NWHS
PACIFIC NORTHWEST
HYDROPOWER DATABASE AND
ANALYSIS SYSTEM

Data Item Description Manual

This manual defines data elements and documents data compilation Requirements for the NWHS database. The manual is subject to change. Questions or comments on the manual should be directed to Bonneville Power Administration, (503) 230-3318.

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Introduction and General Instructions for Data Compilation

Introduction

The Pacific Northwest Hydropower Database is part of the Pacific Northwest Hydropower Database and Analysis System (NWHS). The NWHS was developed by the North Pacific Division of the Corps of Engineers (NPD) in cooperation with The Northwest Power Planning Council (Power Council) and Bonneville Power Administration (BPA). It was developed in response to Section 14.3 of the Power Council's Two-Year Action Plan of the Northwest Conservation and Electric Power Plan, 1983, to provide a regional database of existing and potential hydropower projects. The database is used by the Power Council and BPA in making power resources supply forecasts. In addition, the database provides the site-specific data needed to rank potential hydropower projects under Section 14.2 of the above referenced Power Plan.

The database consists of site-specific data on hydropower projects with Federal Energy Regulatory Commission (FERC) licensing/exemption status and existing projects and previously identified sites without current or previous FERC status. These latter projects and sites consist of (1) existing Federally owned power projects (Federal projects are not subject to FERC jurisdiction): (2) existing Federally owned non-power projects with power potential; (3) existing non-Federal dams and other water control structures with power potential, but which have not been proposed for development through an application filed with FERC; and, (4) undeveloped sites for which power potential has been previously studied.

The initial data compilation for projects with FERC licensing/exemption status was completed using information contained in applications filed by the developer with FERC. The initial data compilation for non-FERC or National Hydropower Study (NHS) projects was completed based on the findings of the National Hydropower Study which was completed by the Corps of Engineers in September, 1981. Additional, more recent information will be compiled and incorporated in the database for the NHS projects as it becomes available. In addition, data on newly proposed FERC and non-FERC (NHS) projects will be added to the database on a periodic basis in order to maintain the database in a current status.

The purpose of this manual is to provide a description of data items included in the database and a uniform set of instructions for data compilation. The manual also (1) identifies items which may be critical to computer analysis of a project's hydropower potential and developmental costs; (2) identifies items for which default values have been provided for in the event that the information is not available in documents describing a particular project; and, (3) provides instructions on entering data into the NWHS Data Base.

Although the database has been developed through use of available project documents, it is recognized that errors in project data may occur. As a service to data compilers, it is requested that persons using the manual for data retrieval purposes report any project data errors found in the database to the NWHS Database Management Group, Bonneville Power Administration, P.O. Box 3621, Portland, OR 97208, (503) 230-3318.

General Instructions

Abbreviations. Standard abbreviations should be used in alphanumeric fields, where necessary to ensure that project and stream names, the names and addresses of project developers, and comments are stored within the data field provided. In the case of project names, however, words such as "Creek" and "River" which are part of the recognized name of the project and for which there are standard abbreviations should not be abbreviated. Names of applicant/developers are not abbreviated unless not enough space. Standard abbreviations for the NWHS database along with the recommended use of punctuation and format for entering names of persons are shown in Table 1-1. Abbreviations for Federal agencies are shown in Table 3-2. Example data entries and specific instructions are included in the data item descriptions included in this manual.

Table 1-1

RULES AND ABBREVIATIONS FOR ENTERING NAMES AND ADDRESSES

Rules:

1. Do not use punctuation marks except dashes in telephone numbers.

2. Names of persons should be entered as follows:

   a. Individual.
      John Henry Doe - Doe, JH

   b. Two individuals, same last name
      John Henry Doe and Mary A. Doe - Doe, JH + MA

3. Abbreviations for Federal agencies are shown in Table 3-2.

Abbreviations	Definitions
ABV	Above
ALT	Alternate
+	And (do not use "&")
ET AL	and others
APPX	Approximate or Approximately
ASSOC	Associates or Association
AVE	Avenue
BC	British Columbia
BLDG	Building
BLVD	Boulevard
BLW	Below
BR	Branch
BDG	Bridge
BRD	Board
CA	California
CNL	Canal
CO	Colorado, Company, Corporation or County
CR	Creek, Center or Central
CT	Court
DA	Drainage Area
DIST	District
DR	Drive
DVR	Diversion
E	East
EXC	Exclude(s) or Exclusive
FK	Fork
HDWKS	Headwork's
HWY	Highway
ID	Idaho
INC	Incorporated
IND	Indian
INV	Investment
lRR	Irrigation
LK	Lake
LTL	Little
M	Middle
MGR	Manager
MI	Mile
MT	Montana, Mount, or Mountain
MUT	Mutual or Mutually
N	North
NAT	Nation or National
NF	National Forest
NO	Number
NV	Nevada
0	Oregon
PH	Powerhouse
PWR	Power
P+L	Power and Light
PRES	President
PUD	Public Utility District
RECLM	Reclamation

