FEASIBILITY STUDY FOR THE ESTABLISHMENT OF A HYDROLOGIC MODEL LIBRARY AT THE WYOMING WATER RESEARCH CENTER

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INFORMATIVE ABSTRACT

The Wyoming Water Development Commission (WWDC) recognized deficiencies in the present system of hydrologic modeling used by state agencies and subsequently funded a study to look at the feasibility of establishing a model library. This study was intended to develop/research alternatives to the current state system of water resource modeling. The results of this study indicate that there are numerous models available to perform studies required by the WWDC and other state agencies in the Water Resources area. Analysis into the standardization of models for future water resources (hydrologic) studies found that the following items were important:

1. The development and continued updating of a list of all models the State currently possesses.

2. The extent and availability of use and usefulness of each model (software copyrights).

3. The availability of documentation for each model listed.

4. The establishing of criteria for use, capabilities, and limitations of each model.

The identification of specific needs in regards to hydrologic modeling within each state department/office is still needed. In order to accomplish the above, it will be necessary for all state agencies to acquire computer equipment compatible with the models found to be functional and of value to one or more state agencies.

Economic considerations encourage the establishment of more cost-effective alternative models to the present system being used by the WWDC, other state agencies, and departments within the University of Wyoming. Increasingly more costly software requires the users of software at the state level to utilize the more desirable water resources models.

Before further analysis into the standardization of models for future water resources (hydrologic) studies is performed, the items listed in this section are recommended. First, an updated list of models currently owned or used by the state should be developed in greater detail than was accomplished by the methods used in this study. This survey would decrease the potential of duplication and increase the inquiry into which models are used. Second, the extent of use and usefulness of each model should be analyzed to better select those models to be standardized. Third, the listing of available documentation for each model will better assess the establishing of criteria for use, capabilities, and limitations of each model owned. This in turn will allow for the selection of appropriate models to be standardized and researched. Next, the identification of specific needs of each state agency is necessary to adequately meet the needs of all users. Furthermore, it is also recommended that microcomputer systems compatible for use with the models deemed most valuable to the WWDC and other state agencies be purchased by the state agencies so that the models can be utilized.

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ESTABLISHMENT OF A WATER RESOURCES MODEL LIBRARY AT THE WYOMING WATER RESEARCH CENTER

INTRODUCTION

SUMMARY

Earlier studies indicated several deficiencies within the system of water resources modeling used by the WWDC and other state agencies. First, due to the use of numerous consultants and a lack of standards for model generation and use, much duplication of effort resulted. This repetition is paid for by the State of Wyoming. Second, the WWDC and other state agencies had not developed a standardized plan for obtaining, archiving, documenting, and maintaining consultant developed models or models purchased for analysis purposes prior to initiation of this study. Previous to a system revision correcting this unforseen disadvantage, the WWDC had access only to the results, not to the generated models in the case of consultant developed modeling efforts for given projects. Future use of these models by the WWDC and other state agencies is now possible because of this correction in contracts with consultants. Presently, with the revision to the system, it may be possible to eliminate the duplication of model creation and furthermore decrease expenses to the State. Lastly, a lack of modeling standards and

diversities between consultant modeling techniques has the potential to result in inconsistencies in results and achievement of WWDC requirements. Subsequently, research into the feasibility of establishing alternatives was conducted. The alternative studied in this report suggests adopting a standardized water resources modeling system within the WWDC and other state agencies in cooperation with the Wyoming Water Research Center (WWRC).

GOAL

The principal goal of this study is to determine the practicality of establishing a water resource model library either at the Wyoming Water Research Center (WWRC) or the Wyoming Water Development Commission (WWDC); whereby the WWRC or WWDC acquires, develops, maintains, and documents water resource data and models for use by state agencies, consultants and others. Achievement of this goal would reduce duplication of effort with the potential for substantial cost reductions for the State of Wyoming.

Future considerations as a result of this study may include, but are not limited to:

1. The development of standardized water resource models by the WWRC or WWDC.

2. The development of a prototype system whereby the WWRC or WWDC would provide water resources data and modeling to State agencies and individuals working on state contracts, in the water

resources area.

DESCRIPTION AND DEFINITION

The increasing importance of developing Wyoming's water resources has prompted the recent and ongoing intensification of hydrologic studies within the state. The WWDC is charged by the legislature to conduct these studies through either in-house studies or outside consultants. One element in most studies is the institution and use of computerized models. Almost all WWDC Level II and III and many Level I studies require computer modeling applications. Commonly, the establishment of computer models has been undertaken by hired consultants to the WWDC. Examples include the North Platte River Management Model and others. The resources and/or facilities needed to ensure model operational status are not always available or compatible with in-house facilities. At the completion of a study the WWDC receives the report and results. There is presently little motivation to allow for future utilization, maintaining, and running of these models after their intended purpose is completed.

This study examines an alternative to the problems observed in the present hydrologic modeling system. In this alternative, WWRC would act as a library for software programs derived from several internal and outside sources. The WWDC would continue to hire outside consultants to develop models for its water development studies; however, these models must meet standards

approved by and acceptable to the WWDC and other state agencies who might subsequently use the models. The model will be placed in the library after the consultant completes their study for the WWDC along with appropriate documentation. This library is to serve as a prototype for a probable system developed for use by all state water agencies.

Although the WWDC is unique to Wyoming in funding the creation of hydrologic models, other agencies and University departments are confronted with similar dilemmas when attempting to employ numerous computer models. Lack of satisfactory computer facilities, expertise, and/or documentation retards their ability to complete water resource related investigations. A central facility to secure future availability, accessibility, documentation, updating, modification, or revision of such models would be a beneficial aid to the State and University water researchers. In addition, a WWRC water resource model library would supplement the existing state-supported Water Bibliography and Water Resource Data System (WRDS) and enhance WWRC service capabilities through direct model interface into the WRDS database. The centralization of selected library models would preclude possible future duplication of efforts and could allow modification of existing models to meet future project needs.

An inventory of existing State or University available models allows identification of the availability and the resources required to guarantee operational status of these models. Furthermore, model cost, area of application, hardware

requirements, and availability of documentation data has stimulated insight into current hydrologic software availability status, thus reducing duplicity of effort. An inventory illustrating the aforementioned information distributed to State and University water researchers ensures inclusion of models beneficial to meeting research needs.

PROJECT APPROACH PROCESS

To accurately determine the practicality of establishing a water resource model library at the WWRC, all hydrologic models currently in possession of the Water Center were categorized and inventoried. This task (Phase I) also included the identification and determination of documentation availability for these models. All identified models were assessed as to their operational status. Completion of this task allowed the estimation of time, manpower, and cost requirements for subsequent verification as to the functional capability of identified models. The forementioned procedure was repeated for models possessed by State agencies and University departments. All inventoried models were then categorized into one of the following broad water-related areas:

Surface Water

Groundwater

Water Quality

Climatic

Miscellaneous

Statistics	Conversions
Graphics	Habitat
Economic	Kinetics
Sediment	Input
Editor	Optimization
Calculations	Pipe Flow
Soils	Hydroelectric

Information compiled during inventory includes a brief narrative description, category of use, computer language, documentation availability, computer hardware requirements, costs, source of model availability, and any informative notes available.

Phase II centered on the development of an inventory including additional hydrologic models currently in use throughout the country. Key Federal, State, and University sources were contacted via telephone and/or letter. Additional sources were then identified through literature reviews. USGS, Army Corps of Engineers, National Weather Service, Soil Conservation Service, and Agricultural Research Service agencies were given priority during this survey process due to low model costs and the wide use and availabilities of their models.

Phase III includes several study operations. First, the inventory was transferred onto a system compatible with most agency facilities and capable of relatively maintenance free data management. An IBM compatible system was used with DBasePlus

software. Secondly, due to the vast period of time from study initiation and completion a second survey was conducted. Those agencies and individuals responding to the initial survey letter were given priority in the second survey poll. Upon completion of this task, a final inventory listing was compiled and distributed to selected University and State water agencies for critique and assessment. A final evaluation process was then completed to facilitate the reviewing process.

The following State agencies and University departments were included in the study and/or reviewing process:

Wyoming State Agencies

1. Wyoming Water Development Commission
2. Wyoming State Engineer's Office
3. Governor's Planning Office
4. Department of Economic Planning and Development
5. Department of Environmental Quality
6. Wyoming Game and Fish Department
7. Wyoming Geological Survey
8. Wyoming Highway Department
9. Industrial Siting Administration
10. Attorney General's Office
11. Wyoming Conservation Commission

University of Wyoming Groups

1. Engineering
2. Geology
3. Agriculture

4. Zoology

5. Botany

6. Economics

The evaluation process included:

1. A statement on the capabilities of the model.

2. A statement on the possible utilization of the model.

3. An analysis of the input data required.

4. An analysis of the computer requirements.

5. A list of sources of information for each model.

Upon completion of the final evaluation and analysis process, this report was completed and submitted to the WWDC for review and final comments. Inclusive in this report are: a section containing conclusions and recommendations, which may be used to assess future development plans associated with this project; an appendix listing of the sources of information for each selected model; an appendix listing of the addresses of each source of information; an appendix illustrating the data obtained from final evaluation research; and an appendix included for utilizing the diskettes (information file in dBasePlus) resulting from this study.

LIBRARY SEARCH COMPLETION PROCESS

A three-phase approach in addressing specific criteria was selected to facilitate study needs. The study procedure for each phase is illustrated in the following section of this report.

PHASE I

Phase I completion was assigned four tasks, including:

1. Inventory generation for all water resource models currently retained by the WWRC; including those models available to WWRC from other University of Wyoming and Wyoming State agencies. A questionnaire sent to all state agencies on models in their possession is included as part of Appendix A of this report.

2. Model documentation availability determination, general model capabilities evaluation, and evaluations of necessary revisions (part of questionnaire).

3.Assignment of each model to one of the following general use categories: surface water, groundwater, water quality, climatic, and miscellaneous.

4.Assessment of manpower, costs, and time essential to obtain operational status of each inventoried model (produced to the extent possible under this study).

Problems encountered during execution of Phase I centered on lack of response to the survey and a lack of model documentation/information. Although several state agencies were extremely helpful many agencies repeatedly did not respond to survey questionnaires. In addition, several agencies that

responded to the questionnaire either had no idea as to the whereabouts of the model indicated in a previous questionnaire or had no documentation or information about the model. This significantly affected the ability to assess the operational status and other relevant factors affecting the value of a model which the agency indicated possession at one time. A complete inventory was therefore impossible to obtain in light of these problems. However, some of these problems may have been alleviated to a certain extent if the completion of this report had closely followed the original data collection and survey. Many state agencies have had a personnel turnover problem which affects their ability to keep track of several things including models and model documentation. Also, it is almost impossible to keep up with changes in technology within the field of computer modeling.

PHASE II

Phase II involved the initiation of a country-wide survey by letter and literature review. The same questionnaire was sent to water centers throughout the United States and Guam, selected universities, selected water resources consulting agencies, state agencies, and some federal agencies. This prompted the generation of a generic listing of presently available water resource models complete with a general description of their individual capabilities. Each model was categorized as outlined in the Phase I procedure and included information on costs and

documentation availability.

Non-response to the survey was a key problem encountered in the completion of this phase. This problem severely minimized the inventory compiled for this study.

PHASE III

Five tasks were performed under Phase III of this study. The first task involved the transfer of inventoried models onto an IBM compatible computer, using a DBasePlus software package for data management. Although earlier in this study it was suggested to use WWRC's CompuPro computer system, the PC type system was chosen due to the increased utilization of similar computers throughout the water resources research community. This is to allow for a more efficient and least cost method of accessibility into the system for all interested parties. Secondly, due to the span of time from the study initiation to near completion, a second survey was conducted via survey letter to selected State agencies and University of Wyoming departments. This was to include any models developed from study initiation to completion of this study and those models substantially modified since study initiation. During the third task a list of models within the inventory was compiled and distributed to key State agencies and University departments for review and comment. A list of widely-used, easily available, beneficial models were selected and included with the list of all inventoried models. Those models selected within the inventory were suggested models

for possible purchase and inclusion in the proposed water resources model library. Those models identified by State agencies and University departments as beneficial in meeting State/University research needs will then be considered for inclusion within the proposed WWRC Water Resources Model Library (this is still an ongoing item). However, all model information will be kept on a dBasePlus file and will be available by floppy disk upon request from the WWRC. Upon sufficient completion of task three, a comprehensive evaluation of the aforementioned tasks will be performed. This evaluation will provide an indication of the costs, logistics, and feasibility of providing both the State and University with state-of-the-art modeling capabilities in addressing Wyoming's water resources concerns. Lastly, all analysis results completed to date were summarized and included as a part of this report. The most significant problem confronted during completion of this phase was a lack of response to the second survey.

MODEL SELECTION PROCESS

APPROACH TO SELECTION PROCESS

Upon completion of task two of Phase III of this study, a list of models received during this study was compiled. The compiled list of models along with a general description of each model was delivered to the WWRC and to key state officials. The WWRC and these officials selected those models most desirable

from their viewpoint. Next, criteria for further model selection was established, by which each "selected" model was researched. Finally, research was completed and results were identified in this report, (Evaluation of Results and Justifications section of this report).

CRITERIA FOR FURTHER MODEL SELECTION

The criteria for rating the usefulness and capability and further selection of each "selected" model was based upon information discovered or lack thereof during the research portion of the final evaluation phase of this study. The criteria includes:

1. The computer requirements of each "selected" model.
2. The degree of availability of documentation and/or information related to each "selected" model.
3. The data input requirements of each "selected" model.
4. The degree of detail each "selected" model provides.

The computer requirements generally illustrate the hardware required to run each model. This may eliminate some models from practical usage by many hydrologic model users. The availability of documentation or information on executing a model may also eliminate a model from use. Without documentation or information it is inadvisable to use a model due to the lack of knowledge on the capabilities and limitations of that model. Data input requirements specify the type of problems that the model may have in trying to apply the model. Some problems may require

calculation from little known data, limiting the application of many models requiring extensive data inputs. Furthermore, the degree of detail provided in a model may limit its use in the analysis of highly detailed problem applications, say in the analysis of Level II and III studies for the WWDC.

EVALUATION RESULTS AND JUSTIFICATIONS

Although many models were found in various state offices, it was often difficult to locate documentation for these models and in some cases the models themselves were not located even though the state agency knew they had used the model previously. One explanation for this problem may be the rapid personnel turnover problem in many state agencies. Each of the models for which information was not located upon a second inquiry and a visit to the agency were listed in Appendix C, along with the complete list of models in the study and a list of "selected" models.

Updating of models and modeling procedures has been difficult to maintain within certain state agencies. In many instances there is a lack of personnel and funding for this obligation. It is difficult to recommend those models for which little or no information was obtained during the course of this study. Several models require extensive data input, which make these models infeasible for many applications. The computer hardware requirements of several models also limit model applications. All of this type of information is provided in this report.

The report appendices provide the following information:

1. A list of "selected" models for which information was located on the criteria mentioned in the previous section of this report.

2. A complete documentation of the information located for each "selected" model, if any was located, based upon the criteria established.

3. A list of "selected" models for which information was not located.

4. A listing of all models inventoried in this study.

These appendices are included for use in further model selection by the WWDC, the WWRC, other State agencies, and University of Wyoming departments based on specific needs of their respective personnel.

RECOMMENDATIONS

Before further analysis into the standardization of models for future water resources (hydrologic) studies can be completed, the items listed in this section should be considered and investigated. First, the development of a current and complete list of models the State currently possesses should be more completely detailed than was accomplished within the scope of this study. A survey of all models within the State's possession would decrease the potential of duplication by increasing the awareness of which models are most valuable to the State by

publishing a list of models available similar to the appendices of this report. Second, the extent of use and usefulness of each model should be analyzed to better select those models to be standardized. Third, the listing of available documentation for each model will better assess the establishing of criteria for use, capabilities, and limitations of each model. This in turn will allow for the selection of appropriate models to be standardized and researched. Next, the identification of specific needs in regards to hydrologic modeling within each state agency is necessary to adequately meet the needs of all users.

In order to accomplish the above, it is recommended that all state agencies acquire a microcomputer system that is compatible and available at each State office that will use these models. Microcomputer capabilities should be utilized in two ways:

1. Stand-alone capability. Because of microcomputer computational abilities, many modeling efforts, which are small enough not to require a mainframe computer, should be performed directly on the microcomputer system. When used in the stand-alone mode, a microcomputer can save the greater-than-$300/hour costs associated with mainframe computational time.

2. Mainframe communications. The microcomputer systems could be used to communicate with the mainframe for the bi-directional transfer of data. Most drainage hydrologic models require creation of numerous data files of river flows, diversions, return flows, etc. Although these may be created on

the mainframe, such file creation necessitates interconnection with the mainframe. This usage results in connection and communication charges, which may become significant. By utilizing the microcomputer system to create, edit, and check data files, the only interconnect time with the mainframe will be during data transfer and running of the mainframe computer program. Thus, not only cost but also demands upon the mainframe will be reduced.

Selection of a microcomputer component of the system should be based upon two primary factors:

1. That the system have the hardware and software capability of communicating with the mainframe.

2. That the system be used for stand-alone modeling where computer software capabilities allow.

An effort to define system requirements is necessary at this point; input is needed on WWDC needs for consideration in this requirement.

Lastly, a library of information, documentation, and models should be maintained, constantly updating and revising the models and system as technology mandates. The benefits of such measures would ultimately outweigh the funding costs. Such benefits include the decrease in duplication of development, the ease of locating and use of each model, the consistent updating to produce a valuable model system, and the potential decrease in modeling costs. The benefits of the aforementioned recommendations would reach the State of Wyoming, consultants,

and others in water resources modeling community.

It is suggested that the model library be located at the Wyoming Water Research Center whereby the WWRC or WWDC acquires, develops, maintains, and documents water resource data and models for use by state agencies, consultants and others. It is anticipated that this would reduce duplication of effort with the potential for substantial cost reductions for the State of Wyoming. The centralization of selected library models would preclude possible future duplication of efforts and could allow modification of existing models to meet future project needs. An inventory of existing State or University available models allows identification of availability and resources required to guarantee operational status of these models. Furthermore, model cost, area of application, hardware requirements, and availability of documentation data has stimulated insight into current hydrologic software availability status.

