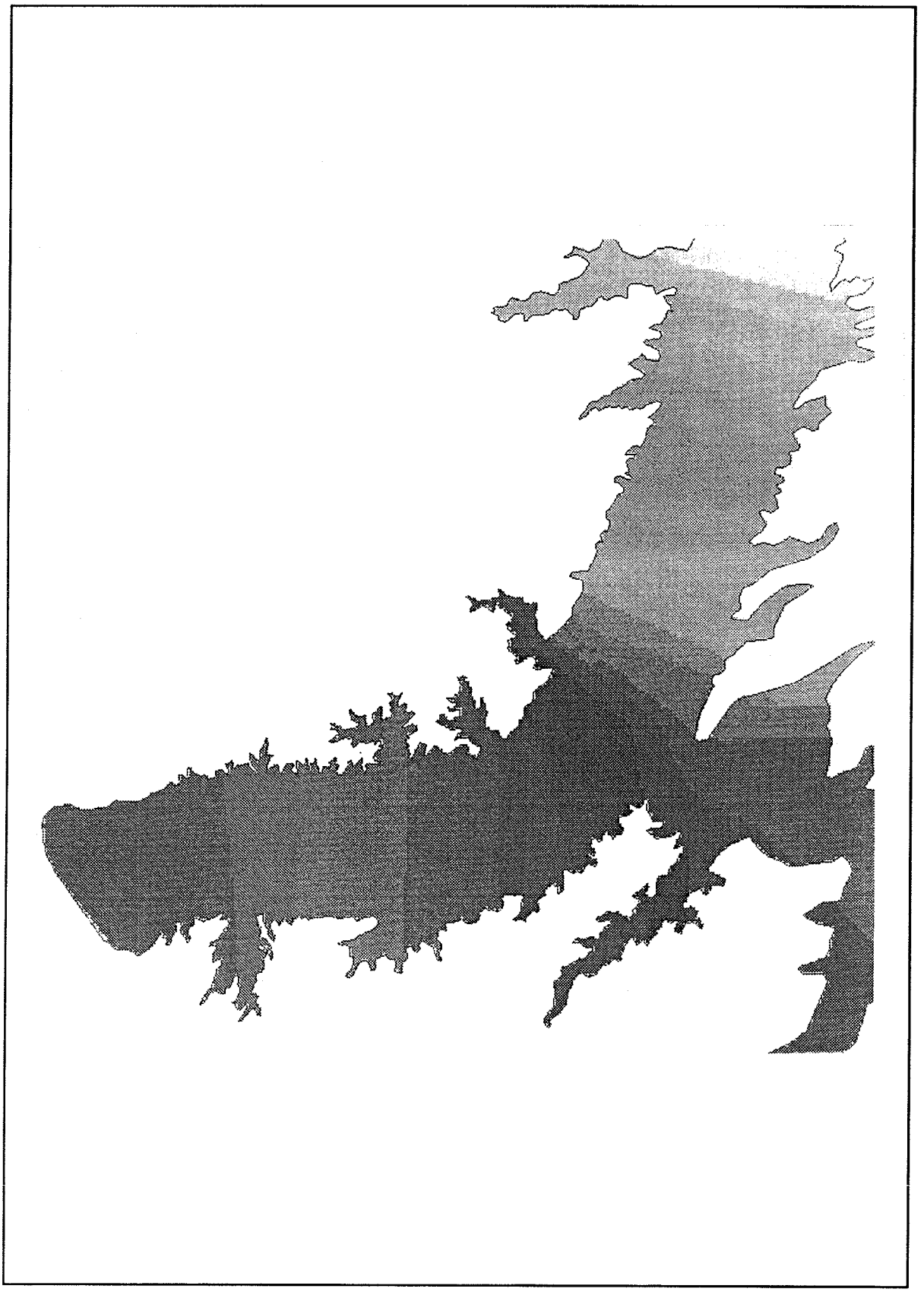

FIGURE C-5. Missouri River Reference Flood Elevations

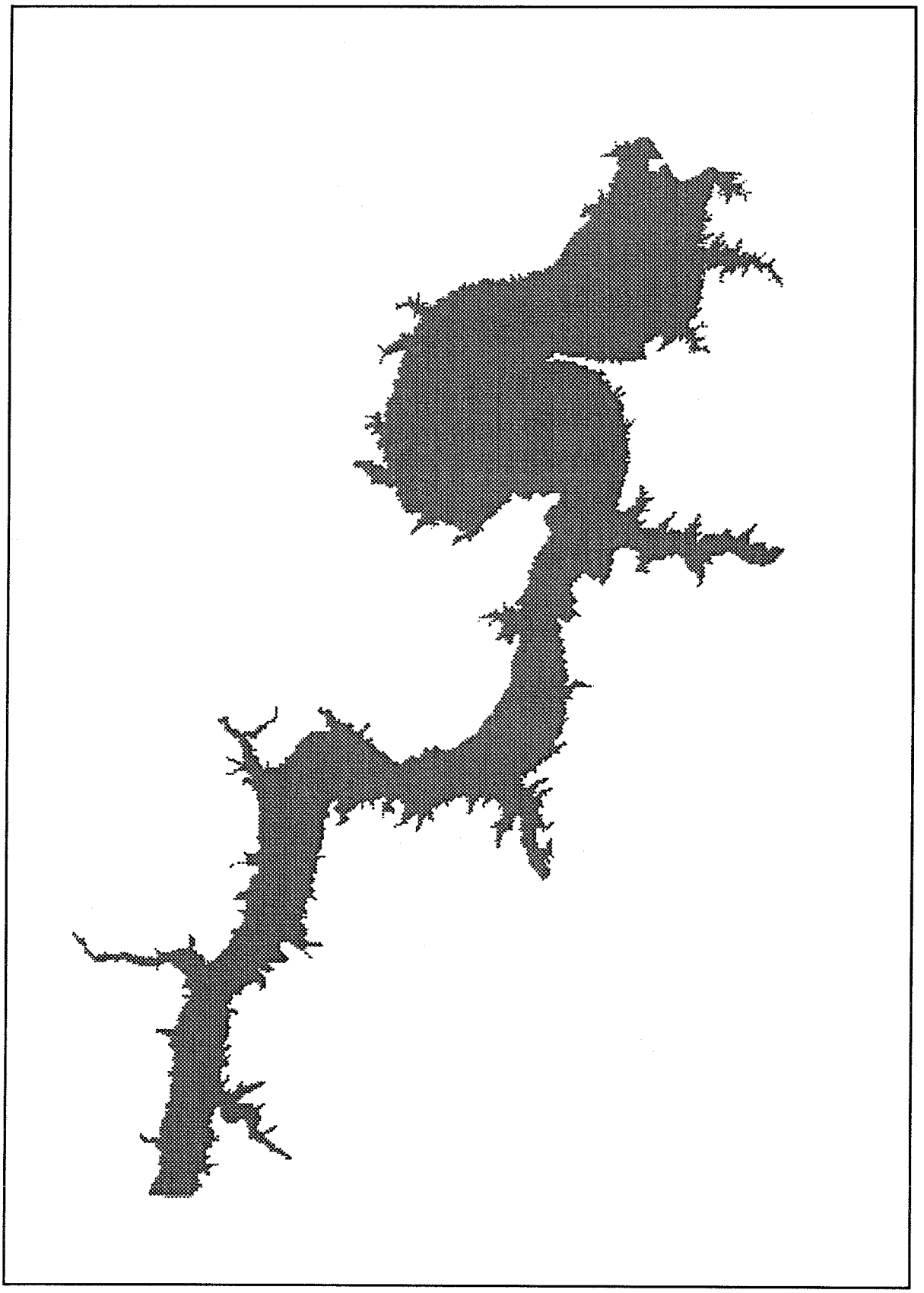

FIGURE C-6. Lake Sharpe Reference Flood Elevations

C-2. HEC-DAMCAL Input

Input Data for Reach 3 (Pierre) and Reach 4 (Fort Pierre)

```
T1              DAMCAL Input File - Urban areas
T2              Pierre, SD - Resolution = 64m (1 acre)
T3              Reference flood: 200,000 cfs, 1423 pool
J1     0        0        0        0        0        0        6        1
J2     1        1        6      204      128        1
J3     3        2        4        0       12        5        6       18   -1.00
ZW A=MISSOURI E=1992 F=URBAN-EXISTING
FT(F5.0,F6.0,2F3.0,F4.0,F6.0)
ST 10 YR   50 YR  100 YR  500 YR     200K     400K
LU     1        1      1.5   50000     -.50       -1     1.00       10        0        1
LT     1        3  RESIDENTIAL
DF     0        1        2        3        4        5        8       10      100      200
DS     7       14       21       27       31       36       48       57       75       99
DC     0       36       47       53       57       60       66       78       99       99
DO     0        5        5        5        5        5        5        5        5        5
LU     2        1      3.0   10000     -.70       -1     1.00       10        0        1
LT     2        3  MOBILE HOMES
DF     0        1        2        3        4        5        8       10      100      200
DS    15       20       31       44       60       74       94       96       98       99
DC     0       51       76       85       89       92       95       96       97       98
DO     0        5        5        5        5        5        5        5        5        5
LU     3        1      0.3 1500000     -.15       -1     1.00       10        0        2
LT     3        2  SCHOOLS
DF     0        1        2        3        4        5        8       10      100      200
DS     0        8       12       15       15       16       22       28       50       75
DC     0       18       26       30       33       35       50       66       99       99
DO     0        5        5        5        5        5        5        5        5        5
LU     4        1      0.5   500000     -.30       -1     1.00       10        0        2
LT     4        2  OFFICES
DF     0        1        2        3        4        5        8       10      100      200
DS     0       12       14       17       19       23       35       45       75       99
DC     0       16       21       24       25       26       36       50       99       99
DO     0        5        5        5        5        5        5        5        5        5
LU     5        1      .25   250000    -1.00       -1     1.00       10        0        3
LT     5        1  WAREHOUSES
DF     0        1        2        3        4        5        8       10      100      200
DS     0        1        1        1        1        3       12       21       50       75
DC     0       11       16       19       21       23       47       99       99       99
DO     0        5        5        5        5        5        5        5        5        5
LU     6        1      .25   500000    -1.00       -1     1.00       10        0        3
LT     6        2  DEPARTMENT STORES
DF     0        1        2        3        4        5        8       10      100      200
DS     0        3        7        7        7        9       17       23       50       75
DC     0       18       33       65       88       95       99       99       99       99
DO     0        5        5        5        5        5        5        5        5        5
LU     7        1      .50   300000    -1.50       -1     1.00       10        0        3
LT     7        2  GROCERY STORES
DF     0        1        2        3        4        5        8       10      100      200
DS     0        3        4        5        6        7       20       37       50       75
DC    50       99       99       99       99       99       99       99       99       99
DO     0        5        5        5        5        5        5        5        5        5
LU     8        1      .50   750000     -.50       -1     1.00       10        0        3
LT     8        2  MOTELS
DF     0        1        2        3        4        5        8       10      100      200
DS     0        4        7       10       12       15       26       37       50       75
DC     0       10       16       21       25       30       52       76       99       99
DO     0        5        5        5        5        5        5        5        5        5
LU     9        1      .50 1000000     -.50       -1     1.00       10        0        4
LT     9        2  INDUSTRIAL
DF     0        1        2        3        4        5        8       10      100      200
DS     0        1        1        1        1        3       12       21       50       75
DC     0       11       16       19       21       23       47       99       99       99
DO     0        5        5        5        5        5        5        5        5        5
LU    10        0     0.10        0        0        0     1.00       10        0        5
LT    10        0  RECREATION AREAS
DF     0        1        2        3        4        5        8       10      100      200
DD     0      .50     1.00     1.50     2.00     2.00     2.00     2.00     2.00     2.00
LU    11        0        0        0        0        0     1.00        2        0        5
```

```
LT    11       0  OPEN SPACE
DF     0     200
DD     0    0.50
LU    12       0       0       0       0       0    1.00       2       0       5
LT    12       0  WATER BODIES
DF     0     200
DD     0       0
DR     3    94.9       0       0       0      66    2.00       0       0
DT RCH 3 CITY OF PIERRE
SE  87.0    87.5    87.8    88.6    94.9   102.3
DR     4    94.9       0       0       0      40    1.00       0       0
DT RCH 4 CITY OF FORT PIERRE
SE  43.5    43.8    43.9    44.3    47.5    51.1
END
```

Input Data for Reaches 1, 2, 6, 7, 8, 9, 10, 11, 12 & 13

```
T1              DAMCAL input file - Agricultural areas
T2              Oahe Dam to Big Bend Dam - Resolution = 64m (1 acre)
T3              Reference flood = 150.0 (1490 ft msl)
J1      0       0       0       0       0       0       0       1       1
J2      1       1       6    1484     816       1
J3      3      10       4       0       4       5       6      18    1.00
ZW A=MISSOURI E=1992 F=AG-EXISTING
FT(F5.0,F6.0,2F3.0,F4.0,F6.1)
ST  200K
LU      1       0    1.00       0       0       0    1.00       6       0
LT      1       0  CROPLAND
DF      0      10      50     100     150     200
DD      0     100     100     100     100     100
LU      2       0    1.00       0       0       0    1.00       6       0
LT      2       0  WOODLAND
DF      0      10      50     100     150     200
DD      0       5       5       5       5       5
LU      3       0    1.00       0       0       0    1.00       6       0
LT      3       0  GRASSLAND
DF      0      10      50     100     150     200
DD      0       1       1       1       1       1
LU      4       0    1.00       0       0       0    1.00       6       0
LT      4       0  WATER
DF      0      10      50     100     150     200
DD      0       0       0       0       0       0
DR      1     210       0       0       0       0   10.00       0       0
DT RCH 1 HUGHES COUNTY
SE     95
DR      2     210       0       0       0       0   10.00       0       0
DT RCH 2 STANLEY COUNTY
SE     95
DR      6     210       0       0       0       0   10.00       0       0
DT RCH 6 STANLEY COUNTY
SE     95
DR      7     150       0       0       0       0   10.00       0       0
DT RCH 7 HUGHES COUNTY
SE     83
DR      8     150       0       0       0       0   10.00       0       0
DT RCH 8 STANLEY COUNTY
SE     83
DR      9     150       0       0       0       0   10.00       0       0
DT RCH 9 LOWER BRULE RESERVATION, STANLEY COUNTY
SE     83
DR     10     150       0       0       0       0   10.00       0       0
DTRCH 10 CROW CREEK RESERVATION, HUGHES COUNTY
SE     83
DR     11     150       0       0       0       0   10.00       0       0
DTRCH 11 LOWER BRULE RESERVATION, LYMAN COUNTY
SE     83
DR     12     150       0       0       0       0   10.00       0       0
DTRCH 12 CROW CREEK RESERVATION, HYDE COUNTY
SE     83
DR     13     150       0       0       0       0   10.00       0       0
DTRCH 13 CROW CREEK RESERVATION, BUFFALO COUNTY
SE     83
END
```

C-3. HEC-DAMCAL Output

Output Data for Reach 3 (Pierre) and Reach 4 (Fort Pierre)

```
*****************************************************
 *    Damage Reach Stage-Damage Calculation Program   *
 *    Users Manual February 1979                      *
 *    Version  2.0.13;  July 1992                     *
 *    IBM-PC Compatible (MS)                          *
 *    Run date 24JUL92   time 09:51:50                *
 *****************************************************


  DDDDD       A     M     M   CCCCC      A     L
  D    D     A A    MM   MM  C     C    A A    L
  D     D   A   A   M M M M  C         A   A   L
  D     D  AAAAAAA  M  M  M  C         AAAAAAA  L
  D     D  A     A  M     M  C         A     A  L
  D    D   A     A  M     M  C     C   A     A  L
  DDDDD    A     A  M     M   CCCCC    A     A  LLLLLLL


        ************************************
        *  U.S. Army Corps of Engineers      *
        *  The Hydrologic Engineering Center *
        *  609 Second Street, Suite B        *
        *  Davis, California 95616           *
        *  (916) 756-1104                    *
        ************************************
```

```
ANALYSIS INFORMATION
--------------------

IPOL    =     0, THERE IS NO POLICY CONTROL IN THIS RUN
IPROF   =     0, THERE IS NO FLOOD PROOFING IN THIS RUN
IEVAC   =     0, THERE IS NO PERMANENT EVACUATION IN THIS RUN
IEVCLU  =     0, THERE IS NO PERMANENT EVACUATION IN THIS RUN
IPRNT   =     0, NORMAL PRINTOUT
ITRACE  =     0, NO TRACE OUTPUT WILL BE DISPLAYED
ITYPE   =     6, NUMBER OF SINGLE EVENT DAMAGES TO BE CALCULATED
IAG     =     1, AGGREGATE SINGLE EVENT DAMAGES

DATA BANK INFORMATION
---------------------

NFILE   =     1, THE DATA BANK IS ON THIS COMPUTER UNIT
NFORM   =     1, THE DATA BANK IS FORMATTED
NDV     =     6, THE NUMBER OF DATA VARIABLES
IROW    =   204, THE NUMBER OF ROWS IN THE DATA BANK
ICOL    =   128, THE NUMBER OF COLUMNS IN THE DATA BANK
IMAGE   =     1, PRINTED IMAGE OF INPUT DECK

DATA VARIABLE INFORMATION
-------------------------

IDAMRC  =     3, THE DATA VARIABLE THAT IS THE DAMAGE REACH CODE
NODR    =     2, THE NUMBER OF DAMAGE REACHES IN THIS ANALYSIS
ILAND   =     4, THE DATA VARIABLE THAT IS THE LAND USE ANALYZED
NOLUC   =    12, THE NUMBER OF LAND USE CATEGORIES
ITOPO   =     5, THE DATA VARIABLE THAT IS TOPOGRAPHY
IRFFD   =     6, THE DATA VARIABLE THAT IS THE REFERENCE FLOOD ELEVATION
IELV    =    18, THE NUMBER OF ELEVATION-DAMAGE POINTS TO BE CALCULATED
GSIZE   =   -1., AN ELEVATION-STRUCTURES FLOODED TABLE WILL BE PRINTED

FILE SYSTEM INFORMATION - A FILE WILL BE CREATED TO PASS DEPTH-AREA DATA TO OTHER
----------------------    HEC PROGRAMS USING THE HEC DATA STORAGE SYSTEM (HECDSS).

PROJ    =     MISSOURI
ALT     =     URBAN-EXISTING
YEAR    =     1992
```

LAND USE CATEGORY 1 DAMAGE CATEGORY NO. 1

AGGREGATED LAND USE CATEGORY NO. = 1

RESIDENTIAL

STAGE FROM 1ST FLOOR	STAGE ADJUSTED	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	3.00	7.00	0.00	0.00	5.25
1.00	4.00	14.00	36.00	5.00	25.20
2.00	5.00	21.00	47.00	5.00	35.04
3.00	6.00	27.00	53.00	5.00	42.13
4.00	7.00	31.00	57.00	5.00	46.86
5.00	8.00	36.00	60.00	5.00	51.98
8.00	11.00	48.00	66.00	5.00	63.79
10.00	13.00	57.00	78.00	5.00	75.60
100.00	103.00	75.00	99.00	5.00	98.04
200.00	203.00	99.00	99.00	5.00	116.94

DENSITY OF THE LAND USE UNITS PER GRID CELL = 1.50

BASE VALUE OF THE STRUCTURE = 50000.00
BASE VALUE OF THE CONTENTS (50.00 PERCENT OF THE STRUCTURE VALUE) = 25000.00
TOTAL DAMAGE OF OTHER WILL BE THE RESPECTIVE PECENTAGE OF THE TOTAL
VACANCY FACTOR (PERCENT DEVELOPED) =100.0
STRUCTURE FIRST FLOOR ADJUSTMENT RELATIVE TO GROUND LEVEL = 3.00

LAND USE CATEGORY 2 DAMAGE CATEGORY NO. 2

AGGREGATED LAND USE CATEGORY NO. = 1

MOBILE HOMES

STAGE FROM 1ST FLOOR	STAGE ADJUSTED	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	3.00	15.00	0.00	0.00	4.50
1.00	4.00	20.00	51.00	5.00	17.55
2.00	5.00	31.00	76.00	5.00	26.52
3.00	6.00	44.00	85.00	5.00	32.60
4.00	7.00	60.00	89.00	5.00	38.52
5.00	8.00	74.00	92.00	5.00	43.60
8.00	11.00	94.00	95.00	5.00	50.56
10.00	13.00	96.00	96.00	5.00	51.41
100.00	103.00	98.00	97.00	5.00	52.26
200.00	203.00	99.00	98.00	5.00	52.79

DENSITY OF THE LAND USE UNITS PER GRID CELL = 3.00

BASE VALUE OF THE STRUCTURE = 10000.00
BASE VALUE OF THE CONTENTS (70.00 PERCENT OF THE STRUCTURE VALUE) = 7000.00
TOTAL DAMAGE OF OTHER WILL BE THE RESPECTIVE PECENTAGE OF THE TOTAL
VACANCY FACTOR (PERCENT DEVELOPED) =100.0
STRUCTURE FIRST FLOOR ADJUSTMENT RELATIVE TO GROUND LEVEL = 3.00

LAND USE CATEGORY 3 DAMAGE CATEGORY NO. 3

AGGREGATED LAND USE CATEGORY NO. = 2

SCHOOLS

STAGE FROM 1ST FLOOR	STAGE ADJUSTED	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	2.00	0.00	0.00	0.00	0.00
1.00	3.00	8.00	18.00	5.00	50.56
2.00	4.00	12.00	26.00	5.00	75.13
3.00	5.00	15.00	30.00	5.00	92.14
4.00	6.00	15.00	33.00	5.00	94.26
5.00	7.00	16.00	35.00	5.00	100.41
8.00	10.00	22.00	50.00	5.00	139.39
10.00	12.00	28.00	66.00	5.00	179.08
100.00	102.00	50.00	99.00	5.00	306.42
200.00	202.00	75.00	99.00	5.00	424.54

DENSITY OF THE LAND USE UNITS PER GRID CELL = 0.30

BASE VALUE OF THE STRUCTURE =*********
BASE VALUE OF THE CONTENTS (15.00 PERCENT OF THE STRUCTURE VALUE) = 225000.02
TOTAL DAMAGE OF OTHER WILL BE THE RESPECTIVE PECENTAGE OF THE TOTAL
VACANCY FACTOR (PERCENT DEVELOPED) =100.0
STRUCTURE FIRST FLOOR ADJUSTMENT RELATIVE TO GROUND LEVEL = 2.00

LAND USE CATEGORY 4 DAMAGE CATEGORY NO. 4

AGGREGATED LAND USE CATEGORY NO. = 2

OFFICES

STAGE FROM 1ST FLOOR	STAGE ADJUSTED	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	2.00	0.00	0.00	0.00	0.00
1.00	3.00	12.00	16.00	5.00	44.10
2.00	4.00	14.00	21.00	5.00	53.29
3.00	5.00	17.00	24.00	5.00	63.53
4.00	6.00	19.00	25.00	5.00	69.56
5.00	7.00	23.00	26.00	5.00	80.85
8.00	10.00	35.00	36.00	5.00	120.23
10.00	12.00	45.00	50.00	5.00	157.50
100.00	102.00	75.00	99.00	5.00	274.84
200.00	202.00	99.00	99.00	5.00	337.84

DENSITY OF THE LAND USE UNITS PER GRID CELL = 0.50

BASE VALUE OF THE STRUCTURE =500000.00
BASE VALUE OF THE CONTENTS (30.00 PERCENT OF THE STRUCTURE VALUE) = 150000.00
TOTAL DAMAGE OF OTHER WILL BE THE RESPECTIVE PECENTAGE OF THE TOTAL
VACANCY FACTOR (PERCENT DEVELOPED) =100.0
STRUCTURE FIRST FLOOR ADJUSTMENT RELATIVE TO GROUND LEVEL = 2.00

LAND USE CATEGORY 5 DAMAGE CATEGORY NO. 5

AGGREGATED LAND USE CATEGORY NO. = 3

WAREHOUSES

STAGE FROM 1ST FLOOR	STAGE ADJUSTED	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	1.00	0.00	0.00	0.00	0.00
1.00	2.00	1.00	11.00	5.00	7.88
2.00	3.00	1.00	16.00	5.00	11.16
3.00	4.00	1.00	19.00	5.00	13.13
4.00	5.00	1.00	21.00	5.00	14.44
5.00	6.00	3.00	23.00	5.00	17.06
8.00	9.00	12.00	47.00	5.00	38.72
10.00	11.00	21.00	99.00	5.00	78.75
100.00	101.00	50.00	99.00	5.00	97.78
200.00	201.00	75.00	99.00	5.00	114.19

DENSITY OF THE LAND USE UNITS PER GRID CELL = 0.25

BASE VALUE OF THE STRUCTURE =250000.00
BASE VALUE OF THE CONTENTS (100.00 PERCENT OF THE STRUCTURE VALUE) = 250000.00
TOTAL DAMAGE OF OTHER WILL BE THE RESPECTIVE PECENTAGE OF THE TOTAL
VACANCY FACTOR (PERCENT DEVELOPED) =100.0
STRUCTURE FIRST FLOOR ADJUSTMENT RELATIVE TO GROUND LEVEL = 1.00

LAND USE CATEGORY 6 DAMAGE CATEGORY NO. 6

AGGREGATED LAND USE CATEGORY NO. = 3

DEPARTMENT STORES

STAGE FROM 1ST FLOOR	STAGE ADJUSTED	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	2.00	0.00	0.00	0.00	0.00
1.00	3.00	3.00	18.00	5.00	27.56
2.00	4.00	7.00	33.00	5.00	52.50
3.00	5.00	7.00	65.00	5.00	94.50
4.00	6.00	7.00	88.00	5.00	124.69
5.00	7.00	9.00	95.00	5.00	136.50
8.00	10.00	17.00	99.00	5.00	152.25
10.00	12.00	23.00	99.00	5.00	160.12
100.00	102.00	50.00	99.00	5.00	195.56
200.00	202.00	75.00	99.00	5.00	228.38

DENSITY OF THE LAND USE UNITS PER GRID CELL = 0.25

BASE VALUE OF THE STRUCTURE =500000.00
BASE VALUE OF THE CONTENTS (100.00 PERCENT OF THE STRUCTURE VALUE) = 500000.00
TOTAL DAMAGE OF OTHER WILL BE THE RESPECTIVE PECENTAGE OF THE TOTAL
VACANCY FACTOR (PERCENT DEVELOPED) =100.0
STRUCTURE FIRST FLOOR ADJUSTMENT RELATIVE TO GROUND LEVEL = 2.00

LAND USE CATEGORY 7 DAMAGE CATEGORY NO. 7

AGGREGATED LAND USE CATEGORY NO. = 3

GROCERY STORES

STAGE FROM 1ST FLOOR	STAGE ADJUSTED	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	2.00	0.00	50.00	0.00	112.50
1.00	3.00	3.00	99.00	5.00	238.61
2.00	4.00	4.00	99.00	5.00	240.19
3.00	5.00	5.00	99.00	5.00	241.76
4.00	6.00	6.00	99.00	5.00	243.34
5.00	7.00	7.00	99.00	5.00	244.91
8.00	10.00	20.00	99.00	5.00	265.39
10.00	12.00	37.00	99.00	5.00	292.16
100.00	102.00	50.00	99.00	5.00	312.64
200.00	202.00	75.00	99.00	5.00	352.01

DENSITY OF THE LAND USE UNITS PER GRID CELL = 0.50

BASE VALUE OF THE STRUCTURE =300000.00
BASE VALUE OF THE CONTENTS (150.00 PERCENT OF THE STRUCTURE VALUE) = 450000.00
TOTAL DAMAGE OF OTHER WILL BE THE RESPECTIVE PECENTAGE OF THE TOTAL
VACANCY FACTOR (PERCENT DEVELOPED) =100.0
STRUCTURE FIRST FLOOR ADJUSTMENT RELATIVE TO GROUND LEVEL = 2.00

LAND USE CATEGORY 8 DAMAGE CATEGORY NO. 8

AGGREGATED LAND USE CATEGORY NO. = 3

MOTELS

STAGE FROM 1ST FLOOR	STAGE ADJUSTED	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	2.00	0.00	0.00	0.00	0.00
1.00	3.00	4.00	10.00	5.00	35.44
2.00	4.00	7.00	16.00	5.00	59.06
3.00	5.00	10.00	21.00	5.00	80.72
4.00	6.00	12.00	25.00	5.00	96.47
5.00	7.00	15.00	30.00	5.00	118.13
8.00	10.00	26.00	52.00	5.00	204.75
10.00	12.00	37.00	76.00	5.00	295.31
100.00	102.00	50.00	99.00	5.00	391.78
200.00	202.00	75.00	99.00	5.00	490.22

DENSITY OF THE LAND USE UNITS PER GRID CELL = 0.50

BASE VALUE OF THE STRUCTURE =750000.00
BASE VALUE OF THE CONTENTS (50.00 PERCENT OF THE STRUCTURE VALUE) = 375000.00
TOTAL DAMAGE OF OTHER WILL BE THE RESPECTIVE PECENTAGE OF THE TOTAL
VACANCY FACTOR (PERCENT DEVELOPED) =100.0
STRUCTURE FIRST FLOOR ADJUSTMENT RELATIVE TO GROUND LEVEL = 2.00

LAND USE CATEGORY 9 DAMAGE CATEGORY NO. 9

AGGREGATED LAND USE CATEGORY NO. = 4

INDUSTRIAL

STAGE FROM 1ST FLOOR	STAGE ADJUSTED	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	2.00	0.00	0.00	0.00	0.00
1.00	3.00	1.00	11.00	5.00	34.13
2.00	4.00	1.00	16.00	5.00	47.25
3.00	5.00	1.00	19.00	5.00	55.13
4.00	6.00	1.00	21.00	5.00	60.38
5.00	7.00	3.00	23.00	5.00	76.13
8.00	10.00	12.00	47.00	5.00	186.38
10.00	12.00	21.00	99.00	5.00	370.13
100.00	102.00	50.00	99.00	5.00	522.38
200.00	202.00	75.00	99.00	5.00	653.63

DENSITY OF THE LAND USE UNITS PER GRID CELL = 0.50

BASE VALUE OF THE STRUCTURE =*********
BASE VALUE OF THE CONTENTS (50.00 PERCENT OF THE STRUCTURE VALUE) = 500000.00
TOTAL DAMAGE OF OTHER WILL BE THE RESPECTIVE PECENTAGE OF THE TOTAL
VACANCY FACTOR (PERCENT DEVELOPED) =100.0
STRUCTURE FIRST FLOOR ADJUSTMENT RELATIVE TO GROUND LEVEL = 2.00

LAND USE CATEGORY 10 DAMAGE CATEGORY NO. 10

AGGREGATED LAND USE CATEGORY NO. = 5

RECREATION AREAS

DEPTH OF WATER	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	0.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	0.50
2.00	0.00	0.00	0.00	1.00
3.00	0.00	0.00	0.00	1.50
4.00	0.00	0.00	0.00	2.00
5.00	0.00	0.00	0.00	2.00
8.00	0.00	0.00	0.00	2.00
10.00	0.00	0.00	0.00	2.00
100.00	0.00	0.00	0.00	2.00
200.00	0.00	0.00	0.00	2.00

DENSITY OF THE LAND USE UNITS PER GRID CELL = 0.10

BASE VALUE OF THE STRUCTURE = 0.00
BASE VALUE OF THE CONTENTS = 0.00
BASE VALUE OF OTHER = 0.00
VACANCY FACTOR (PERCENT DEVELOPED) =100.0

LAND USE CATEGORY 11 DAMAGE CATEGORY NO. 11

AGGREGATED LAND USE CATEGORY NO. = 5

OPEN SPACE

DEPTH OF WATER	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	0.00	0.50

DENSITY OF THE LAND USE UNITS PER GRID CELL = 0.00

BASE VALUE OF THE STRUCTURE = 0.00
BASE VALUE OF THE CONTENTS = 0.00
BASE VALUE OF OTHER = 0.00
VACANCY FACTOR (PERCENT DEVELOPED) =100.0

LAND USE CATEGORY 12 DAMAGE CATEGORY NO. 12

AGGREGATED LAND USE CATEGORY NO. = 5

WATER BODIES

DEPTH OF WATER	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	0.00	0.00

DENSITY OF THE LAND USE UNITS PER GRID CELL = 0.00

BASE VALUE OF THE STRUCTURE = 0.00
BASE VALUE OF THE CONTENTS = 0.00
BASE VALUE OF OTHER = 0.00
VACANCY FACTOR (PERCENT DEVELOPED) =100.0

DAMAGE REACH INDEX LOCATION SUMMARY

ID. NO.	REFERENCE FLOOD ELEVATION	POLICY FLOOD ELEVATION	FLOOD PROOFING ELEVATION	EVACUATION ELEVATION	STARTING DAMAGE ELEVATION	DAMAGE ELEVATION INCREMENT	AGGREGATED DAMAGE RCH. ID.	MODIFY LAND USE DENSITY	PRINT MODIFIED LAND USE
3.	94.9	0.0	0.0	0.0	66.0	2.00	0	0	0
4.	94.9	0.0	0.0	0.0	40.0	1.00	0	0	0