Problems encountered during completion of this study centered on lack of response to survey questionnaires by state agencies, other state water resources centers, consultants, and universities and a lack of model documentation and/or information related to the model at several agencies responding to the survey. Although several state agencies were extremely helpful many agencies repeatedly did not respond to survey questionnaires. In addition, several agencies that responded to the questionnaire either had no idea as to the whereabouts of the model indicated in the questionnaire or had no documentation or

information for the model. This significantly affected the ability to assess the operational status and other factors affecting the value of the models. A complete inventory was also impossible to obtain in light of these problems. However, some of these problems may have been alleviated if the completion of this report had closely followed the original data collection and survey. Many state agencies have had a personnel turnover problem which affects their ability to keep track of models and model documentation. Additionally, it is almost impossible to keep up with changes in technology in the computer modeling field.

APPENDICES

APPENDIX A

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WATER QUALITY MODELS. 33

CLIMATIC MODELS 36

MISCELLANEOUS MODELS. 37

NOTE: The tables listing sources of information, as mentioned above, were produced from dBasePlus file ABCSOURC.DBF.

Agency Name/University Department: _____
Address: _____
City/State/Zip: _____
Name of Technical Liaison/Title: _____
Phone/Date: _____

MODEL INFORMATION

Name: _____

Description/Capabilities: _____
_____
_____
_____
_____
_____

Type of Model:
- ☐ Groundwater
- ☐ Surface Water
- ☐ Water Quality
- ☐ Climatic
- ☐ Economic
- ☐ Miscellaneous (Specify) _____

Documentation Accompanying Model:
- ☐ Extensive/Complete
- ☐ Adequate/Complete
- ☐ Poor/Incomplete
- ☐ Not Available

Source Code Language:
- ☐ Fortran
- ☐ Basic
- ☐ PL/I
- ☐ Cobol
- ☐ Pascal
- ☐ C
- ☐ Not Available
- ☐ Other (specify) _____

Implementing Computer (specify):
- ☐ Mainframe _____
- ☐ Minicomputer _____
- ☐ Microcomputer _____

Where was this model developed/obtained? _____
_____

Additional Comments (owner, location, costs, etc.) _____
_____
_____

SURFACE WATER MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** BINKLEY SOFTWARE

ROUTE-RUNOFF DETENTION BASIN

** BOSS CORPORTATION

BOSS DAMBRK

** CAMP, DRESSER, AND McKEE, INC.

EXTRAN

** CENTER FOR ENVIRONMENTAL RESEARCH

RIVER BALANCE

** CHEYENNE BOARD OF PUBLIC UTILITIES

CROW CREEK WATER SUPPLY AND DISTRIBUTION SYSTEM

** COLORADO STATE UNIVERSITY

CONSIM
FLOODRT
FORCST
HORTON
LAYOUT
MODSIM
MODSIM4
ODSDP
OPRATE
SCREEN
SEWER
SFRUNOFF
SSSFM
SWCP
SYNFLO
UNSTDY
WATPOW

** COMPUTATIONAL HYDRAULICS INC.

PCSWMM3

** DEPT. OF ENVIRONMENTAL QUALITY

ANALYSIS OF WASTE WATER DISCHARGE EFFECTS ON STREAM QUALITY

SURFACE WATER MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** FORSGREN-PERKINS ENGINEERING

STRAWBERRY CREEK WATER ACCOUNTING MODEL

** HEC - U.S. ARMY CORPS OF ENGINEERS

CUHP
HEC BASIN PRECIPITATION COMPUTATIONS (PRECIP)
HEC DAMAGE REACH STAGE-DAMAGE CALCULATION (DAMCAL)
HEC EXPECTED ANNUAL FLOOD DAMAGE COMPUTATION (EAD)
HEC FLOOD FLOW FREQUENCY ANALYSIS (HECWRC)
HEC HYDROLOGIC PARAMETERS (HYDPAR)
HEC INTERIOR DRAINAGE FLOOD ROUTING (INTDRA)
HEC STREAM HYDRAULICS PACKAGE (SHP)
HEC STREAM ROUTING OPTIMIZATON BY NEGATIVE LOCAL FLOWS (OPROUT)
HEC-4 MONTHLY STREAMFLOW SIMULATION
HEC-5 SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
HYDRO POND
OPCHFLOW
STORAGE TREATMENT OVERFLOW RUNOFF MODEL (STORM)
UDSEWER
UDSWMM

** HOMS OFFICE HYDROLOGY AND WATER RESOURCES DEPT.

HYDROLOGICAL OPERATIONAL MULTIPURPOSE SUBPROGRAMME OF WMO - (HOMS)

** ILLINOIS WATER RESOURCE CENTER

SEDIMENT ECONOMICS MODEL

** OKLAHOMA STATE UNIVERSITY

ADVZI
SEDIMOT II

** PUBLIC WORKS AGENCY

FLUVIAL-12

** PURDUE UNIVERSITY

ANSWERS

SURFACE WATER MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** TEXAS A & M UNIVERSITY

A & M WATERSHED MODEL

** U.S. DEPT. OF AGRICULTURE

BORDER FLOW (BRDRFLW)
FLUME
TR-20
TR-48
TR-61

** U.S. ENVIRONMENTAL PROTECTION AGENCY

AGRICULTURAL RUNOFF MANAGEMENT (ARM) MODEL
QUANTITY-QUALITY SIMULATION (QQS)
STORM WATER MANAGEMENT MODEL (SWMM)

** U.S. GEOLOGICAL SURVEY

AP-SYN (USGS E784C)
BRANCH (USGS K757)
DAM-BREAK FLOOD SIMULATION (USGS K634)
DISTRIBUTED ROUTING RAINFALL-RUNOFF MODEL VERSION II (DR3M)
DOWNSTREAM-UPSTREAM RESERVOIR ROUTING (USGS A697)
FINITE-ELEMENT SURFACE-WATER MODELING SYSTEM (FESWMS)
HOURLY-DAILY STREAMFLOW ROUTING (J351)
HYDROLOGIC SIMULATION MODEL (HYSIM)
HYDROLOGICAL SIMULATION PROGRAM (HSPF)
NATURAL BASIN MODEL (A634X)
PRECIPITATION-RUNOFF MODELING SYSTEM (PRMS)
RESERVOIR-STORAGE FREQUENCY MODEL (RSFM)
SIMSYS2D
STEP BACKWATER AND FLOODWAYS ANALYSES (J635)
STEP-BACKWATER AND FLOODWAY ANALYSES (USGS E431)
SWCULRAT (USGS A526)
SWSLOPE (USGS C374)
TENN II
UNSTEADY FLOW ROUTING USING CHARACTERISTICS METHOD (USGS J416)
UNSTEADY STREAMFLOW SIMULATION (USGS J879)
URBAN BASIN MODEL (G824)

SURFACE WATER MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** UNIVERSITY OF ILLINOIS

INSTREAM FLOW NEEDS ANALYSIS

** UNIVERSITY OF WYOMING

H2OTRANS
RUNOFF PREDICTION FROM SATELLITE SNOW AREA MEASUREMENTS

** VIRGINIA TECH

LOWFLOWS

** WESTERN WATER CONSULTANTS, INC.

COLLECT
DAYDAT1
FINAL.FOR
LOWER.FOR
NORTH PLATTE RIVER SIMULATION MODEL
ODPAY
SANDSTON.FOR
UPPER.FOR
WESTSIDE WATER QUALITY PREDICTIONS
WOOD

** WYOMING EMERGENCY MANAGEMENT AGENCY

FLOOD HISTORY

** WYOMING HIGHWAY DEPT.

CULVERT DESIGN SYSTEM (CDS)
HYDRA
WSPRO (HY-7)

** WYOMING STATE ENGINEER'S OFFICE

HYDAUG/TRIHYDRO
RESROUT
SIMPLIFIED DAMBREAK MODEL

** WYOMING WATER DEVELOPMENT COMMISSION

BREACH-ANDERSON MODEL
DEER CREEK, TRIBUTARY TO N. PLATTE RIVER
HAMS FORK RIVER

SURFACE WATER MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

MIDDLE FORK DAM (MIDDLE FORK POWDER RIVER)
NWS DAMBRK
OPSTUDY
SMITHS FORK, TRIBUTARY TO BEAR RIVER
SULPHUR CREEK RESERVOIR 3RD ENLARGEMENT, TRIBUTARY OF BEAR RIVER
TONGUE RIVER
UPPER BEAR RIVER BASIN MODEL
WIRSOS

** WYOMING WATER RESEARCH CENTER

HEC FINITE ELEMENT SOLUTION OF STEADY STATE POT. FLOW PROBS (FEMFLO)
HEC GEOMETRIC ELEMENTS FROM CROSS-SECTION COORDINATES (GEDA)
HEC GRADUALLY VARIED UNSTEADY FLOW PROFILES (USTFLO)
HEC STREAMFLOW ROUTING OPTIMIZATION (SFRO)
HEC-1 FLOOD HYDROGRAPH COMBINING AND ROUTING
HEC-2 WATER SURFACE PROFILES
HEC-3 RESERVOIR SYSTEM ANALYSIS FOR CONSERVATION
HEC-6 SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS
HYDTAB
HYMO (ARS)
INSTREAM FLOW INCREMENTAL METHODOLOGY
MODEIN AND COLBY
MULTWAT
PHYSICAL HABITAT SIMULATION SYSTEM (PHABSIM)
SEDLAB
SLOPAR
STRDSTEP
STREAM ANALYSIS SYSTEM
WATER SURFACE PROFILES (USBR)

GROUNDWATER MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** CENTER FOR ENVIRONMENTAL RESEARCH

BURBS
THORNTHWAITE'S METHOD
UNCONF

** CORNELL UNIVERSITY

METHOD OF UNDERGROUND SOLUTE EVALUATION - (MOUSE)

** DELAWARE DEPT. OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL, ASSOC

GEOGRAPHIC INFORMATION SYSTEM (GIS)

** GCA TECHNOLOGY DIVISION, INC.

SOILLINER

** IN-SITU, INC.

CONTUR
GWVEL
PAPADOP
PLUME
TSMATCH OR HJMATCH
VADOSE
WELLSAMP

** INTERNATIONAL GROUND WATER MODELING CENTER

LTIRD , ODAST , RESSQ
PUMPTEST
SOLUTE
TRAFRAP

** JAMES S. ULRICK

ADVECTIVE TRANSPORT MODEL
CIRCULAR BASIN RECHARGE MOUND
LEAKY AQUIFER DRAWDOWN
LINE SINK AQUIFER MODEL
POINT SINK AQUIFER MODEL
PUMPING TEST ANALYSIS
SOIL MOISTURE ACCOUNTING
THEIS EQUATION SLIDERULE

GROUNDWATER MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** NATIONAL ENERGY SOFTWARE CENTER

MASCOT

** NATIONAL WELL WATER ASSOCIATION

AQUIFER TEST ANALYSES (AQTST)

** NRC/GPO SALES PROGRAM

MLTRAN
TRUST II

** NUCLEAR WASTE ISOLATION

BORHOL

** SCIENTIFIC PUBLICATIONS AND SOFTWARE CENTER

LITHOLOGY PROGRAMS
PUMPING TEST ANALYSIS PROGRAMS
WELLFIELD SIMULATION PROGRAMS
WELLREC PROGRAM

** TETRATECH, INC

ENVSIM

** U.S. ENVIRONMENTAL PROTECTION AGENCY

LEACHING EVALUATION OF AGRICULTURAL CHEMICALS (LEACH)
MINTEQ
PESTICIDE ROOT ZONE MODEL (PRZM)
PLUME 2D
PLUME 3D
UPCONE

** U.S. GEOLOGICAL SURVEY

AQUIFEM & AQUIFEM-SALT

** UCLA

TRACK

** UNIVERSITY OF ARIZONA

CONS2-1D , CONSP(L/NL)-2D , CONSA(L)-2D
DFT/C-1D

GROUNDWATER MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

FIELD-2D
MAST-2D
SEEP2(VM)-2D , SEEP(VM)-3D
STRESEEP-2D

** UNIVERSITY OF FLORIDA

INTERACTIVE SIMULATION OF 1-D WATER MOVEMENT IN SOIL

** UNIVERSITY OF ILLINOIS

GWPATH

** UNIVERSITY OF WYOMING

CONVECTIVE TRANSPORT OF HEAT BY GROUNDWATER

** WESTERN RESEARCH INSTITUTE

GWMOD3
ILLCAV2
ILLINOIS STATE WATER SURVEY MODELS (ISWS)
MAQFLO
ODMOD (PROG1A)
OSMGW
PRINCETON GROUNDWATER FLOW AND MASS TRANSPORT
UNSAT1
UNSAT2 (PROG2A)

** WYOMING STATE ENGINEER'S OFFICE

FINITE DIFFERENCE MODEL-AQUIFER SIMULATION IN TWO DIMENSIONS

** WYOMING WATER DEVELOPMENT COMMISSION

CSU FDM
PRICKETT LONNQUIST AQUIFER SIMULATION MODEL (PLASM)
RANDOM WALK SOLUTE TRANSPORT
RECHARGE

** WYOMING WATER RESEARCH CENTER

2-D, SOLUTE TRANSPORT AND DISPERSION IN GROUNDWATER (MOC)
ANALYTICAL SOLUTIONS OF THE 1-D CONVENCTIVE-DISPERSIVE FLOW
BASIC
FEMWATER(FECWATER) - FEMWASTE(FECWASTE)

GROUNDWATER MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

MCDONALD AND HARBAUGH GROUNDWATER FLOW MODEL (MODFLOW)
SATURATED-UNSATURATED TRANSPORT (SUTRA)
SWIP

WATER QUALITY MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** ANDERSON-NICHOLS AND CO., INC.,

TOX-SCREEN

** BATTELLE PACIFIC NORTHWEST LABS

EXPLORE-I

** COLORADO STATE UNIVERSITY

ASTRAN
WESTEX

** DEPT. OF ENVIRONMENTAL QUALITY

PARAMETER ESTIMATION FIRST-ORDER BOD DELAY
WLA NH3

** HEC - U.S. ARMY CORPS OF ENGINEERS

HEC HEAT EXCHANGE PROGRAM (HEATX)
HEC RECEIVING WATER QUALITY MODEL (RWQM)
HEC RESERVOIR TEMPERATURE STRATIFICATION (RESTMP)
HEC THERMAL SIMULATION OF LAKES (THERMS)
HEC WEATHER (WEATHR)
HEC-5Q SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS

** OKLAHOMA STATE UNIVERSITY

CHEMICAL MOVEMENT IN SOIL: IBM PC USER'S GUIDE
GEOCHEM
HYPE
MULTICOMPONENT ANALYSIS
MULTISCAN PROGRAM

** RISO NATIONAL LABORATORY

COLUMN2

** TEXAS DEPT. OF WATER RESOURCES

DOSAGII

** U.S. DEPT. OF AGRICULTURE

CHEMICALS, RUNOFF, AND EROSION FROM AG. MANAGEMENT SYSTEMS (CREAMS)

WATER QUALITY MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** U.S. ENVIRONMENTAL PROTECTION AGENCY

DYNHYD3
DYNTOX
ENHANCED STREAM-WATER QUALITY MODEL (QUAL2E)
EXPOSURE ANALYSIS MODEL SYSTEM (EXAMS)
REDEQL-EPAK
WASTOX
WATER QUALITY ANALYSIS PROGRAM (WASP)
WRECEV

** U.S. GEOLOGICAL SURVEY

1-D RESERVOIR/LAKE TEMPERATURE AND DO MODEL (USGS L192)
1-D STREAM EXCESS TEMP. ANALYSIS (USGS G301)
2-D EXCESS TEMP. MODEL FOR THERMALLY LOADED STREAM (USGS G300)
BALANCE
DETERMINATION OF BOD PARAMETERS (USGS G731)
DETERMINATION OF PRIMARY PROD. AND COMMUNITY METABOLISM
DR3M-QUAL
DUWAMISH RIVER ESTUARY MODEL (DUSHRY)
GENERAL PURPOSE WATER-QUALITY MODEL (GENQUAL)
LAGRANGIAN TRANSPORT MODEL (LTM)
STEADY-STATE WATER-QUALITY MODEL (USGS G475)
SURFACE JET STREAM EXCESS TEMP. ANALYSIS (USGS G199)
UNSTEADY SOLUTE TRANSPORT SIM. IN STREAMFLOW (USGS J880)

** UNIVERSITY OF CALIFORNIA, DAVIS

ST

** UNIVERSITY OF WYOMING

PHREEQE
WATEQ2/3
WATER QUALITY REGRESSION MODEL

** WESTERN RESEARCH INSTITUTE

GREEN RIVER BASIN ATTRIBUTE MODEL(S)
MAQUAL
POLLUT3
REDEQL
WATEQFC REVISED

WATER QUALITY MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** WYOMING WATER RESEARCH CENTER

HEC WATER QUALITY FOR RIVER-RESERVOIR SYSTEMS (WQRRS)
MODIFIED "WISCONSIN" MODEL FOR MODELING DO IN WYOMING STREAMS

CLIMATIC MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** OKLAHOMA STATE UNIVERSITY

USER'S MANUAL OKLAHOMA CLIMATIC TAPES (1982)

** STATE UNIVERSITY OF NEW YORK AT ALBANY

YIELD

** UNIVERSITY OF WYOMING

CALCULATION AND POTENTIAL EVAPOTRANSPIRATION BY PENMAN METHOD

** WYOMING WATER RESEARCH CENTER

AREAL PRECIPITATION
MEAN AREAL TEMPERATURE (NWSRFS6)
MEAN BASIN PRECIPITATION (NOAA)
NATIONAL WEATHER SERVICE RIVER FORECAST SYSTEM (NWSRFS)
POTENTIAL EVAPORATION
PRECIPITATION FREQUENCY (PREFRE)
PRECIPITATION GAGE ANALYSIS

MISCELLANEOUS MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** COLORADO STATE UNIVERSITY

BBIRR
CSUDP
DPIRR
DYNPRO
FASTEP
KFIRR
OPTCON
OPTIMIZATION LIBRARY
WAT7

** HEC - U.S. ARMY CORPS OF ENGINEERS

FREQ
HEC INPUT DATA CHECKING PROGRAM FOR HEC-5 (CKHEC-5)
HEC AGRICULTURAL FLOOD DAMAGE ANALYSIS (AGDAM)
HEC CORPS EDITOR (COED)
HEC DATA BANK MANAGER (BANK)
HEC DATA REGISTRATION PROGRAM (REGIST)
HEC DREDGED-MATERIAL DISPOSAL MANAGEMENT MODEL (D2M2)
HEC FINITE ELEMENT NETWORK GENERATOR (RMA-1) & HYDRODYNAMICS (RMA-2)
HEC FLOW CONVERSION FOR HEC-5 (INCARD)
HEC FORTRAN SOURCE INVENTORY AND RENUMBERING (FSIR)
HEC HYDRAULIC GRAPHICS PACKAGE (HGP)
HEC HYDROPOWER ANALYSIS USING STREAMFLOW DURATION PROCEDURES (HYDUR)
HEC INTERACATIVE INPUT PREPARATION PROGRAM FOR HEC-5 (INFIVE)
HEC INTERACTIVE NONSTRUCTURAL ANALYSIS PACKAGE (PINA, SIPP)
HEC INTERACTIVE SUMMARY PRINTOUT USING HEC-2 (SUMPO)
HEC MODEL FOR ESTIMATING WATER DEMANDS (DEMAND)
HEC MULTIPLE LINEAR REGRESSION PROGRAM (MLRP)
HEC PERSPECTIVE PLOT (FOURV)
HEC REGIONAL FREQUENCY COMPUTATION (REGFQ)
HEC RESOURCE INFORMATION AND ANALYSIS (RIA)
HEC SMALL-SCALE HYDROELECTRIC POWER COST ESTIMATES (HYCOST)
HEC STATISTICAL ANALYSIS OF TIME SERIES DATA (STATS)
HEC STRUCTURE INVENTORY FOR DAMAGE ANALYSIS (SID)
HEC STRUCTURE INVENTORY FOR DAMAGE ANALYSIS EDIT (SIDEDT)
HEC VECTOR PLOTTING PROGRAM FOR RMA-2 (VECTOR)
HEC-1 INPUT CONVERTER (HEC1CV)
HEC-2 DATA EDITOR (EDIT2)

MISCELLANEOUS MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** HYDRO-QUEBEC GENERATING STATION ENGINEERING BRANCH

ATHENA

** OKLAHOMA STATE UNIVERSITY

BASIN
ENZYME KINETICS PROGRAM
GINO
GPAK2D AND GPAK3D
GRAPHICS PROGRAM (POLYPLOT, HPPOLY, P10,P11)
HPGPAK
IFPS/OPTIMUM
KINETICS CALCULATION PROGRAM
MSTATE
NEUTRON PROBE DATA MANAGEMENT
OSU IRRIGATION COST GENERATOR
PROBE3
RATE COMPUTER PROGRAM
RURAL WATER SYSTEM COMPUTER PROGRAM
STOCHASTIC PROGRAMING SOFTWARE
TRS-80 MODEL 100 TO NORTHSTAR DUMP
WATER QUALITY DECISION SIMULATOR

** ROCKWELL INTERNATIONAL

HEADCO

** SCIENTIFIC PUBLICATIONS AND SOFTWARE CENTER

GRAPHICS FOR 3-D (MODFLOW) AND 2-D (MOC)

** STATE UNIVERSITY OF NEW YORK AT ALBANY

WATER

** U.S. DEPT. OF AGRICULTURE

MEB

** UNIVERSITY OF WYOMING

EVAPOTRANSPIRATION/YIELD MODEL
WYOMING ECONOMIC-DEMOGRAPHIC ASSESSMENT MODEL (WEDAM)

MISCELLANEOUS MODELS
SOURCES OF INFORMATION AND/OR
MODEL DOCUMENTATION

** WATER AND ENERGY RESEARCH INSTITUTE

COMPUTER ANALYSIS OF FLOW IN PIPE NETWORKS

** WYOMING ECONOMIC DEVELOPMENT AND STABILIZATION BOARD

WYOMING INTER-INDUSTRY MODELING SYSTEM (WIMS)

** WYOMING GAME AND FISH DEPT.

POP-II

** WYOMING WATER RESEARCH CENTER

BASINWIDE INSTREAM FLOW ASSESSMENT MODEL FOR INSTREAM FLOW NEEDS
SIMPLIFIED BISHOP METHOD PER GEOTECHNIQUE
SOIL CORE WEIGHTED AVERAGES
SOILMOIST
XSECTPLOT

APPENDIX B

The following is a list of all sources and addresses for the entire list of models in this study. Note: those addresses with subaddresses (i.e. a), b), etc.) indicate that there are two or more addresses for this source. Check the dBase file for the correct address for the models listed under that source.

Anderson-Nichols and Company,Inc.
2666 East Bayshore Road
Palo Alto, CA 94303

Battelle Pacific Northwest Labs
Richland, WA

Binkley Software
7246 Sharon Drive
San Jose, CA 95129

Boss Corporation
210 North Bassett Street
Madison, WI 53703

Camp, Dresser, and McKee, Inc.
Annandale, VA

Center for Environmental Research
Cornell University
471 Hollister Hall
Ithaca, NY 14853

Cheyenne Board of Public Utilities
2100 Pioneer
Cheyenne, WY 82003-1469

Colorado State University
Civil Engineering Dept.
Ft. Collins, CO 80523

Computational Hydraulics Inc.
127 Dalewood Crescent
Hamilton, Ontario, Canada L8S4B8

Cornell University
Riley Robb Hall
Ithaca, NY 14853

Delaware Dept. of Natural Resources and Environmental Control
Institute for Research on Land and Water Resources Newsletter
Spring 1986

Dept. of Environmental Quality
Herschler Building
Cheyenne, WY 82002

Forsgren-Perkins Engineering
75 Yellow Creek Road, Suite #302
Evanston, WY 82930

GCA Technology Division, Inc.
213 Burlington Road
Bedford, MA 01730

HEC - U.S. Army Corps of Engineers
a)609 Second Street
Davis, CA 95616
b)4689 South Xavier Street
Denver, CO 80236

HOMS Office of Hydrology and Water Resources Dept.
WRO Sectretariat Case Postale No.5
CH-1211 Geneva, 20 Switzerland

Hydro-Quebec Generating Station, Engineering Branch
Institute for Research on Land and Water Resources Newsletter
Spring 1986

Illinois Water Resource Center
408 South Goodwin
Urbana, IL 61801

In-Situ, Inc.
P.O. Box I
Laramie, WY 82070

International Ground Water Modeling Center
Butler University
Indianapolis, IN 46208

National Energy Software Center
Argonne National Lab - 9800 South Cass Avenue
Argonne, IL 60439

National Well Water Association
P.O. Box 16737
Columbus, OH 43216

NRC/GPO Sales Program
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Nuclear Waste Isolation
Battelle Memorial Institute - U.S. Dept. of Energy

Washington, D.C. 20555

Oklahoma State University
a)X5433
b)X6417
c)X5555
d)X5113
e)X6250
Stillwater, OK 74078

Public Works Agency
Dept. of Sanitation and Flood Control
San Diego, CA

Purdue University
Dept. of Agricultural Engineering
West Lafayette, IN 47907

Riso National Laboratory
P.O. Box 49
DK-4000 Rockilde, Denmark

Rockwell International
P.O. Box 800
Richland, WA 99352

Scientific Publications and Software Center
P.O. Box 23041
Washington, D.C. 20026-3041

State University of New York at Albany
Dept. Geography and Planning
Albany, NY 12222

Tetratech, Inc.
13746 Mt. Diablo Blvd.
Lafayette, CA 94549

Texas A & M University
Civil Engineering Dept.
College Station, TX 77843

Texas Dept. of Water Resources
Austin, TX

James S. Ulrick
81 Arlington Avenue
Berkeley, CA 94797

University of Arizona
Dept. of Civil Engineering and Engineering Mechanics

Tucson, AZ 85721

University of California, Davis
Dept. of Chemical Engineering
Davis, CA 95616

University of California, Los Angeles (UCLA)
Civil Engineering/ Environmental Engineering Depts.
Los Angeles, CA 90024

University of Florida
Institute of Food and Agricultural Services
Gainesville, FL 32611

University of Illinois
a)208 N. Romine St.
Urbana, IL 61801
b)2204 Griffith Drive
Champaign, IL 61820

University of Wyoming
a)P.O. Box 3006
b)P.O. Box 3354
c)Botany Dept.
d)Geography and Recreation Dept.
e)Zoology Dept.
University Station
Laramie, WY 82071

U.S. Dept. of Agriculture
a)P.O. Box 946
Tifton, GA 31793
b)4331 E. Broadway
Phoenix, AZ 85040

U.S. Environmental Protection Agency
a)Environmental Research Lab
Ada, OK
b)College Station Road
Athens, GA 30613

U.S. Geological Survey
a)415 National Center
Reston, VA 22092
b)Box 25425 Federal Center
Denver, CO 80225
c)Gulf Coast Hydroscience Center, Bldg 1100
NSTL Station, MS 39529
d)12201 Sunrise Valley Drive
Reston, VA 22092
e)Box 1125
Cheyenne, WY 82001

f)1201 Pacific Avenue Suite 600
Tacoma, WA 98402

Virginia Tech
Dept. of Civil Engineering
Blacksburg, VA 24061

Water and Energy Research Institute
University of Guam
Mangilad, Guam 96923

Western Research Institute
P.O. Box 3395 University of Wyoming
Laramie, WY 82071

Western Water Consultants, Inc.
611 Skyline Road
Laramie, WY 82070

Wyoming Economic Development and Stabilization Board
Herschler Building
Cheyenne, WY 82002

Wyoming Emergency Management Agency
Hazard Mitigation Office - P.O. Box 1909
Cheyenne, WY 82003

Wyoming Game and Fish Dept.
5400 Bishop Blvd.
Cheyenne, WY 82009

Wyoming Highway Dept.
P.O. Box 1708
Cheyenne, WY 82002

Wyoming State Engineer's Office
Herschler Building
Cheyenne, WY 82002

Wyoming Water Development Commission
Herschler Building
Cheyenne, WY 82002

Wyoming Water Research Center
P.O. Box 3067 University Station
Laramie, WY 82071

APPENDIX C

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WATER QUALITY MODELS	60
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"SELECTED" MISCELLANEOUS MODELS WITH INFORMATION/DOC LOCATED	78
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"SELECTED" SURFACE WATER MODELS WITHOUT INFO/DOC LOCATED	80
"SELECTED" GROUND WATER MODELS WITHOUT INFORMATION/DOC LOCATED	81
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MODELS INCLUDED IN THIS STUDY

1-D RESERVOIR/LAKE TEMPERATURE AND DO MODEL (USGS L192)
1-D STREAM EXCESS TEMP. ANALYSIS (USGS G301)
2-D EXCESS TEMP. MODEL FOR THERMALLY LOADED STREAM (USGS G300)
2-D, SOLUTE TRANSPORT AND DISPERSION IN GROUNDWATER (MOC)
A & M WATERSHED MODEL
ADVECTIVE TRANSPORT MODEL
ADVZI
AGRICULTURAL RUNOFF MANAGEMENT (ARM) MODEL
ANALYSIS OF WASTE WATER DISCHARGE EFFECTS ON STREAM QUALITY
ANALYTICAL SOLUTIONS OF THE 1-D CONVENCTIVE-DISPERSIVE FLOW
ANSWERS
AP-SYN (USGS E784C)
AQUIFEM & AQUIFEM-SALT
AQUIFER TEST ANALYSES (AQTST)
AREAL PRECIPITATION
ASTRAN
ATHENA
BALANCE
BASIC
BASIN
BASINWIDE INSTREAM FLOW ASSESSMENT MODEL FOR INSTREAM FLOW NEEDS
BBIRR
BORDER FLOW (BRDRFLW)
BORHOL
BOSS DAMBRK
BRANCH (USGS K757)
BREACH-ANDERSON MODEL
BURBS
CALCULATION AND POTENTIAL EVAPOTRANSPIRATION BY PENMAN METHOD
CHEMICAL MOVEMENT IN SOIL: IBM PC USER'S GUIDE
CHEMICALS, RUNOFF, AND EROSION FROM AG. MANAGEMENT SYSTEMS (CREAMS)
CIRCULAR BASIN RECHARGE MOUND
COLLECT
COLUMN2
COMPUTER ANALYSIS OF FLOW IN PIPE NETWORKS
CONS2-1D , CONSP(L/NL)-2D , CONSA(L)-2D
CONSIM
CONTUR
CONVECTIVE TRANSPORT OF HEAT BY GROUNDWATER
CROW CREEK WATER SUPPLY AND DISTRIBUTION SYSTEM
CSU FDM
CSUDP
CUHP
CULVERT DESIGN SYSTEM (CDS)
DAM-BREAK FLOOD SIMULATION (USGS K634)
DAYDAT1
DEER CREEK, TRIBUTARY TO N. PLATTE RIVER
DETERMINATION OF BOD PARAMETERS (USGS G731)
DETERMINATION OF PRIMARY PROD. AND COMMUNITY METABOLISM
DFT/C-1D
DISTRIBUTED ROUTING RAINFALL-RUNOFF MODEL VERSION II (DR3M)

MODELS INCLUDED IN THIS STUDY

DOSAGII
DOWNSTREAM-UPSTREAM RESERVOIR ROUTING (USGS A697)
DPIRR
DR3M-QUAL
DUWAMISH RIVER ESTUARY MODEL (DUSHRY)
DYNHYD3
DYNPRO
DYNTOX
ENHANCED STREAM-WATER QUALITY MODEL (QUAL2E)
ENVSIM
ENZYME KINETICS PROGRAM
EVAPOTRANSPIRATION/YIELD MODEL
EXPLORE-I
EXPOSURE ANALYSIS MODEL SYSTEM (EXAMS)
EXTRAN
FASTEP
FEMWATER(FECWATER) - FEMWASTE(FECWASTE)
FIELD-2D
FINAL.FOR
FINITE DIFFERENCE MODEL-AQUIFER SIMULATION IN TWO DIMENSIONS
FINITE-ELEMENT SURFACE-WATER MODELING SYSTEM (FESWMS)
FLOOD HISTORY
FLOODRT
FLUME
FLUVIAL-12
FORCST
FREQ
GENERAL PURPOSE WATER-QUALITY MODEL (GENQUAL)
GEOCHEM
GEOGRAPHIC INFORMATION SYSTEM (GIS)
GINO
GPAK2D AND GPAK3D
GRAPHICS FOR 3-D (MODFLOW) AND 2-D (MOC)
GRAPHICS PROGRAM (POLYPLOT, HPPOLY, P10,P11)
GREEN RIVER BASIN ATTRIBUTE MODEL(S)
GWMOD3
GWPATH
GWVEL
H2OTRANS
HAMS FORK RIVER
HEADCO
HEC INPUT DATA CHECKING PROGRAM FOR HEC-5 (CKHEC-5)
HEC AGRICULTURAL FLOOD DAMAGE ANALYSIS (AGDAM)
HEC BASIN PRECIPITATION COMPUTATIONS (PRECIP)
HEC CORPS EDITOR (COED)
HEC DAMAGE REACH STAGE-DAMAGE CALCULATION (DAMCAL)
HEC DATA BANK MANAGER (BANK)
HEC DATA REGISTRATION PROGRAM (REGIST)
HEC DREDGED-MATERIAL DISPOSAL MANAGEMENT MODEL (D2M2)
HEC EXPECTED ANNUAL FLOOD DAMAGE COMPUTATION (EAD)
HEC FINITE ELEMENT NETWORK GENERATOR (RMA-1) & HYDRODYNAMICS (RMA-2)

MODELS INCLUDED IN THIS STUDY

HEC FINITE ELEMENT SOLUTION OF STEADY STATE POT. FLOW PROBS (FEMFLO)
HEC FLOOD FLOW FREQUENCY ANALYSIS (HECWRC)
HEC FLOW CONVERSION FOR HEC-5 (INCARD)
HEC FORTRAN SOURCE INVENTORY AND RENUMBERING (FSIR)
HEC GEOMETRIC ELEMENTS FROM CROSS-SECTION COORDINATES (GEDA)
HEC GRADUALLY VARIED UNSTEADY FLOW PROFILES (USTFLO)
HEC HEAT EXCHANGE PROGRAM (HEATX)
HEC HYDRAULIC GRAPHICS PACKAGE (HGP)
HEC HYDROLOGIC PARAMETERS (HYDPAR)
HEC HYDROPOWER ANALYSIS USING STREAMFLOW DURATION PROCEDURES (HYDUR)
HEC INTERACATIVE INPUT PREPARATION PROGRAM FOR HEC-5 (INFIVE)
HEC INTERACTIVE NONSTRUCTURAL ANALYSIS PACKAGE (PINA, SIPP)
HEC INTERACTIVE SUMMARY PRINTOUT USING HEC-2 (SUMPO)
HEC INTERIOR DRAINAGE FLOOD ROUTING (INTDRA)
HEC MODEL FOR ESTIMATING WATER DEMANDS (DEMAND)
HEC MULTIPLE LINEAR REGRESSION PROGRAM (MLRP)
HEC PERSPECTIVE PLOT (FOURV)
HEC RECEIVING WATER QUALITY MODEL (RWQM)
HEC REGIONAL FREQUENCY COMPUTATION (REGFQ)
HEC RESERVOIR TEMPERATURE STRATIFICATION (RESTMP)
HEC RESOURCE INFORMATION AND ANALYSIS (RIA)
HEC SMALL-SCALE HYDROELECTRIC POWER COST ESTIMATES (HYCOST)
HEC STATISTICAL ANALYSIS OF TIME SERIES DATA (STATS)
HEC STREAM HYDRAULICS PACKAGE (SHP)
HEC STREAM ROUTING OPTIMIZATON BY NEGATIVE LOCAL FLOWS (OPROUT)
HEC STREAMFLOW ROUTING OPTIMIZATION (SFRO)
HEC STRUCTURE INVENTORY FOR DAMAGE ANALYSIS (SID)
HEC STRUCTURE INVENTORY FOR DAMAGE ANALYSIS EDIT (SIDEDT)
HEC THERMAL SIMULATION OF LAKES (THERMS)
HEC VECTOR PLOTTING PROGRAM FOR RMA-2 (VECTOR)
HEC WATER QUALITY FOR RIVER-RESERVOIR SYSTEMS (WQRRS)
HEC WEATHER (WEATHR)
HEC-1 FLOOD HYDROGRAPH COMBINING AND ROUTING
HEC-1 INPUT CONVERTER (HEC1CV)
HEC-2 DATA EDITOR (EDIT2)
HEC-2 WATER SURFACE PROFILES
HEC-3 RESERVOIR SYSTEM ANALYSIS FOR CONSERVATION
HEC-4 MONTHLY STREAMFLOW SIMULATION
HEC-5 SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
HEC-5Q SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
HEC-6 SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS
HORTON
HOURLY-DAILY STREAMFLOW ROUTING (J351)
HPGPAK
HYDAUG/TRIHYDRO
HYDRA
HYDRO POND
HYDROLOGIC SIMULATION MODEL (HYSIM)
HYDROLOGICAL OPERATIONAL MULTIPURPOSE SUBPROGRAMME OF WMO - (HOMS)
HYDROLOGICAL SIMULATION PROGRAM (HSPF)
HYDTAB