SINGLE EVENTS FOR DAMAGE REACHES

DAMAGE REACH NO.	10 YR EVENT	50 YR EVENT	100 YR EVENT	500 YR EVENT	200K EVENT	400K EVENT
3.	87.0	87.5	87.8	88.6	94.9	102.3
4.	43.5	43.8	43.9	44.3	47.5	51.1

DAMAGE CATEGORY	LAND USE CODE	LAND USE
1	1	RESIDENTIAL
2	2	MOBILE HOMES
3	3	SCHOOLS
4	4	OFFICES
5	5	WAREHOUSES
6	6	DEPARTMENT STORES
7	7	GROCERY STORES
8	8	MOTELS
9	9	INDUSTRIAL
10	10	RECREATION AREAS
11	11	OPEN SPACE
12	12	WATER BODIES

DAMAGE REACH NO. 3 DAMAGE REACH CODE RCH 3

CITY OF PIERRE

DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)	TOTAL
66.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.80
68.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	38.71
70.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.80	50.87
72.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	80.06	35.95	167.93
74.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	268.54	95.25	422.88
76.0	115.54	0.00	0.00	0.00	6.30	0.00	0.00	0.00	577.50	163.45	929.40
78.0	671.12	0.00	0.00	0.00	18.24	0.00	0.00	0.00	1094.36	231.45	2089.63
80.0	1494.66	0.00	0.00	0.00	75.40	0.00	0.00	0.00	2150.93	296.30	4099.91
82.0	2607.87	0.00	0.00	0.00	200.16	0.00	188.17	115.76	3574.64	351.15	7128.88
84.0	3704.99	8.41	50.56	48.51	408.06	2.76	955.97	548.49	5414.49	398.40	11640.64
86.0	4971.28	66.72	142.70	298.09	705.41	109.20	1974.88	1029.00	7279.02	441.55	17127.04
88.0	6189.95	160.38	238.05	597.84	1214.44	371.57	3254.51	1617.00	9521.86	483.80	23768.11
90.0	7457.88	275.60	437.87	851.23	1894.91	778.97	5232.95	2426.61	*11691.13	521.05	31696.68
92.0	8706.63	403.08	661.12	1225.64	2653.06	1440.34	7439.21	3301.69	*14180.48	542.45	40692.20
94.0	*10157.09	638.40	944.83	1667.10	3332.47	2293.37	9803.37	3758.21	*16456.01	557.15	49756.79
96.0	*11640.90	1014.37	1392.99	2031.40	4046.26	3205.03	*11402.11	4010.46	*18682.77	572.20	58157.81
98.0	*13362.61	1447.31	1950.01	2335.61	4687.03	4258.34	*12774.14	4204.05	*20516.59	587.65	66293.41
100.0	*15325.83	1911.92	2574.25	2611.52	5433.37	5456.57	*13269.23	4234.06	*21355.35	603.25	72956.46
87.0 (10 YR)	5587.02	112.51	169.39	452.16	925.92	194.77	2542.74	1301.67	8380.39	462.60	20243.10
87.5 (50 YR)	5856.54	134.02	201.19	524.29	1065.39	280.09	3041.60	1453.26	8963.64	473.55	22109.88
87.8 (100 YR)	6068.15	151.34	223.30	572.49	1154.70	334.03	3174.33	1544.94	9312.67	479.80	23133.52
88.6 (500 YR)	6551.44	191.98	294.79	660.21	1409.83	462.13	3673.86	1843.80	*10124.47	496.20	25830.34
94.9 (200K)	*10820.86	789.27	1143.14	1862.38	3647.47	2679.30	*10660.83	3927.86	*17540.87	563.35	53788.82
102.3 (400K)	*17715.32	2349.67	3466.06	2858.51	6295.79	6895.69	*13692.34	4268.57	*21735.57	618.90	80090.45

DAMAGE REACH NO. 3 DAMAGE REACH CODE RCH 3

CITY OF PIERRE

DAMAGE CATEGORIES

WATER SURFACE ELEVATION	11 (11)	12 (12)	13 (-1)	14 (-1)	15 (-1)	16 (-1)	17 (-1)	18 (-1)	19 (-1)	20 (-1)	TOTAL
66.0	32.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.80
68.0	38.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.71
70.0	45.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.87
72.0	51.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	167.93
74.0	59.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	422.88
76.0	66.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	929.40
78.0	74.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2089.63
80.0	82.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4099.91
82.0	91.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7128.88
84.0	100.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11640.64
86.0	109.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17127.04
88.0	118.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23768.11
90.0	128.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31696.68
92.0	138.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40692.20
94.0	148.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49756.79
96.0	159.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58157.81
98.0	170.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66293.41
100.0	181.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	72956.46
87.0 (10 YR)	113.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20243.10
87.5 (50 YR)	116.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22109.88
87.8 (100 YR)	117.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23133.52
88.6 (500 YR)	121.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25830.34
94.9 (200K)	153.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53788.82
102.3 (400K)	194.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	80090.45

DAMAGE REACH NO. 3 DAMAGE REACH CODE RCH 3

CITY OF PIERRE

ELEVATION - STRUCTURES FLOODED

DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)	TOTAL
66.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
70.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.4
72.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	5.2	6.2
74.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	8.4	11.9
76.0	10.5	0.0	0.0	0.0	0.3	0.0	0.0	0.0	5.5	12.0	28.3
78.0	39.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	8.5	15.5	63.5
80.0	73.5	0.0	0.0	0.0	2.0	0.0	0.0	0.0	10.5	17.6	103.6
82.0	96.0	0.0	0.0	0.0	4.5	0.0	0.5	3.0	14.0	20.3	138.3
84.0	121.5	3.0	0.3	1.0	7.3	0.3	2.5	4.5	16.5	22.2	179.0
86.0	145.5	12.0	0.6	3.5	9.3	0.5	4.5	6.0	20.5	24.3	226.7
88.0	166.5	18.0	0.9	5.0	11.3	1.8	7.0	7.0	24.0	26.2	267.8
90.0	192.0	24.0	1.5	6.0	14.0	2.5	11.0	7.0	27.0	27.2	312.2
92.0	217.5	33.0	2.1	7.0	15.5	4.0	15.0	7.0	28.0	27.9	357.0
94.0	252.0	60.0	2.7	8.0	18.3	5.5	19.5	7.0	28.0	28.4	429.4
96.0	283.5	96.0	3.9	8.5	20.0	7.5	22.0	7.0	28.0	29.4	505.8
98.0	327.0	120.0	5.4	9.5	22.0	9.3	24.0	7.0	28.0	30.2	582.4
100.0	372.0	147.0	6.6	9.5	23.8	11.3	24.0	7.0	28.0	30.8	659.9
87.0 (10 YR)	154.5	15.0	0.6	4.5	10.5	0.8	5.5	6.0	21.5	25.3	244.2
87.5 (50 YR)	154.5	15.0	0.9	5.0	10.8	1.5	7.0	6.0	23.5	25.7	249.8
87.8 (100 YR)	166.5	18.0	0.9	5.0	11.3	1.8	7.0	6.0	24.0	25.8	266.2
88.6 (500 YR)	169.5	21.0	1.2	5.0	11.5	1.8	8.0	7.0	25.5	26.6	277.0
94.9 (200K)	267.0	75.0	3.3	8.0	19.0	6.3	21.0	7.0	28.0	28.9	463.4
102.3 (400K)	417.0	162.0	8.4	10.0	26.8	13.3	24.0	7.0	28.0	31.8	728.2

DAMAGE REACH NO. 4 DAMAGE REACH CODE RCH 4

CITY OF FORT PIERRE

DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)	TOTAL
40.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
42.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16
43.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64
44.0	0.00	0.00	0.00	0.00	0.00	0.00	1778.78	0.00	0.00	0.00	1780.08
45.0	364.77	0.00	0.00	0.00	0.00	0.00	3482.65	0.00	0.00	0.00	3849.54
46.0	1986.39	0.00	0.00	0.00	0.00	0.00	4007.05	0.00	0.00	0.00	5996.50
47.0	3387.90	0.00	0.00	0.00	0.00	0.00	4910.66	0.00	0.00	0.00	8302.71
48.0	4636.84	0.00	0.00	0.00	0.00	0.00	6020.99	0.00	0.00	0.00	10663.20
49.0	5771.99	0.00	0.00	0.00	0.00	0.00	7156.04	0.00	0.00	0.00	12934.79
50.0	6741.48	0.00	0.00	0.00	0.00	0.00	7974.20	0.00	0.00	0.00	14723.96
51.0	7518.36	0.00	0.00	0.00	0.00	0.00	8261.72	0.00	0.00	0.00	15790.04
52.0	8246.89	0.00	0.00	0.00	0.00	0.00	8435.23	0.00	0.00	0.00	16693.89
53.0	9000.75	0.00	0.00	0.00	0.00	0.00	8699.96	0.00	0.00	0.00	17714.44
54.0	9898.69	0.00	0.00	0.00	0.00	0.00	8961.81	0.00	0.00	0.00	18876.30
55.0	10812.97	0.00	0.00	0.00	0.00	0.00	9129.74	0.00	0.00	0.00	19960.69
56.0	11411.86	0.00	0.00	0.00	0.00	0.00	9295.99	0.00	0.00	0.00	20728.12
57.0	11867.18	0.00	0.00	0.00	0.00	0.00	9456.24	0.00	0.00	0.00	21346.08
43.5 (10 YR)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95
43.8 (50 YR)	0.00	0.00	0.00	0.00	0.00	0.00	1026.11	0.00	0.00	0.00	1027.27
43.9 (100 YR)	0.00	0.00	0.00	0.00	0.00	0.00	1627.45	0.00	0.00	0.00	1628.68
44.3 (500 YR)	18.48	0.00	0.00	0.00	0.00	0.00	2232.78	0.00	0.00	0.00	2252.80
47.5 (200K)	4059.46	0.00	0.00	0.00	0.00	0.00	5476.94	0.00	0.00	0.00	9541.14
51.1 (400K)	7591.78	0.00	0.00	0.00	0.00	0.00	8275.84	0.00	0.00	0.00	15877.75

DAMAGE REACH NO. 4 DAMAGE REACH CODE RCH 4

CITY OF FORT PIERRE

DAMAGE CATEGORIES

WATER SURFACE ELEVATION	11 (11)	12 (12)	13 (-1)	14 (-1)	15 (-1)	16 (-1)	17 (-1)	18 (-1)	19 (-1)	20 (-1)	TOTAL
40.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.0	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
42.0	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16
43.0	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64
44.0	1.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1780.08
45.0	2.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3849.54
46.0	3.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5996.50
47.0	4.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8302.71
48.0	5.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10663.20
49.0	6.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12934.79
50.0	8.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14723.96
51.0	9.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15790.04
52.0	11.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16693.89
53.0	13.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17714.44
54.0	15.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18876.30
55.0	17.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19960.69
56.0	20.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20728.12
57.0	22.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21346.08
43.5 (10 YR)	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95
43.8 (50 YR)	1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1027.27
43.9 (100 YR)	1.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1628.68
44.3 (500 YR)	1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2252.80
47.5 (200K)	4.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9541.14
51.1 (400K)	10.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15877.75

DAMAGE REACH NO. 4 DAMAGE REACH CODE RCH 4

CITY OF FORT PIERRE

ELEVATION - STRUCTURES FLOODED

DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)	TOTAL
40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	6.0
45.0	49.5	0.0	0.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	57.5
46.0	129.0	0.0	0.0	0.0	0.0	0.0	8.5	0.0	0.0	0.0	137.5
47.0	163.5	0.0	0.0	0.0	0.0	0.0	11.0	0.0	0.0	0.0	174.5
48.0	190.5	0.0	0.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0	203.5
49.0	214.5	0.0	0.0	0.0	0.0	0.0	15.5	0.0	0.0	0.0	230.0
50.0	220.5	0.0	0.0	0.0	0.0	0.0	16.5	0.0	0.0	0.0	237.0
51.0	223.5	0.0	0.0	0.0	0.0	0.0	16.5	0.0	0.0	0.0	240.0
52.0	229.5	0.0	0.0	0.0	0.0	0.0	16.5	0.0	0.0	0.0	246.0
53.0	235.5	0.0	0.0	0.0	0.0	0.0	16.5	0.0	0.0	0.0	252.0
54.0	241.5	0.0	0.0	0.0	0.0	0.0	16.5	0.0	0.0	0.0	258.0
55.0	247.5	0.0	0.0	0.0	0.0	0.0	16.5	0.0	0.0	0.0	264.0
56.0	252.0	0.0	0.0	0.0	0.0	0.0	16.5	0.0	0.0	0.0	268.5
57.0	255.0	0.0	0.0	0.0	0.0	0.0	16.5	0.0	0.0	0.0	271.5
43.5 (10 YR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43.8 (50 YR)	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	4.0
43.9 (100 YR)	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	6.0
44.3 (500 YR)	3.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	9.0
47.5 (200K)	186.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0	198.0
51.1 (400K)	223.5	0.0	0.0	0.0	0.0	0.0	16.5	0.0	0.0	0.0	240.0

SINGLE EVENT DAMAGES

AGGREGATED DAMAGE CATEGORIES

DAM RCH	W.S. ELEV	1	2	3	4	5	6	7	8	9	10	TOTAL
3	87.00	5699.53	621.55	4965.10	8380.39	576.52	0.00	0.00	0.00	0.00	0.00	20243.10
3	87.50	5990.55	725.48	5840.34	8963.64	589.86	0.00	0.00	0.00	0.00	0.00	22109.88
3	87.80	6219.50	795.79	6208.01	9312.67	597.55	0.00	0.00	0.00	0.00	0.00	23133.52
3	88.60	6743.42	955.01	7389.62	10124.47	617.82	0.00	0.00	0.00	0.00	0.00	25830.34
3	94.90	11610.13	3005.52	20915.47	17540.87	716.83	0.00	0.00	0.00	0.00	0.00	53788.82
3	102.30	20064.99	6324.57	31152.40	21735.57	812.92	0.00	0.00	0.00	0.00	0.00	80090.46
4	43.50	0.00	0.00	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.95
4	43.80	0.00	0.00	1026.11	0.00	1.16	0.00	0.00	0.00	0.00	0.00	1027.27
4	43.90	0.00	0.00	1627.45	0.00	1.23	0.00	0.00	0.00	0.00	0.00	1628.68
4	44.30	18.48	0.00	2232.78	0.00	1.54	0.00	0.00	0.00	0.00	0.00	2252.80
4	47.50	4059.46	0.00	5476.94	0.00	4.74	0.00	0.00	0.00	0.00	0.00	9541.14
4	51.10	7591.78	0.00	8275.84	0.00	10.13	0.00	0.00	0.00	0.00	0.00	15877.75

++++++++++++++++++++
END OF RUN
DAMCAL PROGRAM STOP
++++++++++++++++++++

Elapsed CPU time is 24 seconds or 0.400 minutes.

Output Data for Reaches 1, 2, 6, 7, 8, 9, 10, 11, 12 & 13

```
*****************************************************
*    Damage Reach Stage-Damage Calculation Program   *
*    Users Manual February 1979                      *
*    Version  2.0.13;  July 1992                     *
*    IBM-PC Compatible (MS)                          *
*    Run date 24JUL92   time 08:56:55                *
*****************************************************
```

```
DDDDD       A     M     M   CCCCC      A     L
D    D     A A    MM   MM  C     C    A A    L
D     D   A   A   M M M M  C          A   A   L
D     D  AAAAAAA  M  M  M  C         AAAAAAA  L
D     D  A     A  M     M  C         A     A  L
D    D   A     A  M     M  C     C   A     A  L
DDDDD    A     A  M     M   CCCCC   A     A  LLLLLLL
```

```
*************************************
*  U.S. Army Corps of Engineers     *
*  The Hydrologic Engineering Center*
*  609 Second Street, Suite B       *
*  Davis, California 95616          *
*  (916) 756-1104                   *
*************************************
```

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                    ANALYSIS INFORMATION
                    --------------------

                    IPOL    =     0, THERE IS NO POLICY CONTROL IN THIS RUN
                    IPROF   =     0, THERE IS NO FLOOD PROOFING IN THIS RUN
                    IEVAC   =     0, THERE IS NO PERMANENT EVACUATION IN THIS RUN
                    IEVCLU  =     0, THERE IS NO PERMANENT EVACUATION IN THIS RUN
                    IPRNT   =     0, NORMAL PRINTOUT
                    ITRACE  =     0, NO TRACE OUTPUT WILL BE DISPLAYED
                    ITYPE   =     1, NUMBER OF SINGLE EVENT DAMAGES TO BE CALCULATED
                    IAG     =     1, AGGREGATE SINGLE EVENT DAMAGES

                    DATA BANK INFORMATION
                    ---------------------

                    NFILE   =     1, THE DATA BANK IS ON THIS COMPUTER UNIT
                    NFORM   =     1, THE DATA BANK IS FORMATTED
                    NDV     =     6, THE NUMBER OF DATA VARIABLES
                    IROW    =  1484, THE NUMBER OF ROWS IN THE DATA BANK
                    ICOL    =   816, THE NUMBER OF COLUMNS IN THE DATA BANK
                    IMAGE   =     1, PRINTED IMAGE OF INPUT DECK

                    DATA VARIABLE INFORMATION
                    -------------------------

                    IDAMRC  =     3, THE DATA VARIABLE THAT IS THE DAMAGE REACH CODE
                    NODR    =    10, THE NUMBER OF DAMAGE REACHES IN THIS ANALYSIS
                    ILAND   =     4, THE DATA VARIABLE THAT IS THE LAND USE ANALYZED
                    NOLUC   =     4, THE NUMBER OF LAND USE CATEGORIES
                    ITOPO   =     5, THE DATA VARIABLE THAT IS TOPOGRAPHY
                    IRFFD   =     6, THE DATA VARIABLE THAT IS THE REFERENCE FLOOD ELEVATION
                    IELV    =    18, THE NUMBER OF ELEVATION-DAMAGE POINTS TO BE CALCULATED
                    GSIZE   =  1.00, GRID CELL SIZE IN ACRES, ELEVATION-AREA TABLE DEVELOPED


ZW A=MISSOURI E=1992 F=AG-EXISTING

                    FILE SYSTEM INFORMATION - A FILE WILL BE CREATED TO PASS DEPTH-AREA DATA TO OTHER
                    ----------------------    HEC PROGRAMS USING THE HEC DATA STORAGE SYSTEM (HECDSS).