MODELS INCLUDED IN THIS STUDY

HYMO (ARS)
HYPE
IFPS/OPTIMUM
ILLCAV2
ILLINOIS STATE WATER SURVEY MODELS (ISWS)
INSTREAM FLOW INCREMENTAL METHODOLOGY
INSTREAM FLOW NEEDS ANALYSIS
INTERACTIVE SIMULATION OF 1-D WATER MOVEMENT IN SOIL
KFIRR
KINETICS CALCULATION PROGRAM
LAGRANGIAN TRANSPORT MODEL (LTM)
LAYOUT
LEACHING EVALUATION OF AGRICULTURAL CHEMICALS (LEACH)
LEAKY AQUIFER DRAWDOWN
LINE SINK AQUIFER MODEL
LITHOLOGY PROGRAMS
LOWER.FOR
LOWFLOWS
LTIRD , ODAST , RESSQ
MAQFLO
MAQUAL
MASCOT
MAST-2D
MCDONALD AND HARBAUGH GROUNDWATER FLOW MODEL (MODFLOW)
MEAN AREAL TEMPERATURE (NWSRFS6)
MEAN BASIN PRECIPITATION (NOAA)
MEB
METHOD OF UNDERGROUND SOLUTE EVALUATION - (MOUSE)
MIDDLE FORK DAM (MIDDLE FORK POWDER RIVER)
MINTEQ
MLTRAN
MODEIN AND COLBY
MODIFIED "WISCONSIN" MODEL FOR MODELING DO IN WYOMING STREAMS
MODSIM
MODSIM4
MSTATE
MULTICOMPONENT ANALYSIS
MULTISCAN PROGRAM
MULTWAT
NATIONAL WEATHER SERVICE RIVER FORECAST SYSTEM (NWSRFS)
NATURAL BASIN MODEL (A634X)
NEUTRON PROBE DATA MANAGEMENT
NORTH PLATTE RIVER SIMULATION MODEL
NWS DAMBRK
ODMOD (PROG1A)
ODPAY
ODSDP
OPCHFLOW
OPRATE
OPSTUDY
OPTCON

MODELS INCLUDED IN THIS STUDY

OPTIMIZATION LIBRARY
OSMGW
OSU IRRIGATION COST GENERATOR
PAPADOP
PARAMETER ESTIMATION FIRST-ORDER BOD DELAY
PCSWMM3
PESTICIDE ROOT ZONE MODEL (PRZM)
PHREEQE
PHYSICAL HABITAT SIMULATION SYSTEM (PHABSIM)
PLUME
PLUME 2D
PLUME 3D
POINT SINK AQUIFER MODEL
POLLUT3
POP-II
POTENTIAL EVAPORATION
PRECIPITATION FREQUENCY (PREFRE)
PRECIPITATION GAGE ANALYSIS
PRECIPITATION-RUNOFF MODELING SYSTEM (PRMS)
PRICKETT LONNQUIST AQUIFER SIMULATION MODEL (PLASM)
PRINCETON GROUNDWATER FLOW AND MASS TRANSPORT
PROBE3
PUMPING TEST ANALYSIS
PUMPING TEST ANALYSIS PROGRAMS
PUMPTEST
QUANTITY-QUALITY SIMULATION (QQS)
RANDOM WALK SOLUTE TRANSPORT
RATE COMPUTER PROGRAM
RECHARGE
REDEQL
REDEQL-EPAK
RESERVOIR-STORAGE FREQUENCY MODEL (RSFM)
RESROUT
RIVER BALANCE
ROUTE-RUNOFF DETENTION BASIN
RUNOFF PREDICTION FROM SATELLITE SNOW AREA MEASUREMENTS
RURAL WATER SYSTEM COMPUTER PROGRAM
SANDSTON.FOR
SATURATED-UNSATURATED TRANSPORT (SUTRA)
SCREEN
SEDIMENT ECONOMICS MODEL
SEDIMOT II
SEDLAB
SEEP2(VM)-2D , SEEP(VM)-3D
SEWER
SFRUNOFF
SIMPLIFIED BISHOP METHOD PER GEOTECHNIQUE
SIMPLIFIED DAMBREAK MODEL
SIMSYS2D
SLOPAR
SMITHS FORK, TRIBUTARY TO BEAR RIVER

MODELS INCLUDED IN THIS STUDY

SOIL CORE WEIGHTED AVERAGES
SOIL MOISTURE ACCOUNTING
SOILLINER
SOILMOIST
SOLUTE
SSSFM
ST
STEADY-STATE WATER-QUALITY MODEL (USGS G475)
STEP BACKWATER AND FLOODWAYS ANALYSES (J635)
STEP-BACKWATER AND FLOODWAY ANALYSES (USGS E431)
STOCHASTIC PROGRAMING SOFTWARE
STORAGE TREATMENT OVERFLOW RUNOFF MODEL (STORM)
STORM WATER MANAGEMENT MODEL (SWMM)
STRAWBERRY CREEK WATER ACCOUNTING MODEL
STRDSTEP
STREAM ANALYSIS SYSTEM
STRESEEP-2D
SULPHUR CREEK RESERVOIR 3RD ENLARGEMENT, TRIBUTARY OF BEAR RIVER
SURFACE JET STREAM EXCESS TEMP. ANALYSIS (USGS G199)
SWCP
SWCULRAT (USGS A526)
SWIP
SWSLOPE (USGS C374)
SYNFLO
TENN II
THEIS EQUATION SLIDERULE
THORNTHWAITE'S METHOD
TONGUE RIVER
TOX-SCREEN
TR-20
TR-48
TR-61
TRACK
TRAFRAP
TRS-80 MODEL 100 TO NORTHSTAR DUMP
TRUST II
TSMATCH OR HJMATCH
UDSEWER
UDSWMM
UNCONF
UNSAT1
UNSAT2 (PROG2A)
UNSTDY
UNSTEADY FLOW ROUTING USING CHARACTERISTICS METHOD (USGS J416)
UNSTEADY SOLUTE TRANSPORT SIM. IN STREAMFLOW (USGS J880)
UNSTEADY STREAMFLOW SIMULATION (USGS J879)
UPCONE
UPPER BEAR RIVER BASIN MODEL
UPPER.FOR
URBAN BASIN MODEL (G824)
USER'S MANUAL OKLAHOMA CLIMATIC TAPES (1982)

MODELS INCLUDED IN THIS STUDY

VADOSE
WASTOX
WAT7
WATEQ2/3
WATEQFC REVISED
WATER
WATER QUALITY ANALYSIS PROGRAM (WASP)
WATER QUALITY DECISION SIMULATOR
WATER QUALITY REGRESSION MODEL
WATER SURFACE PROFILES (USBR)
WATPOW
WELLFIELD SIMULATION PROGRAMS
WELLREC PROGRAM
WELLSAMP
WESTEX
WESTSIDE WATER QUALITY PREDICTIONS
WIRSOS
WLA NH3
WOOD
WRECEV
WSPRO (HY-7)
WYOMING ECONOMIC-DEMOGRAPHIC ASSESSMENT MODEL (WEDAM)
WYOMING INTER-INDUSTRY MODELING SYSTEM (WIMS)
XSECTPLOT
YIELD

SURFACE WATER MODELS INCLUDED IN THIS STUDY

A & M WATERSHED MODEL
ADVZI
AGRICULTURAL RUNOFF MANAGEMENT (ARM) MODEL
ANALYSIS OF WASTE WATER DISCHARGE EFFECTS ON STREAM QUALITY
ANSWERS
AP-SYN (USGS E784C)
BORDER FLOW (BRDRFLW)
BOSS DAMBRK
BRANCH (USGS K757)
BREACH-ANDERSON MODEL
COLLECT
CONSIM
CROW CREEK WATER SUPPLY AND DISTRIBUTION SYSTEM
CUHP
CULVERT DESIGN SYSTEM (CDS)
DAM-BREAK FLOOD SIMULATION (USGS K634)
DAYDAT1
DEER CREEK, TRIBUTARY TO N. PLATTE RIVER
DISTRIBUTED ROUTING RAINFALL-RUNOFF MODEL VERSION II (DR3M)
DOWNSTREAM-UPSTREAM RESERVOIR ROUTING (USGS A697)
EXTRAN
FINAL.FOR
FINITE-ELEMENT SURFACE-WATER MODELING SYSTEM (FESWMS)
FLOOD HISTORY
FLOODRT
FLUME
FLUVIAL-12
FORCST
H2OTRANS
HAMS FORK RIVER
HEC BASIN PRECIPITATION COMPUTATIONS (PRECIP)
HEC DAMAGE REACH STAGE-DAMAGE CALCULATION (DAMCAL)
HEC EXPECTED ANNUAL FLOOD DAMAGE COMPUTATION (EAD)
HEC FINITE ELEMENT SOLUTION OF STEADY STATE POT. FLOW PROBS (FEMFLO)
HEC FLOOD FLOW FREQUENCY ANALYSIS (HECWRC)
HEC GEOMETRIC ELEMENTS FROM CROSS-SECTION COORDINATES (GEDA)
HEC GRADUALLY VARIED UNSTEADY FLOW PROFILES (USTFLO)
HEC HYDROLOGIC PARAMETERS (HYDPAR)
HEC INTERIOR DRAINAGE FLOOD ROUTING (INTDRA)
HEC STREAM HYDRAULICS PACKAGE (SHP)
HEC STREAM ROUTING OPTIMIZATON BY NEGATIVE LOCAL FLOWS (OPROUT)
HEC STREAMFLOW ROUTING OPTIMIZATION (SFRO)
HEC-1 FLOOD HYDROGRAPH COMBINING AND ROUTING
HEC-2 WATER SURFACE PROFILES
HEC-3 RESERVOIR SYSTEM ANALYSIS FOR CONSERVATION
HEC-4 MONTHLY STREAMFLOW SIMULATION
HEC-5 SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
HEC-6 SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS
HORTON
HOURLY-DAILY STREAMFLOW ROUTING (J351)

SURFACE WATER MODELS
INCLUDED IN THIS STUDY

HYDAUG/TRIHYDRO
HYDRA
HYDRO POND
HYDROLOGIC SIMULATION MODEL (HYSIM)
HYDROLOGICAL OPERATIONAL MULTIPURPOSE SUBPROGRAMME OF WMO - (HOMS)
HYDROLOGICAL SIMULATION PROGRAM (HSPF)
HYDTAB
HYMO (ARS)
INSTREAM FLOW INCREMENTAL METHODOLOGY
INSTREAM FLOW NEEDS ANALYSIS
LAYOUT
LOWER.FOR
LOWFLOWS
MIDDLE FORK DAM (MIDDLE FORK POWDER RIVER)
MODEIN AND COLBY
MODSIM
MODSIM4
MULTWAT
NATURAL BASIN MODEL (A634X)
NORTH PLATTE RIVER SIMULATION MODEL
NWS DAMBRK
ODPAY
ODSDP
OPCHFLOW
OPRATE
OPSTUDY
PCSWMM3
PHYSICAL HABITAT SIMULATION SYSTEM (PHABSIM)
PRECIPITATION-RUNOFF MODELING SYSTEM (PRMS)
QUANTITY-QUALITY SIMULATION (QQS)
RESERVOIR-STORAGE FREQUENCY MODEL (RSFM)
RESROUT
RIVER BALANCE
ROUTE-RUNOFF DETENTION BASIN
RUNOFF PREDICTION FROM SATELLITE SNOW AREA MEASUREMENTS
SANDSTON.FOR
SCREEN
SEDIMENT ECONOMICS MODEL
SEDIMOT II
SEDLAB
SEWER
SFRUNOFF
SIMPLIFIED DAMBREAK MODEL
SIMSYS2D
SLOPAR
SMITHS FORK, TRIBUTARY TO BEAR RIVER
SSSFM
STEP BACKWATER AND FLOODWAYS ANALYSES (J635)
STEP-BACKWATER AND FLOODWAY ANALYSES (USGS E431)
STORAGE TREATMENT OVERFLOW RUNOFF MODEL (STORM)

SURFACE WATER MODELS INCLUDED IN THIS STUDY

STORM WATER MANAGEMENT MODEL (SWMM)
STRAWBERRY CREEK WATER ACCOUNTING MODEL
STRDSTEP
STREAM ANALYSIS SYSTEM
SULPHUR CREEK RESERVOIR 3RD ENLARGEMENT, TRIBUTARY OF BEAR RIVER
SWCP
SWCULRAT (USGS A526)
SWSLOPE (USGS C374)
SYNFLO
TENN II
TONGUE RIVER
TR-20
TR-48
TR-61
UDSEWER
UDSWMM
UNSTDY
UNSTEADY FLOW ROUTING USING CHARACTERISTICS METHOD (USGS J416)
UNSTEADY STREAMFLOW SIMULATION (USGS J879)
UPPER BEAR RIVER BASIN MODEL
UPPER.FOR
URBAN BASIN MODEL (G824)
WATER SURFACE PROFILES (USBR)
WATPOW
WESTSIDE WATER QUALITY PREDICTIONS
WIRSOS
WOOD
WSPRO (HY-7)

GROUNDWATER MODELS
INCLUDED IN THIS STUDY

2-D, SOLUTE TRANSPORT AND DISPERSION IN GROUNDWATER (MOC)
ADVECTIVE TRANSPORT MODEL
ANALYTICAL SOLUTIONS OF THE 1-D CONVENCTIVE-DISPERSIVE FLOW
AQUIFEM & AQUIFEM-SALT
AQUIFER TEST ANALYSES (AQTST)
BASIC
BORHOL
BURBS
CIRCULAR BASIN RECHARGE MOUND
CONS2-1D , CONSP(L/NL)-2D , CONSA(L)-2D
CONTUR
CONVECTIVE TRANSPORT OF HEAT BY GROUNDWATER
CSU FDM
DFT/C-1D
ENVSIM
FEMWATER(FECWATER) - FEMWASTE(FECWASTE)
FIELD-2D
FINITE DIFFERENCE MODEL-AQUIFER SIMULATION IN TWO DIMENSIONS
GEOGRAPHIC INFORMATION SYSTEM (GIS)
GWMOD3
GWPATH
GWVEL
ILLCAV2
ILLINOIS STATE WATER SURVEY MODELS (ISWS)
INTERACTIVE SIMULATION OF 1-D WATER MOVEMENT IN SOIL
LEACHING EVALUATION OF AGRICULTURAL CHEMICALS (LEACH)
LEAKY AQUIFER DRAWDOWN
LINE SINK AQUIFER MODEL
LITHOLOGY PROGRAMS
LTIRD , ODAST , RESSQ
MAQFLO
MASCOT
MAST-2D
MCDONALD AND HARBAUGH GROUNDWATER FLOW MODEL (MODFLOW)
METHOD OF UNDERGROUND SOLUTE EVALUATION - (MOUSE)
MINTEQ
MLTRAN
ODMOD (PROG1A)
OSMGW
PAPADOP
PESTICIDE ROOT ZONE MODEL (PRZM)
PLUME
PLUME 2D
PLUME 3D
POINT SINK AQUIFER MODEL
PRICKETT LONNQUIST AQUIFER SIMULATION MODEL (PLASM)
PRINCETON GROUNDWATER FLOW AND MASS TRANSPORT
PUMPING TEST ANALYSIS
PUMPING TEST ANALYSIS PROGRAMS
PUMPTEST

GROUNDWATER MODELS
INCLUDED IN THIS STUDY

RANDOM WALK SOLUTE TRANSPORT
RECHARGE
SATURATED-UNSATURATED TRANSPORT (SUTRA)
SEEP2(VM)-2D , SEEP(VM)-3D
SOIL MOISTURE ACCOUNTING
SOILLINER
SOLUTE
STRESEEP-2D
SWIP
THEIS EQUATION SLIDERULE
THORNTHWAITE'S METHOD
TRACK
TRAFRAP
TRUST II
TSMATCH OR HJMATCH
UNCONF
UNSAT1
UNSAT2 (PROG2A)
UPCONE
VADOSE
WELLFIELD SIMULATION PROGRAMS
WELLREC PROGRAM
WELLSAMP

WATER QUALITY MODELS INCLUDED IN THIS STUDY

1-D RESERVOIR/LAKE TEMPERATURE AND DO MODEL (USGS L192)
1-D STREAM EXCESS TEMP. ANALYSIS (USGS G301)
2-D EXCESS TEMP. MODEL FOR THERMALLY LOADED STREAM (USGS G300)
ASTRAN
BALANCE
CHEMICAL MOVEMENT IN SOIL: IBM PC USER'S GUIDE
CHEMICALS, RUNOFF, AND EROSION FROM AG. MANAGEMENT SYSTEMS (CREAMS)
COLUMN2
DETERMINATION OF BOD PARAMETERS (USGS G731)
DETERMINATION OF PRIMARY PROD. AND COMMUNITY METABOLISM
DOSAGII
DR3M-QUAL
DUWAMISH RIVER ESTUARY MODEL (DUSHRY)
DYNHYD3
DYNTOX
ENHANCED STREAM-WATER QUALITY MODEL (QUAL2E)
EXPLORE-I
EXPOSURE ANALYSIS MODEL SYSTEM (EXAMS)
GENERAL PURPOSE WATER-QUALITY MODEL (GENQUAL)
GEOCHEM
GREEN RIVER BASIN ATTRIBUTE MODEL(S)
HEC HEAT EXCHANGE PROGRAM (HEATX)
HEC RECEIVING WATER QUALITY MODEL (RWQM)
HEC RESERVOIR TEMPERATURE STRATIFICATION (RESTMP)
HEC THERMAL SIMULATION OF LAKES (THERMS)
HEC WATER QUALITY FOR RIVER-RESERVOIR SYSTEMS (WQRRS)
HEC WEATHER (WEATHR)
HEC-5Q SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
HYPE
LAGRANGIAN TRANSPORT MODEL (LTM)
MAQUAL
MODIFIED "WISCONSIN" MODEL FOR MODELING DO IN WYOMING STREAMS
MULTICOMPONENT ANALYSIS
MULTISCAN PROGRAM
PARAMETER ESTIMATION FIRST-ORDER BOD DELAY
PHREEQE
POLLUT3
REDEQL
REDEQL-EPAK
ST
STEADY-STATE WATER-QUALITY MODEL (USGS G475)
SURFACE JET STREAM EXCESS TEMP. ANALYSIS (USGS G199)
TOX-SCREEN
UNSTEADY SOLUTE TRANSPORT SIM. IN STREAMFLOW (USGS J880)
WASTOX
WATEQ2/3
WATEQFC REVISED
WATER QUALITY ANALYSIS PROGRAM (WASP)
WATER QUALITY REGRESSION MODEL
WESTEX