                    PROJ    =     MISSOURI
                    ALT     =     AG-EXISTING
                    YEAR    =     1992
```

LAND USE CATEGORY 1 DAMAGE CATEGORY NO. 1

AGGREGATED LAND USE CATEGORY NO. = 0

CROPLAND

DEPTH OF WATER	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	0.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	100.00
50.00	0.00	0.00	0.00	100.00
100.00	0.00	0.00	0.00	100.00
150.00	0.00	0.00	0.00	100.00
200.00	0.00	0.00	0.00	100.00

DENSITY OF THE LAND USE UNITS PER GRID CELL = 1.00

BASE VALUE OF THE STRUCTURE = 0.00
BASE VALUE OF THE CONTENTS = 0.00
BASE VALUE OF OTHER = 0.00
VACANCY FACTOR (PERCENT DEVELOPED) =100.0

LAND USE CATEGORY 2 DAMAGE CATEGORY NO. 2

AGGREGATED LAND USE CATEGORY NO. = 0

WOODLAND

DEPTH OF WATER	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	0.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	5.00
50.00	0.00	0.00	0.00	5.00
100.00	0.00	0.00	0.00	5.00
150.00	0.00	0.00	0.00	5.00
200.00	0.00	0.00	0.00	5.00

DENSITY OF THE LAND USE UNITS PER GRID CELL = 1.00

BASE VALUE OF THE STRUCTURE = 0.00
BASE VALUE OF THE CONTENTS = 0.00
BASE VALUE OF OTHER = 0.00
VACANCY FACTOR (PERCENT DEVELOPED) =100.0

LAND USE CATEGORY 3 DAMAGE CATEGORY NO. 3

AGGREGATED LAND USE CATEGORY NO. = 0

GRASSLAND

DEPTH OF WATER	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	0.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	1.00
50.00	0.00	0.00	0.00	1.00
100.00	0.00	0.00	0.00	1.00
150.00	0.00	0.00	0.00	1.00
200.00	0.00	0.00	0.00	1.00

DENSITY OF THE LAND USE UNITS PER GRID CELL = 1.00

BASE VALUE OF THE STRUCTURE = 0.00
BASE VALUE OF THE CONTENTS = 0.00
BASE VALUE OF OTHER = 0.00
VACANCY FACTOR (PERCENT DEVELOPED) =100.0

LAND USE CATEGORY 4 DAMAGE CATEGORY NO. 4

AGGREGATED LAND USE CATEGORY NO. = 0

WATER

DEPTH OF WATER	PERCENT DAMAGE STRUCTURE	PERCENT DAMAGE CONTENTS	PERCENT DAMAGE OTHER	AMOUNT OF DAMAGE PER GRID CELL IN THOUSAND DOLLARS
0.00	0.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	0.00
50.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	0.00	0.00
150.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	0.00	0.00

DENSITY OF THE LAND USE UNITS PER GRID CELL = 1.00

BASE VALUE OF THE STRUCTURE = 0.00
BASE VALUE OF THE CONTENTS = 0.00
BASE VALUE OF OTHER = 0.00
VACANCY FACTOR (PERCENT DEVELOPED) =100.0

DAMAGE REACH INDEX LOCATION SUMMARY

ID. NO.	REFERENCE FLOOD ELEVATION	POLICY FLOOD ELEVATION	FLOOD PROOFING ELEVATION	EVACUATION ELEVATION	STARTING DAMAGE ELEVATION	DAMAGE ELEVATION INCREMENT	AGGREGATED DAMAGE RCH. ID.	MODIFY LAND USE DENSITY	PRINT MODIFIED LAND USE
1.	210.0	0.0	0.0	0.0	0.0	10.00	0	0	0
2.	210.0	0.0	0.0	0.0	0.0	10.00	0	0	0
6.	210.0	0.0	0.0	0.0	0.0	10.00	0	0	0
7.	150.0	0.0	0.0	0.0	0.0	10.00	0	0	0
8.	150.0	0.0	0.0	0.0	0.0	10.00	0	0	0
9.	150.0	0.0	0.0	0.0	0.0	10.00	0	0	0
10.	150.0	0.0	0.0	0.0	0.0	10.00	0	0	0
11.	150.0	0.0	0.0	0.0	0.0	10.00	0	0	0
12.	150.0	0.0	0.0	0.0	0.0	10.00	0	0	0
13.	150.0	0.0	0.0	0.0	0.0	10.00	0	0	0

SINGLE EVENTS FOR DAMAGE REACHES

DAMAGE REACH NO.	200K EVENT
1.	95.0
2.	95.0
6.	95.0
7.	83.0
8.	83.0
9.	83.0
10.	83.0
11.	83.0
12.	83.0
13.	83.0

DAMAGE CATEGORY	LAND USE CODE	LAND USE
1	1	CROPLAND
2	2	WOODLAND
3	3	GRASSLAND
4	4	WATER

DAMAGE REACH NO. 1 DAMAGE REACH CODE RCH 1

HUGHES COUNTY, UPSTREAM OF PIERRE

ELEVATION - AREA FLOODED (IN ACRES)
DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (-1)	6 (-1)	7 (-1)	8 (-1)	9 (-1)	10 (-1)	TOTAL
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0
60.0	0.0	0.0	22.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.0
70.0	0.0	0.0	59.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	59.0
80.0	0.0	0.0	107.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	107.0
90.0	0.0	0.0	163.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	163.0
100.0	0.0	0.0	222.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	222.0
110.0	0.0	0.0	292.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	292.0
120.0	0.0	0.0	362.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	362.0
130.0	0.0	0.0	462.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	462.0
140.0	0.0	0.0	596.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	596.0
150.0	0.0	0.0	686.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	686.0
160.0	0.0	0.0	807.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	807.0
170.0	0.0	0.0	968.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	968.0
95.0 (200K)	0.0	0.0	194.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	194.0

DAMAGE REACH NO. 2 DAMAGE REACH CODE RCH 2

STANLEY COUNTY, UPSTREAM OF FORT PIERRE

ELEVATION - AREA FLOODED (IN ACRES)
DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (-1)	6 (-1)	7 (-1)	8 (-1)	9 (-1)	10 (-1)	TOTAL
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0	0.0	0.0	1237.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1237.0
60.0	0.0	0.0	1889.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1889.0
70.0	0.0	0.0	2731.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2731.0
80.0	7.0	0.0	3100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3107.0
90.0	29.0	0.0	3266.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3295.0
100.0	58.0	0.0	3436.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3494.0
110.0	93.0	0.0	3574.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3667.0
120.0	148.0	0.0	3714.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3862.0
130.0	216.0	0.0	3815.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4031.0
140.0	218.0	0.0	3889.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4107.0
150.0	218.0	0.0	3951.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4169.0
160.0	218.0	0.0	4005.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4223.0
170.0	218.0	0.0	4015.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4233.0
95.0 (200K)	39.0	0.0	3351.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3390.0

DAMAGE REACH NO. 6 DAMAGE REACH CODE RCH 6

STANLEY COUNTY, DOWNSTREAM OF FORT PIERRE

ELEVATION - AREA FLOODED (IN ACRES)
DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (-1)	6 (-1)	7 (-1)	8 (-1)	9 (-1)	10 (-1)	TOTAL
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0	578.0	0.0	462.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1040.0
60.0	580.0	0.0	607.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1187.0
70.0	580.0	0.0	704.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1284.0
80.0	580.0	0.0	753.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1333.0
90.0	580.0	0.0	782.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1362.0
100.0	580.0	0.0	795.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1375.0
110.0	580.0	0.0	806.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1386.0
120.0	580.0	0.0	810.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1390.0
130.0	580.0	0.0	810.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1390.0
140.0	580.0	0.0	810.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1390.0
150.0	580.0	0.0	810.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1390.0
160.0	580.0	0.0	810.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1390.0
170.0	580.0	0.0	810.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1390.0
95.0 (200K)	580.0	0.0	790.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1370.0

DAMAGE REACH NO. 7 DAMAGE REACH CODE RCH 7

HUGHES COUNTY, DOWNSTREAM OF PIERRE

ELEVATION - AREA FLOODED (IN ACRES)
DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (-1)	6 (-1)	7 (-1)	8 (-1)	9 (-1)	10 (-1)	TOTAL
0.0	9.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0
10.0	14.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
20.0	16.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.0
30.0	789.0	0.0	250.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1039.0
40.0	1775.0	0.0	621.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2396.0
50.0	2615.0	0.0	1196.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3811.0
60.0	3459.0	0.0	1660.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5119.0
70.0	3984.0	0.0	2245.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6229.0
80.0	4446.0	0.0	3316.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7762.0
90.0	4597.0	0.0	4360.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8957.0
100.0	4689.0	0.0	5270.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9959.0
110.0	4780.0	0.0	6030.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10810.0
120.0	4855.0	0.0	6942.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11797.0
130.0	4936.0	0.0	7791.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12727.0
140.0	5048.0	0.0	8386.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13434.0
150.0	5126.0	0.0	8875.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14001.0
160.0	5190.0	0.0	9190.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14380.0
170.0	5226.0	0.0	9373.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14599.0
83.0 (200K)	4524.0	0.0	3659.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8183.0

DAMAGE REACH NO. 8 DAMAGE REACH CODE RCH 8

STANLEY COUNTY, DS OF REACH 6

ELEVATION - AREA FLOODED (IN ACRES)
DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (-1)	6 (-1)	7 (-1)	8 (-1)	9 (-1)	10 (-1)	TOTAL
0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
10.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
20.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
30.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
40.0	0.0	0.0	1511.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1511.0
50.0	0.0	0.0	2403.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2403.0
60.0	0.0	0.0	2828.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2828.0
70.0	0.0	0.0	3100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3100.0
80.0	0.0	0.0	3361.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3361.0
90.0	0.0	0.0	3870.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3870.0
100.0	0.0	0.0	4111.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4111.0
110.0	0.0	0.0	4327.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4327.0
120.0	0.0	0.0	4499.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4499.0
130.0	0.0	0.0	4602.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4602.0
140.0	0.0	0.0	4641.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4641.0
150.0	0.0	0.0	4653.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4653.0
160.0	0.0	0.0	4654.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4654.0
170.0	0.0	0.0	4654.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4654.0
83.0 (200K)	0.0	0.0	3567.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3567.0

DAMAGE REACH NO. 9 DAMAGE REACH CODE RCH 9

LOWER BRULE RESERVATION, STANLEY COUNTY

ELEVATION - AREA FLOODED (IN ACRES)
DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (-1)	6 (-1)	7 (-1)	8 (-1)	9 (-1)	10 (-1)	TOTAL
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0	635.0	3.0	1626.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2264.0
40.0	1730.0	225.0	2332.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4287.0
50.0	2281.0	256.0	2820.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5357.0
60.0	2823.0	425.0	3189.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6437.0
70.0	3274.0	464.0	3366.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7104.0
80.0	3368.0	464.0	3549.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7381.0
90.0	3374.0	464.0	3719.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7557.0
100.0	3374.0	464.0	3780.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7618.0
110.0	3374.0	464.0	3803.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7641.0
120.0	3374.0	464.0	3814.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7652.0
130.0	3374.0	464.0	3822.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7660.0
140.0	3374.0	464.0	3831.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7669.0
150.0	3374.0	464.0	3838.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7676.0
160.0	3374.0	464.0	3844.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7682.0
170.0	3374.0	464.0	3854.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7692.0
83.0 (200K)	3374.0	464.0	3608.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7446.0

DAMAGE REACH NO. 10 DAMAGE REACH CODE RCH 10

CROW CREEK RESERVATION, HUGHES COUNTY

ELEVATION - AREA FLOODED (IN ACRES)
DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (-1)	6 (-1)	7 (-1)	8 (-1)	9 (-1)	10 (-1)	TOTAL
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.0	826.0	118.0	1569.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2513.0
30.0	2363.0	292.0	3027.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5682.0
40.0	4060.0	431.0	3724.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8215.0
50.0	5563.0	534.0	4364.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10461.0
60.0	7550.0	627.0	5017.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13194.0
70.0	8874.0	709.0	5422.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15005.0
80.0	10116.0	805.0	6056.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16977.0
90.0	11418.0	984.0	6391.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18793.0
100.0	11868.0	984.0	6568.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19420.0
110.0	11989.0	984.0	6689.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19662.0
120.0	12078.0	984.0	6777.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19839.0
130.0	12149.0	984.0	6871.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20004.0
140.0	12202.0	984.0	6973.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20159.0
150.0	12221.0	984.0	7046.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20251.0
160.0	12245.0	984.0	7069.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20298.0
170.0	12274.0	984.0	7071.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20329.0
83.0 (200K)	10654.0	963.0	6188.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17805.0

DAMAGE REACH NO. 11 DAMAGE REACH CODE RCH 11

LOWER BRULE RESERVATION, LYMAN COUNTY

ELEVATION - AREA FLOODED (IN ACRES)
DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (-1)	6 (-1)	7 (-1)	8 (-1)	9 (-1)	10 (-1)	TOTAL
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	526.0	0.0	58.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	584.0
20.0	3184.0	3.0	917.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4104.0
30.0	5951.0	73.0	2009.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8033.0
40.0	7537.0	144.0	3117.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10798.0
50.0	8749.0	213.0	4285.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13247.0
60.0	9722.0	240.0	5579.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15541.0
70.0	10653.0	240.0	7292.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18185.0
80.0	11758.0	240.0	9184.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21182.0
90.0	13452.0	240.0	11554.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25246.0
100.0	14509.0	240.0	13510.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28259.0
110.0	15073.0	240.0	14976.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30289.0
120.0	15469.0	240.0	15799.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31508.0
130.0	15996.0	240.0	16390.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32626.0
140.0	16496.0	240.0	16731.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33467.0
150.0	16844.0	240.0	16958.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34042.0
160.0	17212.0	240.0	17131.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34583.0
170.0	17590.0	240.0	17276.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35106.0
83.0 (200K)	12517.0	240.0	9891.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22648.0

DAMAGE REACH NO. 12 DAMAGE REACH CODE RCH 12

CROW CREEK RESERVATION, HYDE COUNTY

ELEVATION - AREA FLOODED (IN ACRES)
DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (-1)	6 (-1)	7 (-1)	8 (-1)	9 (-1)	10 (-1)	TOTAL
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0
30.0	46.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.0
40.0	62.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.0
50.0	77.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.0
60.0	98.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
70.0	149.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	159.0
80.0	208.0	0.0	23.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	231.0
90.0	255.0	0.0	32.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	287.0
100.0	329.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	364.0
110.0	406.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	441.0
120.0	473.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	508.0
130.0	553.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	588.0
140.0	627.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	662.0
150.0	695.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	730.0
160.0	753.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	788.0
170.0	803.0	0.0	36.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	839.0
83.0 (200K)	222.0	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	249.0

DAMAGE REACH NO. 13 DAMAGE REACH CODE RCH 13

CROW CREEK RESERVATION, BUFFALO COUNTY

ELEVATION - AREA FLOODED (IN ACRES)
DAMAGE CATEGORIES

WATER SURFACE ELEVATION	1 (1)	2 (2)	3 (3)	4 (4)	5 (-1)	6 (-1)	7 (-1)	8 (-1)	9 (-1)	10 (-1)	TOTAL
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	182.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	182.0
20.0	202.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	202.0
30.0	321.0	0.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	337.0
40.0	597.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	632.0
50.0	1350.0	0.0	138.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1488.0
60.0	2844.0	0.0	809.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3653.0
70.0	5067.0	0.0	2098.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7165.0
80.0	6319.0	0.0	2892.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9211.0
90.0	6899.0	0.0	3048.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9947.0
100.0	7270.0	0.0	3102.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10372.0
110.0	7487.0	0.0	3122.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10609.0
120.0	7628.0	0.0	3123.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10751.0
130.0	7699.0	0.0	3123.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10822.0
140.0	7756.0	0.0	3123.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10879.0
150.0	7818.0	0.0	3126.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10944.0
160.0	7864.0	0.0	3131.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10995.0
170.0	7901.0	0.0	3148.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11049.0
83.0	6502.0	0.0	2979.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9481.0
(200K)											

SINGLE EVENT DAMAGES

AGGREGATED DAMAGE REACH NO. 1 200K EVENT

AGGREGATED DAMAGE CATEGORIES

DAM RCH	W.S. ELEV	1	2	3	4	5	6	7	8	9	10	TOTAL
1	95.00	166.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	166.60
2	95.00	6068.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6068.30
6	95.00	*58781.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*58781.50
7	83.00	*********	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*********
8	83.00	3332.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3332.50
9	83.00	*********	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*********
10	83.00	*********	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*********
11	83.00	*********	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*********
12	83.00	*19931.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*19931.70
13	83.00	*********	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*********
TOTAL		*********	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*********

++++++++++++++++++++
END OF RUN
DAMCAL PROGRAM STOP
++++++++++++++++++++

Elapsed CPU time is 302 seconds or 5.033 minutes.

C-4. HEC-DSS Displays

The following displays are output from HEC-DAMCAL into HEC-DSS.

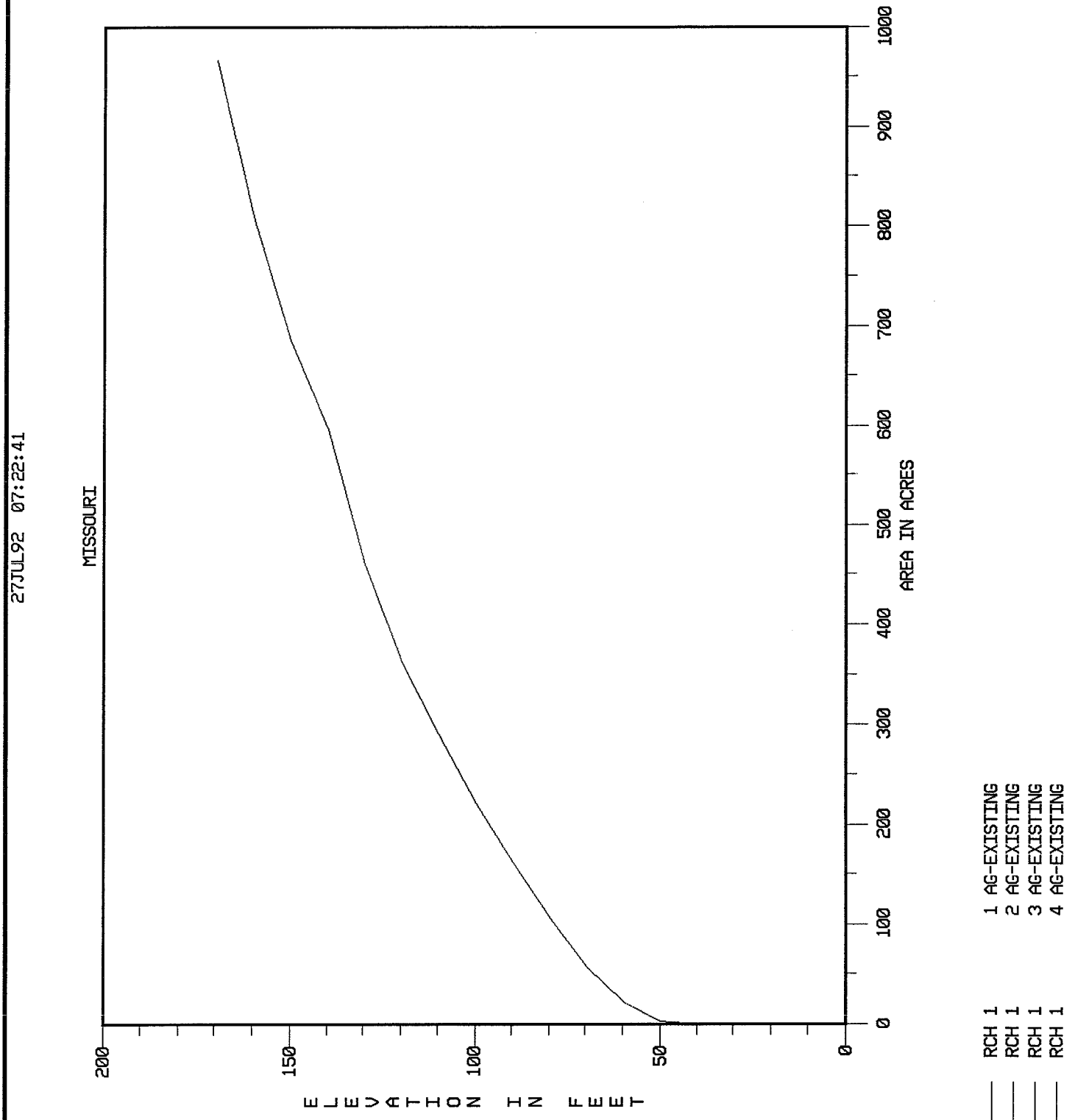

FIGURE C-7. Damage Reach 1 Elevation - Crop Area Relationships

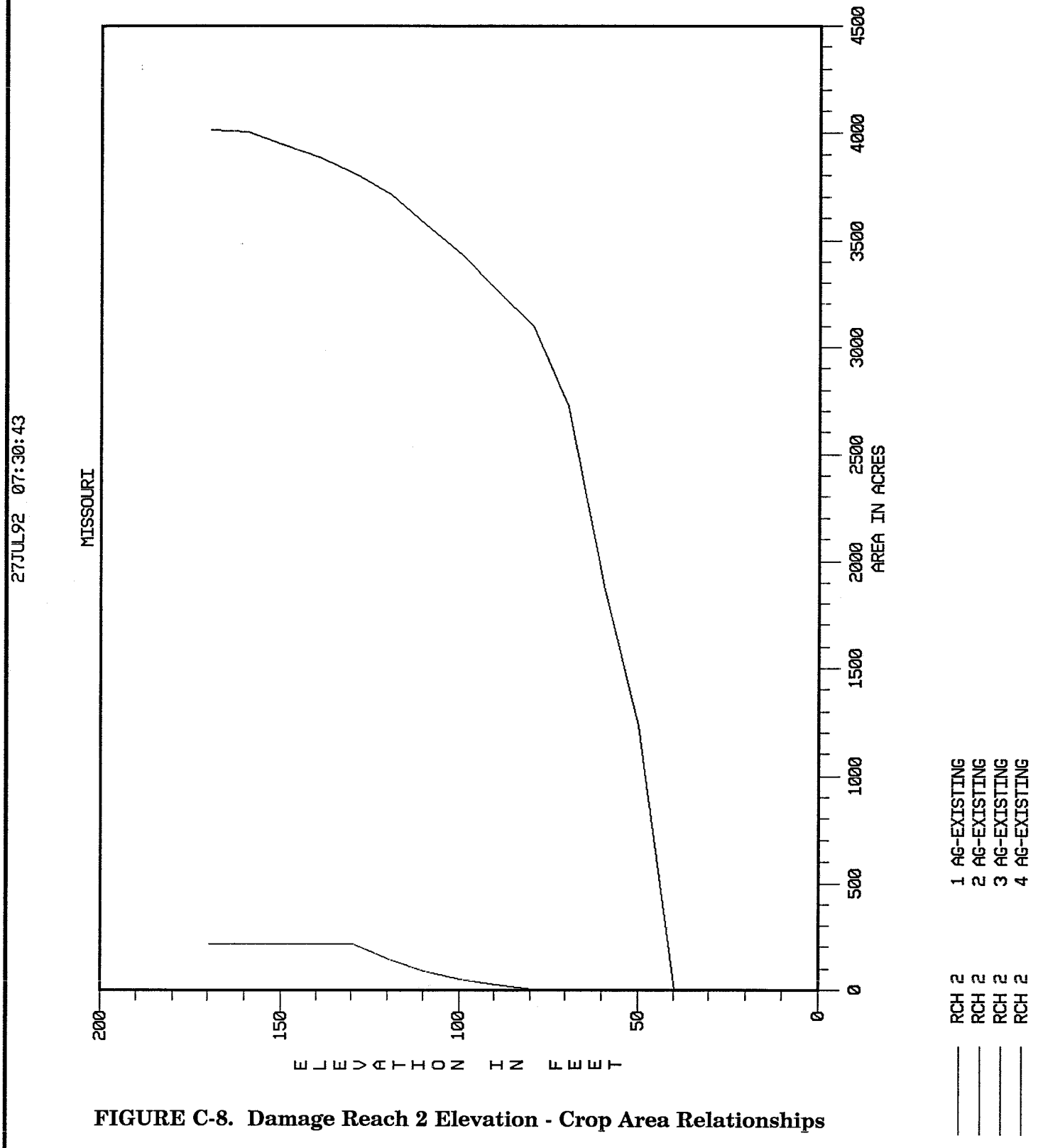

FIGURE C-8. Damage Reach 2 Elevation - Crop Area Relationships

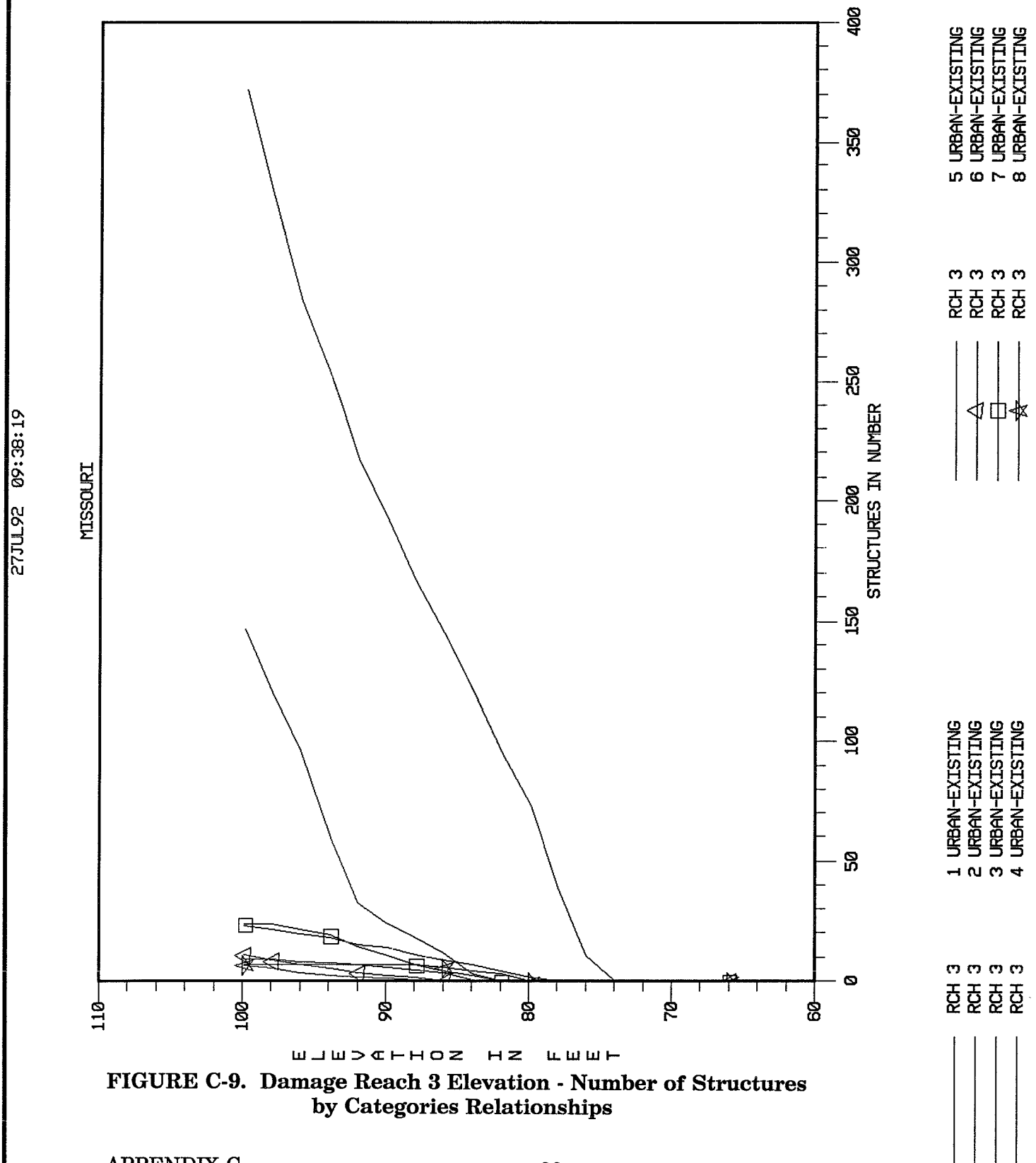

FIGURE C-9. Damage Reach 3 Elevation - Number of Structures by Categories Relationships

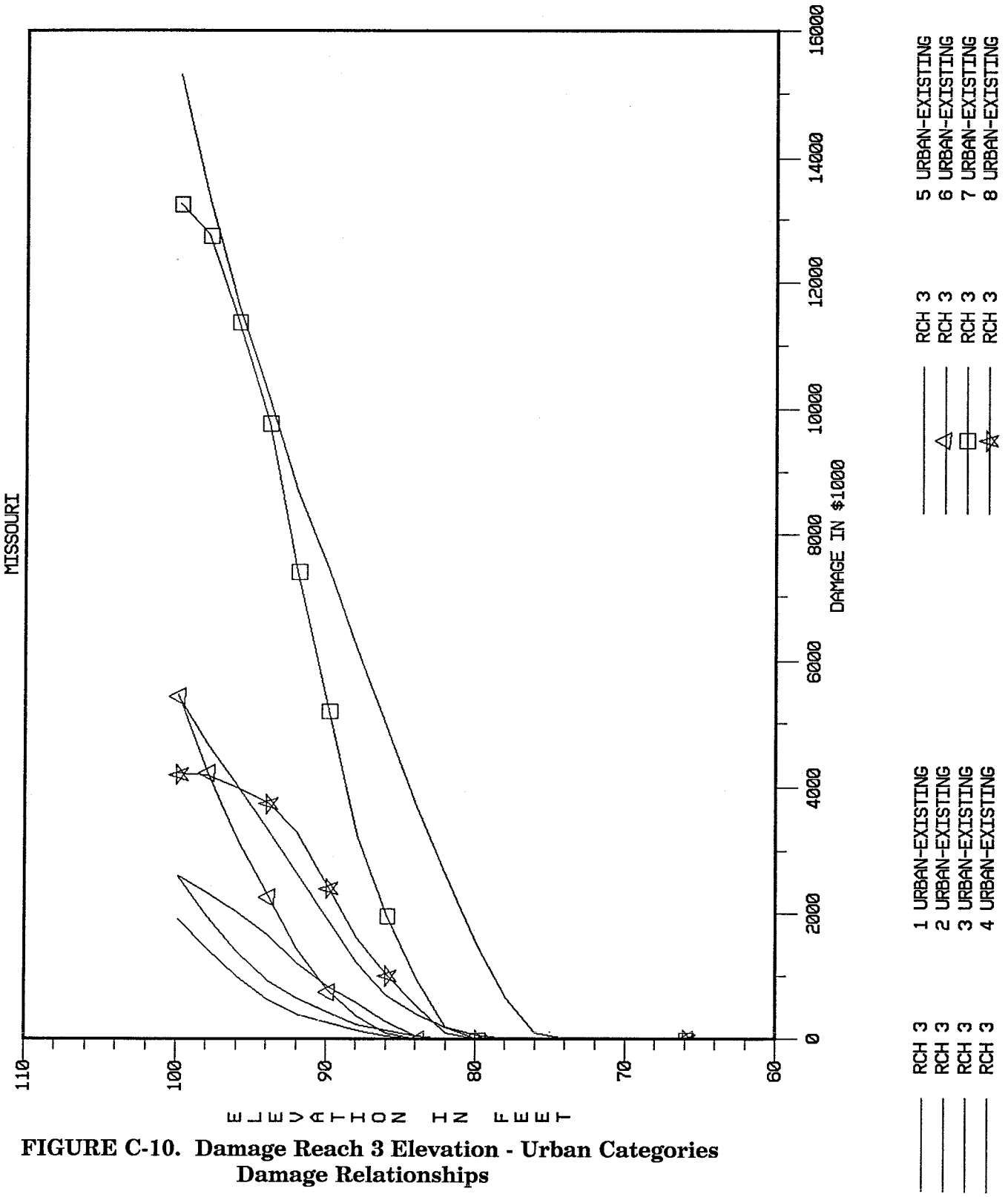

FIGURE C-10. Damage Reach 3 Elevation - Urban Categories Damage Relationships

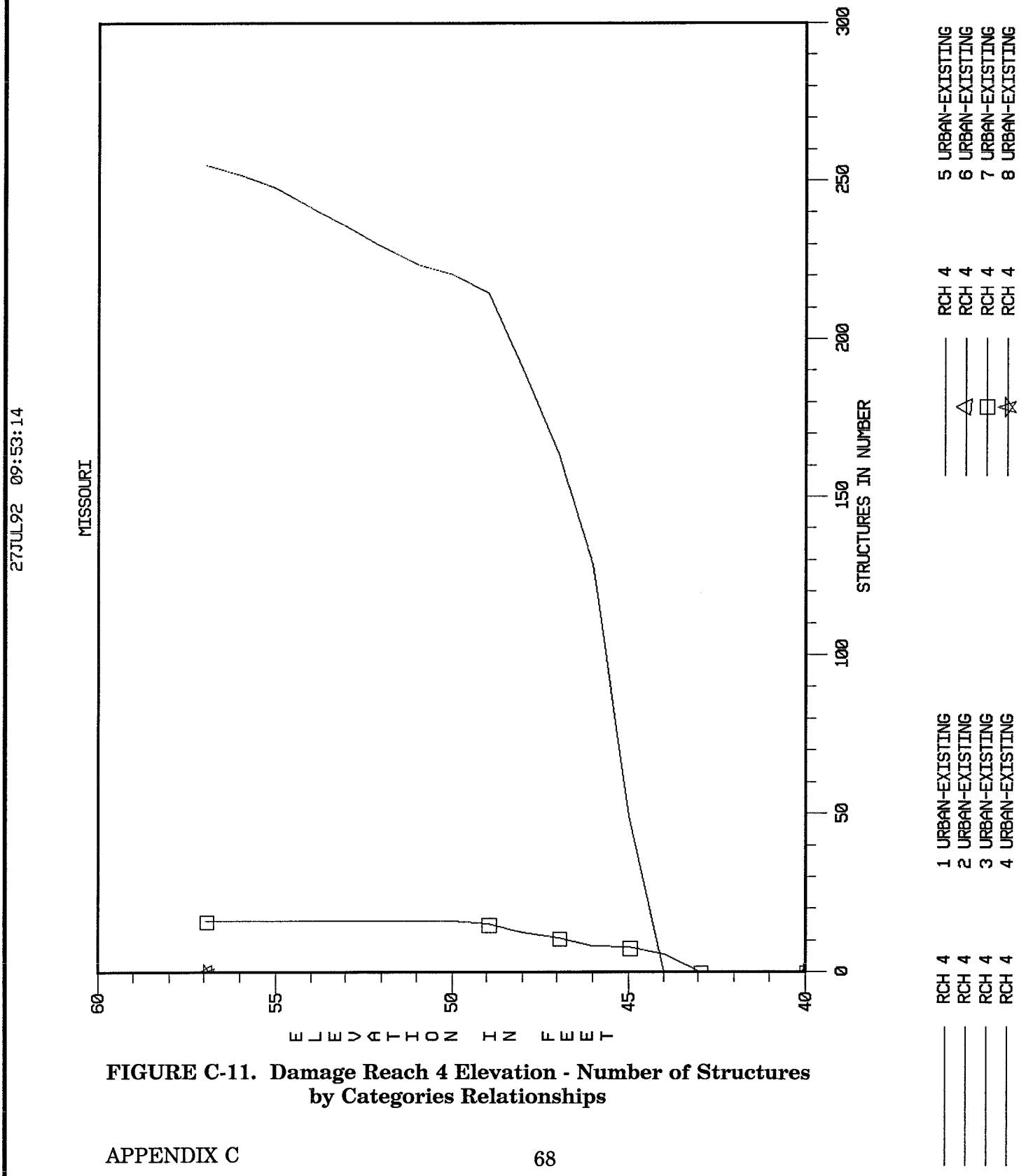

FIGURE C-11. Damage Reach 4 Elevation - Number of Structures by Categories Relationships

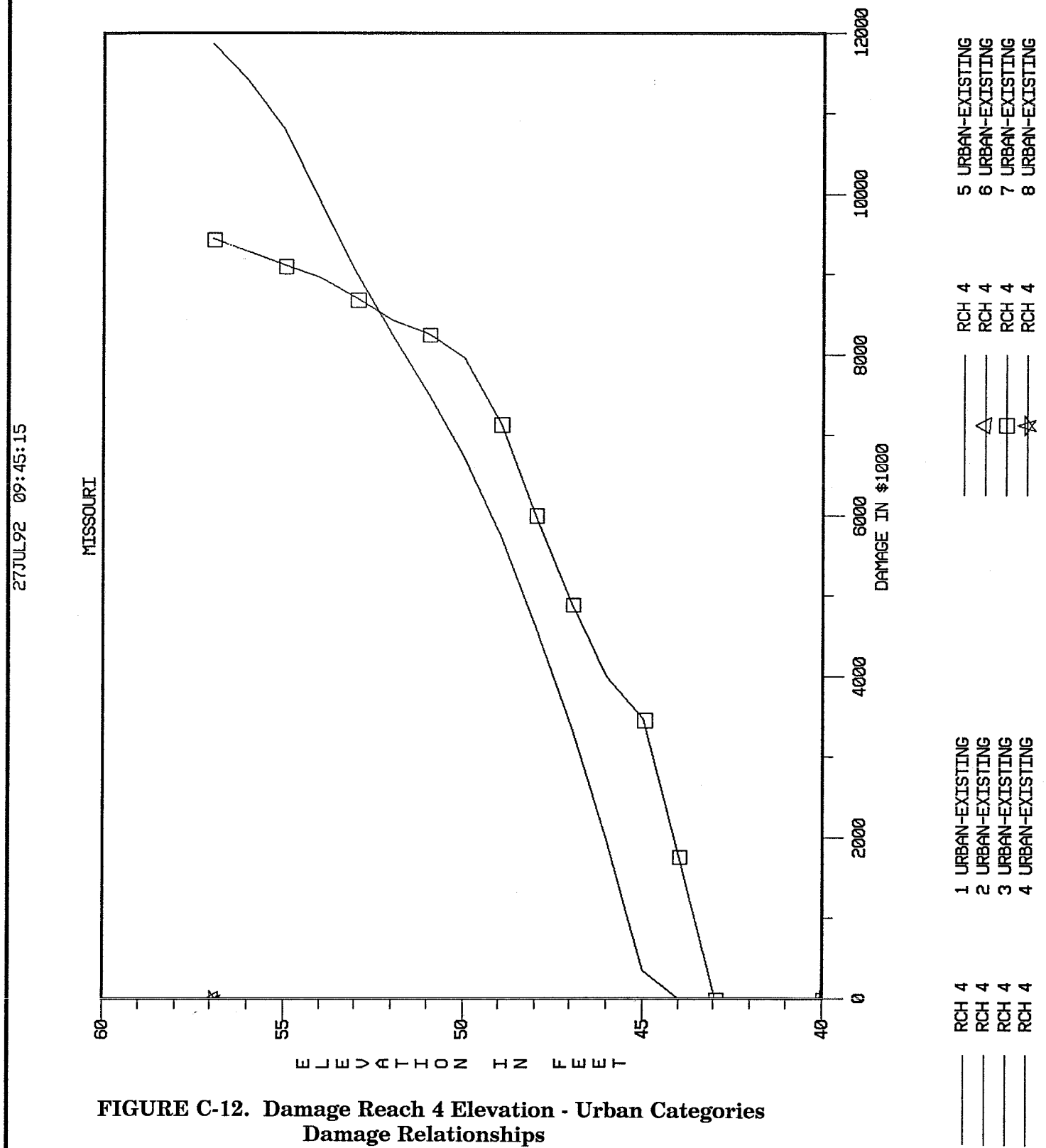

FIGURE C-12. Damage Reach 4 Elevation - Urban Categories Damage Relationships

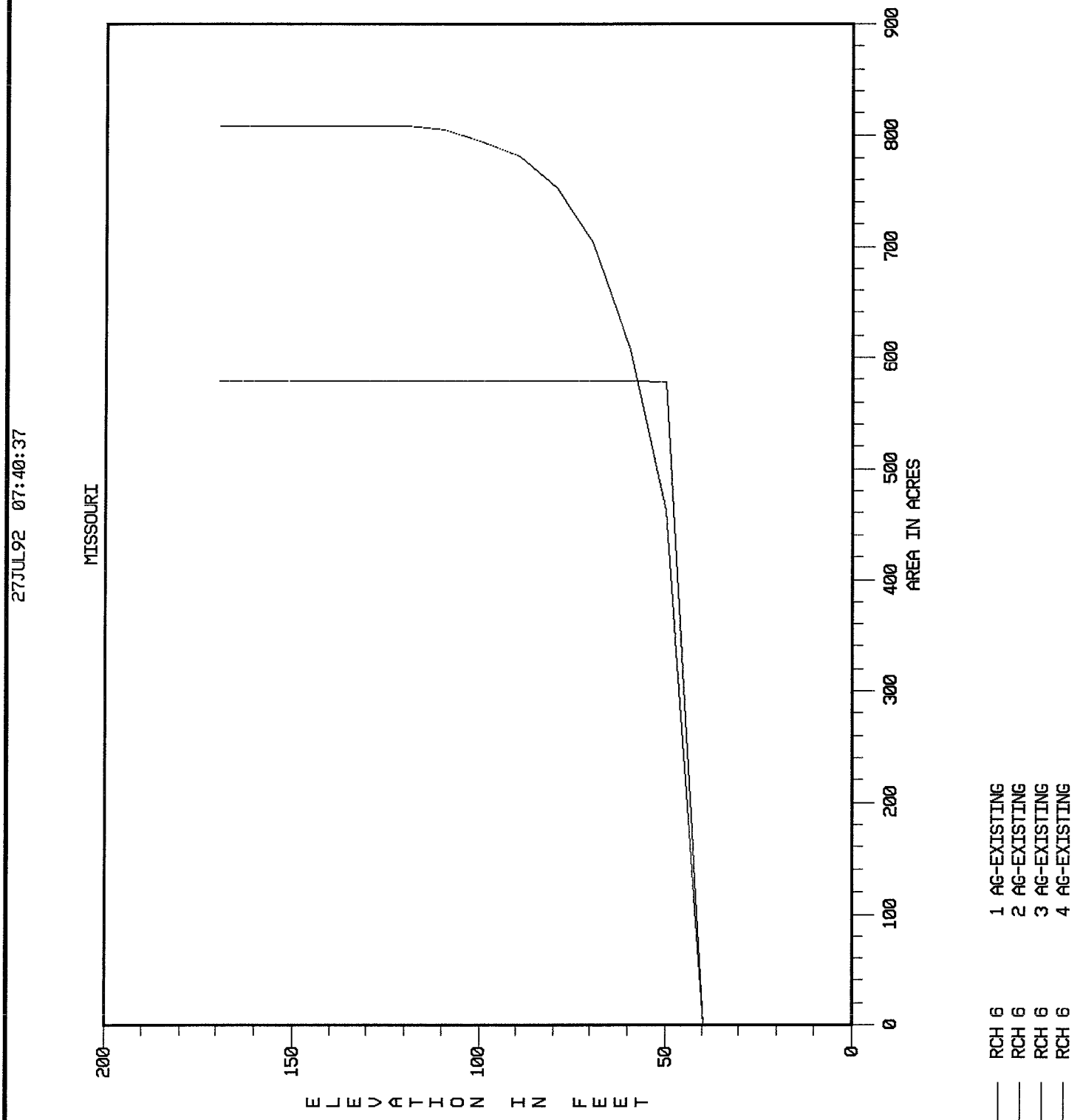

FIGURE C-13. Damage Reach 6 Elevation - Crop Area Relationships

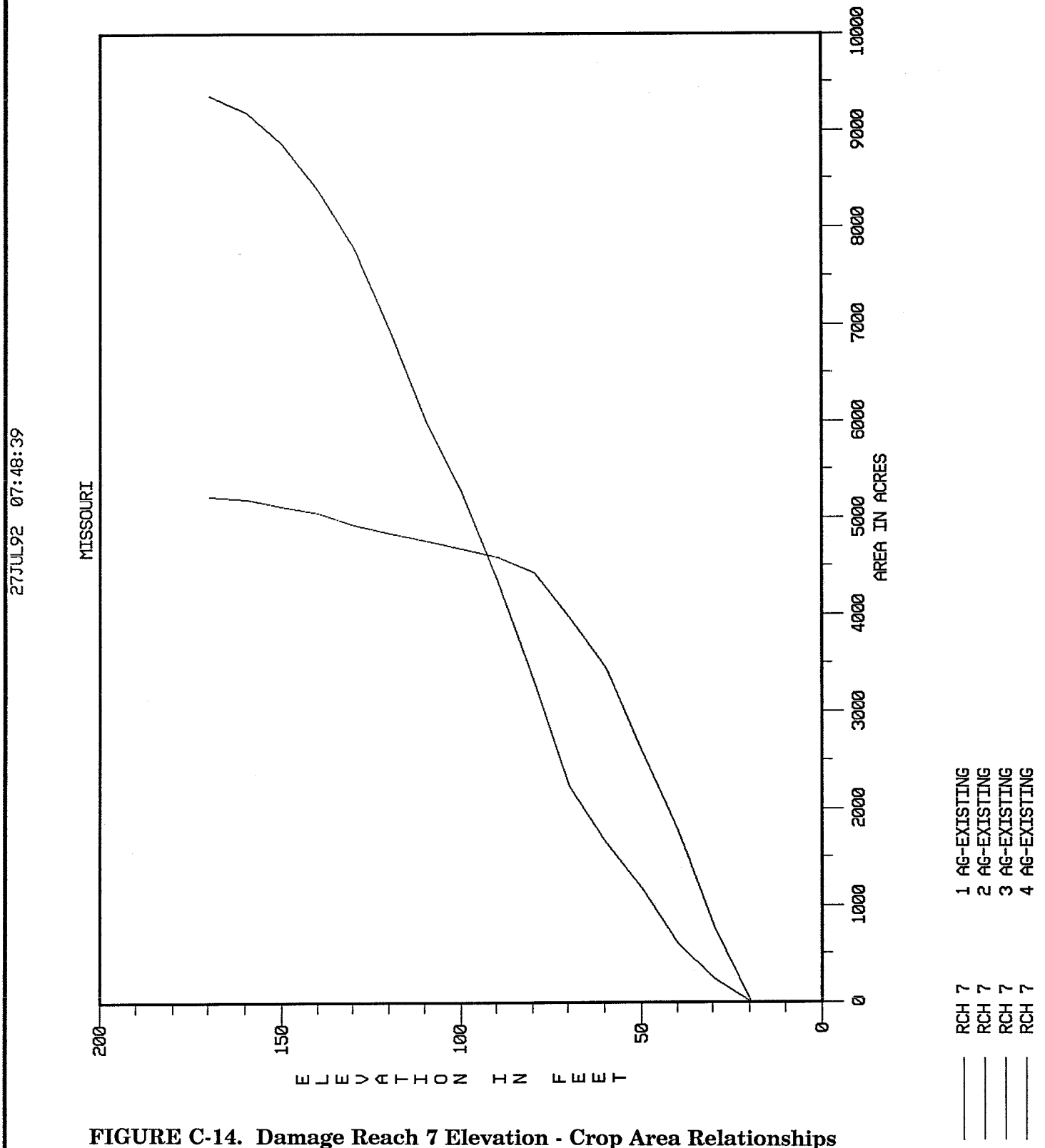

FIGURE C-14. Damage Reach 7 Elevation - Crop Area Relationships

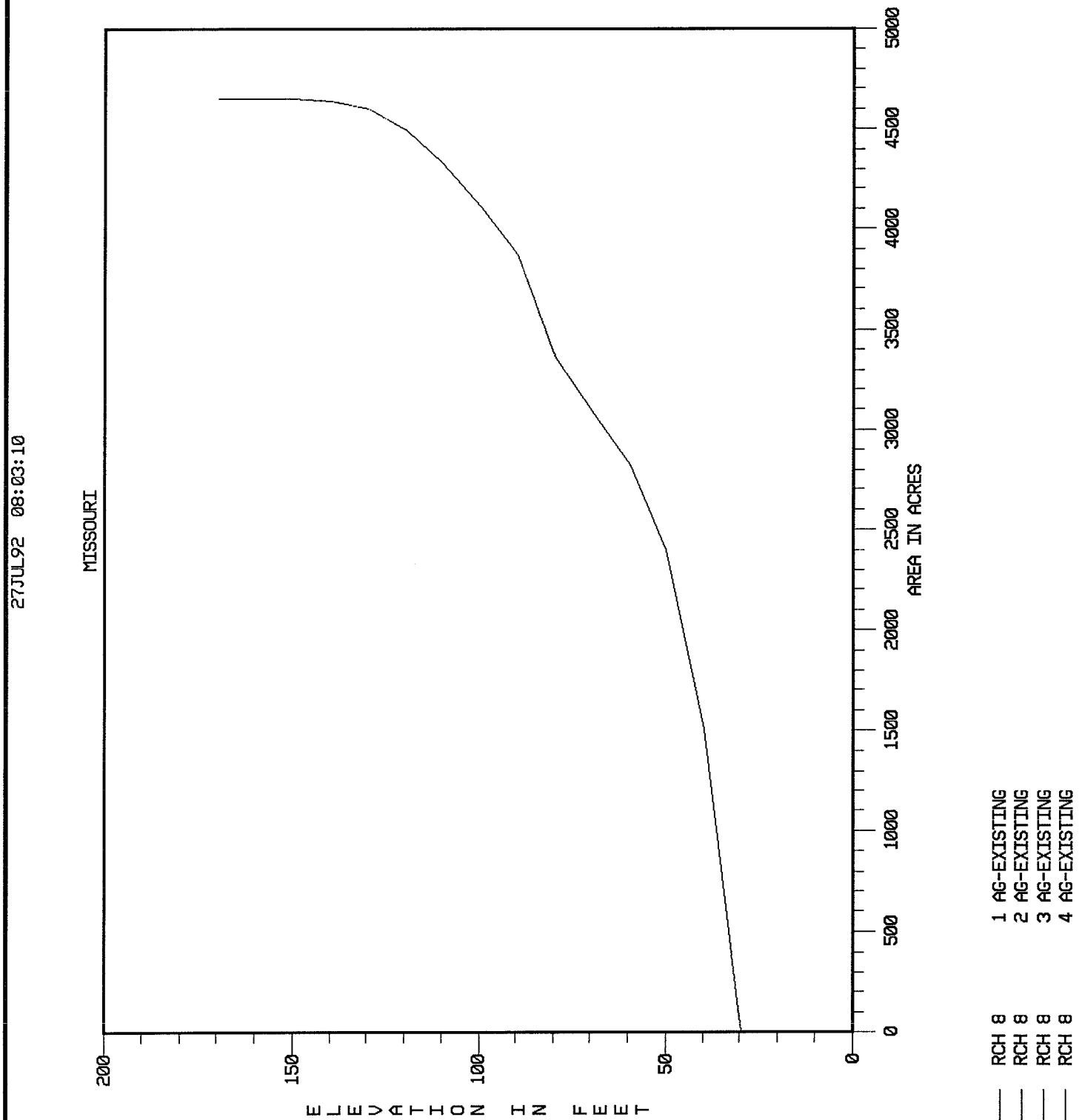

FIGURE C-15. Damage Reach 8 Elevation - Crop Area Relationships

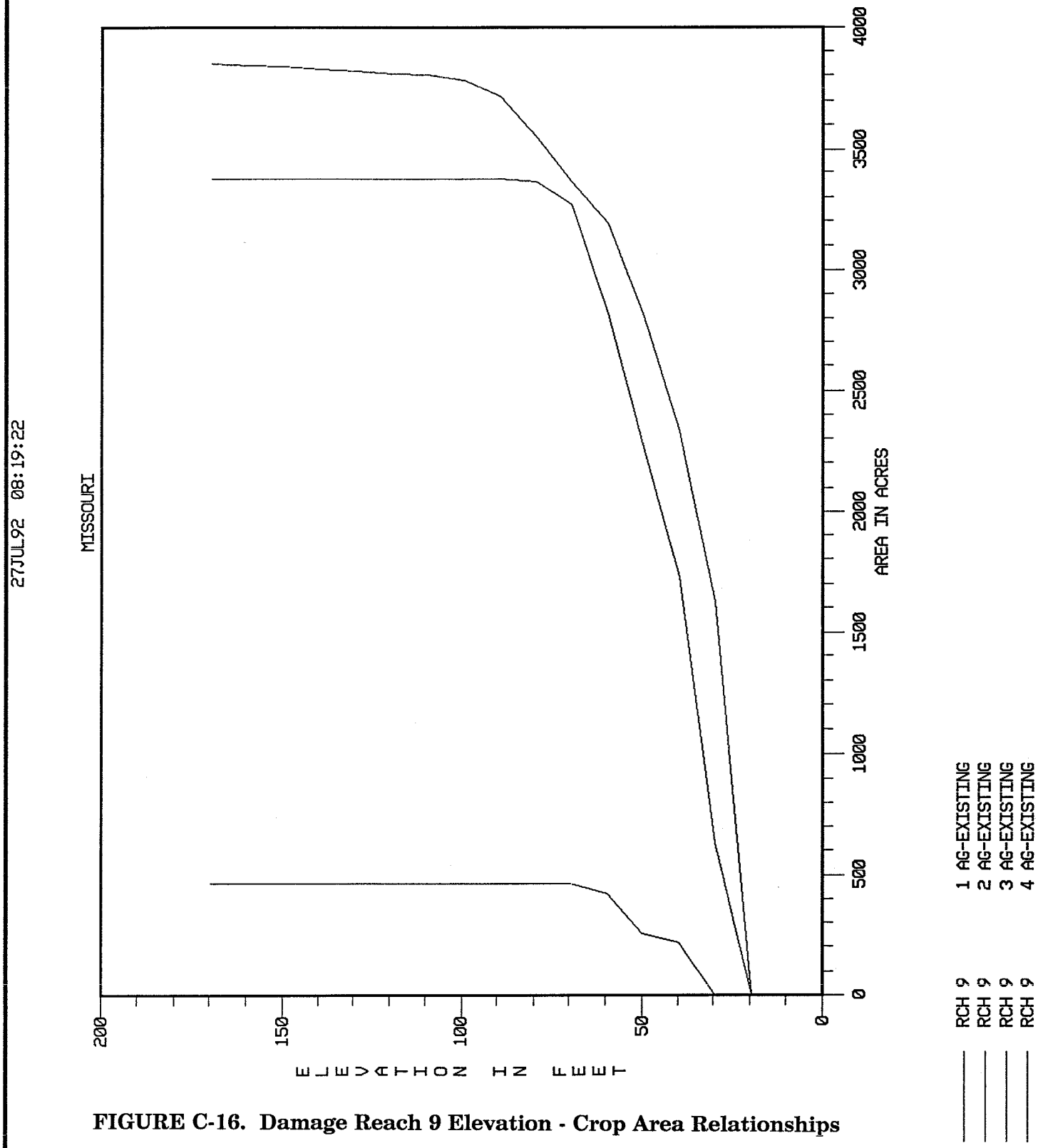

FIGURE C-16. Damage Reach 9 Elevation - Crop Area Relationships

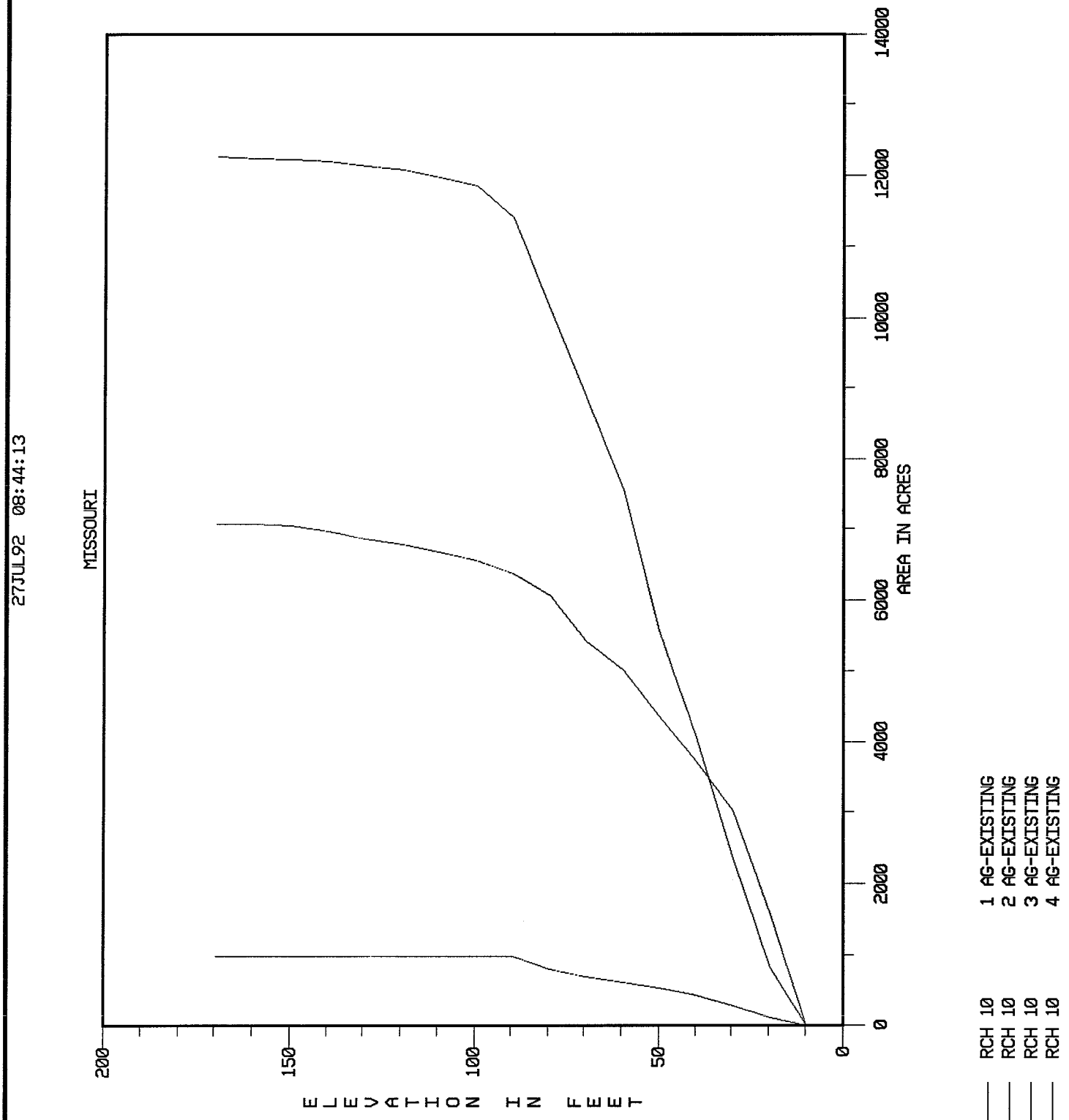

FIGURE C-17. Damage Reach 10 Elevation - Crop Area Relationships

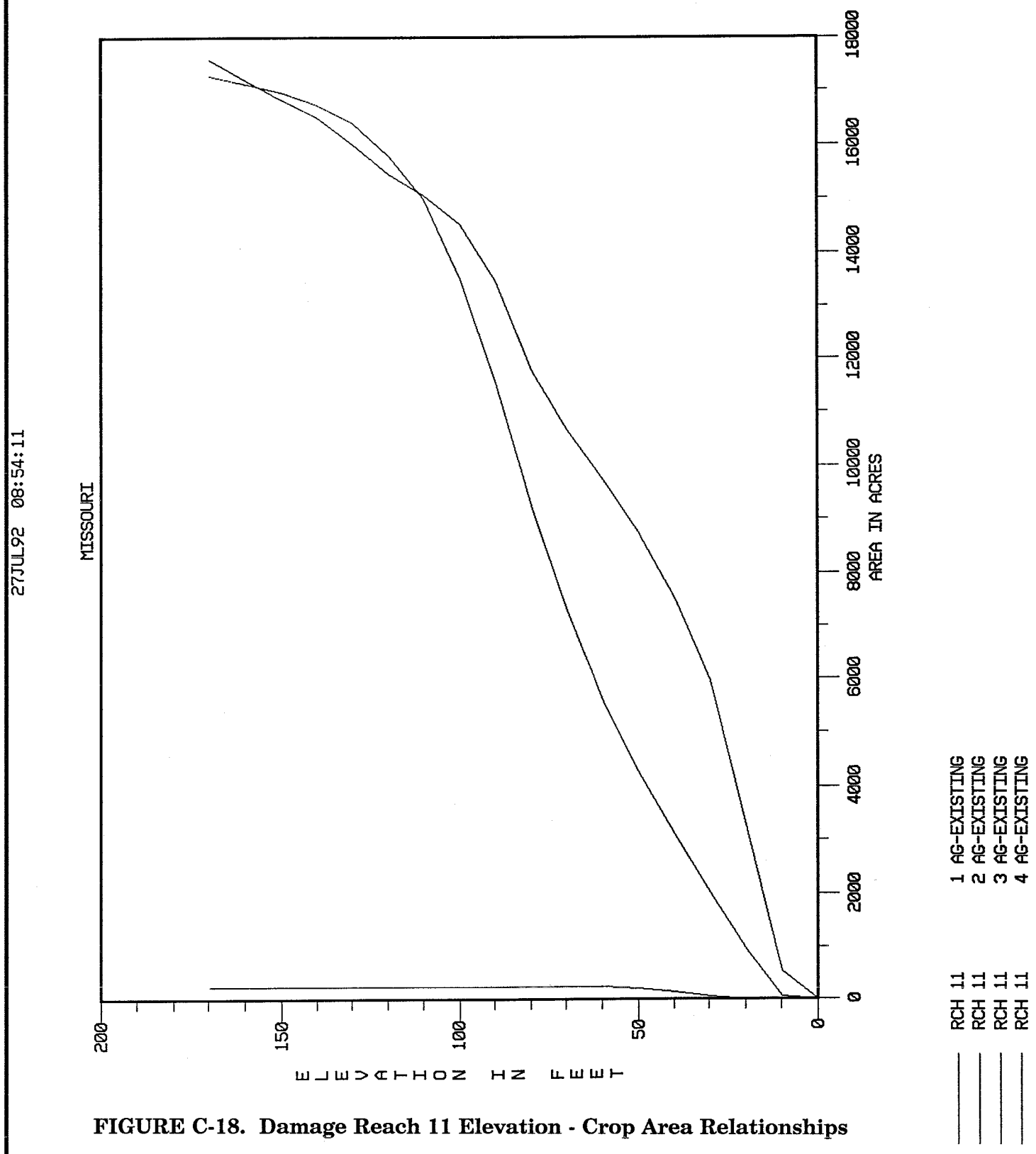

FIGURE C-18. Damage Reach 11 Elevation - Crop Area Relationships

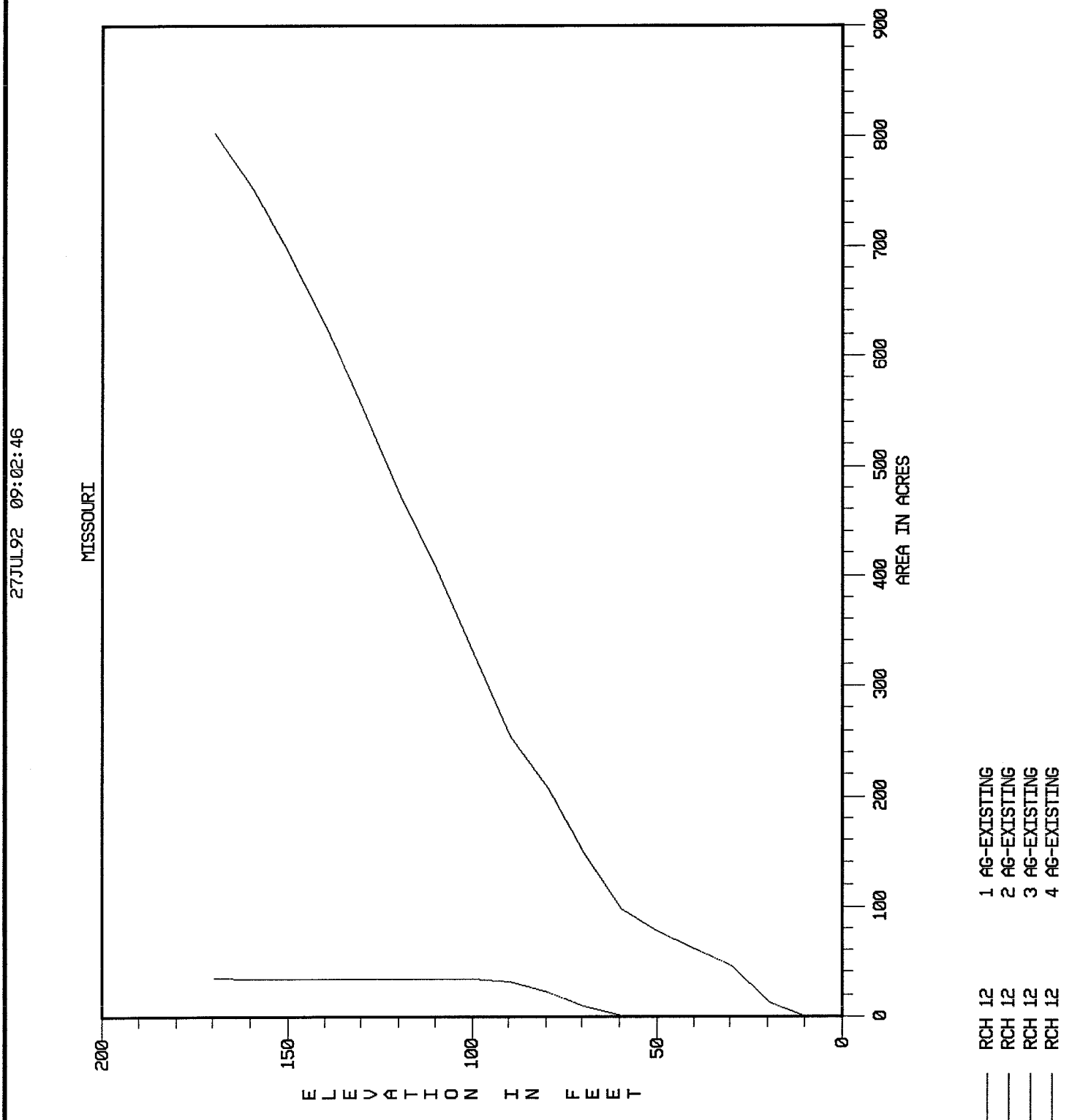

FIGURE C-19. Damage Reach 12 Elevation - Crop Area Relationships

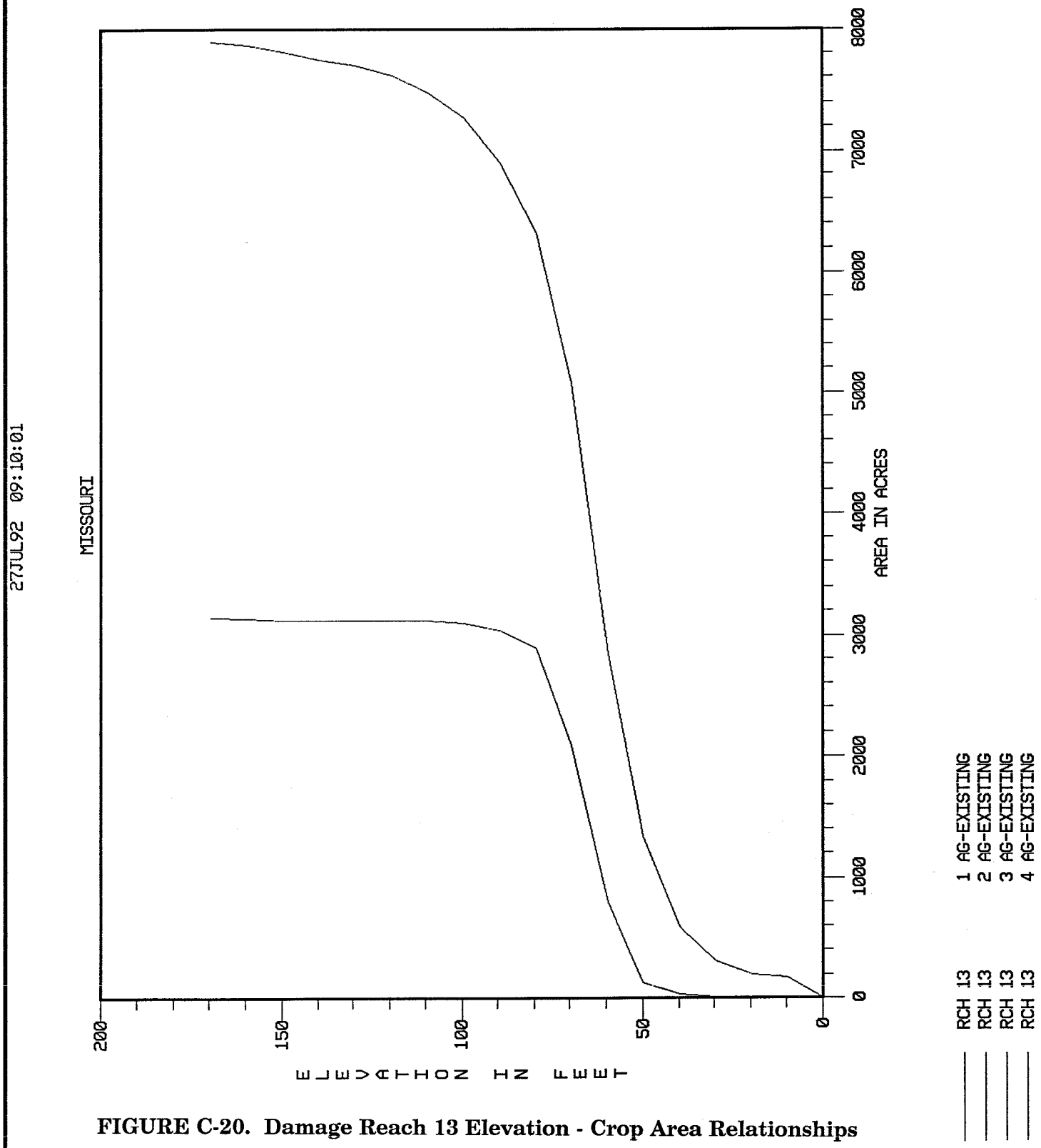

FIGURE C-20. Damage Reach 13 Elevation - Crop Area Relationships

APPENDIX D

HEC-PBA DATA

APPENDIX D

HEC-PBA DATA

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APPENDIX D

HEC-PBA DATA

D-1. HEC-PBA Input - Preprocessor and Analysis Program Input Files

Preprocessor Program Input Data