WATER QUALITY MODELS
INCLUDED IN THIS STUDY

WLA NH3
WRECEV

CLIMATIC MODELS INCLUDED IN THIS STUDY

AREAL PRECIPITATION
CALCULATION AND POTENTIAL EVAPOTRANSPIRATION BY PENMAN METHOD
MEAN AREAL TEMPERATURE (NWSRFS6)
MEAN BASIN PRECIPITATION (NOAA)
NATIONAL WEATHER SERVICE RIVER FORECAST SYSTEM (NWSRFS)
POTENTIAL EVAPORATION
PRECIPITATION FREQUENCY (PREFRE)
PRECIPITATION GAGE ANALYSIS
USER'S MANUAL OKLAHOMA CLIMATIC TAPES (1982)
YIELD

MISCELLANEOUS MODELS INCLUDED IN THIS STUDY

ATHENA
BASIN
BASINWIDE INSTREAM FLOW ASSESSMENT MODEL FOR INSTREAM FLOW NEEDS
BBIRR
COMPUTER ANALYSIS OF FLOW IN PIPE NETWORKS
CSUDP
DPIRR
DYNPRO
ENZYME KINETICS PROGRAM
EVAPOTRANSPIRATION/YIELD MODEL
FASTEP
FREQ
GINO
GPAK2D AND GPAK3D
GRAPHICS FOR 3-D (MODFLOW) AND 2-D (MOC)
GRAPHICS PROGRAM (POLYPLOT, HPPOLY, P10,P11)
HEADCO
HEC INPUT DATA CHECKING PROGRAM FOR HEC-5 (CKHEC-5)
HEC AGRICULTURAL FLOOD DAMAGE ANALYSIS (AGDAM)
HEC CORPS EDITOR (COED)
HEC DATA BANK MANAGER (BANK)
HEC DATA REGISTRATION PROGRAM (REGIST)
HEC DREDGED-MATERIAL DISPOSAL MANAGEMENT MODEL (D2M2)
HEC FINITE ELEMENT NETWORK GENERATOR (RMA-1) & HYDRODYNAMICS (RMA-2)
HEC FLOW CONVERSION FOR HEC-5 (INCARD)
HEC FORTRAN SOURCE INVENTORY AND RENUMBERING (FSIR)
HEC HYDRAULIC GRAPHICS PACKAGE (HGP)
HEC HYDROPOWER ANALYSIS USING STREAMFLOW DURATION PROCEDURES (HYDUR)
HEC INTERACATIVE INPUT PREPARATION PROGRAM FOR HEC-5 (INFIVE)
HEC INTERACTIVE NONSTRUCTURAL ANALYSIS PACKAGE (PINA, SIPP)
HEC INTERACTIVE SUMMARY PRINTOUT USING HEC-2 (SUMPO)
HEC MODEL FOR ESTIMATING WATER DEMANDS (DEMAND)
HEC MULTIPLE LINEAR REGRESSION PROGRAM (MLRP)
HEC PERSPECTIVE PLOT (FOURV)
HEC REGIONAL FREQUENCY COMPUTATION (REGFQ)
HEC RESOURCE INFORMATION AND ANALYSIS (RIA)
HEC SMALL-SCALE HYDROELECTRIC POWER COST ESTIMATES (HYCOST)
HEC STATISTICAL ANALYSIS OF TIME SERIES DATA (STATS)
HEC STRUCTURE INVENTORY FOR DAMAGE ANALYSIS (SID)
HEC STRUCTURE INVENTORY FOR DAMAGE ANALYSIS EDIT (SIDEDT)
HEC VECTOR PLOTTING PROGRAM FOR RMA-2 (VECTOR)
HEC-1 INPUT CONVERTER (HEC1CV)
HEC-2 DATA EDITOR (EDIT2)
HPGPAK
IFPS/OPTIMUM
KFIRR
KINETICS CALCULATION PROGRAM
MEB
MSTATE
NEUTRON PROBE DATA MANAGEMENT

MISCELLANEOUS MODELS
INCLUDED IN THIS STUDY

OPTCON
OPTIMIZATION LIBRARY
OSU IRRIGATION COST GENERATOR
POP-II
PROBE3
RATE COMPUTER PROGRAM
RURAL WATER SYSTEM COMPUTER PROGRAM
SIMPLIFIED BISHOP METHOD PER GEOTECHNIQUE
SOIL CORE WEIGHTED AVERAGES
SOILMOIST
STOCHASTIC PROGRAMING SOFTWARE
TRS-80 MODEL 100 TO NORTHSTAR DUMP
WAT7
WATER
WATER QUALITY DECISION SIMULATOR
WYOMING ECONOMIC-DEMOGRAPHIC ASSESSMENT MODEL (WEDAM)
WYOMING INTER-INDUSTRY MODELING SYSTEM (WIMS)
XSECTPLOT

"SELECTED MODELS INCLUDED IN THIS STUDY

2-D, SOLUTE TRANSPORT AND DISPERSION IN GROUNDWATER (MOC)
AGRICULTURAL RUNOFF MANAGEMENT (ARM) MODEL
ANALYTICAL SOLUTIONS OF THE 1-D CONVENCTIVE-DISPERSIVE FLOW
ANSWERS
AREAL PRECIPITATION
CHEMICALS, RUNOFF, AND EROSION FROM AG. MANAGEMENT SYSTEMS (CREAMS)
CONTUR
CULVERT DESIGN SYSTEM (CDS)
DISTRIBUTED ROUTING RAINFALL-RUNOFF MODEL VERSION II (DR3M)
DR3M-QUAL
ENHANCED STREAM-WATER QUALITY MODEL (QUAL2E)
FEMWATER(FECWATER) - FEMWASTE(FECWASTE)
FINITE DIFFERENCE MODEL-AQUIFER SIMULATION IN TWO DIMENSIONS
FLOOD HISTORY
FLUME
GWMOD3
H2OTRANS
HEC BASIN PRECIPITATION COMPUTATIONS (PRECIP)
HEC EXPECTED ANNUAL FLOOD DAMAGE COMPUTATION (EAD)
HEC GRADUALLY VARIED UNSTEADY FLOW PROFILES (USTFLO)
HEC HYDROPOWER ANALYSIS USING STREAMFLOW DURATION PROCEDURES (HYDUR)
HEC REGIONAL FREQUENCY COMPUTATION (REGFQ)
HEC STREAM HYDRAULICS PACKAGE (SHP)
HEC STREAMFLOW ROUTING OPTIMIZATION (SFRO)
HEC WATER QUALITY FOR RIVER-RESERVOIR SYSTEMS (WQRRS)
HEC-1 FLOOD HYDROGRAPH COMBINING AND ROUTING
HEC-2 WATER SURFACE PROFILES
HEC-3 RESERVOIR SYSTEM ANALYSIS FOR CONSERVATION
HEC-4 MONTHLY STREAMFLOW SIMULATION
HEC-5 SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
HEC-5Q SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
HEC-6 SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS
HYDAUG/TRIHYDRO
HYDRA
HYDROLOGIC SIMULATION MODEL (HYSIM)
HYDTAB
ILLINOIS STATE WATER SURVEY MODELS (ISWS)
MAQFLO
MCDONALD AND HARBAUGH GROUNDWATER FLOW MODEL (MODFLOW)
MEAN BASIN PRECIPITATION (NOAA)
MINTEQ
MODEIN AND COLBY
NATIONAL WEATHER SERVICE RIVER FORECAST SYSTEM (NWSRFS)
NATURAL BASIN MODEL (A634X)
NEUTRON PROBE DATA MANAGEMENT
NORTH PLATTE RIVER SIMULATION MODEL
NWS DAMBRK
OPSTUDY
PARAMETER ESTIMATION FIRST-ORDER BOD DELAY
PESTICIDE ROOT ZONE MODEL (PRZM)
PHREEQE

"SELECTED MODELS INCLUDED IN THIS STUDY

PHYSICAL HABITAT SIMULATION SYSTEM (PHABSIM)
PLUME
PLUME 2D
PLUME 3D
PRECIPITATION-RUNOFF MODELING SYSTEM (PRMS)
PRICKETT LONNQUIST AQUIFER SIMULATION MODEL (PLASM)
PUMPTEST
RANDOM WALK SOLUTE TRANSPORT
RECHARGE
RESERVOIR-STORAGE FREQUENCY MODEL (RSFM)
RESROUT
SATURATED-UNSATURATED TRANSPORT (SUTRA)
SEDIMOT II
SEDLAB
SIMPLIFIED BISHOP METHOD PER GEOTECHNIQUE
SIMPLIFIED DAMBREAK MODEL
SLOPAR
STEADY-STATE WATER-QUALITY MODEL (USGS G475)
STEP BACKWATER AND FLOODWAYS ANALYSES (J635)
STEP-BACKWATER AND FLOODWAY ANALYSES (USGS E431)
STORAGE TREATMENT OVERFLOW RUNOFF MODEL (STORM)
STORM WATER MANAGEMENT MODEL (SWMM)
SWIP
TR-20
TR-48
TR-61
TSMATCH OR HJMATCH
UNSAT2 (PROG2A)
UNSTEADY FLOW ROUTING USING CHARACTERISTICS METHOD (USGS J416)
UNSTEADY SOLUTE TRANSPORT SIM. IN STREAMFLOW (USGS J880)
WASTOX
WATEQ2/3
WATEQFC REVISED
WATER QUALITY ANALYSIS PROGRAM (WASP)
WELLSAMP
WIRSOS
WSPRO (HY-7)
WYOMING ECONOMIC-DEMOGRAPHIC ASSESSMENT MODEL (WEDAM)
WYOMING INTER-INDUSTRY MODELING SYSTEM (WIMS)

"SELECTED" SURFACE WATER MODELS
INCLUDED IN THIS STUDY

AGRICULTURAL RUNOFF MANAGEMENT (ARM) MODEL
ANSWERS
CULVERT DESIGN SYSTEM (CDS)
DISTRIBUTED ROUTING RAINFALL-RUNOFF MODEL VERSION II (DR3M)
FLOOD HISTORY
FLUME
H2OTRANS
HEC BASIN PRECIPITATION COMPUTATIONS (PRECIP)
HEC EXPECTED ANNUAL FLOOD DAMAGE COMPUTATION (EAD)
HEC GRADUALLY VARIED UNSTEADY FLOW PROFILES (USTFLO)
HEC STREAM HYDRAULICS PACKAGE (SHP)
HEC STREAMFLOW ROUTING OPTIMIZATION (SFRO)
HEC-1 FLOOD HYDROGRAPH COMBINING AND ROUTING
HEC-2 WATER SURFACE PROFILES
HEC-3 RESERVOIR SYSTEM ANALYSIS FOR CONSERVATION
HEC-4 MONTHLY STREAMFLOW SIMULATION
HEC-5 SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
HEC-6 SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS
HYDAUG/TRIHYDRO
HYDRA
HYDROLOGIC SIMULATION MODEL (HYSIM)
HYDTAB
MODEIN AND COLBY
NATURAL BASIN MODEL (A634X)
NORTH PLATTE RIVER SIMULATION MODEL
NWS DAMBRK
OPSTUDY
PHYSICAL HABITAT SIMULATION SYSTEM (PHABSIM)
PRECIPITATION-RUNOFF MODELING SYSTEM (PRMS)
RESERVOIR-STORAGE FREQUENCY MODEL (RSFM)
RESROUT
SEDIMOT II
SEDLAB
SIMPLIFIED DAMBREAK MODEL
SLOPAR
STEP BACKWATER AND FLOODWAYS ANALYSES (J635)
STEP-BACKWATER AND FLOODWAY ANALYSES (USGS E431)
STORAGE TREATMENT OVERFLOW RUNOFF MODEL (STORM)
STORM WATER MANAGEMENT MODEL (SWMM)
TR-20
TR-48
TR-61
UNSTEADY FLOW ROUTING USING CHARACTERISTICS METHOD (USGS J416)
WIRSOS
WSPRO (HY-7)

"SELECTED" GROUNDWATER MODELS
INCLUDED IN THIS STUDY

2-D, SOLUTE TRANSPORT AND DISPERSION IN GROUNDWATER (MOC)
ANALYTICAL SOLUTIONS OF THE 1-D CONVENCTIVE-DISPERSIVE FLOW
CONTUR
FEMWATER(FECWATER) - FEMWASTE(FECWASTE)
FINITE DIFFERENCE MODEL-AQUIFER SIMULATION IN TWO DIMENSIONS
GWMOD3
ILLINOIS STATE WATER SURVEY MODELS (ISWS)
MAQFLO
MCDONALD AND HARBAUGH GROUNDWATER FLOW MODEL (MODFLOW)
MINTEQ
PESTICIDE ROOT ZONE MODEL (PRZM)
PLUME
PLUME 2D
PLUME 3D
PRICKETT LONNQUIST AQUIFER SIMULATION MODEL (PLASM)
PUMPTEST
RANDOM WALK SOLUTE TRANSPORT
RECHARGE
SATURATED-UNSATURATED TRANSPORT (SUTRA)
SWIP
TSMATCH OR HJMATCH
UNSAT2 (PROG2A)
WELLSAMP

"SELECTED" WATER QUALITY MODELS
INCLUDED IN THIS STUDY

CHEMICALS, RUNOFF, AND EROSION FROM AG. MANAGEMENT SYSTEMS (CREAMS)
DR3M-QUAL
ENHANCED STREAM-WATER QUALITY MODEL (QUAL2E)
HEC WATER QUALITY FOR RIVER-RESERVOIR SYSTEMS (WQRRS)
HEC-5Q SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
PARAMETER ESTIMATION FIRST-ORDER BOD DELAY
PHREEQE
STEADY-STATE WATER-QUALITY MODEL (USGS G475)
UNSTEADY SOLUTE TRANSPORT SIM. IN STREAMFLOW (USGS J880)
WASTOX
WATEQ2/3
WATEQFC REVISED
WATER QUALITY ANALYSIS PROGRAM (WASP)

"SELECTED" CLIMATIC MODELS
INCLUDED IN THIS STUDY

AREAL PRECIPITATION
MEAN BASIN PRECIPITATION (NOAA)
NATIONAL WEATHER SERVICE RIVER FORECAST SYSTEM (NWSRFS)

"SELECTED" MISCELLANEOUS MODELS
INCLUDED IN THIS STUDY

HEC HYDROPOWER ANALYSIS USING STREAMFLOW DURATION PROCEDURES (HYDUR)
HEC REGIONAL FREQUENCY COMPUTATION (REGFQ)
NEUTRON PROBE DATA MANAGEMENT
SIMPLIFIED BISHOP METHOD PER GEOTECHNIQUE
WYOMING ECONOMIC-DEMOGRAPHIC ASSESSMENT MODEL (WEDAM)
WYOMING INTER-INDUSTRY MODELING SYSTEM (WIMS)

"SELECTED" MODELS
INCLUDED IN THIS STUDY
WITH INFORMATION/DOCUMENTATION LOCATED

2-D, SOLUTE TRANSPORT AND DISPERSION IN GROUNDWATER (MOC)
ANSWERS
CHEMICALS, RUNOFF, AND EROSION FROM AG. MANAGEMENT SYSTEMS (CREAMS)
CONTUR
CULVERT DESIGN SYSTEM (CDS)
DISTRIBUTED ROUTING RAINFALL-RUNOFF MODEL VERSION II (DR3M)
DR3M-QUAL
ENHANCED STREAM-WATER QUALITY MODEL (QUAL2E)
FLOOD HISTORY
H2OTRANS
HEC BASIN PRECIPITATION COMPUTATIONS (PRECIP)
HEC EXPECTED ANNUAL FLOOD DAMAGE COMPUTATION (EAD)
HEC GRADUALLY VARIED UNSTEADY FLOW PROFILES (USTFLO)
HEC HYDROPOWER ANALYSIS USING STREAMFLOW DURATION PROCEDURES (HYDUR)
HEC REGIONAL FREQUENCY COMPUTATION (REGFQ)
HEC STREAM HYDRAULICS PACKAGE (SHP)
HEC STREAMFLOW ROUTING OPTIMIZATION (SFRO)
HEC WATER QUALITY FOR RIVER-RESERVOIR SYSTEMS (WQRRS)
HEC-1 FLOOD HYDROGRAPH COMBINING AND ROUTING
HEC-2 WATER SURFACE PROFILES
HEC-3 RESERVOIR SYSTEM ANALYSIS FOR CONSERVATION
HEC-4 MONTHLY STREAMFLOW SIMULATION
HEC-5 SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
HEC-5Q SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
HYDAUG/TRIHYDRO
HYDRA
HYDROLOGIC SIMULATION MODEL (HYSIM)
ILLINOIS STATE WATER SURVEY MODELS (ISWS)
MCDONALD AND HARBAUGH GROUNDWATER FLOW MODEL (MODFLOW)
MINTEQ
NATURAL BASIN MODEL (A634X)
NEUTRON PROBE DATA MANAGEMENT
NORTH PLATTE RIVER SIMULATION MODEL
NWS DAMBRK
OPSTUDY
PARAMETER ESTIMATION FIRST-ORDER BOD DELAY
PESTICIDE ROOT ZONE MODEL (PRZM)
PHREEQE
PLUME
PRECIPITATION-RUNOFF MODELING SYSTEM (PRMS)
PRICKETT LONNQUIST AQUIFER SIMULATION MODEL (PLASM)
PUMPTEST
RANDOM WALK SOLUTE TRANSPORT
RECHARGE
RESERVOIR-STORAGE FREQUENCY MODEL (RSFM)
RESROUT
SATURATED-UNSATURATED TRANSPORT (SUTRA)
SEDIMOT II
SIMPLIFIED DAMBREAK MODEL

"SELECTED" MODELS
INCLUDED IN THIS STUDY
WITH INFORMATION/DOCUMENTATION LOCATED

STEADY-STATE WATER-QUALITY MODEL (USGS G475)
STEP BACKWATER AND FLOODWAYS ANALYSES (J635)
STEP-BACKWATER AND FLOODWAY ANALYSES (USGS E431)
STORM WATER MANAGEMENT MODEL (SWMM)
TR-20
TSMATCH OR HJMATCH
UNSAT2 (PROG2A)
UNSTEADY FLOW ROUTING USING CHARACTERISTICS METHOD (USGS J416)
UNSTEADY SOLUTE TRANSPORT SIM. IN STREAMFLOW (USGS J880)
WATEQFC REVISED
WATER QUALITY ANALYSIS PROGRAM (WASP)
WELLSAMP
WIRSOS
WSPRO (HY-7)
WYOMING INTER-INDUSTRY MODELING SYSTEM (WIMS)

"SELECTED" SURFACE WATER MODELS
INCLUDED IN THIS STUDY
WITH INFORMATION/DOCUMENTATION LOCATED

ANSWERS
CULVERT DESIGN SYSTEM (CDS)
DISTRIBUTED ROUTING RAINFALL-RUNOFF MODEL VERSION II (DR3M)
FLOOD HISTORY
H2OTRANS
HEC BASIN PRECIPITATION COMPUTATIONS (PRECIP)
HEC EXPECTED ANNUAL FLOOD DAMAGE COMPUTATION (EAD)
HEC GRADUALLY VARIED UNSTEADY FLOW PROFILES (USTFLO)
HEC STREAM HYDRAULICS PACKAGE (SHP)
HEC STREAMFLOW ROUTING OPTIMIZATION (SFRO)
HEC-1 FLOOD HYDROGRAPH COMBINING AND ROUTING
HEC-2 WATER SURFACE PROFILES
HEC-3 RESERVOIR SYSTEM ANALYSIS FOR CONSERVATION
HEC-4 MONTHLY STREAMFLOW SIMULATION
HEC-5 SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
HYDAUG/TRIHYDRO
HYDRA
HYDROLOGIC SIMULATION MODEL (HYSIM)
NATURAL BASIN MODEL (A634X)
NORTH PLATTE RIVER SIMULATION MODEL
NWS DAMBRK
OPSTUDY
PRECIPITATION-RUNOFF MODELING SYSTEM (PRMS)
RESERVOIR-STORAGE FREQUENCY MODEL (RSFM)
RESROUT
SEDIMOT II
SIMPLIFIED DAMBREAK MODEL
STEP BACKWATER AND FLOODWAYS ANALYSES (J635)
STEP-BACKWATER AND FLOODWAY ANALYSES (USGS E431)
STORM WATER MANAGEMENT MODEL (SWMM)
TR-20
UNSTEADY FLOW ROUTING USING CHARACTERISTICS METHOD (USGS J416)
WIRSOS
WSPRO (HY-7)

"SELECTED" GROUNDWATER MODELS
INCLUDED IN THIS STUDY
WITH INFORMATION/DOCUMENTATION LOCATED

2-D, SOLUTE TRANSPORT AND DISPERSION IN GROUNDWATER (MOC)
CONTUR
ILLINOIS STATE WATER SURVEY MODELS (ISWS)
MCDONALD AND HARBAUGH GROUNDWATER FLOW MODEL (MODFLOW)
MINTEQ
PESTICIDE ROOT ZONE MODEL (PRZM)
PLUME
PRICKETT LONNQUIST AQUIFER SIMULATION MODEL (PLASM)
PUMPTEST
RANDOM WALK SOLUTE TRANSPORT
RECHARGE
SATURATED-UNSATURATED TRANSPORT (SUTRA)
TSMATCH OR HJMATCH
UNSAT2 (PROG2A)
WELLSAMP

"SELECTED" WATER QUALITY MODELS
INCLUDED IN THIS STUDY
WITH INFORMATION/DOCUMENTATION LOCATED

CHEMICALS, RUNOFF, AND EROSION FROM AG. MANAGEMENT SYSTEMS (CREAMS)
DR3M-QUAL
ENHANCED STREAM-WATER QUALITY MODEL (QUAL2E)
HEC WATER QUALITY FOR RIVER-RESERVOIR SYSTEMS (WQRRS)
HEC-5Q SIMULATION OF FLOOD CONTROL AND CONSERVATION SYSTEMS
PARAMETER ESTIMATION FIRST-ORDER BOD DELAY
PHREEQE
STEADY-STATE WATER-QUALITY MODEL (USGS G475)
UNSTEADY SOLUTE TRANSPORT SIM. IN STREAMFLOW (USGS J880)
WATEQFC REVISED
WATER QUALITY ANALYSIS PROGRAM (WASP)

"SELECTED" CLIMATIC MODELS
INCLUDED IN THIS STUDY
WITH INFORMATION/DOCUMENTATION LOCATED

"SELECTED" MISCELLANEOUS MODELS
INCLUDED IN THIS STUDY
WITH INFORMATION/DOCUMENTATION LOCATED

HEC HYDROPOWER ANALYSIS USING STREAMFLOW DURATION PROCEDURES (HYDUR)
HEC REGIONAL FREQUENCY COMPUTATION (REGFQ)
NEUTRON PROBE DATA MANAGEMENT
WYOMING INTER-INDUSTRY MODELING SYSTEM (WIMS)

"SELECTED" MODELS
INCLUDED IN THIS STUDY
WITHOUT INFORMATION/DOCUMENTATION LOCATED

AGRICULTURAL RUNOFF MANAGEMENT (ARM) MODEL
ANALYTICAL SOLUTIONS OF THE 1-D CONVENCTIVE-DISPERSIVE FLOW
AREAL PRECIPITATION
FEMWATER(FECWATER) - FEMWASTE(FECWASTE)
FINITE DIFFERENCE MODEL-AQUIFER SIMULATION IN TWO DIMENSIONS
FLUME
GWMOD3
HEC-6 SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS
HYDTAB
MAQFLO
MEAN BASIN PRECIPITATION (NOAA)
MODEIN AND COLBY
NATIONAL WEATHER SERVICE RIVER FORECAST SYSTEM (NWSRFS)
PHYSICAL HABITAT SIMULATION SYSTEM (PHABSIM)
PLUME 2D
PLUME 3D
SEDLAB
SIMPLIFIED BISHOP METHOD PER GEOTECHNIQUE
SLOPAR
STORAGE TREATMENT OVERFLOW RUNOFF MODEL (STORM)
SWIP
TR-48
TR-61
WASTOX
WATEQ2/3
WYOMING ECONOMIC-DEMOGRAPHIC ASSESSMENT MODEL (WEDAM)

"SELECTED" SURFACE WATER MODELS
INCLUDED IN THIS STUDY
WITHOUT INFORMATION/DOCUMENTATION LOCATED

AGRICULTURAL RUNOFF MANAGEMENT (ARM) MODEL
FLUME
HEC-6 SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS
HYDTAB
MODEIN AND COLBY
PHYSICAL HABITAT SIMULATION SYSTEM (PHABSIM)
SEDLAB
SLOPAR
STORAGE TREATMENT OVERFLOW RUNOFF MODEL (STORM)
TR-48
TR-61

"SELECTED" GROUNDWATER MODELS
INCLUDED IN THIS STUDY
WITHOUT INFORMATION/DOCUMENTATION LOCATED

ANALYTICAL SOLUTIONS OF THE 1-D CONVENCTIVE-DISPERSIVE FLOW
FEMWATER(FECWATER) - FEMWASTE(FECWASTE)
FINITE DIFFERENCE MODEL-AQUIFER SIMULATION IN TWO DIMENSIONS
GWMOD3
MAQFLO
PLUME 2D
PLUME 3D
SWIP

"SELECTED" WATER QUALITY MODELS
INCLUDED IN THIS STUDY
WITHOUT INFORMATION/DOCUMENTATION LOCATED

WASTOX
WATEQ2/3

"SELECTED" CLIMATIC MODELS
INCLUDED IN THIS STUDY
WITHOUT INFORMATION/DOCUMENTATION LOCATED

AREAL PRECIPITATION
MEAN BASIN PRECIPITATION (NOAA)
NATIONAL WEATHER SERVICE RIVER FORECAST SYSTEM (NWSRFS)

"SELECTED" MISCELLANEOUS MODELS
INCLUDED IN THIS STUDY
WITHOUT INFORMATION/DOCUMENTATION LOCATED

SIMPLIFIED BISHOP METHOD PER GEOTECHNIQUE
WYOMING ECONOMIC-DEMOGRAPHIC ASSESSMENT MODEL (WEDAM)

APPENDIX D

APPENDIX D TABLE OF CONTENTS
RESEARCH INFORMATION FOR CRITERIA SELECTION

NOTE: The data for the "selected" models for which information and/or documentation was located are included in this section. Likewise, a list of those "selected" models for which no information and/or documentation was located is included on the following page and in Appendix C (page 79 of this report).

"SELECTED" MODELS
INCLUDED IN THIS STUDY
WITHOUT INFORMATION/DOCUMENTATION LOCATED

AGRICULTURAL RUNOFF MANAGEMENT (ARM) MODEL
ANALYTICAL SOLUTIONS OF THE 1-D CONVENCTIVE-DISPERSIVE FLOW
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FEMWATER(FECWATER) - FEMWASTE(FECWASTE)
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SLOPAR
STORAGE TREATMENT OVERFLOW RUNOFF MODEL (STORM)
SWIP
TR-48
TR-61
WASTOX
WATEQ2/3
WYOMING ECONOMIC-DEMOGRAPHIC ASSESSMENT MODEL (WEDAM)

RESEARCHED INFORMATION FOR CRITERIA SELECTION

MODEL: Natural Basin Model (USGS A634X)

COMPUTER REQUIREMENTS: Amdahl computer system or equivalent

PROGRAM USE: Calibrates a natural basin by computing storm peaks and volumes and determines optimum magnitudes of 1 to 10 model parameters controlling rainfall-runoff. The model parameters enable computation of soil-moisture accounting, infiltration, and streamflow routing. Model program requires use of several interface programs for execution.

DATA REQUIREMENTS: Short-interval precipitation and discharge data, daily precipitation and evaporation totals.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Distributed routing rainfall-runoff model (USGS DR3M)

COMPUTER REQUIREMENTS: Amdahl computer system or equivalent

PROGRAM USE: Computes storm runoff from an urban basin. Uses the soil-moisture accounting and infiltration components developed by Dawdy and a Rosenbrock Optimization routine.

DATA REQUIREMENTS: Subdivided catchment data, short-interval precipitation and discharge data, daily precipitation and evaporation totals, subcatchment areas, drainage system, pervious and impervious areas, roughness and hydraulic data.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Precipitation-runoff modeling system (USGS PRMS)

COMPUTER REQUIREMENTS: Amdahl computer system or equivalent

PROGRAM USE: A complete watershed system model which computes rainfall- and snowmelt-runoff, sediment discharge, and all water balance components for a watershed and user-defined subunits of a watershed. Rainfall- and snowmelt-runoff are computed as mean daily flows. Rainfall event hydrographs and associated sediment discharge can be simulated for individual storm periods where short time-interval data are available. Optimization and sensitivity analysis capabilities are included.

DATA REQUIREMENTS: For daily streamflow computations a minimum of daily precipitation and daily maximum and minimum air temperature are required. For snowmelt computations daily short-wave solar radiation data are recommended. For areas without snowmelt, daily pan evaporation data can be substituted for temperature data. For storm hydrograph and sediment computations

short time-interval percipitation, streamflow, and sediment data are needed. Physical descriptive data on the topography, soils, and vegetation are input for each watershed subunit. The spatial and temporal variation of precipitation, temperature, and solar radiation are also needed.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Areal Nonpoint Source Watershed Environment Response Simulation (ANSWERS)

COMPUTER REQUIREMENTS: APL computer system or equivalent

PROGRAM USE: Simulates runoff and sediment yield from small rural watersheds for discrete storm events. Catchment response is described in a square-grid matrix superimposed on the watershed. Hydrologic considerations that have been incorporated include interception, infiltration, surface detention, and subsurface drainage. Sediment yield is simulated using modifications of the Universal Soil Loss Equation (USLE) to compute soil detachment and empirical relationships to compute transport.

DATA REQUIREMENTS: Short interval precipitation and antecedent moisture conditions are needed for each storm to be simulated. Soils information includes infiltraion parameters and potential soil erodibility. Land use and surface information includes surface roughness and interception and depression storage characteristics. Channel descriptors required are width and roughness. Individual element descriptors are location, topography, and USLE parameters.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Hydrologic Simulation Model (HYSIM)

COMPUTER REQUIREMENTS: APL computer system or equivalent

PROGRAM USE: Designed to be used for assessing the impacts of land-use change on the hydrologic balance of a watershed. The model is capable of simulating daily streamflows and storm flows for small watersheds. Suspended sediment may also be simulated in conjunction with daily streamflow or storm hydrographs.

DATA REQUIREMENTS: Rainfall data, monthly potential evapotranspiration data, watershed characteristics.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Unsteady flow routing using method of characteristics (USGS J416)

COMPUTER REQUIREMENTS: ?

PROGRAM USE: Simulation of unsteady flows in rivers and estuaries by the multiple-reach method of characteristics.

DATA REQUIREMENTS: Time-dependent data at two ends of the reach. Velocity, stage, and channel geometry data.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Step-backwater and floodway analyses. (USGS E431)

COMPUTER REQUIREMENTS: Amdahl computer system or equivalent

PROGRAM USE: The program computes water-surface profiles for gradually varied, subcritical flow for both existing stream conditions and stream conditions as modified by encroachments.

DATA REQUIREMENTS: Cross-section geometry and roughness, bridge geometry and coefficients, roadway geometry and coefficients, flow distances, discharges and starting elevations.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Step backwater floodway analyses (USGS J635).

COMPUTER REQUIREMENTS: Amdahl computer system or equivalent

PROGRAM USE: The program computes water-surface profiles for gradually varied, subcritical or supercritical flows for both existing stream conditions and stream conditions as modified by encroachments, modified version of USGS E431.

DATA REQUIREMENTS: Cross-section geometry and roughness, bridge geometry and coefficients, roadway geometry and coefficients, flow distances, discharges and starting elevations.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Reservoir-storage frequency model (USGS RSFM)

COMPUTER REQUIREMENTS: ?

PROGRAM USE: Computes probabilities of reservoir storage including the risks of being unable to supply downstream demand. Simulates the behavior of ephemeral and intermittent streams by accounting for high day-to-day variations in streamflow as well as zero-flow periods. Probability routing of daily mean streamflow is used.

DATA REQUIREMENTS: A record of daily mean streamflow along with reservoir-storage capacity and an outflow function.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Unsteady solute transport simulation in streamflow using a finite difference model (USGS J880).

COMPUTER REQUIREMENTS: APL computer system or equivalent

PROGRAM USE: Computes solute concentration pollutographs at any point in a stream having one-dimensional streamflow.

DATA REQUIREMENTS: Solute inflows at upstream boundary, tributaries and source or sinks. Flow data at each time step and cross section. Designed to be used with USGS J879 for the supply of flow data.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Steady-state water-quality model (USGS G475).

COMPUTER REQUIREMENTS: APL computer systems or equivalent

PROGRAM USE: Computes concentrations of dissolved oxygen, biochemical oxygen demand, phosphorus, and total and fecal coliforms.

DATA REQUIREMENTS: Short-term oxygen, CBOD, NBOD, or nitrogen cycle variables, and coliform concentrations at several points in the stream network; flow and stream geometry data; point source and linear runoff waste data; reaeration and other model parameters.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Multi-event urban runoff quality model (USGS DR3M-QUAL)

COMPUTER REQUIREMENTS: Amdahl computer system or equivalent

PROGRAM USE: Simulates the concentration of pollutants in runoff from urban watersheds. Computations made using 3 sources of pollutants: impervious areas, pervious area, and precipitation. The program provides detailed simulation of storm events and a daily accounting of pollutant accumulation on impervious areas between storm events. Algorithms for simulating detention storage and street sweeping are included. It is useful for urban stormwater quality studies, determining the effects of urbanization on stormwater quality, evaluating stormwater management strategies, and estimating urban non-point source pollutant loadings on receiving waters.

DATA REQUIREMENTS: Short-time interval discharge data, daily precipitation and evaporation totals, drainage system data

similar to DR3M, information on the frequency and efficiency of street sweeping, geometry data for detention basins, information on precipitation quality, estimates of model water-quality parameters, and within-storm water-quality data.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: PHREEQE - Chemical reactions in natural waters

COMPUTER REQUIREMENTS: Amdahl computer systems or equivalent

PROGRAM USE: Simulates chemical reactions in natural waters at low temperatures, 0-50 oC. The program is capable of mixing waters, equilibrating waters with multiple phases and simulating redox reactions.

DATA REQUIREMENTS: Chemical analyses for all major constituents in a water and a thermodynamic data set.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: QUAL IIE

COMPUTER REQUIREMENTS: IBM PC or compatible versions are available.

PROGRAM USE: The program can analyze the effects of the magnitude and location of point and non-point sources, simulates 13 constituents, steady and dynamic water quality responses, flow augmentations for DO control, dendritic steam systems, multiple loads, and BOD reductions necessary for DO level requirements.

DATA REQUIREMENTS: Depth, velocity, and discharge for a period exceeding the traveltime in the reach, loads of constituents throughout the reach, and meteorological data.

SOURCE OF INFORMATION: USGS Open File Report 82-430

MODEL: Parameter Estimation First-Order BOD Decay

COMPUTER REQUIREMENTS: IBM PC or compatible

PROGRAM USE: Program is used to compute parameters related to first-order BOD decay rates. Does statistics and graphics to screen.

DATA REQUIREMENTS: Data file with BOD concentrations and day taken (usually in 5 day increments) and first estimate of K value.

SOURCE OF INFORMATION: Dept. of Environmental Quality, Water Quality Division

MODEL: PLUME

COMPUTER REQUIREMENTS: IBM PC or compatible with a minimum 512K bytes RAM and DOS 2.0 or higher.

PROGRAM USE: The program can predict the motion and spread of a contaminant in an aquifer, calculate relative values of longitudinal and transverse dispersivities, generate various types of plots, and handle time-dependent sources of contamination. It may be used to assess the ability of groundwater to dispose of toxic wastes, predict the time required to restore contaminated groundwater to acceptable standards, and evaluate the potential for liability due to contaminants migrating off-site.