```
T1 MISSOURI RIVER
T2 OAHE DAM TO BIG BEND DAM IN SOUTH DAKOTA
T3 TEST DATA       JUNE 1992
J1      0        0        0
BD OMAHA OMAHA DISTRICT
BS    SD SOUTH DAKOTA
BC  HUGH HUGHES COUNTY
BC  STAN STANLEY COUNTY
BC  LYMN LYMAN COUNTY
BC  HYDE HYDE COUNTY
BC  BUFF BUFFALO COUNTY
BB  SUBA OPEN RIVER
BB  SUBB LAKE SHARPE
BB  CROW CRW RESERVATION
BB  LBRU LBR RESERVATION
BW  MISS MISSOURI RIVER
BG CONG1 REP TIM JOHNSON
BX  PIER PIERRE
BX  FTPR FORT PIERRE
BX  LOWB LOWER BRULE
BX  FTTM FORT THOMPSON
BX  CHAM CHAMBERLAIN
GA         GAGE 3
ZH      MISSOURI          GAGE 3             1DAY       REGULATED
GA        GAGE 4
ZH      MISSOURI          GAGE 4             1DAY       REGULATED
GA       GAGE 11
ZH      MISSOURI         GAGE 11             1DAY       REGULATED
CR WHEAT      28  BUSHEL    3.15   16.00       5    SPRING WHEAT
CS WHEAT      90     115     140       7
ZC A=SOUTH DAKOTA B=WHEAT C=DAY-LOSS E=1992
CD     0       1       3       7
CR  CORN      91  BUSHEL    2.20   28.00       5            CORN
CS  CORN     120     145     165      10
ZC A=SOUTH DAKOTA B=CORN C=DAY-LOSS E=1992
CD     0       1       3       7
CR  OATS      50  BUSHEL    1.20   23.00       5            OATS
CS  OATS      90     127     145       7
ZC A=SOUTH DAKOTA B=OATS C=DAY-LOSS E=1992
CD     0       1       3       7
CR  MILO      41  BUSHEL    2.04   18.00       5         SORGHUM
CS  MILO     125     161     180       7
ZC A=SOUTH DAKOTA B=SORGHUM C=DAY-LOSS E=1992
CD     0       1       3       7
DR RCH 1  GAGE 3       0 HUGHES COUNTY, US OF PIERRE
DB OMAHA      SD    HUGH             MISS    SUBA   CONG1
DS  OAHE OAHE RESERVOIR
FS    40
ZR A=MISSOURI B=RCH 1  C=ELEVATION-CURVES E=1992 F=AG-EXISTING
CP WHEAT      18
```

```
CP  CORN       36
CP  OATS       14
CP  MILO       10
DR RCH 2  GAGE 4        0 STANLEY COUNTY, US OF FORT PIERRE
DB OMAHA       SD    STAN            MISS    SUBA   CONG1
DS  OAHE OAHE RESERVOIR
FS    40
ZR A=MISSOURI B=RCH 2  C=ELEVATION-CURVES E=1992 F=AG-EXISTING
CP WHEAT       29
CP  OATS       21
CP  MILO       50
DR RCH 3  GAGE 3        0 CITY OF PIERRE
DB OMAHA       SD    HUGH            MISS    SUBA   CONG1
DS  OAHE OAHE RESERVOIR
FS    66
ZR A=MISSOURI B=RCH 3 C=ELEVATION-CURVES E=1992 F=URBAN-EXISTING
UC   RES      180 RESIDENTIAL
UC   COM      180 COMMERCIAL
UC   IND      180 INDUSTRIAL
UC   PUB      180 PUBLIC WORKS
UC OTHER       30 OPEN SPACE
DR RCH 4  GAGE 4        0 CITY OF FORT PIERRE
DB OMAHA       SD    HUGH            MISS    SUBA   CONG1
DS  OAHE OAHE RESERVOIR
FS    40
ZR A=MISSOURI B=RCH 4 C=ELEVATION-CURVES E=1992 F=URBAN-EXISTING
UC   RES      180 RESIDENTIAL
UC   COM      180 COMMERCIAL
UC   IND      180 INDUSTRIAL
UC   PUB      180 PUBLIC WORKS
UC OTHER       30 OPEN SPACE
DR RCH 6  GAGE 4        0 STANLEY COUNTY DS OF FORT PIERRE
DB OMAHA       SD    STAN            MISS    SUBA   CONG1
DS  OAHE OAHE RESERVOIR
FS    40
ZR A=MISSOURI B=RCH 6  C=ELEVATION-CURVES E=1992 F=AG-EXISTING
CP WHEAT       29
CP  OATS       21
CP  MILO       50
DR RCH 7 GAGE 11        0 HUGHES COUNTY, DS OF PIERRE
DB OMAHA       SD    HUGH            MISS    SUBB   CONG1
DS  OAHE OAHE RESERVOIR
FS    20
ZR A=MISSOURI B=RCH 7  C=ELEVATION-CURVES E=1992 F=AG-EXISTING
CP WHEAT       18
CP  CORN       36
CP  OATS       14
CP  MILO       10
DR RCH 8 GAGE 11        0 STANLEY COUNTY, DS OF FORT PIERRE
DB OMAHA       SD    STAN            MISS    SUBB   CONG1
DS  OAHE OAHE RESERVOIR
FS    30
ZR A=MISSOURI B=RCH 8  C=ELEVATION-CURVES E=1992 F=AG-EXISTING
CP WHEAT       29
CP  OATS       21
CP  MILO       50
DR RCH 9 GAGE 11        0 LOWER BRULE RESERVATION, STANLEY COUNTY
DB OMAHA       SD    STAN            MISS    LBRU   CONG1
DS  OAHE OAHE RESERVOIR
FS    20
ZR A=MISSOURI B=RCH 9  C=ELEVATION-CURVES E=1992 F=AG-EXISTING
CP WHEAT       29
CP  OATS       21
CP  MILO       50
DR RCH10 GAGE 11        0 CROW CREEK RESERVATION, HUGHES COUNTY
```