DATA REQUIREMENTS: Direction of groundwater flow; conductivities and angles thereof; number of fissure/fracture families, frequencies, angles, standard deviations, and spacings; porosities; mass of contaminants; aquifer dimensions; and contaminant characteristics.

SOURCE OF INFORMATION: In-Situ, Inc. - Laramie, WY 82070

MODEL: HJ-MATCH (Hantush-Jacob Type Curve Automated Matching)

COMPUTER REQUIREMENTS: IBM PC or compatible with 512k byte RAM and DOS 2.0 or higher.

PROGRAM USE: Program finds the best values of hydrologic properties (permeability, porosity, leakage factor, and aquitard conductivity) in a fully penetrated leaky confined aquifer complete with plotting capabilities.

DATA REQUIREMENTS: User supplies only raw data for hydrologic properties.

SOURCE OF INFORMATION: In-Situ, Inc. - Laramie, WY 82070

MODEL: TS-MATCH (Theis Curve Automated Matching)

COMPUTER REQUIREMENTS: IBM PC or compatible with 512k byte RAM and DOS 2.0 or higher.

PROGRAM USE: Program finds the best values of hydrologic properties in a fully penetrated nonleaky confined aquifer complete with plotting capabilities.

DATA REQUIREMENTS: User supplies only raw data for hydrologic properties.

SOURCE OF INFORMATION: In-Situ, Inc. - Laramie, WY 82070

MODEL: WELLSAMP

COMPUTER REQUIREMENTS: IBM PC or compatible with 256K RAM and DOS 2.0 or higher.

PROGRAM USE: Program permits user to determine duration of pumping required to obtain a sample containing a desired percent of aquifer water. It can be used to sample monitor wells more efficiently and to predict drawdown in the wellbore and is suitable for fully penetrated, nonleaky confined aquifers and partially penetrated, unconfined aquifers.

DATA REQUIREMENTS: Aquifer characteristics and pumping properties.

SOURCE OF INFORMATION: In-Situ, Inc. - Laramie, WY 82070

MODEL: CONTUR

COMPUTER REQUIREMENTS: IBM PC or compatible with 512K RAM and DOS 2.0 or higher.

PROGRAM USE: The program can produce mainframe-quality contour maps of regularly and irregularly distributed data on a PC.

DATA REQUIREMENTS: Contour data points and minimum and maximum values of X and Y.

SOURCE OF INFORMATION: In-Situ, Inc. - Laramie, WY 82070

MODEL: HEC-1 Flood Hydrograph Package

COMPUTER REQUIREMENTS: IBM PC with 256K or compatible

PROGRAM USE: Simulates surface runoff response of a river basin to precipitation by representing the basin as an interconnected system of hydrologic and hydraulic components.

DATA REQUIREMENTS: Area, precipitation, flows, weather data, soil and cover characteristics, channel characteristics, reservoir characteristics, topography and geological data, pump data, and economic data as applicable to specific application.

SOURCE OF INFORMATION: HEC-1 Flood Hydrograph Package User's Manual - March 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: HEC-2 Water Surface Profiles

COMPUTER REQUIREMENTS: IBM PC with 512K bytes RAM minimum or

compatibles.

PROGRAM USE: Computes and plots the water surface profiles for river channels of any cross-section for either subcritical or supercritical flow conditions. Effects of various hydraulic structures such as bridges, culverts, and weirs may be considered in the computations. Capabilities are available for assessing the effects of channel improvements, levees, and floodway on water surface profiles.

DATA REQUIREMENTS: Channel characteristics, meteorological data, flow data and characteristics, structural definitions and analyses, and improvement data as applicable to specific application.

SOURCE OF INFORMATION: HEC-2 Water Surface Profiles Programmer's Manual - November 1976 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center- Davis, CA 95616

MODEL: HEC-3 Reservoir System Analysis for Conservation

COMPUTER REQUIREMENTS: Large computers such as CDC 6600 or IBM 360/50.

PROGRAM USE: Program simulates the operation of a reservoir system for such conservation purposes as water supply, navigation, recreation, low-flow augmentation and hydroelectric power. The program can accept any configuration of reservoirs, diversions, power plants, and stream control points. Economic values can be computed also.

DATA REQUIREMENTS: System hydrology, reservoir characteristics, control plant characteristics, power plant characteristics, diversion data, economic evaluation data, and operation criteria for system as applicable to specific applications.

SOURCE OF INFORMATION: HEC-3 Reservoir System Analysis for Conservation User's Manual - July 1974 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: Streamflow Routing Optimization (SFRO)

COMPUTER REQUIREMENTS: computer with 40,000 digit, variable word length memory

PROGRAM USE: Produces observed outflow hydrographs for a number of floods.

DATA REQUIREMENTS: Inflow and outflow observed hydrographs at

one point on main stem of system and hydrographs at each of any tributary streams below point on main stem, combination points, and travel times for combination points.

SOURCE OF INFORMATION: Streamflow Routing Optimization (SFRO) User's Manual - November 1966 - U.S. Army Corps of Engineer's- Water Resources Support Center - The Hydrologic Engineering Center -Davis, CA 95616

MODEL: Water Quality for River-Reservoir Systems (WQRRS)

COMPUTER REQUIREMENTS: operational on CDC 7600 and UNIVAC 1108.

PROGRAM USE: Program is a dynamic flow and water-quality model for modeling one-dimensional aerobic lakes or streams on the order of a day to several months. Simulations include: temperature, DO, BOD, coliform bacteria, detritus, NH3, NO2, NO3, PO4, alkalinity, fishery requirements, toxicity, zooplankton, TDS, phytoplankton, total inorganic carbon, organic sediments, benthic animals, suspended solids, inorganic sediments, aquatic insects, and benthic algae.

DATA REQUIREMENTS: Data for channel geometry or stage-discharge, initial instream quality data, data for the constituents of interest, meteorological data, and withdrawal specifications as applicable to specific applications.

SOURCE OF INFORMATION: Water Quality for River-Reservoir Systems (WQRRS) User's Manual - October 1978 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: Expected Annual Flood Damage Computation (EAD)

COMPUTER REQUIREMENTS: IBM PC or compatible with 512K RAM and MS DOS compatible.

PROGRAM USE: Program performs damage computations required in the economic evaluation of flood plain management plans which can be part of multipurpose water resource development. The program can compute the damage for a specific flood event, the expected annual damage for one or more years, and the equivalent annual damage for a stated interest rate and period of analysis.

DATA REQUIREMENTS: Hydrologic relationships of exceedance frequency and corresponding flow or elevation and, if required, elevation versus flow and the economic relationship of elevation versus damage for each appropriate damage category.

SOURCE OF INFORMATION: Computer Program Catalog - 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: HEC-5 Simulation of Flood Control and Conservation Systems

COMPUTER REQUIREMENTS: IBM PC or compatible with 640K RAM and MS DOS compatible.

PROGRAM USE: This program is designed to simulated the sequential operation of a reservoir-channel system with a branched network configuration. Any time interval can be used and two time intervals can be used within a single simulation. Channel routing can be performed and hydropower requirements can be defined for individual projects or for a system of projects. Pump-storage operation can also be simulated. Sizing of conservation demands or storage can be performed and economic computations can be provided for hydropower benefits and flood damage evaluations.

DATA REQUIREMENTS: Channel, reservoir, power plant, and pumping characteristics; as well as other data as applicable for specified applications.

SOURCE OF INFORMATION: Computer Program Catalog - 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: Hydropower Analysis Using Streamflow Duration Procedures (HYDUR)

COMPUTER REQUIREMENTS: ?

PROGRAM USE: This program will calculate estimates of power and energy potential for run-of-river type projects. It will also perform pre-reconnaissance level benefits and costs at proposed hydropower installations.

DATA REQUIREMENTS: Plant capacity and streamflow duration data.

SOURCE OF INFORMATION: Computer Program Catalog - 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: HEC-6 Scour and Deposition in Rivers and Reservoirs

COMPUTER REQUIREMENTS: MS DOS compatible with 512K RAM

PROGRAM USE: Calculates water surface and sediment bed surface profiles by computing the interaction between sediment material in the stream bed and the flowing water-sediment mixture. The total sediment load is computed for each cross section along with the trap efficiencies for clays, silts, and sands. The change in bed elevation, water surface elevation, and thalweg elevation are

also computed for each cross section. Dredging and in-stream gravel mining operations can be simulated and reservoir deposition can be analyzed in with this model.

DATA REQUIREMENTS: Flow, sediment, stream bed, and cross section characteristics of a stream.

SOURCE OF INFORMATION: Computer Program Catalog - 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: Stream Hydraulics Package (SHP)

COMPUTER REQUIREMENTS: ?

PROGRAM USE: The program evaluates velocity, flow, and depth at regular time intervals in a stream network of branching channels and/or around islands. This program can be used with the following HEC developed models: STORM, HEC-2, GEDA, WQRRS, or Stream Water Quality.

DATA REQUIREMENTS: Velocity, flow, depth, stage-discharge relationships, backwater equations, hydrologic routing, or the full unsteady flow equations at the user's option as applicable for specified use.

SOURCE OF INFORMATION: Computer Program Catalog - 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: Gradually Varied Unsteady Flow Profiles (USTFLO)

COMPUTER REQUIREMENTS: ?

PROGRAM USE: This program simulates one-dimensional, unsteady, free surface flow. It calculates water surface elevations, discharges, velocities, and flow direction as functions of time at each cross section. Local (tributary) inflow can be accommodated.

DATA REQUIREMENTS: Discharge hydrographs, stage hydrographs, or rating curves for boundary conditions. Flow and channel characteristics.

SOURCE OF INFORMATION: Computer Program Catalog - 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: HEC-4 Monthly Streamflow Simulation

COMPUTER REQUIREMENTS: ?

PROGRAM USE: Determines statistical characteristics of monthly streamflows and will generate a sequence of hypothetical streamflows of any desired length with those characteristics. It will reconstitute missing streamflows and generate monthly streamflows at ungaged locations based on regional studies.

DATA REQUIREMENTS: Monthly streamflow data for gaged stations.

SOURCE OF INFORMATION: Computer Program Catalog - 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: Regional Frequency Computation (REGFQ)

COMPUTER REQUIREMENTS: ?

PROGRAM USE: Computes the statistics of annual maximum hydrologic events that are necessary to a regional frequency study. Missing events are computed so that complete sets of events are obtained for all years at all stations while preserving all intercorrelations.

DATA REQUIREMENTS: Recorded events at each station and for each duration.

SOURCE OF INFORMATION: Computer Program Catalog - 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: Basin Precipitation Computations (PRECIP)

COMPUTER REQUIREMENTS: ?

PROGRAM USE: Calculates area-average hyetographs from observed gage data. Individual gages may have missing records; each ordinate of the area-average hyetograph is based uniquely on the nearest gages for which data are available.

DATA REQUIREMENTS: Data from recording and non-recording gages may be used, as well as "bucket survey" type data. Data may be in irregular time intervals or in a regular interval that differs from the interval of the area-average hyetographs.

SOURCE OF INFORMATION: Computer Program Catalog - 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: Storage, Treatment, Overflow, Runoff Model (STORM)

COMPUTER REQUIREMENTS: ?

PROGRAM USE: Capable of predicting wet-weather pollutographs for

use in a receiving water assessment model, impacts of change in land uses, preliminary sizing of storage and treatment facilities for desired control of storm water runoff.

DATA REQUIREMENTS: Land use characteristic data, meteorological data, and other data as applicable for specific simulation.

SOURCE OF INFORMATION: Computer Program Catalog - 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: Simulation of Flood Control and Conservation Systems, Appendix on Water Quality Analysis (HEC-5Q).

COMPUTER REQUIREMENTS: ?

PROGRAM USE: Simulates the sequential operation of reservoir systems for flood control and conservation purposes. Water quality analysis includes water temperature, three conservative and three non-conservative constituents, DO, and phytoplankton.

DATA REQUIREMENTS: Control points, inflows, releases, initial water qualities, and reservoir characteristics may be needed as specific applications require.

SOURCE OF INFORMATION: Computer Program Catalog - 1987 - U.S. Army Corps of Engineer's - Water Resources Support Center - The Hydrologic Engineering Center - Davis, CA 95616

MODEL: Wyoming Integrated River System Operation Study (WIRSOS)

COMPUTER REQUIREMENTS: Boeing Computer Services CRAY and CDC Cyber Systems and PC Version verified for use on IBM PC AT and XT.

PROGRAM USE: A tool for defining and quantifying the impact of federal claims for reserved rights, including Indian rights, on State-awarded water rights in connection with the general adjudication of water rights in the Bighorn River Basin of Wyoming.

DATA REQUIREMENTS: Virgin flows, diversions, climatic zones, crop consumptive uses, efficiency and diversion schedules, return flows, instream flows, and reservoir operations.

SOURCE OF INFORMATION: WIRSOS User's Manual - Leonard Rice Consulting Water Engineers, Inc. - April 1985 - WWRC

MODEL: Random Walk Solute Transport Model

COMPUTER REQUIREMENTS: IBM PC or compatible with 256K byte RAM.

PROGRAM USE: Simulates 1- or 2-dimensional steady or unsteady flow problems in heterogeneous aquifers under water table and or artesian or leaky aquifer conditions. Also covers time-varying pumpage or injection by wells, natural or artificial recharge, the flow relationships of water exchange between surface waters and the ground water reservoir, the process of ground water evapotranspiration, the mechanism of possible conversion of storage coefficients from artesian to water table conditions, and the flow from springs. It also allows specification of chemical constituent concentrations at any segment of the model. Effects of convection, dispersion, and chemical reactions are included.

DATA REQUIREMENTS: Porosity, aquifer elevations, source concentrations, grid pattern for aquifer, dispersity, head values, pump locations, pumping rates and schedules, sink locations and rates, and flows.

SOURCE OF INFORMATION: Illinois State Water Survey Bulletin 65-1981 - Random Walk Solute Transport Model by Thomas A. Prickett, Thomas G. Naymilk, and Carl G. Lonnquist.

MODEL: OPSTUDY

COMPUTER REQUIREMENTS: IBM PC or compatible with 256K bytes RAM

PROGRAM USE: Utility program to assist hydrologists in coding monthly water operation studies of the book-keeping type.

DATA REQUIREMENTS: Future depletion fraction, irrigated acreage, environmental by-pass demand, linear canal loss, historic streamflow, and farm delivery requirements along with flow and evaporation data.

SOURCE OF INFORMATION: US Bureau of Reclamation program documentation by Fred J. Otradovsky - June 1981

MODEL: Culvert Design System (CDC)

COMPUTER REQUIREMENTS: IBM PC or compatible with minimum 278K byte storage and OS/MVS operating system

PROGRAM USE: System can either hydraulically design a culvert or hydraulically review an existing or proposed culvert size.

DATA REQUIREMENTS: Stage-discharge, stage-storage, culvert design and review, and flow distribution.

SOURCE OF INFORMATION: Wyoming State Highway Dept. User's Manual release - Jan. 1980 .

MODEL: TR-20

COMPUTER REQUIREMENTS: 320K bytes of core storage and 3 temporary data files.

PROGRAM USE: Computer program for project formulation hydrology assists engineer in hydrologic evaluation of flood events for use in analysis of water resource projects. The program is a single event model which computes direct runoff resulting from any synthetic or natural rainstorm. It develops flood hydrographs from runoff and routes the lfow through stream channels and reservoirs. It also computes peak discharges, water surface elevations, and times of occurence for any cross-section of structure.

DATA REQUIREMENTS: Hydrograph, cross-sections, area descriptors, soil and cover characteristics, flows, and meteorological data.

SOURCE OF INFORMATION: Northeast NTC and Hydrology Unit - Soil Conservation Service - May 1982 - Computer Program for Project Formulation Hydrology.

MODEL: TR-48 Structural Site Analysis Computer Program (DAMS2)

COMPUTER REQUIREMENTS: Mainframe computers without modification; requires 300K storage and 2 temporary files.

PROGRAM USE: Assists user in the hydraul and hydrologic analyses of dams. The program develops inflow hydrographs and uses the storage-discharge relationships at dam sites to floodroute the hydrographs through existing or potential reservoirs.

DATA REQUIREMENTS: Drainage area characteristics, inflow hydrographs for area, and other data relating to specific simulations.

SOURCE OF INFORMATION: Technical Release No. 48 DAMS2 (Interim version) Structural Site Analysis Computer Program - USDA Soil Conservation Service.

MODEL: TR-61 Water Surface Profile 2 Computer Program

COMPUTER REQUIREMENTS: IBM PC or compatible with 220K RAM and three temporary files.

PROGRAM USE: Program can aid in the determination of flow characteristics for a given set of stream and flood-plain conditions; it can compute water surface profiles in open channels.

DATA REQUIREMENTS: Large amounts of physical data on valley shape, roughness, flow restriction, etc.

SOURCE OF INFORMATION: Article xeroxed by Ted Gilbert of SCS

Hydrology Branch in Casper, WY.

MODEL: Illinois State Water Survey Models (ISWS)

COMPUTER REQUIREMENTS: ?

PROGRAM USE: 1-, 2-, or 3-dimensional nonsteady flow of groundwater in heterogeneous aquifers under water table, nonleaky, and leaky artesian conditions.

DATA REQUIREMENTS: Head values, flow rates, storage factors, transmissivity, nodal data, grid spacings, recharge factors, elevations, permeabilities, and other aquifer characterization data as applicable for specified simulation.

SOURCE OF INFORMATION: Selected Digital Computer Techniques for Groundwater Resource Evaluation by T.A. Prickett and C.G. Lonnquist - 1971 - Illinois State Water Survey

MODEL: H2OTRANS

COMPUTER REQUIREMENTS: I believe it could be ran on microcomputer system with 256K RAM.

PROGRAM USE: Computes transpiration and water stress development in western coniferous forests.

DATA REQUIREMENTS: Meteorological data, snow pack melt coefficients, max. soil infiltration rates, water storage capacity of forest litter, max. available water in root zones, canopy interception coefficient, total leaf areas, and ground surface area as required by specific simulation.

SOURCE OF INFORMATION: Research paper RM-252 - USDA Forest Service - Steven W. Running - April 1984

MODEL: McDonald and Harbaugh Groundwater Flow Model (MODFLOW)

COMPUTER REQUIREMENTS: IBM, Control Data, Prime, Amdahl, Digital Equipment, and Cray computers without modification.

PROGRAM USE: Used for either 2- or 3-dimensional applications. Analyzes flow from rivers , flow into drains, and layers simulated as confined, unconfined, or a combination of both. Flow from external stresses, such as flow to wells, areal recharge, evapotranspiration, flow to drains, and flow through riverbeds can also be simulated.

DATA REQUIREMENTS: Wells, recharge, river data, drain data, evapotranspiration data, general head boundaries, and aquifer characteristics.

SOURCE OF INFORMATION: USGS User's Manual for Three-Dimensional Finite-Difference Ground-Water Flow by Michael G. McDonald and Arlen W. Harbaugh.

MODEL: 2-D, Solute Transport and Dispersion in Groundwater (MOC)

COMPUTER REQUIREMENTS: IBM PC with DOS 2.0 of later and 256K RAM or compatible computers.

PROGRAM USE: Simulates solute transport in flowing groundwater and can be applied to one- or two-dimensional problems involving steady-state or transient flow. The model computes changes in concentration over time caused by the processes of convective transport, hydrodynamic dispersion, and mixing from fluid sources. The aquifer may be heterogeneous and/or anisotropic.

DATA REQUIREMENTS: Pumping rates, schedules, locations, and numbers; nodal data; porosities; storage coefficients; aquifer parameters and descriptors; flow characteristic data; and initialization data for heads, elevations and concentrations.

SOURCE OF INFORMATION: Techniques of Water-Resources Investigations of the USGS - Computer Model of Two-Dimensional Solute Transport and Dispersion in Ground Water - Book 7 Chapter C2.

MODEL: Saturated-Unsaturated Transport (SUTRA)

COMPUTER REQUIREMENTS: IBM PC with 640K RAM and Fortran Compiler.

PROGRAM USE: Simulates fluid movement and transport of either energy or dissolved substances in a subsurface environment. Fluid density-dependent saturated or unsaturated ground-water flow and transport of a solute in the ground water or transport of thermal energy in the ground water and solid matrix of the aquifer may be simulated. Solute transport simulation with SUTRA may be used for modeling of variable density leachate movement, and for cross-sectional modeling of salt-water intrusion in aquifers at near-well or regional scales. SUTRA energy transport simulation may be used to model thermal regimes in aquifers, subsurface heat conduction, aquifer thermal energy storage systems, geothermal reservoirs, thermal pollution of aquifers, and natural hydrogeologic convection systems.

DATA REQUIREMENTS: Variable with specific application.

SOURCE OF INFORMATION: Scientific Publications Co. Summer 1988 Catalog, page 7.

MODEL: Variably Saturated Flow Model (UNSAT2)

COMPUTER REQUIREMENTS: IBM system, CDC 6600/7600, CDC Cyber 172,

or compatibles.

PROGRAM USE: Analyzes the flow of water in unsaturated, partially saturated, or saturated porous media.

DATA REQUIREMENTS: Nodal, flow, heads, pump, seepage faces, plant/cover characteristic, conductivities, pressure head, porosity, soil surface geometric, atmospheric, root zone grid, and element data as well as material constant properties.

SOURCE OF INFORMATION: Variably Saturated Flow Model by L.A. Davis and S.P. Neuman - Water, Waste, and Land, Inc. - Ft. Collins, CO 80526 - Dec. 1983

MODEL: WATEQFC Revised

COMPUTER REQUIREMENTS: Cyber with Edit facilities or compatibles.

PROGRAM USE: Uses the chemical analysis of a water sample and equilbrium thermodynamics to calculate the distribution of aqueous species and the state of saturation of the water with respect to solid phases.

DATA REQUIREMENTS: Density, constituents, DO, specific conductance, temperature, pH, species characteristics, minerals, and other constituents data as specific application requires.

SOURCE OF INFORMATION: WATEQFC Revised for Cyber system and Western Research Institute by P.E. Matsoukas - April 1984

MODEL: Prickett Lonnquist Aquifer Simulation Model (PLASM)

COMPUTER REQUIREMENTS: Cyber or compatible

PROGRAM USE: A finite difference model for simulating two-dimensional transient saturated flow in confined aquifers.

DATA REQUIREMENTS: Aquifer parameters including transmissivity, conductivity, storage coefficient, specific yield, depth, width, and recharge. Model inputs such as nodal data, pump data and schedules, and time step data.

SOURCE OF INFORMATION: No documentation found only examples of program use.

MODEL: HYDAUG/TRIHYDRO

COMPUTER REQUIREMENTS: IBM PC or compatible with DOS 2.0 or higher.

PROGRAM USE: Program computes runoff from selected storm events.

DATA REQUIREMENTS: Drainage area, stream length, elevation difference, curve number, minimum infiltration loss rate, basin longitude, adjusted precipitation, and type of distribution for precipitation/runoff event.

SOURCE OF INFORMATION: HYDAUG by Western Water Consultants, Inc.- Laramie, WY 82070 - July 1984

MODEL: Wyoming Inter-Industry Modeling System (WIMS)

COMPUTER REQUIREMENTS: mainframe systems

PROGRAM USE: It is capable of not only describing the economic interdependence existing among sectors of an economy but also the capacity to measure, sector by sector, the direct and indirect economic consequences of alternative development scenarios. The method is thus both descriptive and analytical. Also used to quantify multipliers for sectors and industries within counties.

DATA REQUIREMENTS: Total revenue generated - for forecasting use.

SOURCE OF INFORMATION: Wyoming Economic Development and Stabilization Board Statistics Dept. - User's Manual for WIMS.

MODEL: RESROUT

COMPUTER REQUIREMENTS: IBM PC or compatibles or Prime computers.

PROGRAM USE: Routes reservoir flooding above high water line (hwl).

DATA REQUIREMENTS: May use edited HYDAUG.OUT files or terminal input. Input hydrograph ordinates, storm design, time increment, and discharge-storage data for specified feet of freeboard.

SOURCE OF INFORMATION: No documentation located previewed program at Wyoming State Engineer's Office.

MODEL: HYDRA

COMPUTER REQUIREMENTS: microcomputer system

PROGRAM USE: The program will select the pipe size, slope and invert elevations and analyze existing system of pipes and/ or ditches. When an existing system of pipes is overloaded it will indicate suggested flow removal quantities as well as an increased pipe diameter size as an alternative remedy. The program also provides means of cost estimation and storm, sewer, and sanitary flows.

DATA REQUIREMENTS: Channel or ditch characterization parameters, geometry factors and unit prices, hydrological data, infiltration data, precipitation data, flow data, pipe systems characteristics, and slope data as applicable for simulations.

SOURCE OF INFORMATION: Chapter IV - PFP-HYDRA manual - Wyoming Highway Dept.

MODEL: Water Surface Profile Computation Model WSPRO (HY-7)

COMPUTER REQUIREMENTS: microcomputer system

PROGRAM USE: Designed to provide a water-surface profile for following flow situations: unconstricted flow, single opening bridge, bridge opens with spur dikes, single opening embankment overflow, multiple alternatives for a single job, and multiple openings.

DATA REQUIREMENTS: Profile control data; cross-section definitions including structural definitions, geometry data, roughness data, and flow length data; bridge section data; approach section data; culvert section data; and template geometry propagation data as applicable to specific applications.

SOURCE OF INFORMATION: Chapter VI - WSPRO - Wyoming Highway Dept.

MODEL: NWS Dambreak

COMPUTER REQUIREMENTS: microcomputer system preferably with math coprocessor (IBM PC AT recommended)

PROGRAM USE: Three functional parts include: description of dam failure mode (temporal and geometrical description of breach); computation of time history (hydrograph) of outflow through breach as affected by breach description, reservoir inflow, reservoir storage characterization, spillway outflows, and downstream tailwater elevations;; and routing of outflow hydrographs through downstream valley in order to determine changes in hydrograph due to valley storage, friction al resistance, downstream bridges or dams, and to determine the resulting water surface elevations and flood-wave travel-time.

DATA REQUIREMENTS: Failure time interval, terminal size and shape of breach, breach parameters, dam size and shape characteristics, spillway characteristics, reservoir characterization, topography and soil characterization, cross-sectional properties, flow data, landslide characterization, flood-plain routing, reservoir failure characterization data, discharge coefficients, pump and turbine characteristics, and normal inflow and outflow characteristic data.

SOURCE OF INFORMATION: PC NWS Dambreak documentation - Wyoming Water Development Commission and Barry Mountain.

MODEL: Simplified NWS Dambreak

COMPUTER REQUIREMENTS: microcomputer system

PROGRAM USE: Simplified version of program previously listed as NWS Dambreak has like program uses with less reliable results due to simplification from original program.

DATA REQUIREMENTS: Dam height, reservoir storage volume, and depth to width ratio as minimum inputs. Reservoir parameters and dimensional data, breach parameters and descriptive data, outflows, emergency flows, flood depth, channel slope and roughness, and inflow data recommended for best results.

SOURCE OF INFORMATION: Program documentation from Wyoming Water Development Commission and Barry Mountain.

MODEL: Recharge

COMPUTER REQUIREMENTS: IBM PC, XT, or IBM compatible computer with 64K storage minimum.

PROGRAM USE: Allows user to predict the response of a water table to artificial recharge of water from rectangular basins in a homogeneous aquifer of infinite areal extent or in a homogeneous stream aquifer system. The model calculates discharge to the stream in a stream aquifer system at specified times.

DATA REQUIREMENTS: Recharge rates, aquifer parameters, time period of analysis, end of recharge period, distance, depth to water, basin geometry, angle from the length axis, and distance to stream.

SOURCE OF INFORMATION: D.J. Molden, D.K. Sunada, J.W. Warner, and G.U. Sunada, Artificial Recharge version 1.0, 1984, CSU

MODEL: Flood History

COMPUTER REQUIREMENTS: Mainframe computer use - although data available to users upon request.

PROGRAM USE: Description and Identification of historical Flooding events.

DATA REQUIREMENTS: Date of event, location of flood, political entity affected, type of incident, source of flooding, cause of flooding, site specific problems, damage estimate and type of damage, injuries/fatalities, response to flooding, amount of

precipitation recorded and locatio of measuring equipment, discharge, frequency of the floods, and reference sources are included in this data base file.

SOURCE OF INFORMATION: Wyoming Emergency Management Agency

MODEL: WASP

COMPUTER REQUIREMENTS: PC with 256K RAM and DOS 2.12 or higher

PROGRAM USE: Used to interpret an predict water quality responses to natural phenomena and man-made pollution for various pollution management decisions. Models for aquatic systems including both the water column an the underlying benthos. Time-varying process of advection, dispersion, point and diffuse mass loading, and boundary exchange are represented.

DATA REQUIREMENTS: Environmental data, chemical species and properties, stream characterization, and meteorological data as application requires.

SOURCE OF INFORMATION: Robert B. Ambrose, Jr., P.E.; Tim A. Wood; John P. Connolly, PhD.; and Robert W. Schanz - User's Manual and Programmer's Guide for WASP4, A Hydrodynamic and Water Quality Model - EPA/600/3-87/039 - Jan 1988

MODEL: Pesticide Root Zone Model (PRZM)

COMPUTER REQUIREMENTS: Operational on DEC PDP 11/70 minicomputer

PROGRAM USE: Model simulates the vertical movement of pesticides in the unsaturated soil, within and below the plant root zone, and extending to the water table. The model consists of hydrology and chemical transport components that simulate runoff, erosion, plant uptake, leaching, decay, folia washoff and volatilization of a pesticide.

DATA REQUIREMENTS: Meteorological data, evaporation data, crop and cover characteristics, USLE parameters, hydrologic data, pesticide characteristics and application, and soil characteristics.

SOURCE OF INFORMATION: Robert F. Carsel, Charles N. Smith, Lee A. Mulkey, J. David Dean, and Peter Jowise - User's Manual for the Pesticide Root Zone Model (PRZM) - EPA-600/3-84-109 - Dec. 1984.

MODEL: MINTEQ

COMPUTER REQUIREMENTS: IBM PC with 256K RAM minimum

PROGRAM USE: Versatile, quantitative geochemical model for

predicting the equilibrium behavior of metals in a variety of chemical environments. Complex series of reaction among solution species, gases, solids, and sorbed phases can be modeled.

DATA REQUIREMENTS: Species characteristics, stream characteristics, and other data as applicable for specified simulation.

SOURCE OF INFORMATION: David S. Brown and Jerry D. Allison - An Equilibrium Metal Speciation Model User's Manual - EPA/600/3-87/012 - Oct. 1987

MODEL: Storm Water Management Model (SWMM)

COMPUTER REQUIREMENTS: A large, high-speed computer is required, such as an IBM 370, Amdahl 470, Univac 1108, or CDC 6600. Through considerable effort, users have been able to adapt different blocks of the program to various mini-computers, but only with extensive use of off-line storage and increase in execution times.

PROGRAM USE: A comprehensive mathematical model for simulation of urban runoff quantity and quality in storm and combined sewer system. All aspects of the urban hydrologic and quality cycles are simulated, including surface runoff, transport through the drainage network, storage and treatment, and receiving water effects.

DATA REQUIREMENTS: General and control data, meteorological data, surface quality and quantity data, transport and infiltration data, pollution characteristics, dry-weather flow, and evaporation data are needed for specific applications of this model.

SOURCE OF INFORMATION: Wayne C. Huber, James P. Heaney, Stephan J. Nix, Robert E. Dickenson, and Donald J. Polmann - Storm Water Management Model (SWMM) User's Guide - EPA-600/2-84-109a - Nov. 1981.

MODEL: Chemical, Runoff, and Erosion from Agricultural Management Systems (CREAMS)

COMPUTER REQUIREMENTS: PC with DOS 2.1 for higher and 320K RAM storage minimum.

PROGRAM USE: Simulates the effects of management systems on nonpoint source water pollution. It predicts the delivery of runoff, sediment, pesticides, and nutrients from a drainage area within a field. The program is structured as three separate components: hydrology, chemistry, and erosion and sedimentation, with each component ran as a separate program.

DATA REQUIREMENTS: Data files and parameter files area needed to run any component of this program. Hydrology data files consists of precipitation data and the parameter file describes the field's hydrologic conditions. The hydrology pass file is data file for the erosion/sedimentation component and the parameter file for this component describes the field erosion and sediment transport conditions. The chemical component uses the erosion/ sedimentation pass file for data and a parameter file to describe the chemical applications and reactions within the field.

SOURCE OF INFORMATION: User's Guide for the CREAMS Computer Model - Washington Computer Center Version - USDA Technical Release 72 - 1984

MODEL: Sedimot-II

COMPUTER REQUIREMENTS: IBM PC, XT, AT, or compatible with at least 512K RAM and an 8087 or 80287 co-processor and DOS 3.0 or higher.

PROGRAM USE: The model is capable of predicting a storm hydrograph and storm sediment graph for a user specified design storm. The hydrograph and sediment graph can be routed along a stream to a given point of interest. Three sediment control structures are currently modeled: sediment basins, porous rock check dams, and grass filters.

DATA REQUIREMENTS: Watershed identification, storm type and data, junctions, sedimentology parameters, no. of particle size distributions, sediment particle sizes, percent finer, structures, routing parameters between structures, subwatershed/structure information, subwatershed data, sedimentology data, ponding information, pond flow routing data, stage, area, discharge, spillway design parameters, grass filter data and design parameters, and check dam design parameters as required for specified simulation.

SOURCE OF INFORMATION: Richard C. Warner, Bruce N. Wilson, Billy J. Barfield, David S. Logson, and Pamela J. Nebgen - A Hydrology and Sedimentology Watershed Model (SEDIMOT-II) - Dept. of Agricultural Engineering - University of Kentucky - 1987

MODEL: Pumptest Analysis Programs

COMPUTER REQUIREMENTS: IBM PC, XT, AT, or COMPAQ-PC with 256K RAM and DOS 2.1 or higher or compatibles with Color graphics card and compatible monitor.

PROGRAM USE: The programs can graph the results on the screen or onto a plotter. Both production and observation well data can be analyzed. Several wells can be displayed on the same graph.

Both drawdown and recovery data can be displayed on the same graph. Pumping test data can be generated for specified transmissivity and storage coefficients.

DATA REQUIREMENTS: Menu-driven with prompts for input data and extensive error-trapping routines built into the programs. A variety of data may be required dependant on the simulation selected; whether it be drawdown or recovery or type curve plotting.

SOURCE OF INFORMATION: Scientific Publications and Software Center Catalog - June 1986 -

MODEL: Neutron Probe Data Management

COMPUTER REQUIREMENTS: PC with ZBasic and NorthStar Horizon

PROGRAM USE: Provides water content calculation and graphical presentation for studies utilizing neutron probes for water content. Includes the following programs: NPMAIN, NUTPRB, W-TPLOT, and W-SPLOT.

DATA REQUIREMENTS: Data from use of neutron probes on water content studies.

SOURCE OF INFORMATION: Computer Programs for Water Research at Oklahoma State University - March 1986

APPENDIX E

dBASEPLUS FILE LISTING

The following is a list and description of each dBasePlus file included on the enclosed diskettes:

1. DESCRIBE.FRM - a report format for listing by name a description of each model.
2. LIST.FRM - report format for listing models by name.
3. LISTING.DBF - a data base file consiting of the data collected, minus the extended research completed on the "selected" models which is listed in the previous appendix. This file consists of 332 records/models each with a length of 19 fields. The fields include:
    1. Name - model name or title
    2. Describe - model description
    3. Type - categorized type of model (ie. surface water, groundwater, water quality, climatic, or misc)
    4. Documented - documentation status
    5. Language - computer language model is written
    6. Computer - computer hardware requirements
    7. Cost - model costs
    8. Notes - notes on model or further description
    9. Infosource - source of model information
    10. Infoaddres - source address
    11. Citystzip - source address
    12. Contact - source contact
    13. Contctphon - contact phone number
    14. Cntctnotes - notes from contact or other notes
    15. Survey - model information result of survey
    16. Selected - model selected for further review
    17. Infolocatd - further information located for "selected" models
    18. Modelsourc - model known to be at source
    19. Sourcemodl - source of model, if other than infosource
4. MISCINFO.FRM - report format for listing by name model information on documentation status, computer language, computer hardware requirements, and costs of model.
5. NOTES.FRM - report format for listing by name model notes and contact notes.
6. SOURCEIN.FRM - report format for listing by name model source of information, source address, contact, and contact phone number.
7. SOURCES.FRM - report format for listing by source of information the model name/title.

The diskettes for this study following this file listing.