```
DB OMAHA       SD    HUGH             MISS    CROW   CONG1
DS  OAHE OAHE RESERVOIR
FS    10
ZR A=MISSOURI B=RCH 10 C=ELEVATION-CURVES E=1992 F=AG-EXISTING
CP WHEAT       18
CP  CORN       36
CP  OATS       14
CP  MILO       10
DR RCH11 GAGE 11        0 LOWER BRULE RESERVATION, LYMAN COUNTY
DB OMAHA       SD    LYMN             MISS    LBRU   CONG1
DS  OAHE OAHE RESERVOIR
FS     0
ZR A=MISSOURI B=RCH 11 C=ELEVATION-CURVES E=1992 F=AG-EXISTING
CP  CORN       16
CP  OATS       17
CP  MILO       67
DR RCH12 GAGE 11        0 CROW CREEK RESERVATION, HYDE COUNTY
DB OMAHA       SD    HYDE             MISS    CROW   CONG1
DS  OAHE OAHE RESERVOIR
FS    10
ZR A=MISSOURI B=RCH 12 C=ELEVATION-CURVES E=1992 F=AG-EXISTING
CP WHEAT       29
CP  OATS       36
CP  MILO       17
DR RCH13 GAGE 11        0 CROW CREEK RESERVATION, BUFFALO COUNTY
DB OMAHA       SD    BUFF             MISS    CROW   CONG1
DS  OAHE OAHE RESERVOIR
FS     0
ZR A=MISSOURI B=RCH 13 C=ELEVATION-CURVES E=1992 F=AG-EXISTING
CP WHEAT       14
CP  CORN       39
CP  OATS       12
CP  MILO       25
EJ
```

D-2. HEC-PBA Input - Crop Loss Functions

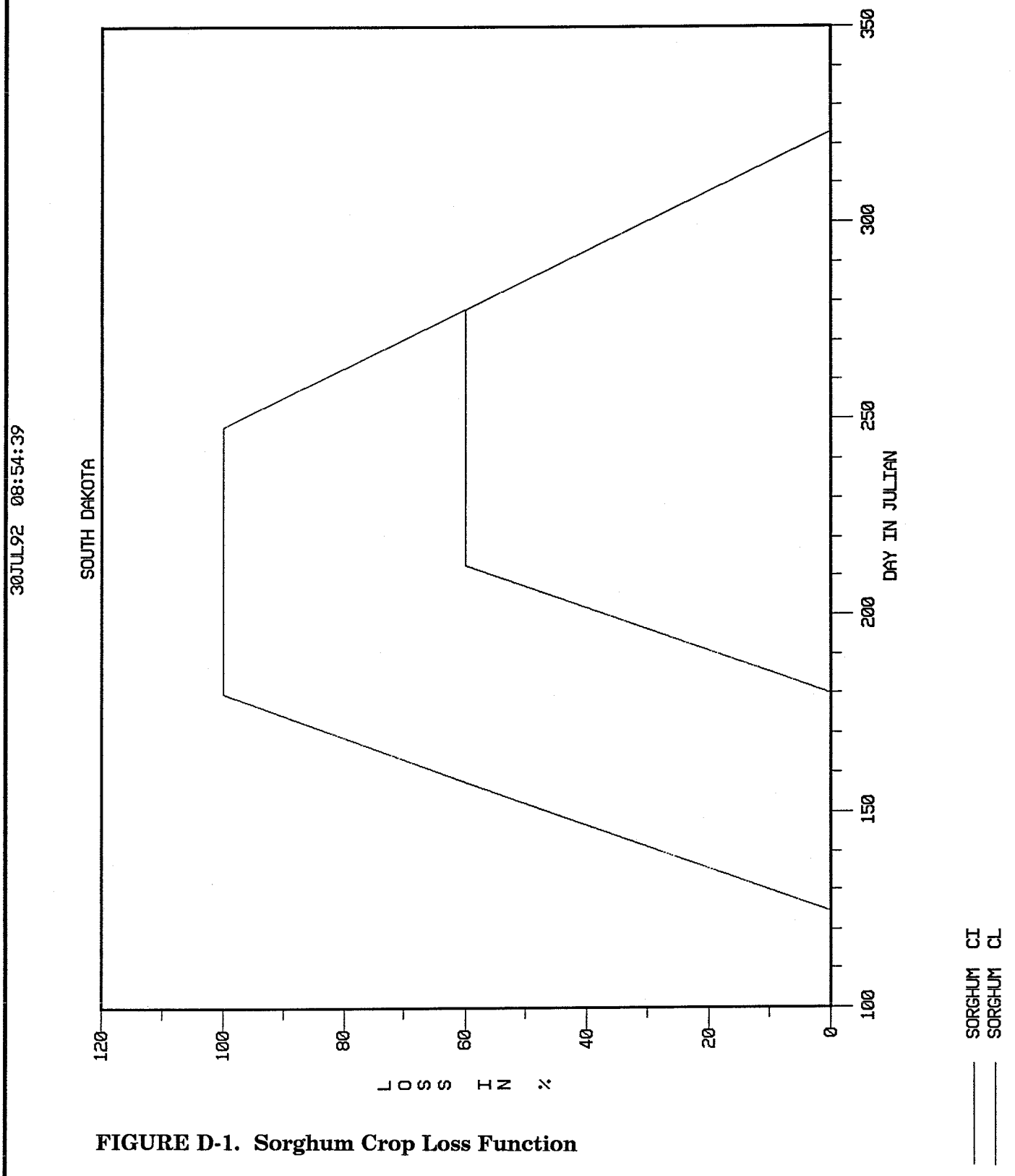

FIGURE D-1. Sorghum Crop Loss Function

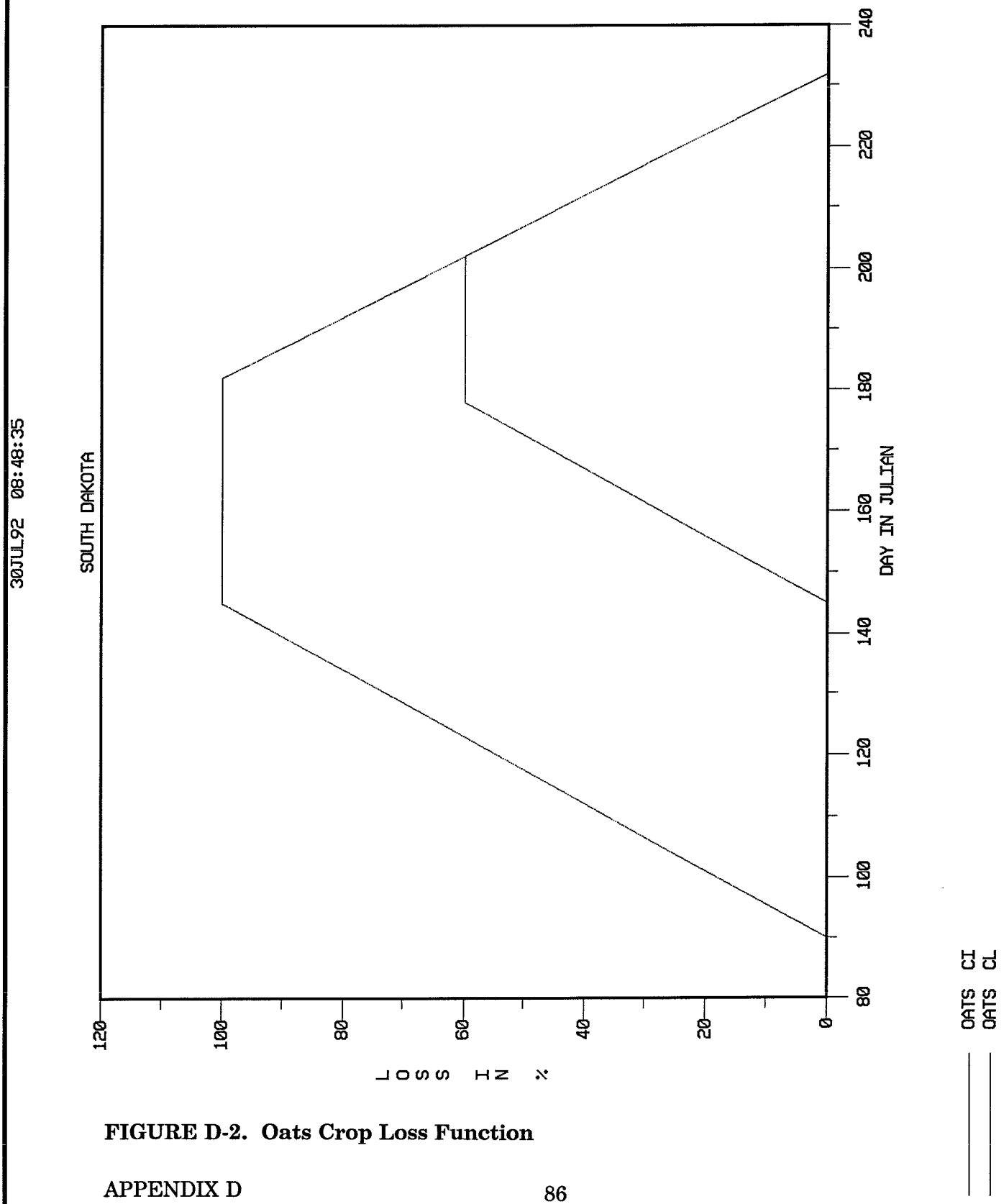

FIGURE D-2. Oats Crop Loss Function

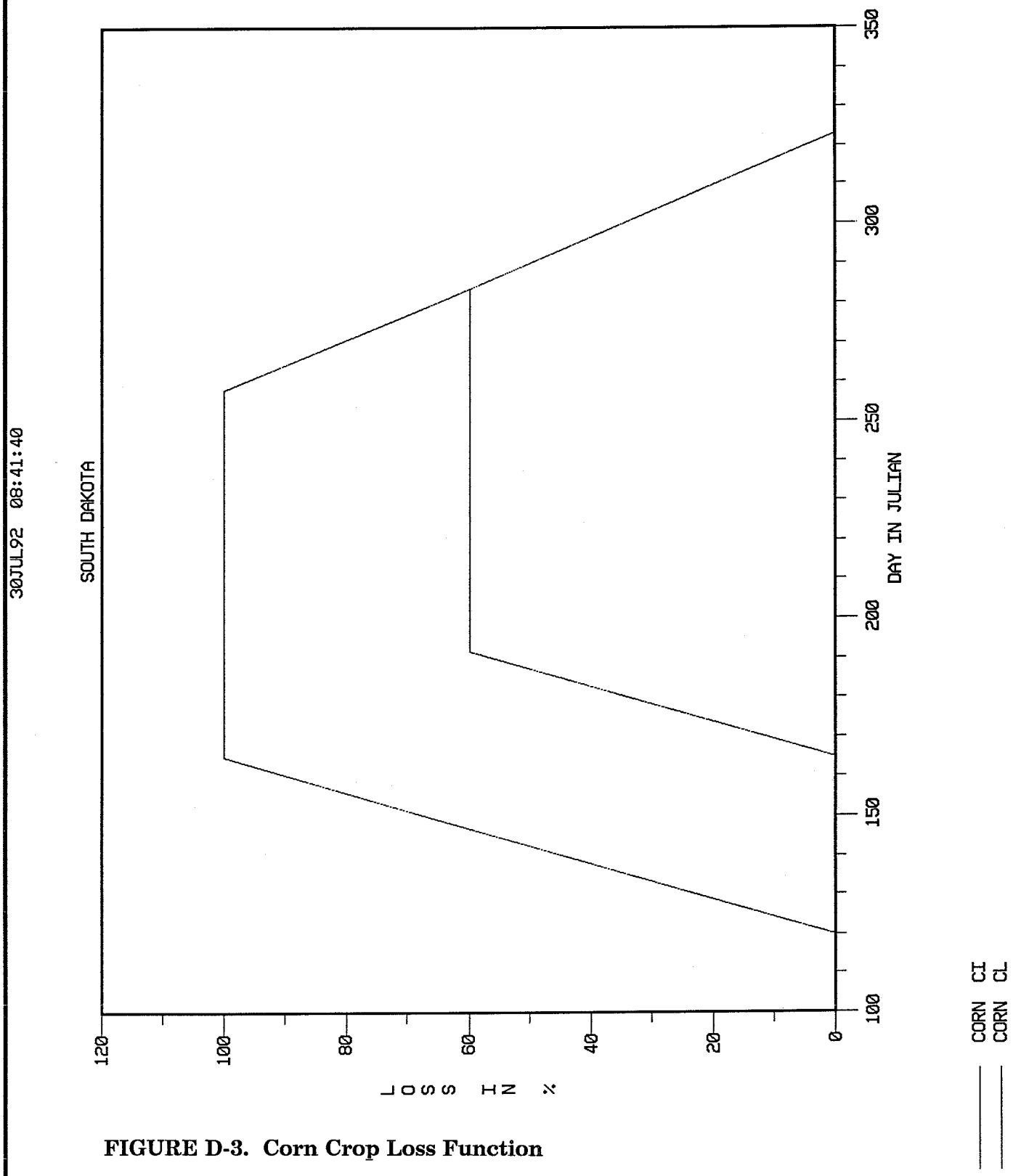

FIGURE D-3. Corn Crop Loss Function

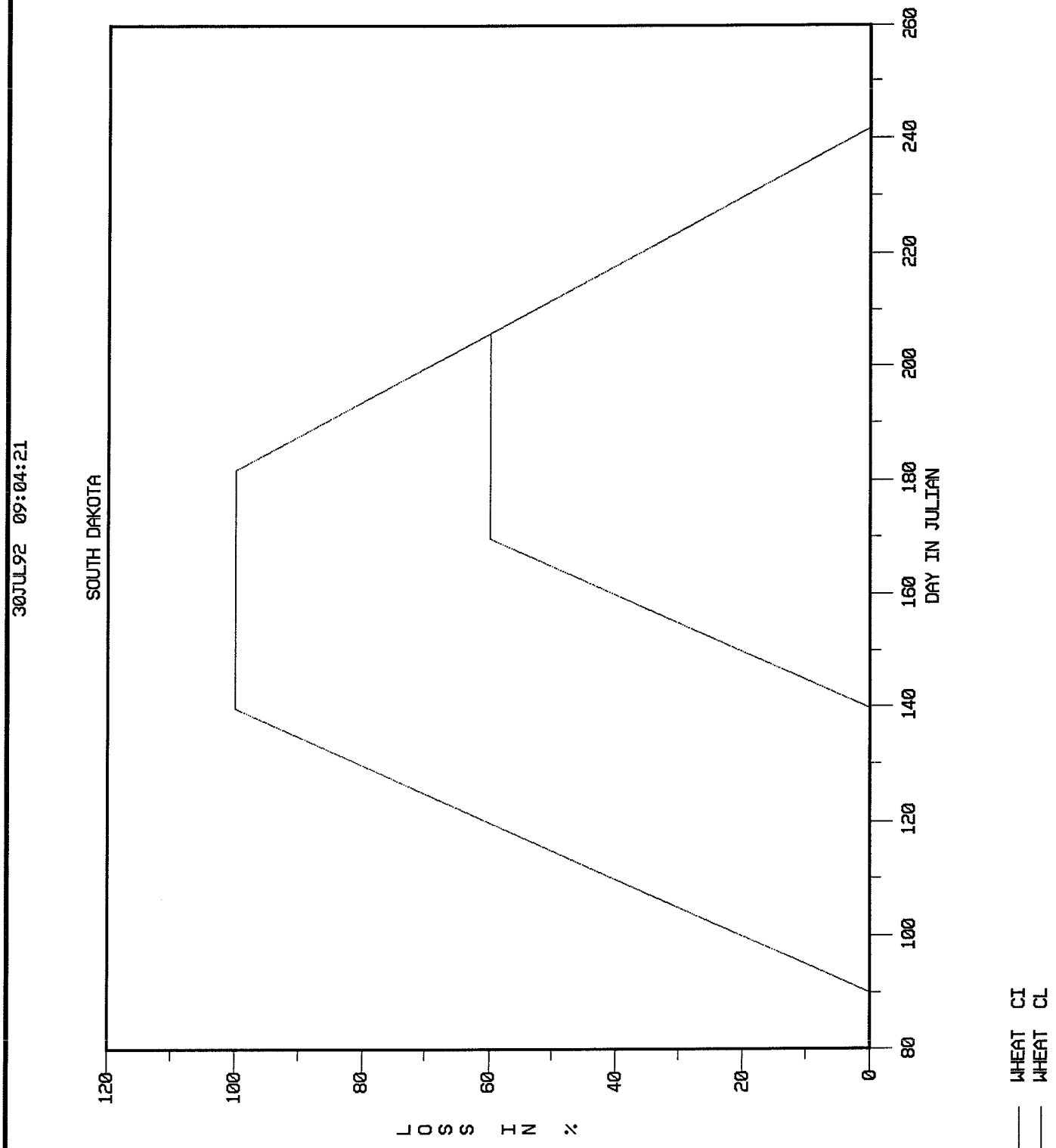

FIGURE D-4. Wheat Crop Loss Function

D-3. HEC-PBA Input - Flood Hydrographs

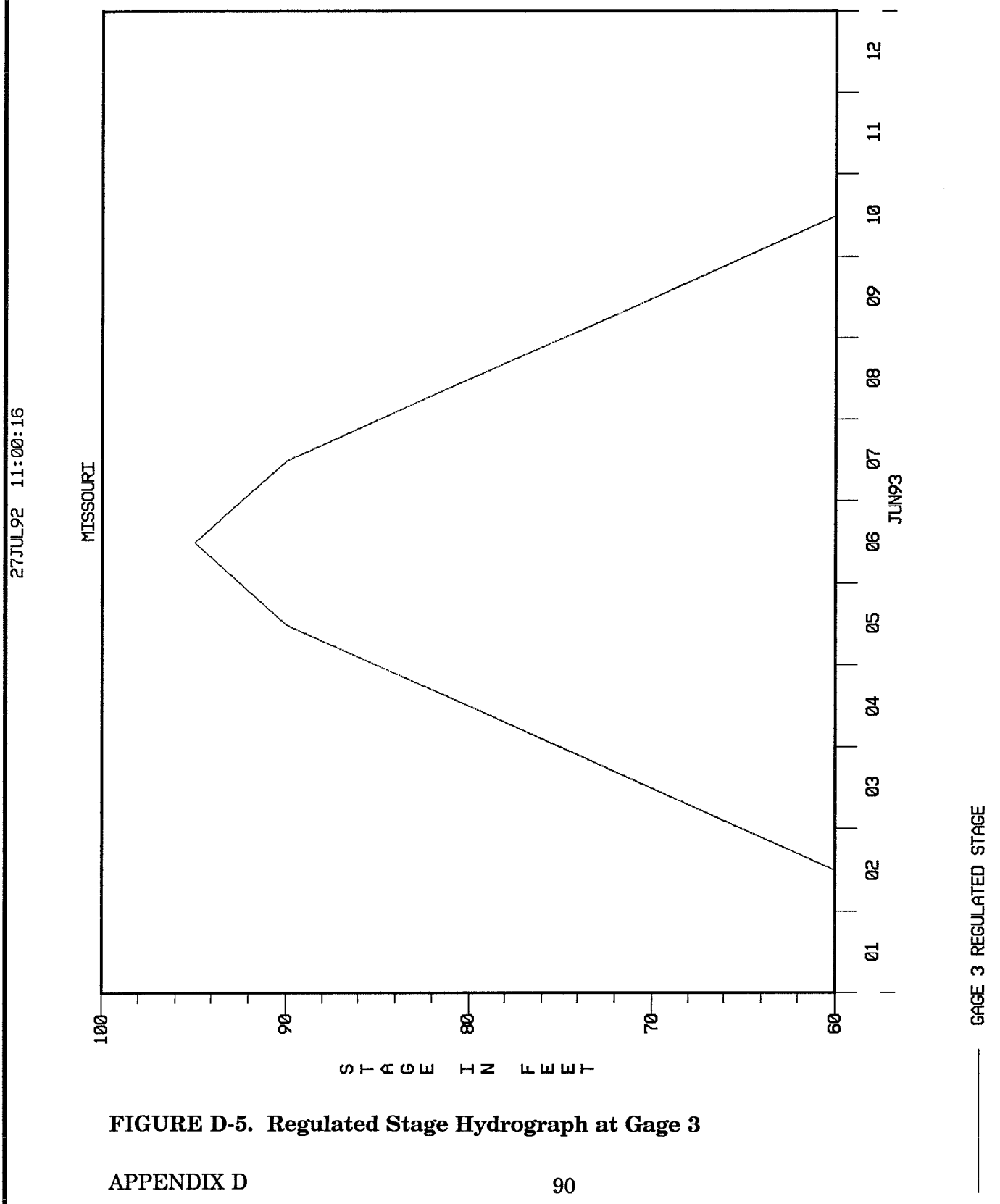

FIGURE D-5. Regulated Stage Hydrograph at Gage 3

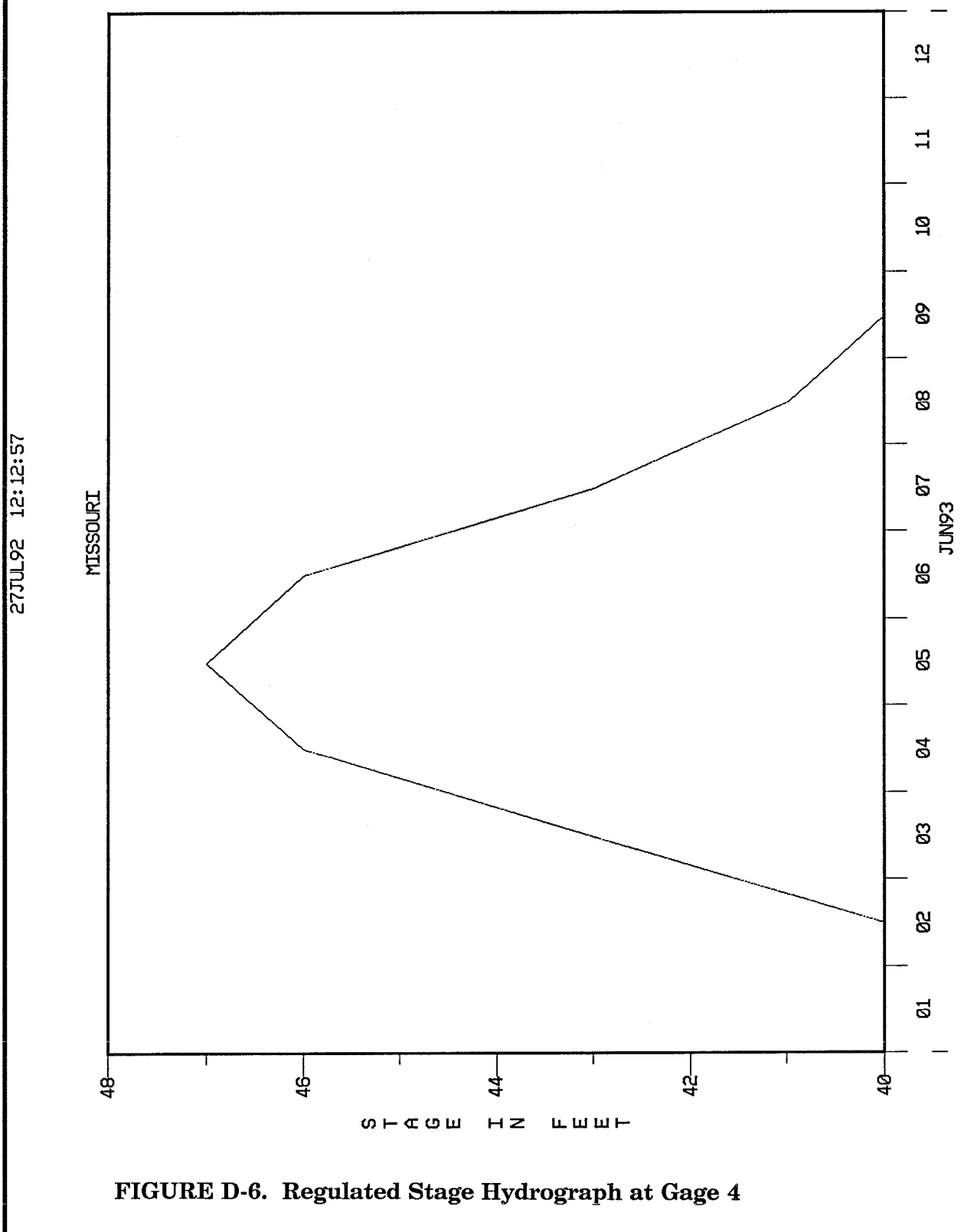

FIGURE D-6. Regulated Stage Hydrograph at Gage 4

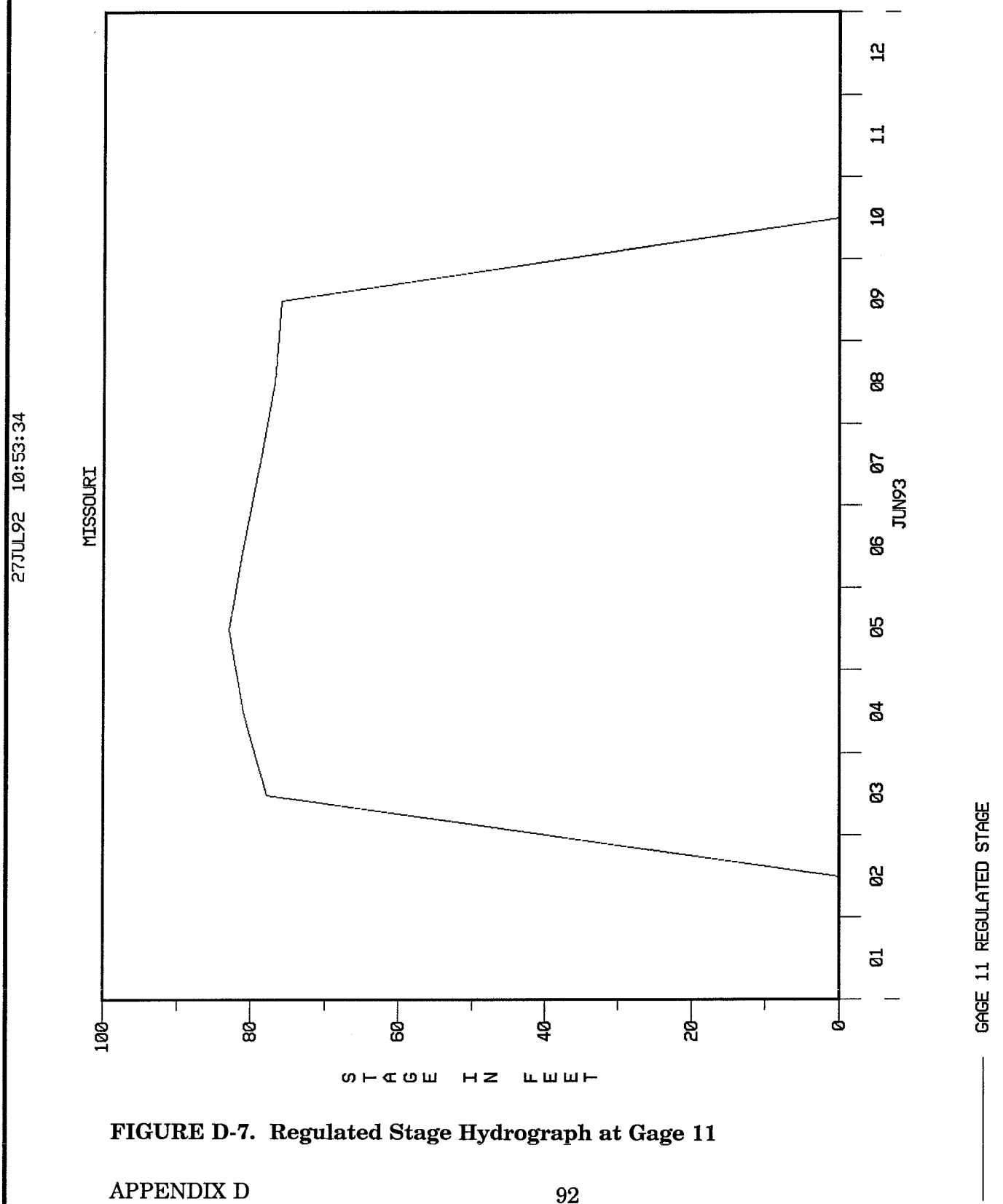

FIGURE D-7. Regulated Stage Hydrograph at Gage 11

D-4. HEC-PBA Output - Preprocessor and Analysis Programs

Preprocessor Program Output Data

```
*******************************************************
*  FLOOD DAMAGE PROJECT BENEFIT ACCOMPLISHMENT        *
*  PRE-PROCESSOR PROGRAM                              *
*  SEPTEMBER 1991                                     *
*  VERSION 1.00                                       *
*                                                     *
*  RUN DATE 24 JUL 92  TIME 12:46:04                  *
*******************************************************
```

```
****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616             *
*  (916) 756-1104 FAX (916) 756-8250   *
****************************************
```

```
XXXXX   XXXXXX  XXXXXXX XXXXXX  XXXXXX     X
X   X   X     X   X   X X     X X     X   X X
X   X   X     X   X     X     X X     X  X   X
XXXXX   XXXXXX    XXXX   XXXXXX  XXXXXX  XXXXXXX
X       X   X     X      X       X     X X     X
X       X    X    X    X X       X     X X     X
X       X     X XXXXXXX X       XXXXXX  X     X
```

MISSOURI RIVER
OAHE DAM TO BIG BEND DAM IN SOUTH DAKOTA

```
BD RECORD - COE DISTRICT
BD OMAHA OMAHA DISTRICT

BS RECORD - STATE
BS    SD SOUTH DAKOTA

BC RECORD - COUNTY
BC  HUGH HUGHES COUNTY
BC  STAN STANLEY COUNTY
BC  LYMN LYMAN COUNTY
BC  HYDE HYDE COUNTY
BC  BUFF BUFFALO COUNTY

BB RECORD - SUB-BASIN
BB  SUBA OPEN RIVER
BB  SUBB LAKE SHARPE
BB  CROW CRW RESERVATION
BB  LBRU LBR RESERVATION

BW RECORD - WATERSHED
BW  MISS MISSOURI RIVER

BG RECORD - CONGRESSIONAL DISTRICT
BG CONG1 REP TIM JOHNSON

BX RECORD - COMMUNITY
BX  PIER PIERRE
BX  FTPR FORT PIERRE
BX  LOWB LOWER BRULE
BX  FTTM FORT THOMPSON
BX  CHAM CHAMBERLAIN

GA RECORD - GAUGE NAME
GA        GAGE 3

ZH RECORD - HYDROGRAPH DATA - DSS PATHNAME
ZH      MISSOURI          GAGE 3            1DAY       REGULATED

GA RECORD - GAUGE NAME
GA        GAGE 4

ZH RECORD - HYDROGRAPH DATA - DSS PATHNAME
ZH      MISSOURI          GAGE 4            1DAY       REGULATED

GA RECORD - GAUGE NAME
GA       GAGE 11

ZH RECORD - HYDROGRAPH DATA - DSS PATHNAME
ZH      MISSOURI         GAGE 11            1DAY       REGULATED
```

```
CR RECORD - CROP DEFINITION
CR WHEAT      28  BUSHEL    3.15   16.00       5    SPRING WHEAT

CS RECORD - SEASONAL CROP VARIABLES
CS WHEAT      90     115     140       7

FULYLD =     115.00 LAST DATE TO PLANT WITHOUT LOSS OF YIELD
FSTPLT =      90.00 FIRST DATE TO PLANT
LSTPLT =     140.00 LAST DATE TO PLANT
DRYOUT =       7.00 DAYS

ZC Record - Crop Data - DSS Pathname
ZC A=SOUTH DAKOTA B=WHEAT C=DAY-LOSS E=1992


CROPID  =      WHEAT CROP NAME
CYA     =      28.00 YIELD PER UNIT AREA
CUP     =       3.15 UNIT PRICE
HRVCST  =      16.00 HARVEST COST $ PER ACRE
ADLOSS  =      0.050 OTHER AGRICULTURAL LOSS FACTOR
FULYLD  =       115. LAST DATE TO PLANT WITHOUT LOSS OF YIELD
LSTPLT  =       140. LAST DATE TO PLANT
DRYOUT  =        7.0 DAYS
CRPTIT  =     SPRING WHEAT
```

CROP LOSS TABLE (PERCENT LOSS VALUES)

DATE	DAY OF YEAR	POTENTIAL LOSS (%)	REDUCED YIELD (%)	PERCENT LOSS BY FLOOD DURATION (DAYS) 0.0	1.0	3.0	7.0
31 MARCH	90.	0.0	0.0	0.0	0.0	0.0	0.0
20 MAY	140.	100.0	0.0	0.0	0.0	25.0	50.0
19 JUNE	170.	100.0	60.0	0.0	75.0	100.0	100.0
1 JULY	182.	100.0	60.0	0.0	100.0	100.0	100.0
25 JULY	206.	60.0	60.0	0.0	100.0	100.0	100.0
30 AUG	242.	0.0	0.0	0.0	100.0	100.0	100.0

CROP LOSS TABLE (DOLLAR LOSS VALUES)

DATE	DAY OF YEAR	POTENTIAL LOSS ($)	REDUCED YIELD ($)	DOLLAR LOSS BY FLOOD DURATION (DAYS) PER ACRE 0.0	1.0	3.0	7.0
31 MARCH	90.	0.00	0.00	0.00	0.00	0.00	0.00
20 MAY	140.	72.20	0.00	0.00	0.00	18.05	36.10
19 JUNE	170.	72.20	43.32	0.00	54.15	72.20	72.20
1 JULY	182.	72.20	43.32	0.00	72.20	72.20	72.20
25 JULY	206.	43.32	43.32	0.00	43.32	43.32	43.32
30 AUG	242.	0.00	0.00	0.00	0.00	0.00	0.00

```
CR RECORD - CROP DEFINITION
CR  CORN      91  BUSHEL    2.20   28.00       5            CORN


CS RECORD - SEASONAL CROP VARIABLES
CS  CORN     120     145     165      10

FULYLD =     145.00 LAST DATE TO PLANT WITHOUT LOSS OF YIELD
FSTPLT =     120.00 FIRST DATE TO PLANT
LSTPLT =     165.00 LAST DATE TO PLANT
DRYOUT =      10.00 DAYS

ZC Record - Crop Data - DSS Pathname
ZC A=SOUTH DAKOTA B=CORN C=DAY-LOSS E=1992


CROPID  =       CORN CROP NAME
CYA     =      91.00 YIELD PER UNIT AREA
CUP     =       2.20 UNIT PRICE
HRVCST  =      28.00 HARVEST COST $ PER ACRE
ADLOSS  =      0.050 OTHER AGRICULTURAL LOSS FACTOR
FULYLD  =       145. LAST DATE TO PLANT WITHOUT LOSS OF YIELD
LSTPLT  =       165. LAST DATE TO PLANT
DRYOUT  =       10.0 DAYS
CRPTIT  =            CORN
```

CROP LOSS TABLE (PERCENT LOSS VALUES)

DATE	DAY OF YEAR	POTENTIAL LOSS (%)	REDUCED YIELD (%)	PERCENT LOSS BY FLOOD DURATION (DAYS) 0.0	1.0	3.0	7.0
30 APRIL	120.	0.0	0.0	0.0	0.0	0.0	0.0
14 JUNE	165.	100.0	0.0	0.0	0.0	50.0	75.0
11 JULY	192.	100.0	60.0	0.0	0.0	100.0	100.0
15 SEPT	258.	100.0	60.0	0.0	0.0	100.0	100.0
11 OCT	284.	60.0	60.0	0.0	0.0	100.0	100.0
19 NOV	323.	0.0	0.0	0.0	0.0	100.0	100.0

CROP LOSS TABLE (DOLLAR LOSS VALUES)

DATE	DAY OF YEAR	POTENTIAL LOSS ($)	REDUCED YIELD ($)	DOLLAR LOSS BY FLOOD DURATION (DAYS) PER ACRE 0.0	1.0	3.0	7.0
30 APRIL	120.	0.00	0.00	0.00	0.00	0.00	0.00
14 JUNE	165.	172.20	0.00	0.00	0.00	86.10	129.15
11 JULY	192.	172.20	103.32	0.00	0.00	172.20	172.20
15 SEPT	258.	172.20	103.32	0.00	0.00	172.20	172.20
11 OCT	284.	103.32	103.32	0.00	0.00	103.32	103.32
19 NOV	323.	0.00	0.00	0.00	0.00	0.00	0.00

```
CR RECORD - CROP DEFINITION
CR  OATS      50  BUSHEL    1.20   23.00       5            OATS

CS RECORD - SEASONAL CROP VARIABLES
CS  OATS      90     127     145       7

FULYLD =     127.00 LAST DATE TO PLANT WITHOUT LOSS OF YIELD
FSTPLT =      90.00 FIRST DATE TO PLANT
LSTPLT =     145.00 LAST DATE TO PLANT
DRYOUT =       7.00 DAYS

CROPID  =       OATS CROP NAME
CYA     =      50.00 YIELD PER UNIT AREA
CUP     =       1.20 UNIT PRICE
HRVCST  =      23.00 HARVEST COST $ PER ACRE
ADLOSS  =      0.050 OTHER AGRICULTURAL LOSS FACTOR
FULYLD  =       127. LAST DATE TO PLANT WITHOUT LOSS OF YIELD
LSTPLT  =       145. LAST DATE TO PLANT
DRYOUT  =        7.0 DAYS
CRPTIT  =            OATS
```

CROP LOSS TABLE (PERCENT LOSS VALUES)

DATE	DAY OF YEAR	POTENTIAL LOSS (%)	REDUCED YIELD (%)	PERCENT LOSS BY FLOOD DURATION (DAYS) 0.0	1.0	3.0	7.0
31 MARCH	90.	0.0	0.0	0.0	0.0	0.0	0.0
25 MAY	145.	100.0	0.0	0.0	0.0	25.0	50.0
27 JUNE	178.	100.0	60.0	0.0	75.0	100.0	100.0
1 JULY	182.	100.0	60.0	0.0	100.0	100.0	100.0
21 JULY	202.	60.0	60.0	0.0	100.0	100.0	100.0
20 AUG	232.	0.0	0.0	0.0	100.0	100.0	100.0

CROP LOSS TABLE (DOLLAR LOSS VALUES)

DATE	DAY OF YEAR	POTENTIAL LOSS ($)	REDUCED YIELD ($)	DOLLAR LOSS BY FLOOD DURATION (DAYS) PER ACRE 0.0	1.0	3.0	7.0
31 MARCH	90.	0.00	0.00	0.00	0.00	0.00	0.00
25 MAY	145.	37.00	0.00	0.00	0.00	9.25	18.50
27 JUNE	178.	37.00	22.20	0.00	27.75	37.00	37.00
1 JULY	182.	37.00	22.20	0.00	37.00	37.00	37.00
21 JULY	202.	22.20	22.20	0.00	22.20	22.20	22.20
20 AUG	232.	0.00	0.00	0.00	0.00	0.00	0.00

```
CR RECORD - CROP DEFINITION
CR  MILO      41  BUSHEL    2.04   18.00       5          SORGHUM

CS RECORD - SEASONAL CROP VARIABLES
CS  MILO     125      161      180        7

FULYLD =     161.00 LAST DATE TO PLANT WITHOUT LOSS OF YIELD
FSTPLT =     125.00 FIRST DATE TO PLANT
LSTPLT =     180.00 LAST DATE TO PLANT
DRYOUT =       7.00 DAYS

ZC Record - Crop Data - DSS Pathname
ZC A=SOUTH DAKOTA B=SORGHUM C=DAY-LOSS E=1992

CROPID  =       MILO CROP NAME
CYA     =      41.00 YIELD PER UNIT AREA
CUP     =       2.04 UNIT PRICE
HRVCST  =      18.00 HARVEST COST $ PER ACRE
ADLOSS  =      0.050 OTHER AGRICULTURAL LOSS FACTOR
FULYLD  =       161. LAST DATE TO PLANT WITHOUT LOSS OF YIELD
LSTPLT  =       180. LAST DATE TO PLANT
DRYOUT  =        7.0 DAYS
CRPTIT  =          SORGHUM
```

CROP LOSS TABLE (PERCENT LOSS VALUES)

DATE	DAY OF YEAR	POTENTIAL LOSS (%)	REDUCED YIELD (%)	PERCENT LOSS BY FLOOD DURATION (DAYS) 0.0	1.0	3.0	7.0
5 MAY	125.	0.0	0.0	0.0	0.0	0.0	0.0
29 JUNE	180.	100.0	0.0	0.0	0.0	25.0	50.0
1 AUG	213.	100.0	60.0	0.0	75.0	100.0	100.0
5 SEPT	248.	100.0	60.0	0.0	100.0	100.0	100.0
5 OCT	278.	60.0	60.0	0.0	100.0	100.0	100.0
19 NOV	323.	0.0	0.0	0.0	100.0	100.0	100.0

CROP LOSS TABLE (DOLLAR LOSS VALUES)

DATE	DAY OF YEAR	POTENTIAL LOSS ($)	REDUCED YIELD ($)	DOLLAR LOSS BY FLOOD DURATION (DAYS) PER ACRE 0.0	1.0	3.0	7.0
5 MAY	125.	0.00	0.00	0.00	0.00	0.00	0.00
29 JUNE	180.	65.64	0.00	0.00	0.00	16.41	32.82
1 AUG	213.	65.64	39.38	0.00	49.23	65.64	65.64
5 SEPT	248.	65.64	39.38	0.00	65.64	65.64	65.64
5 OCT	278.	39.38	39.38	0.00	39.38	39.38	39.38
19 NOV	323.	0.00	0.00	0.00	0.00	0.00	0.00

```
WATER RESOURCE UNIT
DR RCH 1  GAGE 3       0 HUGHES COUNTY, US OF PIERRE

WRUID  =      RCH 1 WATER RESOURCE UNIT ID
GAUGE  =     GAGE 3
DELTEL =       0.00 GAUGE ELEVATION OFFSET
WRUTIT =  HUGHES COUNTY, US OF PIERRE

WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
DB OMAHA       SD    HUGH            MISS    SUBA   CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =         SD
COUNTY =       HUGH
WATSHD =       MISS WATERSHED
SUBASN =       SUBA SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

DS RECORD - RESERVOIR PROJECT
DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

FS RECORD - FLOOD STAGE ELEVATION
FS    40

ZR RECORD - REACH DATA - DSS PATHNAME
ZR A=MISSOURI B=RCH 1  C=ELEVATION-CURVES E=1992 F=AG-EXISTING

CROPID =      WHEAT
CROPAR =      18.00 % OF REACH PLANTED

CROPID =       CORN
CROPAR =      36.00 % OF REACH PLANTED

CROPID =       OATS
CROPAR =      14.00 % OF REACH PLANTED

CROPID =       MILO
CROPAR =      10.00 % OF REACH PLANTED
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 1	GAGE 3	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

	CUMULATIVE CROP AREA (ACRES)			
ELEVATION	WHEAT	CORN	OATS	MILO
40.00	0.00	0.00	0.00	0.00
50.00	0.00	0.00	0.00	0.00
60.00	0.00	0.00	0.00	0.00
70.00	0.00	0.00	0.00	0.00
80.00	0.00	0.00	0.00	0.00
90.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	0.00	0.00
110.00	0.00	0.00	0.00	0.00
120.00	0.00	0.00	0.00	0.00
130.00	0.00	0.00	0.00	0.00
140.00	0.00	0.00	0.00	0.00
150.00	0.00	0.00	0.00	0.00
160.00	0.00	0.00	0.00	0.00
170.00	0.00	0.00	0.00	0.00

```
 WATER RESOURCE UNIT
 DR RCH 2  GAGE 4       0 STANLEY COUNTY, US OF FORT PIERRE

WRUID  =      RCH 2 WATER RESOURCE UNIT ID
GAUGE  =     GAGE 4
 DELTEL =       0.00 GAUGE ELEVATION OFFSET
WRUTIT =  STANLEY COUNTY, US OF FORT PIERRE

 WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
 DB OMAHA       SD    STAN            MISS    SUBA   CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =        SD
COUNTY =       STAN
WATSHD =       MISS WATERSHED
SUBASN =       SUBA SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

 DS RECORD - RESERVOIR PROJECT
 DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

 FS RECORD - FLOOD STAGE ELEVATION
 FS    40

 ZR RECORD - REACH DATA - DSS PATHNAME
 ZR A=MISSOURI B=RCH 2  C=ELEVATION-CURVES E=1992 F=AG-EXISTING

CROPID =      WHEAT
 CROPAR =      29.00 % OF REACH PLANTED

CROPID =       OATS
 CROPAR =      21.00 % OF REACH PLANTED

CROPID =       MILO
 CROPAR =      50.00 % OF REACH PLANTED
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 2	GAGE 4	OMAHA	SD	STAN		MISS	SUBA	CONG1					OAHE

		CUMULATIVE CROP AREA (ACRES)		
ELEVATION	AREA	WHEAT	OATS	MILO
40.00	0.00	0.00	0.00	0.00
50.00	0.00	0.00	0.00	0.00
60.00	0.00	0.00	0.00	0.00
70.00	0.00	0.00	0.00	0.00
80.00	7.00	2.03	1.47	3.50
90.00	29.00	8.41	6.09	14.50
100.00	58.00	16.82	12.18	29.00
110.00	93.00	26.97	19.53	46.50
120.00	148.00	42.92	31.08	74.00
130.00	216.00	62.64	45.36	108.00
140.00	218.00	63.22	45.78	109.00
150.00	218.00	63.22	45.78	109.00
160.00	218.00	63.22	45.78	109.00
170.00	218.00	63.22	45.78	109.00

```
 WATER RESOURCE UNIT
 DR RCH 3  GAGE 3       0 CITY OF PIERRE

WRUID  =      RCH 3 WATER RESOURCE UNIT ID
GAUGE  =     GAGE 3
 DELTEL =       0.00 GAUGE ELEVATION OFFSET
WRUTIT =  CITY OF PIERRE

 WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
 DB OMAHA      SD    HUGH            MISS    SUBA    CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =        SD
COUNTY =       HUGH
WATSHD =       MISS WATERSHED
SUBASN =       SUBA SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

 DS RECORD - RESERVOIR PROJECT
 DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

 FS RECORD - FLOOD STAGE ELEVATION
 FS    66

 ZR RECORD - REACH DATA - DSS PATHNAME
 ZR A=MISSOURI B=RCH 3 C=ELEVATION-CURVES E=1992 F=URBAN-EXISTING

URBAN  =        RES URBAN DAMAGE CATEGORY ID
 RCONST =     180.00 RECONSTRUCTION PERIOD
URBTIT =  RESIDENTIAL

URBAN  =        COM URBAN DAMAGE CATEGORY ID
 RCONST =     180.00 RECONSTRUCTION PERIOD
URBTIT =  COMMERCIAL

URBAN  =        IND URBAN DAMAGE CATEGORY ID
 RCONST =     180.00 RECONSTRUCTION PERIOD
URBTIT =  INDUSTRIAL

URBAN  =        PUB URBAN DAMAGE CATEGORY ID
 RCONST =     180.00 RECONSTRUCTION PERIOD
URBTIT =  PUBLIC WORKS

URBAN  =      OTHER URBAN DAMAGE CATEGORY ID
 RCONST =      30.00 RECONSTRUCTION PERIOD
URBTIT =  OPEN SPACE
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 3	GAGE 3	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

	URBAN PROPERTY DAMAGE ($1000)								
ELEVATION	RES	STRUCTURES	COM	STRUCTURES	IND	STRUCTURES	PUB	OTHER	STRUCTURES
66.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.80	0.00
68.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.71	0.10
70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.87	1.40
72.00	0.00	0.00	0.00	0.00	0.00	0.00	80.06	87.86	5.20
74.00	0.00	0.00	0.00	0.00	0.00	0.00	268.54	154.34	8.40
76.00	115.54	10.50	0.00	0.00	6.30	0.25	577.50	230.06	12.00
78.00	671.12	39.00	0.00	0.00	18.24	0.50	1094.36	305.90	15.50
80.00	1494.66	73.50	0.00	0.00	75.40	2.00	2150.93	378.92	17.60
82.00	2607.87	96.00	0.00	0.00	504.09	8.00	3574.64	442.28	20.30
84.00	3713.40	124.50	99.07	1.30	1915.27	14.50	5414.49	498.41	22.20
86.00	5037.99	157.50	440.79	4.10	3818.49	20.25	7279.02	550.75	24.30
88.00	6350.32	184.50	835.89	5.90	6457.52	27.00	9521.86	602.52	26.20
90.00	7733.48	216.00	1289.10	7.50	10333.44	34.50	11691.13	649.54	27.20
92.00	9109.71	250.50	1886.76	9.10	14834.30	41.50	14180.48	680.96	27.90
94.00	10795.49	312.00	2611.93	10.70	19187.43	50.25	16456.01	705.93	28.40
96.00	12655.27	379.50	3424.39	12.40	22663.87	56.50	18682.77	731.51	29.40
98.00	14809.92	447.00	4285.62	14.90	25923.57	62.25	20516.59	757.72	30.20
100.00	17237.76	519.00	5185.78	16.10	28393.24	66.00	21355.35	784.33	30.80

```
 WATER RESOURCE UNIT
 DR RCH 4  GAGE 4       0 CITY OF FORT PIERRE

WRUID  =      RCH 4 WATER RESOURCE UNIT ID
GAUGE  =     GAGE 4
 DELTEL =       0.00 GAUGE ELEVATION OFFSET
WRUTIT =  CITY OF FORT PIERRE

 WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
 DB OMAHA       SD    HUGH            MISS    SUBA   CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =         SD
COUNTY =       HUGH
WATSHD =       MISS WATERSHED
SUBASN =       SUBA SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

 DS RECORD - RESERVOIR PROJECT
 DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

 FS RECORD - FLOOD STAGE ELEVATION
 FS    40

 ZR RECORD - REACH DATA - DSS PATHNAME
 ZR A=MISSOURI B=RCH 4 C=ELEVATION-CURVES E=1992 F=URBAN-EXISTING

URBAN  =        RES URBAN DAMAGE CATEGORY ID
 RCONST =     180.00 RECONSTRUCTION PERIOD
URBTIT =  RESIDENTIAL

URBAN  =        COM URBAN DAMAGE CATEGORY ID
 RCONST =     180.00 RECONSTRUCTION PERIOD
URBTIT =  COMMERCIAL

URBAN  =        IND URBAN DAMAGE CATEGORY ID
 RCONST =     180.00 RECONSTRUCTION PERIOD
URBTIT =  INDUSTRIAL

URBAN  =        PUB URBAN DAMAGE CATEGORY ID
 RCONST =     180.00 RECONSTRUCTION PERIOD
URBTIT =  PUBLIC WORKS

URBAN  =      OTHER URBAN DAMAGE CATEGORY ID
 RCONST =      30.00 RECONSTRUCTION PERIOD
URBTIT =  OPEN SPACE
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 4	GAGE 4	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

	URBAN PROPERTY DAMAGE ($1000)					
ELEVATION	RES	STRUCTURES	COM	IND	PUB	OTHER
40.00	0.00	0.00	0.00	0.00	0.00	0.00
41.00	0.00	0.00	0.00	0.00	0.00	0.03
42.00	0.00	0.00	0.00	0.00	0.00	0.16
43.00	0.00	0.00	0.00	0.00	0.00	0.64
44.00	0.00	0.00	0.00	1778.78	0.00	1.31
45.00	364.77	49.50	0.00	3482.65	0.00	2.12
46.00	1986.39	129.00	0.00	4007.05	0.00	3.07
47.00	3387.90	163.50	0.00	4910.66	0.00	4.15
48.00	4636.84	190.50	0.00	6020.99	0.00	5.37
49.00	5771.99	214.50	0.00	7156.04	0.00	6.75
50.00	6741.48	220.50	0.00	7974.20	0.00	8.29
51.00	7518.36	223.50	0.00	8261.72	0.00	9.96
52.00	8246.89	229.50	0.00	8435.23	0.00	11.77
53.00	9000.75	235.50	0.00	8699.96	0.00	13.73
54.00	9898.69	241.50	0.00	8961.81	0.00	15.79
55.00	10812.97	247.50	0.00	9129.74	0.00	17.98
56.00	11411.86	252.00	0.00	9295.99	0.00	20.27
57.00	11867.18	255.00	0.00	9456.24	0.00	22.67

```
 WATER RESOURCE UNIT
 DR RCH 6  GAGE 4       0 STANLEY COUNTY DS OF FORT PIERRE

WRUID  =      RCH 6 WATER RESOURCE UNIT ID
GAUGE  =     GAGE 4
 DELTEL =       0.00 GAUGE ELEVATION OFFSET
WRUTIT =  STANLEY COUNTY DS OF FORT PIERRE

 WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
 DB OMAHA      SD    STAN            MISS    SUBA   CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =        SD
COUNTY =       STAN
WATSHD =       MISS WATERSHED
SUBASN =       SUBA SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

 DS RECORD - RESERVOIR PROJECT
 DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

 FS RECORD - FLOOD STAGE ELEVATION
 FS    40

 ZR RECORD - REACH DATA - DSS PATHNAME
 ZR A=MISSOURI B=RCH 6  C=ELEVATION-CURVES E=1992 F=AG-EXISTING

CROPID =      WHEAT
 CROPAR =      29.00 % OF REACH PLANTED

CROPID =       OATS
 CROPAR =      21.00 % OF REACH PLANTED

CROPID =       MILO
 CROPAR =      50.00 % OF REACH PLANTED
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 6	GAGE 4	OMAHA	SD	STAN		MISS	SUBA	CONG1					OAHE

		CUMULATIVE CROP AREA (ACRES)		
ELEVATION	AREA	WHEAT	OATS	MILO
40.00	0.00	0.00	0.00	0.00
50.00	578.00	167.62	121.38	289.00
60.00	580.00	168.20	121.80	290.00
70.00	580.00	168.20	121.80	290.00
80.00	580.00	168.20	121.80	290.00
90.00	580.00	168.20	121.80	290.00
100.00	580.00	168.20	121.80	290.00
110.00	580.00	168.20	121.80	290.00
120.00	580.00	168.20	121.80	290.00
130.00	580.00	168.20	121.80	290.00
140.00	580.00	168.20	121.80	290.00
150.00	580.00	168.20	121.80	290.00
160.00	580.00	168.20	121.80	290.00
170.00	580.00	168.20	121.80	290.00

```
 WATER RESOURCE UNIT
 DR RCH 7 GAGE 11        0 HUGHES COUNTY, DS OF PIERRE

WRUID  =       RCH 7 WATER RESOURCE UNIT ID
GAUGE  =    GAGE 11
 DELTEL =        0.00 GAUGE ELEVATION OFFSET
WRUTIT =  HUGHES COUNTY, DS OF PIERRE

 WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
 DB OMAHA       SD    HUGH            MISS    SUBB   CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =        SD
COUNTY =       HUGH
WATSHD =       MISS WATERSHED
SUBASN =       SUBB SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

 DS RECORD - RESERVOIR PROJECT
 DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

 FS RECORD - FLOOD STAGE ELEVATION
 FS    20

 ZR RECORD - REACH DATA - DSS PATHNAME
 ZR A=MISSOURI B=RCH 7  C=ELEVATION-CURVES E=1992 F=AG-EXISTING

CROPID =      WHEAT
 CROPAR =      18.00 % OF REACH PLANTED

CROPID =       CORN
 CROPAR =      36.00 % OF REACH PLANTED

CROPID =       OATS
 CROPAR =      14.00 % OF REACH PLANTED

CROPID =       MILO
 CROPAR =      10.00 % OF REACH PLANTED
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 7	GAGE 11	OMAHA	SD	HUGH		MISS	SUBB	CONG1					OAHE

	CUMULATIVE CROP AREA (ACRES)				
ELEVATION	AREA	WHEAT	CORN	OATS	MILO
20.00	0.00	0.00	0.00	0.00	0.00
30.00	789.00	142.02	284.04	110.46	78.90
40.00	1775.00	319.50	639.00	248.50	177.50
50.00	2615.00	470.70	941.40	366.10	261.50
60.00	3459.00	622.62	1245.24	484.26	345.90
70.00	3984.00	717.12	1434.24	557.76	398.40
80.00	4446.00	800.28	1600.56	622.44	444.60
90.00	4597.00	827.46	1654.92	643.58	459.70
100.00	4689.00	844.02	1688.04	656.46	468.90
110.00	4780.00	860.40	1720.80	669.20	478.00
120.00	4855.00	873.90	1747.80	679.70	485.50
130.00	4936.00	888.48	1776.96	691.04	493.60
140.00	5048.00	908.64	1817.28	706.72	504.80
150.00	5126.00	922.68	1845.36	717.64	512.60
160.00	5190.00	934.20	1868.40	726.60	519.00
170.00	5226.00	940.68	1881.36	731.64	522.60

```
 WATER RESOURCE UNIT
 DR RCH 8 GAGE 11       0 STANLEY COUNTY, DS OF FORT PIERRE

WRUID  =      RCH 8 WATER RESOURCE UNIT ID
GAUGE  =    GAGE 11
 DELTEL =       0.00 GAUGE ELEVATION OFFSET
WRUTIT =  STANLEY COUNTY, DS OF FORT PIERRE

 WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
 DB OMAHA       SD    STAN            MISS    SUBB   CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =        SD
COUNTY =       STAN
WATSHD =       MISS WATERSHED
SUBASN =       SUBB SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

 DS RECORD - RESERVOIR PROJECT
 DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

 FS RECORD - FLOOD STAGE ELEVATION
 FS    30

 ZR RECORD - REACH DATA - DSS PATHNAME
 ZR A=MISSOURI B=RCH 8  C=ELEVATION-CURVES E=1992 F=AG-EXISTING

CROPID =      WHEAT
 CROPAR =      29.00 % OF REACH PLANTED

CROPID =       OATS
 CROPAR =      21.00 % OF REACH PLANTED

CROPID =       MILO
 CROPAR =      50.00 % OF REACH PLANTED
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 8	GAGE 11	OMAHA	SD	STAN		MISS	SUBB	CONG1					OAHE

	CUMULATIVE CROP AREA (ACRES)		
ELEVATION	WHEAT	OATS	MILO
30.00	0.00	0.00	0.00
40.00	0.00	0.00	0.00
50.00	0.00	0.00	0.00
60.00	0.00	0.00	0.00
70.00	0.00	0.00	0.00
80.00	0.00	0.00	0.00
90.00	0.00	0.00	0.00
100.00	0.00	0.00	0.00
110.00	0.00	0.00	0.00
120.00	0.00	0.00	0.00
130.00	0.00	0.00	0.00
140.00	0.00	0.00	0.00
150.00	0.00	0.00	0.00
160.00	0.00	0.00	0.00
170.00	0.00	0.00	0.00

```
 WATER RESOURCE UNIT
 DR RCH 9 GAGE 11       0 LOWER BRULE RESERVATION, STANLEY COUNTY

WRUID  =      RCH 9 WATER RESOURCE UNIT ID
GAUGE  =    GAGE 11
 DELTEL =       0.00 GAUGE ELEVATION OFFSET
WRUTIT =  LOWER BRULE RESERVATION, STANLEY COUNTY

 WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
 DB OMAHA      SD    STAN            MISS    LBRU   CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =        SD
COUNTY =       STAN
WATSHD =       MISS WATERSHED
SUBASN =       LBRU SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

 DS RECORD - RESERVOIR PROJECT
 DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

 FS RECORD - FLOOD STAGE ELEVATION
 FS    20

 ZR RECORD - REACH DATA - DSS PATHNAME
 ZR A=MISSOURI B=RCH 9  C=ELEVATION-CURVES E=1992 F=AG-EXISTING

CROPID =      WHEAT
 CROPAR =      29.00 % OF REACH PLANTED

CROPID =       OATS
 CROPAR =      21.00 % OF REACH PLANTED

CROPID =       MILO
 CROPAR =      50.00 % OF REACH PLANTED
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 9	GAGE 11	OMAHA	SD	STAN		MISS	LBRU	CONG1					OAHE

		CUMULATIVE CROP AREA (ACRES)		
ELEVATION	AREA	WHEAT	OATS	MILO
20.00	0.00	0.00	0.00	0.00
30.00	635.00	184.15	133.35	317.50
40.00	1730.00	501.70	363.30	865.00
50.00	2281.00	661.49	479.01	1140.50
60.00	2823.00	818.67	592.83	1411.50
70.00	3274.00	949.46	687.54	1637.00
80.00	3368.00	976.72	707.28	1684.00
90.00	3374.00	978.46	708.54	1687.00
100.00	3374.00	978.46	708.54	1687.00
110.00	3374.00	978.46	708.54	1687.00
120.00	3374.00	978.46	708.54	1687.00
130.00	3374.00	978.46	708.54	1687.00
140.00	3374.00	978.46	708.54	1687.00
150.00	3374.00	978.46	708.54	1687.00
160.00	3374.00	978.46	708.54	1687.00
170.00	3374.00	978.46	708.54	1687.00

```
 WATER RESOURCE UNIT
 DR RCH10 GAGE 11       0 CROW CREEK RESERVATION, HUGHES COUNTY

WRUID  =      RCH10 WATER RESOURCE UNIT ID
GAUGE  =    GAGE 11
 DELTEL =       0.00 GAUGE ELEVATION OFFSET
WRUTIT =  CROW CREEK RESERVATION, HUGHES COUNTY

 WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
 DB OMAHA      SD    HUGH           MISS    CROW   CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =         SD
COUNTY =       HUGH
WATSHD =       MISS WATERSHED
SUBASN =       CROW SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

 DS RECORD - RESERVOIR PROJECT
 DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

 FS RECORD - FLOOD STAGE ELEVATION
 FS    10

 ZR RECORD - REACH DATA - DSS PATHNAME
 ZR A=MISSOURI B=RCH 10 C=ELEVATION-CURVES E=1992 F=AG-EXISTING

CROPID =      WHEAT
 CROPAR =      18.00 % OF REACH PLANTED

CROPID =       CORN
 CROPAR =      36.00 % OF REACH PLANTED

CROPID =       OATS
 CROPAR =      14.00 % OF REACH PLANTED

CROPID =       MILO
 CROPAR =      10.00 % OF REACH PLANTED
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH10	GAGE 11	OMAHA	SD	HUGH		MISS	CROW	CONG1					OAHE

		CUMULATIVE CROP AREA (ACRES)			
ELEVATION	AREA	WHEAT	CORN	OATS	MILO
10.00	0.00	0.00	0.00	0.00	0.00
20.00	826.00	148.68	297.36	115.64	82.60
30.00	2363.00	425.34	850.68	330.82	236.30
40.00	4060.00	730.80	1461.60	568.40	406.00
50.00	5563.00	1001.34	2002.68	778.82	556.30
60.00	7550.00	1359.00	2718.00	1057.00	755.00
70.00	8874.00	1597.32	3194.64	1242.36	887.40
80.00	10116.00	1820.88	3641.76	1416.24	1011.60
90.00	11418.00	2055.24	4110.48	1598.52	1141.80
100.00	11868.00	2136.24	4272.48	1661.52	1186.80
110.00	11989.00	2158.02	4316.04	1678.46	1198.90
120.00	12078.00	2174.04	4348.08	1690.92	1207.80
130.00	12149.00	2186.82	4373.64	1700.86	1214.90
140.00	12202.00	2196.36	4392.72	1708.28	1220.20
150.00	12221.00	2199.78	4399.56	1710.94	1222.10
160.00	12245.00	2204.10	4408.20	1714.30	1224.50
170.00	12274.00	2209.32	4418.64	1718.36	1227.40

```
 WATER RESOURCE UNIT
 DR RCH11 GAGE 11       0 LOWER BRULE RESERVATION, LYMAN COUNTY

WRUID  =      RCH11 WATER RESOURCE UNIT ID
GAUGE  =    GAGE 11
 DELTEL =       0.00 GAUGE ELEVATION OFFSET
WRUTIT =  LOWER BRULE RESERVATION, LYMAN COUNTY

 WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
 DB OMAHA       SD    LYMN            MISS    LBRU   CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =        SD
COUNTY =       LYMN
WATSHD =       MISS WATERSHED
SUBASN =       LBRU SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

 DS RECORD - RESERVOIR PROJECT
 DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

 FS RECORD - FLOOD STAGE ELEVATION
 FS     0

 ZR RECORD - REACH DATA - DSS PATHNAME
 ZR A=MISSOURI B=RCH 11 C=ELEVATION-CURVES E=1992 F=AG-EXISTING

CROPID =       CORN
 CROPAR =      16.00 % OF REACH PLANTED

CROPID =       OATS
 CROPAR =      17.00 % OF REACH PLANTED

CROPID =       MILO
 CROPAR =      67.00 % OF REACH PLANTED
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH11	GAGE 11	OMAHA	SD	LYMN		MISS	LBRU	CONG1					OAHE

		CUMULATIVE CROP AREA (ACRES)		
ELEVATION	AREA	CORN	OATS	MILO
0.00	0.00	0.00	0.00	0.00
10.00	526.00	84.16	89.42	352.42
20.00	3184.00	509.44	541.28	2133.28
30.00	5951.00	952.16	1011.67	3987.17
40.00	7537.00	1205.92	1281.29	5049.79
50.00	8749.00	1399.84	1487.33	5861.83
60.00	9722.00	1555.52	1652.74	6513.74
70.00	10653.00	1704.48	1811.01	7137.51
80.00	11758.00	1881.28	1998.86	7877.86
90.00	13452.00	2152.32	2286.84	9012.84
100.00	14509.00	2321.44	2466.53	9721.03
110.00	15073.00	2411.68	2562.41	10098.91
120.00	15469.00	2475.04	2629.73	10364.23
130.00	15996.00	2559.36	2719.32	10717.32
140.00	16496.00	2639.36	2804.32	11052.32
150.00	16844.00	2695.04	2863.48	11285.48
160.00	17212.00	2753.92	2926.04	11532.04
170.00	17590.00	2814.40	2990.30	11785.30

```
 WATER RESOURCE UNIT
 DR RCH12 GAGE 11       0 CROW CREEK RESERVATION, HYDE COUNTY

WRUID  =      RCH12 WATER RESOURCE UNIT ID
GAUGE  =    GAGE 11
 DELTEL =       0.00 GAUGE ELEVATION OFFSET
WRUTIT =  CROW CREEK RESERVATION, HYDE COUNTY

 WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
 DB OMAHA      SD    HYDE            MISS    CROW   CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =        SD
COUNTY =       HYDE
WATSHD =       MISS WATERSHED
SUBASN =       CROW SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

 DS RECORD - RESERVOIR PROJECT
 DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

 FS RECORD - FLOOD STAGE ELEVATION
 FS    10

 ZR RECORD - REACH DATA - DSS PATHNAME
 ZR A=MISSOURI B=RCH 12 C=ELEVATION-CURVES E=1992 F=AG-EXISTING

CROPID =      WHEAT
 CROPAR =      29.00 % OF REACH PLANTED

CROPID =       OATS
 CROPAR =      36.00 % OF REACH PLANTED

CROPID =       MILO
 CROPAR =      17.00 % OF REACH PLANTED
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH12	GAGE 11	OMAHA	SD	HYDE		MISS	CROW	CONG1					OAHE

		CUMULATIVE CROP AREA (ACRES)		
ELEVATION	AREA	WHEAT	OATS	MILO
10.00	0.00	0.00	0.00	0.00
20.00	14.00	4.06	5.04	2.38
30.00	46.00	13.34	16.56	7.82
40.00	62.00	17.98	22.32	10.54
50.00	77.00	22.33	27.72	13.09
60.00	98.00	28.42	35.28	16.66
70.00	149.00	43.21	53.64	25.33
80.00	208.00	60.32	74.88	35.36
90.00	255.00	73.95	91.80	43.35
100.00	329.00	95.41	118.44	55.93
110.00	406.00	117.74	146.16	69.02
120.00	473.00	137.17	170.28	80.41
130.00	553.00	160.37	199.08	94.01
140.00	627.00	181.83	225.72	106.59
150.00	695.00	201.55	250.20	118.15
160.00	753.00	218.37	271.08	128.01
170.00	803.00	232.87	289.08	136.51

```
 WATER RESOURCE UNIT
 DR RCH13 GAGE 11       0 CROW CREEK RESERVATION, BUFFALO COUNTY

WRUID  =      RCH13 WATER RESOURCE UNIT ID
GAUGE  =    GAGE 11
 DELTEL =       0.00 GAUGE ELEVATION OFFSET
WRUTIT =  CROW CREEK RESERVATION, BUFFALO COUNTY

 WATER RESOURCE UNIT BOUNDARY SPECIFICATIONS
 DB OMAHA      SD    BUFF            MISS    CROW   CONG1

DIST   =      OMAHA COE DISTRICT
STATE  =        SD
COUNTY =       BUFF
WATSHD =       MISS WATERSHED
SUBASN =       CROW SUBBASIN
CONG   =      CONG1 CONGRESSIONAL DISTRICT

 DS RECORD - RESERVOIR PROJECT
 DS  OAHE OAHE RESERVOIR
RESID  =       OAHE RESERVOIR PROJECT ID
RESTIT =  OAHE RESERVOIR  RESERVOIR PROJECT TITLE

 FS RECORD - FLOOD STAGE ELEVATION
 FS     0

 ZR RECORD - REACH DATA - DSS PATHNAME
 ZR A=MISSOURI B=RCH 13 C=ELEVATION-CURVES E=1992 F=AG-EXISTING

CROPID =      WHEAT
 CROPAR =      14.00 % OF REACH PLANTED

CROPID =       CORN
 CROPAR =      39.00 % OF REACH PLANTED

CROPID =       OATS
 CROPAR =      12.00 % OF REACH PLANTED

CROPID =       MILO
 CROPAR =      25.00 % OF REACH PLANTED
```

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH13	GAGE 11	OMAHA	SD	BUFF		MISS	CROW	CONG1					OAHE

		CUMULATIVE CROP AREA (ACRES)			
ELEVATION	AREA	WHEAT	CORN	OATS	MILO
0.00	0.00	0.00	0.00	0.00	0.00
10.00	182.00	25.48	70.98	21.84	45.50
20.00	202.00	28.28	78.78	24.24	50.50
30.00	321.00	44.94	125.19	38.52	80.25
40.00	597.00	83.58	232.83	71.64	149.25
50.00	1350.00	189.00	526.50	162.00	337.50
60.00	2844.00	398.16	1109.16	341.28	711.00
70.00	5067.00	709.38	1976.13	608.04	1266.75
80.00	6319.00	884.66	2464.41	758.28	1579.75
90.00	6899.00	965.86	2690.61	827.88	1724.75
100.00	7270.00	1017.80	2835.30	872.40	1817.50
110.00	7487.00	1048.18	2919.93	898.44	1871.75
120.00	7628.00	1067.92	2974.92	915.36	1907.00
130.00	7699.00	1077.86	3002.61	923.88	1924.75
140.00	7756.00	1085.84	3024.84	930.72	1939.00
150.00	7818.00	1094.52	3049.02	938.16	1954.50
160.00	7864.00	1100.96	3066.96	943.68	1966.00
170.00	7901.00	1106.14	3081.39	948.12	1975.25

Analysis Program Input Data

```
T1 MISSOURI RIVER
T2 OAHE DAM TO BIG BEND DAM IN SOUTH DAKOTA
T3 TEST INPUT DATA FOR USE IN THE OMAHA DISTRICTS RMS
J1      1         0
JE       02JUN93 10JUN93
PB  OAHE      100
TA TRACE      ALL
EJ
```

Analysis Program Output

```
*****************************************************
*  FLOOD DAMAGE PROJECT BENEFIT ACCOMPLISHMENT      *
*  ANALYSIS PROGRAM                                 *
*  SEPTEMBER 1991                                   *
*  VERSION 1.00                                     *
*                                                   *
*  RUN DATE 24 JUL 92  TIME 12:46:20                *
*****************************************************
```

```
****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616             *
*  (916) 756-1104 FAX (916) 756-8250   *
****************************************
```

```
XXXXXX  XXX     XXXXXX   XXXXXX      X
X      X   X    X     X  X     X    X X
X      X    X   X     X  X     X   X   X
XXXX   X    X   XXXXXX   XXXXXX   XXXXXXX
X      X    X   X        X     X  X     X
X      X   X    X        X     X  X     X
X      XXX      X        XXXXXX   X     X
```

MISSOURI RIVER
OAHE DAM TO BIG BEND DAM IN SOUTH DAKOTA
TEST INPUT DATA FOR USE IN THE OMAHA DISTRICTS RMS
GAUGE HYDROGRAPHS

		GAGE 3 W/O	GAGE 4 W/O	GAGE 11 W/O
153	2 JUN 93	60.0	40.0	0.0
154	3 JUN 93	70.0	43.0	78.0
155	4 JUN 93	80.0	46.0	81.0
156	5 JUN 93	90.0	47.0	83.0
157	6 JUN 93	95.0	46.0	81.0
158	7 JUN 93	90.0	43.0	79.0
159	8 JUN 93	80.0	41.0	77.0
160	9 JUN 93	70.0	40.0	76.0
161	10 JUN 93	60.0	40.0	0.0

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 1	GAGE 3	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

SPRING WHEAT

		WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	40.0- 50.0	0.00	0.00	0.00	0.00	0.00	0.00
2	50.0- 60.0	0.00	0.00	0.00	0.00	0.00	0.00
3	60.0- 70.0	0.00	0.00	0.00	0.00	0.00	0.00
4	70.0- 80.0	0.00	0.00	0.00	0.00	0.00	0.00
5	80.0- 90.0	0.00	0.00	0.00	0.00	0.00	0.00
6	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
7	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
8	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
9	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
10	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
11	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
12	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
13	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

CORN

		WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	40.0- 50.0	0.00	0.00	0.00	0.00	0.00	0.00
2	50.0- 60.0	0.00	0.00	0.00	0.00	0.00	0.00
3	60.0- 70.0	0.00	0.00	0.00	0.00	0.00	0.00
4	70.0- 80.0	0.00	0.00	0.00	0.00	0.00	0.00
5	80.0- 90.0	0.00	0.00	0.00	0.00	0.00	0.00
6	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
7	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
8	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
9	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
10	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
11	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
12	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
13	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 1	GAGE 3	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

OATS

ZONE	ELEVATION	WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	40.0- 50.0	0.00	0.00	0.00	0.00	0.00	0.00
2	50.0- 60.0	0.00	0.00	0.00	0.00	0.00	0.00
3	60.0- 70.0	0.00	0.00	0.00	0.00	0.00	0.00
4	70.0- 80.0	0.00	0.00	0.00	0.00	0.00	0.00
5	80.0- 90.0	0.00	0.00	0.00	0.00	0.00	0.00
6	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
7	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
8	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
9	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
10	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
11	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
12	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
13	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

SORGHUM

ZONE	ELEVATION	WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	40.0- 50.0	0.00	0.00	0.00	0.00	0.00	0.00
2	50.0- 60.0	0.00	0.00	0.00	0.00	0.00	0.00
3	60.0- 70.0	0.00	0.00	0.00	0.00	0.00	0.00
4	70.0- 80.0	0.00	0.00	0.00	0.00	0.00	0.00
5	80.0- 90.0	0.00	0.00	0.00	0.00	0.00	0.00
6	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
7	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
8	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
9	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
10	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
11	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
12	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
13	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 1	GAGE 3	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

	AREA FLOODED			FLOOD DAMAGE		
AGRICULTURAL DAMAGE CATEGORIES	WITHOUT PROJECT (ACRES)	WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
SPRING WHEAT	0.00	0.00	0.00	0.00	0.00	0.00
CORN	0.00	0.00	0.00	0.00	0.00	0.00
OATS	0.00	0.00	0.00	0.00	0.00	0.00
SORGHUM	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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	STRUCTURES FLOODED			FLOOD DAMAGE		
URBAN DAMAGE CATEGORIES	WITHOUT PROJECT	WITH PROJECT	STRUCTURES MODIFIED	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	0.00	0.00	0.00
STRUCTURES FLOODED	0.00	0.00	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 2	GAGE 4	OMAHA	SD	STAN		MISS	SUBA	CONG1					OAHE

SPRING WHEAT

ZONE	ELEVATION	WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	40.0- 50.0	0.00	0.00	0.00	0.00	0.00	0.00
2	50.0- 60.0	0.00	0.00	0.00	0.00	0.00	0.00
3	60.0- 70.0	0.00	0.00	0.00	0.00	0.00	0.00
4	70.0- 80.0	0.00	0.00	0.00	0.00	0.00	0.00
5	80.0- 90.0	0.00	0.00	0.00	0.00	0.00	0.00
6	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
7	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
8	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
9	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
10	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
11	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
12	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
13	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

OATS

ZONE	ELEVATION	WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	40.0- 50.0	0.00	0.00	0.00	0.00	0.00	0.00
2	50.0- 60.0	0.00	0.00	0.00	0.00	0.00	0.00
3	60.0- 70.0	0.00	0.00	0.00	0.00	0.00	0.00
4	70.0- 80.0	0.00	0.00	0.00	0.00	0.00	0.00
5	80.0- 90.0	0.00	0.00	0.00	0.00	0.00	0.00
6	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
7	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
8	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
9	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
10	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
11	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
12	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
13	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 2	GAGE 4	OMAHA	SD	STAN		MISS	SUBA	CONG1					OAHE

SORGHUM

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	40.0-	50.0	0.00	0.00	0.00	0.00	0.00	0.00
2	50.0-	60.0	0.00	0.00	0.00	0.00	0.00	0.00
3	60.0-	70.0	0.00	0.00	0.00	0.00	0.00	0.00
4	70.0-	80.0	0.00	0.00	0.00	0.00	0.00	0.00
5	80.0-	90.0	0.00	0.00	0.00	0.00	0.00	0.00
6	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
7	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
8	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
9	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
10	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
11	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
12	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
13	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 2	GAGE 4	OMAHA	SD	STAN		MISS	SUBA	CONG1					OAHE

	AREA FLOODED			FLOOD DAMAGE		
AGRICULTURAL DAMAGE CATEGORIES	WITHOUT PROJECT (ACRES)	WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
SPRING WHEAT	0.00	0.00	0.00	0.00	0.00	0.00
OATS	0.00	0.00	0.00	0.00	0.00	0.00
SORGHUM	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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	STRUCTURES FLOODED			FLOOD DAMAGE		
URBAN DAMAGE CATEGORIES	WITHOUT PROJECT	WITH PROJECT	STRUCTURES MODIFIED	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	0.00	0.00	0.00
STRUCTURES FLOODED	0.00	0.00	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 3	GAGE 3	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

RESIDENTIAL

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	WITHOUT PROJECT CONDITIONS STRUCTURES	WITH PROJECT CONDITIONS DAMAGE ($1000)	WITH PROJECT CONDITIONS STRUCTURES
1	66.0-	68.0	0.00	0.00	0.00	0.00
2	68.0-	70.0	0.00	0.00	0.00	0.00
3	70.0-	72.0	0.00	0.00	0.00	0.00
4	72.0-	74.0	0.00	0.00	0.00	0.00
5	74.0-	76.0	115.54	10.50	115.54	10.50
6	76.0-	78.0	555.58	28.50	555.58	28.50
7	78.0-	80.0	823.54	34.50	823.54	34.50
8	80.0-	82.0	1113.21	22.50	1113.21	22.50
9	82.0-	84.0	1105.53	28.50	1105.53	28.50
10	84.0-	86.0	1324.59	33.00	1324.59	33.00
11	86.0-	88.0	1312.33	27.00	1312.33	27.00
12	88.0-	90.0	1383.16	31.50	1383.16	31.50
13	90.0-	92.0	1376.23	34.50	1376.23	34.50
14	92.0-	94.0	1685.78	61.50	1685.78	61.50
15	94.0-	96.0	929.89	33.75	929.89	33.75
16	96.0-	98.0	0.00	0.00	0.00	0.00
17	98.0-	100.0	0.00	0.00	0.00	0.00
		TOTAL	11725.38	345.75	11725.38	345.75

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 3	GAGE 3	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

COMMERCIAL

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	WITHOUT PROJECT CONDITIONS STRUCTURES	WITH PROJECT CONDITIONS DAMAGE ($1000)	WITH PROJECT CONDITIONS STRUCTURES
1	66.0-	68.0	0.00	0.00	0.00	0.00
2	68.0-	70.0	0.00	0.00	0.00	0.00
3	70.0-	72.0	0.00	0.00	0.00	0.00
4	72.0-	74.0	0.00	0.00	0.00	0.00
5	74.0-	76.0	0.00	0.00	0.00	0.00
6	76.0-	78.0	0.00	0.00	0.00	0.00
7	78.0-	80.0	0.00	0.00	0.00	0.00
8	80.0-	82.0	0.00	0.00	0.00	0.00
9	82.0-	84.0	99.07	1.30	99.07	1.30
10	84.0-	86.0	341.72	2.80	341.72	2.80
11	86.0-	88.0	395.10	1.80	395.10	1.80
12	88.0-	90.0	453.21	1.60	453.21	1.60
13	90.0-	92.0	597.66	1.60	597.66	1.60
14	92.0-	94.0	725.17	1.60	725.17	1.60
15	94.0-	96.0	406.23	0.85	406.23	0.85
16	96.0-	98.0	0.00	0.00	0.00	0.00
17	98.0-	100.0	0.00	0.00	0.00	0.00
		TOTAL	3018.16	11.55	3018.16	11.55

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 3	GAGE 3	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

INDUSTRIAL

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	STRUCTURES	WITH PROJECT CONDITIONS DAMAGE ($1000)	STRUCTURES
1	66.0-	68.0	0.00	0.00	0.00	0.00
2	68.0-	70.0	0.00	0.00	0.00	0.00
3	70.0-	72.0	0.00	0.00	0.00	0.00
4	72.0-	74.0	0.00	0.00	0.00	0.00
5	74.0-	76.0	6.30	0.25	6.30	0.25
6	76.0-	78.0	11.94	0.25	11.94	0.25
7	78.0-	80.0	57.16	1.50	57.16	1.50
8	80.0-	82.0	428.68	6.00	428.68	6.00
9	82.0-	84.0	1411.19	6.50	1411.19	6.50
10	84.0-	86.0	1903.21	5.75	1903.21	5.75
11	86.0-	88.0	2639.03	6.75	2639.03	6.75
12	88.0-	90.0	3875.92	7.50	3875.92	7.50
13	90.0-	92.0	4500.86	7.00	4500.86	7.00
14	92.0-	94.0	4353.13	8.75	4353.13	8.75
15	94.0-	96.0	1738.22	3.13	1738.22	3.13
16	96.0-	98.0	0.00	0.00	0.00	0.00
17	98.0-	100.0	0.00	0.00	0.00	0.00
		TOTAL	20925.65	53.38	20925.65	53.38

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 3	GAGE 3	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

PUBLIC WORKS

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	STRUCTURES	WITH PROJECT CONDITIONS DAMAGE ($1000)	STRUCTURES
1	66.0-	68.0	0.00	0.00	0.00	0.00
2	68.0-	70.0	0.00	0.00	0.00	0.00
3	70.0-	72.0	80.06	1.00	80.06	1.00
4	72.0-	74.0	188.48	2.50	188.48	2.50
5	74.0-	76.0	308.96	2.00	308.96	2.00
6	76.0-	78.0	516.86	3.00	516.86	3.00
7	78.0-	80.0	1056.56	2.00	1056.56	2.00
8	80.0-	82.0	1423.72	3.50	1423.72	3.50
9	82.0-	84.0	1839.84	2.50	1839.84	2.50
10	84.0-	86.0	1864.54	4.00	1864.54	4.00
11	86.0-	88.0	2242.84	3.50	2242.84	3.50
12	88.0-	90.0	2169.27	3.00	2169.27	3.00
13	90.0-	92.0	2489.36	1.00	2489.36	1.00
14	92.0-	94.0	2275.53	0.00	2275.53	0.00
15	94.0-	96.0	1113.38	0.00	1113.38	0.00
16	96.0-	98.0	0.00	0.00	0.00	0.00
17	98.0-	100.0	0.00	0.00	0.00	0.00
		TOTAL	17569.39	28.00	17569.39	28.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 3	GAGE 3	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

OPEN SPACE

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	STRUCTURES	WITH PROJECT CONDITIONS DAMAGE ($1000)	STRUCTURES
1	66.0-	68.0	5.91	0.10	5.91	0.10
2	68.0-	70.0	12.17	1.30	12.17	1.30
3	70.0-	72.0	36.99	3.80	36.99	3.80
4	72.0-	74.0	66.48	3.20	66.48	3.20
5	74.0-	76.0	75.72	3.60	75.72	3.60
6	76.0-	78.0	75.84	3.50	75.84	3.50
7	78.0-	80.0	73.02	2.10	73.02	2.10
8	80.0-	82.0	63.36	2.70	63.36	2.70
9	82.0-	84.0	56.12	1.90	56.12	1.90
10	84.0-	86.0	52.34	2.10	52.34	2.10
11	86.0-	88.0	51.77	1.90	51.77	1.90
12	88.0-	90.0	47.02	1.00	47.02	1.00
13	90.0-	92.0	31.42	0.70	31.42	0.70
14	92.0-	94.0	24.97	0.50	24.97	0.50
15	94.0-	96.0	12.79	0.50	12.79	0.50
16	96.0-	98.0	0.00	0.00	0.00	0.00
17	98.0-	100.0	0.00	0.00	0.00	0.00
		TOTAL	685.92	28.90	685.92	28.90

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 3	GAGE 3	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

AGRICULTURAL DAMAGE CATEGORIES	AREA FLOODED: WITHOUT PROJECT (ACRES)	AREA FLOODED: WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	FLOOD DAMAGE: WITHOUT PROJECT ($1000)	FLOOD DAMAGE: WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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URBAN DAMAGE CATEGORIES	STRUCTURES FLOODED: WITHOUT PROJECT	STRUCTURES FLOODED: WITH PROJECT	STRUCTURES MODIFIED	FLOOD DAMAGE: WITHOUT PROJECT ($1000)	FLOOD DAMAGE: WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
RESIDENTIAL	345.75	345.75	0.00	11725.38	11725.38	0.00
COMMERCIAL	11.55	11.55	0.00	3018.16	3018.16	0.00
INDUSTRIAL	53.38	53.38	0.00	20925.65	20925.65	0.00
PUBLIC WORKS	28.00	28.00	0.00	17569.39	17569.39	0.00
OPEN SPACE	28.90	28.90	0.00	685.92	685.92	0.00
TOTAL	467.57	467.57	0.00	53924.51	53924.51	0.00

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WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	53924.51	53924.51	0.00
STRUCTURES FLOODED	467.57	467.57	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 4	GAGE 4	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

RESIDENTIAL

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	WITHOUT PROJECT CONDITIONS STRUCTURES	WITH PROJECT CONDITIONS DAMAGE ($1000)	WITH PROJECT CONDITIONS STRUCTURES
1	40.0-	41.0	0.00	0.00	0.00	0.00
2	41.0-	42.0	0.00	0.00	0.00	0.00
3	42.0-	43.0	0.00	0.00	0.00	0.00
4	43.0-	44.0	0.00	0.00	0.00	0.00
5	44.0-	45.0	364.77	49.50	364.77	49.50
6	45.0-	46.0	1621.62	79.50	1621.62	79.50
7	46.0-	47.0	1401.51	34.50	1401.51	34.50
8	47.0-	48.0	0.00	0.00	0.00	0.00
9	48.0-	49.0	0.00	0.00	0.00	0.00
10	49.0-	50.0	0.00	0.00	0.00	0.00
11	50.0-	51.0	0.00	0.00	0.00	0.00
12	51.0-	52.0	0.00	0.00	0.00	0.00
13	52.0-	53.0	0.00	0.00	0.00	0.00
14	53.0-	54.0	0.00	0.00	0.00	0.00
15	54.0-	55.0	0.00	0.00	0.00	0.00
16	55.0-	56.0	0.00	0.00	0.00	0.00
17	56.0-	57.0	0.00	0.00	0.00	0.00
		TOTAL	3387.90	163.50	3387.90	163.50

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 4	GAGE 4	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

COMMERCIAL

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	WITHOUT PROJECT CONDITIONS STRUCTURES	WITH PROJECT CONDITIONS DAMAGE ($1000)	WITH PROJECT CONDITIONS STRUCTURES
1	40.0-	41.0	0.00	0.00	0.00	0.00
2	41.0-	42.0	0.00	0.00	0.00	0.00
3	42.0-	43.0	0.00	0.00	0.00	0.00
4	43.0-	44.0	0.00	0.00	0.00	0.00
5	44.0-	45.0	0.00	0.00	0.00	0.00
6	45.0-	46.0	0.00	0.00	0.00	0.00
7	46.0-	47.0	0.00	0.00	0.00	0.00
8	47.0-	48.0	0.00	0.00	0.00	0.00
9	48.0-	49.0	0.00	0.00	0.00	0.00
10	49.0-	50.0	0.00	0.00	0.00	0.00
11	50.0-	51.0	0.00	0.00	0.00	0.00
12	51.0-	52.0	0.00	0.00	0.00	0.00
13	52.0-	53.0	0.00	0.00	0.00	0.00
14	53.0-	54.0	0.00	0.00	0.00	0.00
15	54.0-	55.0	0.00	0.00	0.00	0.00
16	55.0-	56.0	0.00	0.00	0.00	0.00
17	56.0-	57.0	0.00	0.00	0.00	0.00
		TOTAL	0.00	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 4	GAGE 4	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

INDUSTRIAL

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	STRUCTURES	WITH PROJECT CONDITIONS DAMAGE ($1000)	STRUCTURES
1	40.0-	41.0	0.00	0.00	0.00	0.00
2	41.0-	42.0	0.00	0.00	0.00	0.00
3	42.0-	43.0	0.00	0.00	0.00	0.00
4	43.0-	44.0	1778.78	6.00	1778.78	6.00
5	44.0-	45.0	1703.87	2.00	1703.87	2.00
6	45.0-	46.0	524.40	0.50	524.40	0.50
7	46.0-	47.0	903.61	2.50	903.61	2.50
8	47.0-	48.0	0.00	0.00	0.00	0.00
9	48.0-	49.0	0.00	0.00	0.00	0.00
10	49.0-	50.0	0.00	0.00	0.00	0.00
11	50.0-	51.0	0.00	0.00	0.00	0.00
12	51.0-	52.0	0.00	0.00	0.00	0.00
13	52.0-	53.0	0.00	0.00	0.00	0.00
14	53.0-	54.0	0.00	0.00	0.00	0.00
15	54.0-	55.0	0.00	0.00	0.00	0.00
16	55.0-	56.0	0.00	0.00	0.00	0.00
17	56.0-	57.0	0.00	0.00	0.00	0.00
		TOTAL	4910.66	11.00	4910.66	11.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 4	GAGE 4	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

PUBLIC WORKS

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	WITHOUT PROJECT CONDITIONS STRUCTURES	WITH PROJECT CONDITIONS DAMAGE ($1000)	WITH PROJECT CONDITIONS STRUCTURES
1	40.0-	41.0	0.00	0.00	0.00	0.00
2	41.0-	42.0	0.00	0.00	0.00	0.00
3	42.0-	43.0	0.00	0.00	0.00	0.00
4	43.0-	44.0	0.00	0.00	0.00	0.00
5	44.0-	45.0	0.00	0.00	0.00	0.00
6	45.0-	46.0	0.00	0.00	0.00	0.00
7	46.0-	47.0	0.00	0.00	0.00	0.00
8	47.0-	48.0	0.00	0.00	0.00	0.00
9	48.0-	49.0	0.00	0.00	0.00	0.00
10	49.0-	50.0	0.00	0.00	0.00	0.00
11	50.0-	51.0	0.00	0.00	0.00	0.00
12	51.0-	52.0	0.00	0.00	0.00	0.00
13	52.0-	53.0	0.00	0.00	0.00	0.00
14	53.0-	54.0	0.00	0.00	0.00	0.00
15	54.0-	55.0	0.00	0.00	0.00	0.00
16	55.0-	56.0	0.00	0.00	0.00	0.00
17	56.0-	57.0	0.00	0.00	0.00	0.00
		TOTAL	0.00	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 4	GAGE 4	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

OPEN SPACE

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	WITHOUT PROJECT CONDITIONS STRUCTURES	WITH PROJECT CONDITIONS DAMAGE ($1000)	WITH PROJECT CONDITIONS STRUCTURES
1	40.0-	41.0	0.03	0.00	0.03	0.00
2	41.0-	42.0	0.14	0.00	0.14	0.00
3	42.0-	43.0	0.48	0.00	0.48	0.00
4	43.0-	44.0	0.66	0.00	0.66	0.00
5	44.0-	45.0	0.82	0.00	0.82	0.00
6	45.0-	46.0	0.95	0.00	0.95	0.00
7	46.0-	47.0	1.08	0.00	1.08	0.00
8	47.0-	48.0	0.00	0.00	0.00	0.00
9	48.0-	49.0	0.00	0.00	0.00	0.00
10	49.0-	50.0	0.00	0.00	0.00	0.00
11	50.0-	51.0	0.00	0.00	0.00	0.00
12	51.0-	52.0	0.00	0.00	0.00	0.00
13	52.0-	53.0	0.00	0.00	0.00	0.00
14	53.0-	54.0	0.00	0.00	0.00	0.00
15	54.0-	55.0	0.00	0.00	0.00	0.00
16	55.0-	56.0	0.00	0.00	0.00	0.00
17	56.0-	57.0	0.00	0.00	0.00	0.00
		TOTAL	4.15	0.00	4.15	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 4	GAGE 4	OMAHA	SD	HUGH		MISS	SUBA	CONG1					OAHE

	AREA FLOODED			FLOOD DAMAGE		
AGRICULTURAL DAMAGE CATEGORIES	WITHOUT PROJECT (ACRES)	WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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	STRUCTURES FLOODED			FLOOD DAMAGE		
URBAN DAMAGE CATEGORIES	WITHOUT PROJECT	WITH PROJECT	STRUCTURES MODIFIED	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
RESIDENTIAL	163.50	163.50	0.00	3387.90	3387.90	0.00
COMMERCIAL	0.00	0.00	0.00	0.00	0.00	0.00
INDUSTRIAL	11.00	11.00	0.00	4910.66	4910.66	0.00
PUBLIC WORKS	0.00	0.00	0.00	0.00	0.00	0.00
OPEN SPACE	0.00	0.00	0.00	4.15	4.15	0.00
TOTAL	174.50	174.50	0.00	8302.71	8302.71	0.00

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WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	8302.71	8302.71	0.00
STRUCTURES FLOODED	174.50	174.50	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 6	GAGE 4	OMAHA	SD	STAN		MISS	SUBA	CONG1					OAHE

SPRING WHEAT

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	40.0-	50.0	5.02	0.25	117.33	5.02	0.25	117.33
2	50.0-	60.0	0.00	0.00	0.00	0.00	0.00	0.00
3	60.0-	70.0	0.00	0.00	0.00	0.00	0.00	0.00
4	70.0-	80.0	0.00	0.00	0.00	0.00	0.00	0.00
5	80.0-	90.0	0.00	0.00	0.00	0.00	0.00	0.00
6	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
7	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
8	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
9	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
10	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
11	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
12	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
13	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	5.02	0.25	117.33	5.02	0.25	117.33

OATS

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	40.0-	50.0	1.43	0.07	84.97	1.43	0.07	84.97
2	50.0-	60.0	0.00	0.00	0.00	0.00	0.00	0.00
3	60.0-	70.0	0.00	0.00	0.00	0.00	0.00	0.00
4	70.0-	80.0	0.00	0.00	0.00	0.00	0.00	0.00
5	80.0-	90.0	0.00	0.00	0.00	0.00	0.00	0.00
6	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
7	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
8	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
9	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
10	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
11	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
12	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
13	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	1.43	0.07	84.97	1.43	0.07	84.97

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 6	GAGE 4	OMAHA	SD	STAN		MISS	SUBA	CONG1					OAHE

SORGHUM

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	40.0-	50.0	0.97	0.05	202.30	0.97	0.05	202.30
2	50.0-	60.0	0.00	0.00	0.00	0.00	0.00	0.00
3	60.0-	70.0	0.00	0.00	0.00	0.00	0.00	0.00
4	70.0-	80.0	0.00	0.00	0.00	0.00	0.00	0.00
5	80.0-	90.0	0.00	0.00	0.00	0.00	0.00	0.00
6	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
7	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
8	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
9	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
10	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
11	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
12	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
13	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	0.97	0.05	202.30	0.97	0.05	202.30

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 6	GAGE 4	OMAHA	SD	STAN		MISS	SUBA	CONG1					OAHE

	AREA FLOODED			FLOOD DAMAGE		
AGRICULTURAL DAMAGE CATEGORIES	WITHOUT PROJECT (ACRES)	WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
SPRING WHEAT	117.33	117.33	0.00	5.02	5.02	0.00
OATS	84.97	84.97	0.00	1.43	1.43	0.00
SORGHUM	202.30	202.30	0.00	0.97	0.97	0.00
OTHER LOSSES				0.37	0.37	0.00
TOTAL	404.60	404.60	0.00	7.79	7.79	0.00

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	STRUCTURES FLOODED			FLOOD DAMAGE		
URBAN DAMAGE CATEGORIES	WITHOUT PROJECT	WITH PROJECT	STRUCTURES MODIFIED	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	7.79	7.79	0.00
STRUCTURES FLOODED	0.00	0.00	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	404.60	404.60	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 7	GAGE 11	OMAHA	SD	HUGH		MISS	SUBB	CONG1					OAHE

SPRING WHEAT

		WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	20.0- 30.0	7.40	0.37	142.02	7.40	0.37	142.02
2	30.0- 40.0	9.28	0.46	177.48	9.28	0.46	177.48
3	40.0- 50.0	7.87	0.39	151.20	7.87	0.39	151.20
4	50.0- 60.0	7.83	0.39	151.92	7.83	0.39	151.92
5	60.0- 70.0	4.83	0.24	94.50	4.83	0.24	94.50
6	70.0- 80.0	3.94	0.20	83.16	3.94	0.20	83.16
7	80.0- 90.0	0.25	0.01	8.15	0.25	0.01	8.15
8	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
9	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
10	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
11	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
12	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
13	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
14	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
15	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	41.39	2.07	808.43	41.39	2.07	808.43

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 7	GAGE 11	OMAHA	SD	HUGH		MISS	SUBB	CONG1					OAHE

CORN

		WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	20.0- 30.0	20.11	1.01	284.04	20.11	1.01	284.04
2	30.0- 40.0	25.33	1.27	354.96	25.33	1.27	354.96
3	40.0- 50.0	21.44	1.07	302.40	21.44	1.07	302.40
4	50.0- 60.0	21.23	1.06	303.84	21.23	1.06	303.84
5	60.0- 70.0	13.01	0.65	189.00	13.01	0.65	189.00
6	70.0- 80.0	9.88	0.49	166.32	9.88	0.49	166.32
7	80.0- 90.0	0.17	0.01	16.31	0.17	0.01	16.31
8	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
9	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
10	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
11	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
12	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
13	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
14	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
15	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	111.16	5.56	1616.87	111.16	5.56	1616.87

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 7	GAGE 11	OMAHA	SD	HUGH		MISS	SUBB	CONG1					OAHE

OATS

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	20.0-	30.0	2.56	0.13	110.46	2.56	0.13	110.46
2	30.0-	40.0	3.21	0.16	138.04	3.21	0.16	138.04
3	40.0-	50.0	2.71	0.14	117.60	2.71	0.14	117.60
4	50.0-	60.0	2.68	0.13	118.16	2.68	0.13	118.16
5	60.0-	70.0	1.64	0.08	73.50	1.64	0.08	73.50
6	70.0-	80.0	1.27	0.06	64.68	1.27	0.06	64.68
7	80.0-	90.0	0.06	0.00	6.34	0.06	0.00	6.34
8	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
9	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
10	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
11	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
12	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
13	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
14	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
15	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	14.12	0.71	628.78	14.12	0.71	628.78

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 7	GAGE 11	OMAHA	SD	HUGH		MISS	SUBB	CONG1					OAHE

SORGHUM

		WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	20.0- 30.0	0.69	0.03	78.90	0.69	0.03	78.90
2	30.0- 40.0	0.87	0.04	98.60	0.87	0.04	98.60
3	40.0- 50.0	0.73	0.04	84.00	0.73	0.04	84.00
4	50.0- 60.0	0.71	0.04	84.40	0.71	0.04	84.40
5	60.0- 70.0	0.43	0.02	52.50	0.43	0.02	52.50
6	70.0- 80.0	0.30	0.01	46.20	0.30	0.01	46.20
7	80.0- 90.0	0.00	0.00	4.53	0.00	0.00	4.53
8	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
9	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
10	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
11	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
12	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
13	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
14	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
15	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	3.73	0.19	449.13	3.73	0.19	449.13

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 7	GAGE 11	OMAHA	SD	HUGH		MISS	SUBB	CONG1					OAHE

	AREA FLOODED			FLOOD DAMAGE		
AGRICULTURAL DAMAGE CATEGORIES	WITHOUT PROJECT (ACRES)	WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
SPRING WHEAT	808.43	808.43	0.00	41.39	41.39	0.00
CORN	1616.87	1616.87	0.00	111.16	111.16	0.00
OATS	628.78	628.78	0.00	14.12	14.12	0.00
SORGHUM	449.13	449.13	0.00	3.73	3.73	0.00
OTHER LOSSES				8.52	8.52	0.00
TOTAL	3503.21	3503.21	0.00	178.92	178.92	0.00

	STRUCTURES FLOODED			FLOOD DAMAGE		
URBAN DAMAGE CATEGORIES	WITHOUT PROJECT	WITH PROJECT	STRUCTURES MODIFIED	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	178.92	178.92	0.00
STRUCTURES FLOODED	0.00	0.00	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	3503.21	3503.21	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 8	GAGE 11	OMAHA	SD	STAN		MISS	SUBB	CONG1					OAHE

SPRING WHEAT

		WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	30.0- 40.0	0.00	0.00	0.00	0.00	0.00	0.00
2	40.0- 50.0	0.00	0.00	0.00	0.00	0.00	0.00
3	50.0- 60.0	0.00	0.00	0.00	0.00	0.00	0.00
4	60.0- 70.0	0.00	0.00	0.00	0.00	0.00	0.00
5	70.0- 80.0	0.00	0.00	0.00	0.00	0.00	0.00
6	80.0- 90.0	0.00	0.00	0.00	0.00	0.00	0.00
7	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
8	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
9	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
10	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
11	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
12	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
13	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
14	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 8	GAGE 11	OMAHA	SD	STAN		MISS	SUBB	CONG1					OAHE

OATS

		WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	30.0- 40.0	0.00	0.00	0.00	0.00	0.00	0.00
2	40.0- 50.0	0.00	0.00	0.00	0.00	0.00	0.00
3	50.0- 60.0	0.00	0.00	0.00	0.00	0.00	0.00
4	60.0- 70.0	0.00	0.00	0.00	0.00	0.00	0.00
5	70.0- 80.0	0.00	0.00	0.00	0.00	0.00	0.00
6	80.0- 90.0	0.00	0.00	0.00	0.00	0.00	0.00
7	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
8	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
9	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
10	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
11	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
12	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
13	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
14	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 8	GAGE 11	OMAHA	SD	STAN		MISS	SUBB	CONG1					OAHE

SORGHUM

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	30.0-	40.0	0.00	0.00	0.00	0.00	0.00	0.00
2	40.0-	50.0	0.00	0.00	0.00	0.00	0.00	0.00
3	50.0-	60.0	0.00	0.00	0.00	0.00	0.00	0.00
4	60.0-	70.0	0.00	0.00	0.00	0.00	0.00	0.00
5	70.0-	80.0	0.00	0.00	0.00	0.00	0.00	0.00
6	80.0-	90.0	0.00	0.00	0.00	0.00	0.00	0.00
7	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
8	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
9	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
10	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
11	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
12	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
13	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
14	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 8	GAGE 11	OMAHA	SD	STAN		MISS	SUBB	CONG1					OAHE

	AREA FLOODED			FLOOD DAMAGE		
AGRICULTURAL DAMAGE CATEGORIES	WITHOUT PROJECT (ACRES)	WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
SPRING WHEAT	0.00	0.00	0.00	0.00	0.00	0.00
OATS	0.00	0.00	0.00	0.00	0.00	0.00
SORGHUM	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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	STRUCTURES FLOODED			FLOOD DAMAGE		
URBAN DAMAGE CATEGORIES	WITHOUT PROJECT	WITH PROJECT	STRUCTURES MODIFIED	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	0.00	0.00	0.00
STRUCTURES FLOODED	0.00	0.00	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	0.00	0.00	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 9	GAGE 11	OMAHA	SD	STAN		MISS	LBRU	CONG1					OAHE

SPRING WHEAT

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	20.0-	30.0	9.60	0.48	184.15	9.60	0.48	184.15
2	30.0-	40.0	16.60	0.83	317.55	16.60	0.83	317.55
3	40.0-	50.0	8.31	0.42	159.79	8.31	0.42	159.79
4	50.0-	60.0	8.10	0.41	157.18	8.10	0.41	157.18
5	60.0-	70.0	6.68	0.33	130.79	6.68	0.33	130.79
6	70.0-	80.0	1.29	0.06	27.26	1.29	0.06	27.26
7	80.0-	90.0	0.02	0.00	0.52	0.02	0.00	0.52
8	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
9	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
10	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
11	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
12	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
13	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
14	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
15	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	50.60	2.53	977.24	50.60	2.53	977.24

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 9	GAGE 11	OMAHA	SD	STAN		MISS	LBRU	CONG1					OAHE

OATS

		WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	20.0- 30.0	3.09	0.15	133.35	3.09	0.15	133.35
2	30.0- 40.0	5.34	0.27	229.95	5.34	0.27	229.95
3	40.0- 50.0	2.66	0.13	115.71	2.66	0.13	115.71
4	50.0- 60.0	2.58	0.13	113.82	2.58	0.13	113.82
5	60.0- 70.0	2.11	0.11	94.71	2.11	0.11	94.71
6	70.0- 80.0	0.39	0.02	19.74	0.39	0.02	19.74
7	80.0- 90.0	0.00	0.00	0.38	0.00	0.00	0.38
8	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
9	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
10	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
11	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
12	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
13	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
14	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
15	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	16.17	0.81	707.66	16.17	0.81	707.66

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 9	GAGE 11	OMAHA	SD	STAN		MISS	LBRU	CONG1					OAHE

SORGHUM

		WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	20.0- 30.0	2.76	0.14	317.50	2.76	0.14	317.50
2	30.0- 40.0	4.81	0.24	547.50	4.81	0.24	547.50
3	40.0- 50.0	2.39	0.12	275.50	2.39	0.12	275.50
4	50.0- 60.0	2.29	0.11	271.00	2.29	0.11	271.00
5	60.0- 70.0	1.86	0.09	225.50	1.86	0.09	225.50
6	70.0- 80.0	0.30	0.02	47.00	0.30	0.02	47.00
7	80.0- 90.0	0.00	0.00	0.90	0.00	0.00	0.90
8	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
9	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
10	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
11	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
12	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
13	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
14	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
15	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	14.41	0.72	1684.90	14.41	0.72	1684.90

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH 9	GAGE 11	OMAHA	SD	STAN		MISS	LBRU	CONG1					OAHE

	AREA FLOODED			FLOOD DAMAGE		
AGRICULTURAL DAMAGE CATEGORIES	WITHOUT PROJECT (ACRES)	WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
SPRING WHEAT	977.24	977.24	0.00	50.60	50.60	0.00
OATS	707.66	707.66	0.00	16.17	16.17	0.00
SORGHUM	1684.90	1684.90	0.00	14.41	14.41	0.00
OTHER LOSSES				4.06	4.06	0.00
TOTAL	3369.80	3369.80	0.00	85.25	85.25	0.00

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	STRUCTURES FLOODED			FLOOD DAMAGE		
URBAN DAMAGE CATEGORIES	WITHOUT PROJECT	WITH PROJECT	STRUCTURES MODIFIED	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	85.25	85.25	0.00
STRUCTURES FLOODED	0.00	0.00	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	3369.80	3369.80	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH10	GAGE 11	OMAHA	SD	HUGH		MISS	CROW	CONG1					OAHE

SPRING WHEAT

			WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION		DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	10.0-	20.0	7.73	0.39	148.68	7.73	0.39	148.68
2	20.0-	30.0	14.42	0.72	276.66	14.42	0.72	276.66
3	30.0-	40.0	15.97	0.80	305.46	15.97	0.80	305.46
4	40.0-	50.0	14.07	0.70	270.54	14.07	0.70	270.54
5	50.0-	60.0	18.43	0.92	357.66	18.43	0.92	357.66
6	60.0-	70.0	12.17	0.61	238.32	12.17	0.61	238.32
7	70.0-	80.0	10.60	0.53	223.56	10.60	0.53	223.56
8	80.0-	90.0	2.13	0.11	70.31	2.13	0.11	70.31
9	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
10	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
11	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
12	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
13	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
14	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
15	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
16	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	95.52	4.78	1891.19	95.52	4.78	1891.19

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH10	GAGE 11	OMAHA	SD	HUGH		MISS	CROW	CONG1					OAHE

CORN

			WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION		DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	10.0-	20.0	20.89	1.04	297.36	20.89	1.04	297.36
2	20.0-	30.0	39.18	1.96	553.32	39.18	1.96	553.32
3	30.0-	40.0	43.59	2.18	610.92	43.59	2.18	610.92
4	40.0-	50.0	38.36	1.92	541.08	38.36	1.92	541.08
5	50.0-	60.0	49.98	2.50	715.32	49.98	2.50	715.32
6	60.0-	70.0	32.80	1.64	476.64	32.80	1.64	476.64
7	70.0-	80.0	26.55	1.33	447.12	26.55	1.33	447.12
8	80.0-	90.0	1.50	0.07	140.62	1.50	0.07	140.62
9	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
10	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
11	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
12	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
13	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
14	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
15	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
16	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	252.85	12.64	3782.38	252.85	12.64	3782.38

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH10	GAGE 11	OMAHA	SD	HUGH		MISS	CROW	CONG1					OAHE

OATS

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	10.0-	20.0	2.67	0.13	115.64	2.67	0.13	115.64
2	20.0-	30.0	4.98	0.25	215.18	4.98	0.25	215.18
3	30.0-	40.0	5.52	0.28	237.58	5.52	0.28	237.58
4	40.0-	50.0	4.84	0.24	210.42	4.84	0.24	210.42
5	50.0-	60.0	6.30	0.32	278.18	6.30	0.32	278.18
6	60.0-	70.0	4.13	0.21	185.36	4.13	0.21	185.36
7	70.0-	80.0	3.40	0.17	173.88	3.40	0.17	173.88
8	80.0-	90.0	0.55	0.03	54.68	0.55	0.03	54.68
9	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
10	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
11	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
12	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
13	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
14	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
15	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
16	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	32.40	1.62	1470.92	32.40	1.62	1470.92

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH10	GAGE 11	OMAHA	SD	HUGH		MISS	CROW	CONG1					OAHE

SORGHUM

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	10.0-	20.0	0.71	0.04	82.60	0.71	0.04	82.60
2	20.0-	30.0	1.34	0.07	153.70	1.34	0.07	153.70
3	30.0-	40.0	1.49	0.07	169.70	1.49	0.07	169.70
4	40.0-	50.0	1.30	0.07	150.30	1.30	0.07	150.30
5	50.0-	60.0	1.68	0.08	198.70	1.68	0.08	198.70
6	60.0-	70.0	1.09	0.05	132.40	1.09	0.05	132.40
7	70.0-	80.0	0.80	0.04	124.20	0.80	0.04	124.20
8	80.0-	90.0	0.04	0.00	39.06	0.04	0.00	39.06
9	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
10	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
11	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
12	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
13	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
14	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
15	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
16	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	8.45	0.42	1050.66	8.45	0.42	1050.66

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH10	GAGE 11	OMAHA	SD	HUGH		MISS	CROW	CONG1					OAHE

	AREA FLOODED			FLOOD DAMAGE		
AGRICULTURAL DAMAGE CATEGORIES	WITHOUT PROJECT (ACRES)	WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
SPRING WHEAT	1891.19	1891.19	0.00	95.52	95.52	0.00
CORN	3782.38	3782.38	0.00	252.85	252.85	0.00
OATS	1470.92	1470.92	0.00	32.40	32.40	0.00
SORGHUM	1050.66	1050.66	0.00	8.45	8.45	0.00
OTHER LOSSES				19.46	19.46	0.00
TOTAL	8195.15	8195.15	0.00	408.68	408.68	0.00

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	STRUCTURES FLOODED			FLOOD DAMAGE		
URBAN DAMAGE CATEGORIES	WITHOUT PROJECT	WITH PROJECT	STRUCTURES MODIFIED	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	408.68	408.68	0.00
STRUCTURES FLOODED	0.00	0.00	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	8195.15	8195.15	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH11	GAGE 11	OMAHA	SD	LYMN		MISS	LBRU	CONG1					OAHE

CORN

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	0.0-	10.0	5.87	0.29	84.16	5.87	0.29	84.16
2	10.0-	20.0	29.88	1.49	425.28	29.88	1.49	425.28
3	20.0-	30.0	31.35	1.57	442.72	31.35	1.57	442.72
4	30.0-	40.0	18.11	0.91	253.76	18.11	0.91	253.76
5	40.0-	50.0	13.75	0.69	193.92	13.75	0.69	193.92
6	50.0-	60.0	10.88	0.54	155.68	10.88	0.54	155.68
7	60.0-	70.0	10.25	0.51	148.96	10.25	0.51	148.96
8	70.0-	80.0	10.50	0.52	176.80	10.50	0.52	176.80
9	80.0-	90.0	0.87	0.04	81.31	0.87	0.04	81.31
10	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
11	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
12	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
13	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
14	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
15	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
16	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
17	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	131.45	6.57	1962.59	131.45	6.57	1962.59

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH11	GAGE 11	OMAHA	SD	LYMN		MISS	LBRU	CONG1					OAHE

OATS

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	0.0-	10.0	2.06	0.10	89.42	2.06	0.10	89.42
2	10.0-	20.0	10.43	0.52	451.86	10.43	0.52	451.86
3	20.0-	30.0	10.90	0.54	470.39	10.90	0.54	470.39
4	30.0-	40.0	6.26	0.31	269.62	6.26	0.31	269.62
5	40.0-	50.0	4.74	0.24	206.04	4.74	0.24	206.04
6	50.0-	60.0	3.75	0.19	165.41	3.75	0.19	165.41
7	60.0-	70.0	3.53	0.18	158.27	3.53	0.18	158.27
8	70.0-	80.0	3.67	0.18	187.85	3.67	0.18	187.85
9	80.0-	90.0	0.87	0.04	86.39	0.87	0.04	86.39
10	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
11	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
12	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
13	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
14	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
15	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
16	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
17	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	46.21	2.31	2085.25	46.21	2.31	2085.25

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH11	GAGE 11	OMAHA	SD	LYMN		MISS	LBRU	CONG1					OAHE

SORGHUM

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	0.0-	10.0	3.01	0.15	352.42	3.01	0.15	352.42
2	10.0-	20.0	15.36	0.77	1780.86	15.36	0.77	1780.86
3	20.0-	30.0	16.13	0.81	1853.89	16.13	0.81	1853.89
4	30.0-	40.0	9.33	0.47	1062.62	9.33	0.47	1062.62
5	40.0-	50.0	7.04	0.35	812.04	7.04	0.35	812.04
6	50.0-	60.0	5.52	0.28	651.91	5.52	0.28	651.91
7	60.0-	70.0	5.14	0.26	623.77	5.14	0.26	623.77
8	70.0-	80.0	4.74	0.24	740.35	4.74	0.24	740.35
9	80.0-	90.0	0.34	0.02	340.49	0.34	0.02	340.49
10	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
11	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
12	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
13	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
14	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
15	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
16	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
17	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	66.61	3.33	8218.35	66.61	3.33	8218.35

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH11	GAGE 11	OMAHA	SD	LYMN		MISS	LBRU	CONG1					OAHE

	AREA FLOODED			FLOOD DAMAGE		
AGRICULTURAL DAMAGE CATEGORIES	WITHOUT PROJECT (ACRES)	WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
CORN	1962.59	1962.59	0.00	131.45	131.45	0.00
OATS	2085.25	2085.25	0.00	46.21	46.21	0.00
SORGHUM	8218.35	8218.35	0.00	66.61	66.61	0.00
OTHER LOSSES				12.21	12.21	0.00
TOTAL	12266.20	12266.20	0.00	256.49	256.49	0.00

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	STRUCTURES FLOODED			FLOOD DAMAGE		
URBAN DAMAGE CATEGORIES	WITHOUT PROJECT	WITH PROJECT	STRUCTURES MODIFIED	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	256.49	256.49	0.00
STRUCTURES FLOODED	0.00	0.00	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	12266.20	12266.20	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH12	GAGE 11	OMAHA	SD	HYDE		MISS	CROW	CONG1					OAHE

SPRING WHEAT

		WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	10.0- 20.0	0.21	0.01	4.06	0.21	0.01	4.06
2	20.0- 30.0	0.48	0.02	9.28	0.48	0.02	9.28
3	30.0- 40.0	0.24	0.01	4.64	0.24	0.01	4.64
4	40.0- 50.0	0.23	0.01	4.35	0.23	0.01	4.35
5	50.0- 60.0	0.31	0.02	6.09	0.31	0.02	6.09
6	60.0- 70.0	0.76	0.04	14.79	0.76	0.04	14.79
7	70.0- 80.0	0.81	0.04	17.11	0.81	0.04	17.11
8	80.0- 90.0	0.12	0.01	4.09	0.12	0.01	4.09
9	90.0- 100.0	0.00	0.00	0.00	0.00	0.00	0.00
10	100.0- 110.0	0.00	0.00	0.00	0.00	0.00	0.00
11	110.0- 120.0	0.00	0.00	0.00	0.00	0.00	0.00
12	120.0- 130.0	0.00	0.00	0.00	0.00	0.00	0.00
13	130.0- 140.0	0.00	0.00	0.00	0.00	0.00	0.00
14	140.0- 150.0	0.00	0.00	0.00	0.00	0.00	0.00
15	150.0- 160.0	0.00	0.00	0.00	0.00	0.00	0.00
16	160.0- 170.0	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL	3.17	0.16	64.41	3.17	0.16	64.41

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH12	GAGE 11	OMAHA	SD	HYDE		MISS	CROW	CONG1					OAHE

OATS

			WITHOUT PROJECT CONDITIONS			WITH PROJECT CONDITIONS		
ZONE	ELEVATION		DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	10.0-	20.0	0.12	0.01	5.04	0.12	0.01	5.04
2	20.0-	30.0	0.27	0.01	11.52	0.27	0.01	11.52
3	30.0-	40.0	0.13	0.01	5.76	0.13	0.01	5.76
4	40.0-	50.0	0.12	0.01	5.40	0.12	0.01	5.40
5	50.0-	60.0	0.17	0.01	7.56	0.17	0.01	7.56
6	60.0-	70.0	0.41	0.02	18.36	0.41	0.02	18.36
7	70.0-	80.0	0.42	0.02	21.24	0.42	0.02	21.24
8	80.0-	90.0	0.05	0.00	5.08	0.05	0.00	5.08
9	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
10	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
11	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
12	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
13	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
14	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
15	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
16	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	1.69	0.08	79.96	1.69	0.08	79.96

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH12	GAGE 11	OMAHA	SD	HYDE		MISS	CROW	CONG1					OAHE

SORGHUM

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	10.0-	20.0	0.02	0.00	2.38	0.02	0.00	2.38
2	20.0-	30.0	0.05	0.00	5.44	0.05	0.00	5.44
3	30.0-	40.0	0.02	0.00	2.72	0.02	0.00	2.72
4	40.0-	50.0	0.02	0.00	2.55	0.02	0.00	2.55
5	50.0-	60.0	0.03	0.00	3.57	0.03	0.00	3.57
6	60.0-	70.0	0.07	0.00	8.67	0.07	0.00	8.67
7	70.0-	80.0	0.06	0.00	10.03	0.06	0.00	10.03
8	80.0-	90.0	0.00	0.00	2.40	0.00	0.00	2.40
9	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
10	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
11	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
12	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
13	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
14	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
15	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
16	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	0.28	0.01	37.76	0.28	0.01	37.76

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH12	GAGE 11	OMAHA	SD	HYDE		MISS	CROW	CONG1					OAHE

	AREA FLOODED			FLOOD DAMAGE		
AGRICULTURAL DAMAGE CATEGORIES	WITHOUT PROJECT (ACRES)	WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
SPRING WHEAT	64.41	64.41	0.00	3.17	3.17	0.00
OATS	79.96	79.96	0.00	1.69	1.69	0.00
SORGHUM	37.76	37.76	0.00	0.28	0.28	0.00
OTHER LOSSES				0.26	0.26	0.00
TOTAL	182.12	182.12	0.00	5.39	5.39	0.00

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	STRUCTURES FLOODED			FLOOD DAMAGE		
URBAN DAMAGE CATEGORIES	WITHOUT PROJECT	WITH PROJECT	STRUCTURES MODIFIED	WITHOUT PROJECT ($1000)	WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	5.39	5.39	0.00
STRUCTURES FLOODED	0.00	0.00	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	182.12	182.12	0.00

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH13	GAGE 11	OMAHA	SD	BUFF		MISS	CROW	CONG1					OAHE

SPRING WHEAT

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	0.0-	10.0	1.32	0.07	25.48	1.32	0.07	25.48
2	10.0-	20.0	0.15	0.01	2.80	0.15	0.01	2.80
3	20.0-	30.0	0.87	0.04	16.66	0.87	0.04	16.66
4	30.0-	40.0	2.02	0.10	38.64	2.02	0.10	38.64
5	40.0-	50.0	5.48	0.27	105.42	5.48	0.27	105.42
6	50.0-	60.0	10.78	0.54	209.16	10.78	0.54	209.16
7	60.0-	70.0	15.89	0.79	311.22	15.89	0.79	311.22
8	70.0-	80.0	8.31	0.42	175.28	8.31	0.42	175.28
9	80.0-	90.0	0.74	0.04	24.36	0.74	0.04	24.36
10	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
11	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
12	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
13	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
14	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
15	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
16	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
17	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	45.56	2.28	909.02	45.56	2.28	909.02

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH13	GAGE 11	OMAHA	SD	BUFF		MISS	CROW	CONG1					OAHE

CORN

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	0.0-	10.0	4.95	0.25	70.98	4.95	0.25	70.98
2	10.0-	20.0	0.55	0.03	7.80	0.55	0.03	7.80
3	20.0-	30.0	3.29	0.16	46.41	3.29	0.16	46.41
4	30.0-	40.0	7.68	0.38	107.64	7.68	0.38	107.64
5	40.0-	50.0	20.82	1.04	293.67	20.82	1.04	293.67
6	50.0-	60.0	40.71	2.04	582.66	40.71	2.04	582.66
7	60.0-	70.0	59.66	2.98	866.97	59.66	2.98	866.97
8	70.0-	80.0	29.00	1.45	488.28	29.00	1.45	488.28
9	80.0-	90.0	0.72	0.04	67.86	0.72	0.04	67.86
10	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
11	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
12	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
13	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
14	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
15	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
16	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
17	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	167.37	8.37	2532.27	167.37	8.37	2532.27

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH13	GAGE 11	OMAHA	SD	BUFF		MISS	CROW	CONG1					OAHE

OATS

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	0.0-	10.0	0.50	0.03	21.84	0.50	0.03	21.84
2	10.0-	20.0	0.06	0.00	2.40	0.06	0.00	2.40
3	20.0-	30.0	0.33	0.02	14.28	0.33	0.02	14.28
4	30.0-	40.0	0.77	0.04	33.12	0.77	0.04	33.12
5	40.0-	50.0	2.08	0.10	90.36	2.08	0.10	90.36
6	50.0-	60.0	4.06	0.20	179.28	4.06	0.20	179.28
7	60.0-	70.0	5.94	0.30	266.76	5.94	0.30	266.76
8	70.0-	80.0	2.94	0.15	150.24	2.94	0.15	150.24
9	80.0-	90.0	0.21	0.01	20.88	0.21	0.01	20.88
10	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
11	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
12	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
13	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
14	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
15	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
16	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
17	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	16.89	0.84	779.16	16.89	0.84	779.16

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH13	GAGE 11	OMAHA	SD	BUFF		MISS	CROW	CONG1					OAHE

SORGHUM

ZONE	ELEVATION		WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)	WITH PROJECT CONDITIONS DAMAGE ($1000)	OTHER LOSS ($1000)	AREA FLOODED (ACRES)
1	0.0-	10.0	0.39	0.02	45.50	0.39	0.02	45.50
2	10.0-	20.0	0.04	0.00	5.00	0.04	0.00	5.00
3	20.0-	30.0	0.26	0.01	29.75	0.26	0.01	29.75
4	30.0-	40.0	0.61	0.03	69.00	0.61	0.03	69.00
5	40.0-	50.0	1.63	0.08	188.25	1.63	0.08	188.25
6	50.0-	60.0	3.16	0.16	373.50	3.16	0.16	373.50
7	60.0-	70.0	4.58	0.23	555.75	4.58	0.23	555.75
8	70.0-	80.0	2.00	0.10	313.00	2.00	0.10	313.00
9	80.0-	90.0	0.04	0.00	43.50	0.04	0.00	43.50
10	90.0-	100.0	0.00	0.00	0.00	0.00	0.00	0.00
11	100.0-	110.0	0.00	0.00	0.00	0.00	0.00	0.00
12	110.0-	120.0	0.00	0.00	0.00	0.00	0.00	0.00
13	120.0-	130.0	0.00	0.00	0.00	0.00	0.00	0.00
14	130.0-	140.0	0.00	0.00	0.00	0.00	0.00	0.00
15	140.0-	150.0	0.00	0.00	0.00	0.00	0.00	0.00
16	150.0-	160.0	0.00	0.00	0.00	0.00	0.00	0.00
17	160.0-	170.0	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL	12.72	0.64	1623.25	12.72	0.64	1623.25

WRUID	GAUGE	COE	STATE	COUNTY	TOWN	WATSHD	SUBASN	CONG	CMNTY	FLDIST	LEVEE	CHANNL	RESVR
RCH13	GAGE 11	OMAHA	SD	BUFF		MISS	CROW	CONG1					OAHE

AGRICULTURAL DAMAGE CATEGORIES	AREA FLOODED: WITHOUT PROJECT (ACRES)	AREA FLOODED: WITH PROJECT (ACRES)	AREA MODIFIED (ACRES)	FLOOD DAMAGE: WITHOUT PROJECT ($1000)	FLOOD DAMAGE: WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
SPRING WHEAT	909.02	909.02	0.00	45.56	45.56	0.00
CORN	2532.27	2532.27	0.00	167.37	167.37	0.00
OATS	779.16	779.16	0.00	16.89	16.89	0.00
SORGHUM	1623.25	1623.25	0.00	12.72	12.72	0.00
OTHER LOSSES				12.13	12.13	0.00
TOTAL	5843.70	5843.70	0.00	254.67	254.67	0.00

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URBAN DAMAGE CATEGORIES	STRUCTURES FLOODED: WITHOUT PROJECT	STRUCTURES FLOODED: WITH PROJECT	STRUCTURES MODIFIED	FLOOD DAMAGE: WITHOUT PROJECT ($1000)	FLOOD DAMAGE: WITH PROJECT ($1000)	DAMAGE REDUCED ($1000)
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00

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WATER RESOURCE UNIT TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENTS
DAMAGE ($1000)	254.67	254.67	0.00
STRUCTURES FLOODED	0.00	0.00	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED (ACRES)	5843.70	5843.70	0.00

WATER RESOURCE UNIT SUMMARY

BEGINNING DATE - 02JUN93 ENDING DATE - 10JUN93 LOOKBACK DATE - 02JUN93
URBAN PRICE INDEX - 1.00 AG PRICE INDEX - 1.00

	WITHOUT PROJECT CONDITIONS					WITH PROJECT CONDITIONS					PROJECT ACCOMPLISHMENTS				
	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE
MISSOURI RIVER															
OPEN RIVER															
RCH 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RCH 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RCH 3	0.0	0.0	53924.5	467.6	0.0	0.0	0.0	53924.5	467.6	0.0	0.0	0.0	0.0	0.0	0.0
RCH 4	0.0	0.0	8302.7	174.5	0.0	0.0	0.0	8302.7	174.5	0.0	0.0	0.0	0.0	0.0	0.0
RCH 6	7.8	404.6	0.0	0.0	0.0	7.8	404.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	7.8	404.6	62227.2	642.1	0.0	7.8	404.6	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0
LAKE SHARPE															
RCH 7	178.9	3503.2	0.0	0.0	0.0	178.9	3503.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RCH 8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	178.9	3503.2	0.0	0.0	0.0	178.9	3503.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRW RESERVATION															
RCH10	408.7	8195.1	0.0	0.0	0.0	408.7	8195.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RCH12	5.4	182.1	0.0	0.0	0.0	5.4	182.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RCH13	254.7	5843.7	0.0	0.0	0.0	254.7	5843.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	668.7	14221.0	0.0	0.0	0.0	668.7	14221.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LBR RESERVATION															
RCH 9	85.3	3369.8	0.0	0.0	0.0	85.3	3369.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RCH11	256.5	12266.2	0.0	0.0	0.0	256.5	12266.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	341.7	15636.0	0.0	0.0	0.0	341.7	15636.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	1197.2	33764.8	62227.2	642.1	0.0	1197.2	33764.8	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	1197.2	33764.8	62227.2	642.1	0.0	1197.2	33764.8	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0

CONGRESSIONAL DISTRICT SUMMARY

BEGINNING DATE - 02JUN93 ENDING DATE - 10JUN93 LOOKBACK DATE - 02JUN93
URBAN PRICE INDEX - 1.00 AG PRICE INDEX - 1.00

	WITHOUT PROJECT CONDITIONS					WITH PROJECT CONDITIONS					PROJECT ACCOMPLISHMENTS				
	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE
SOUTH DAKOTA															
REP TIM JOHNSON	1197.2	33764.8	62227.2	642.1	0.0	1197.2	33764.8	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0
SUB-TOTAL	1197.2	33764.8	62227.2	642.1	0.0	1197.2	33764.8	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0
GRAND TOTAL	1197.2	33764.8	62227.2	642.1	0.0	1197.2	33764.8	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0

COUNTY SUMMARY

BEGINNING DATE - 02JUN93 ENDING DATE - 10JUN93 LOOKBACK DATE - 02JUN93
URBAN PRICE INDEX - 1.00 AG PRICE INDEX - 1.00

	WITHOUT PROJECT CONDITIONS					WITH PROJECT CONDITIONS					PROJECT ACCOMPLISHMENTS				
	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE
SOUTH DAKOTA															
HUGHES COUNTY	587.6	11698.4	62227.2	642.1	0.0	587.6	11698.4	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0
STANLEY COUNTY	93.0	3774.4	0.0	0.0	0.0	93.0	3774.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LYMAN COUNTY	256.5	12266.2	0.0	0.0	0.0	256.5	12266.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HYDE COUNTY	5.4	182.1	0.0	0.0	0.0	5.4	182.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BUFFALO COUNTY	254.7	5843.7	0.0	0.0	0.0	254.7	5843.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUB-TOTAL	1197.2	33764.8	62227.2	642.1	0.0	1197.2	33764.8	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0
GRAND TOTAL	1197.2	33764.8	62227.2	642.1	0.0	1197.2	33764.8	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0

RESERVOIR PROJECT SUMMARY

BEGINNING DATE - 02JUN93 ENDING DATE - 10JUN93 LOOKBACK DATE - 02JUN93
URBAN PRICE INDEX - 1.00 AG PRICE INDEX - 1.00

	WITHOUT PROJECT CONDITIONS					WITH PROJECT CONDITIONS					PROJECT ACCOMPLISHMENTS				
	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE	AGRI ($1000)	AREA (ACRES)	URBAN ($1000)	STRUCT	PEOPLE
MISSOURI RIVER															
OAHE RESERVOIR	1197.2	33764.8	62227.2	642.1	0.0	1197.2	33764.8	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0
SUB-TOTAL	1197.2	33764.8	62227.2	642.1	0.0	1197.2	33764.8	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0
GRAND TOTAL	1197.2	33764.8	62227.2	642.1	0.0	1197.2	33764.8	62227.2	642.1	0.0	0.0	0.0	0.0	0.0	0.0

********** ANALYSIS SUMMARY **********

DAMAGE CATEGORIES	WITHOUT PROJECT CONDITIONS DAMAGE ($1000)	WITH PROJECT CONDITIONS DAMAGE ($1000)	PROJECT DAMAGE REDUCTION ($1000)
AGRICULTURAL			
SPRING WHEAT	241.26	241.26	0.00
CORN	662.83	662.83	0.00
OATS	128.92	128.92	0.00
SORGHUM	107.17	107.17	0.00
OTHER LOSSES	57.01	57.01	0.00
SUBTOTAL	1197.20	1197.20	0.00
URBAN			
RESIDENTIAL	15113.28	15113.28	0.00
COMMERCIAL	3018.16	3018.16	0.00
INDUSTRIAL	25836.31	25836.31	0.00
PUBLIC WORKS	17569.39	17569.39	0.00
OPEN SPACE	690.07	690.07	0.00
SUBTOTAL	62227.21	62227.21	0.00
TOTAL	63424.41	63424.41	0.00

SUMMARY TOTALS	WITHOUT PROJECT CONDITIONS	WITH PROJECT CONDITIONS	PROJECT ACCOMPLISHMENT
DAMAGE ($1000)	63424.41	63424.41	0.00
STRUCTURES	642.08	642.08	0.00
PEOPLE FLOODED	0.00	0.00	0.00
AREA FLOODED	33764.79	33764.79	0.00