R	River
RES	Reservoir
RD	Road
RT	Route
S	South
SPG	Spring(s)
SQ	Square
STA	Station
STM	Stream
ST	Street
STE	Suite
TE	Terrace
TRB	Tribe
TRIB	Tributary
UT	Utah
W	West
WA	Washington
WY	Wyoming or Way

Addition or Deletion of Projects. The responsibility for adding or deleting projects to or from the database lies with the NWHS database Management Group, Bonneville Power Administration, P.O. Box 3621, Portland, OR 97208, telephone (503) 230-3318. As notices of new FERC projects are received by the NWHS Database Management Group they will be added to the database, and that data compilation will be completed. Non-FERC projects will be added to the database in the same manner. Project records will be deleted from the database by the Management Group based on their determination that deletion is appropriate or based on a request from BPA. Minimum input data for adding a new FERC site to the database are item numbers 102, 109, 112, 114, 125, and 133.

Critical Data Items. Critical and potentially critical data items have been denoted by a dollar sign ($) in the left margin of the project data form (see example data form in Appendix A). Most of these are absolutely required, but the instructions for individual data items should be referred to for further explanation. This indicator should help those involved in data compilation to determine how much time should be invested in finding data. In general, potentially critical items for which default values have not been provided (see explanation of Default Codes) must have a value input by the user. Blanks in these items will prevent successful execution of the Hydropower Analysis Model (HAM). Data requirements for each of the HAM analysis options are listed in Appendix E. (See last few pages for list.)

Database Access. Refer to Users Guide

Database Maintenance. Maintenance of the database (initiated in June 1985) consists of (1) adding new projects to the database; (2) deleting duplicate records for the same site and developer; (3) updating the database to record changes in project status; (4) completing data compilation for new (new to the database) projects and, (5) revising site-specific data on projects with a database record to incorporate the developer's most recent proposal, etc. In general, data compilation is the responsibility of BPA as well as the maintenance of the database, including entering project data and maintaining the computer programs which support the database.

Data Item Initialization Values. When new projects are added the database, numeric fields, with two exceptions, are initialized with a small negative value (-1.0) in order to enable users of the database to determine the presence and absence of input data. The exceptions are Items 414 and 418 (Net Lake Evaporation and Net Consumptive Use) which are initialized with the value, -999.0 and 142 to 144 (2nd to 4th dam/diversion stream mile) which are initialized with the value, 0. The normally used initialization value (-1.0) is not used for these items because relatively small negative values, including -1.0, are possible user input values or normally they are not used.

Data Item Type/Source. Printouts of the project data forms indicate the type/source of each data item in the column to the left of the data item number. The type/source possibilities are "U" (user input data), "B" (user or machine input data) and "M" (machine input data). In the case of Item 103, both letters "M" and "U" are shown on the project data form. This indicates that the first character is machine generated and the second character is user input. Users should not enter data into the machine generated data item fields.

Date Data Items. All date data items (Item numbers 201, 203, 204, 205, 207, 208, 209, 211, 218) are to be entered in standard computer time units (year/month/day). Construction dates (Item numbers 223, 224, 228, 229) require only the year and month (year/month). In cases where data sources do not include information on the month or day, these should be input to the database as 01, i.e., unless otherwise specified, the month will be assumed to be the first month (January) and the day will be assumed to the first day of the month.

Default Codes. Several parameters in the Database have values or codes which will be assumed by the Hydropower Analysis Model (HAM) if information is not input during data compilation. These are called "defaults", and they allow the computer to make certain cost and energy analysis based on estimated physical characteristics. Most of the parameters with default values describe project layout and structural specifications and are located in the 300 section of the project data form.

In order to evaluate the accuracy of computer analyses for hydrology, cost, and energy a distinction must be made between the reasons a default value may have been assigned. There are two possible reasons: 1) no information was available so an assumption was made: and 2) the project actually falls into a category or code which happens to be a default value. For instance, for Item 321 Penstock Type - Difficulty), the default code is "STB2" (Steel, Buried, Medium Difficulty). Information may have been available indicating the proposed penstock will have these characteristics. On the other hand, an applicant may have indicated a penstock of some length would be installed but gave no other data. In the later case, the machine default should be specified by entering the code "M" which indicates the "unknown" or "estimated" status of the value used by HAM in cost or energy calculations.

For items having compound default values or codes, enter the complete code based on information available about the project. If only a part of the code can be entered based on known information, enter the appropriate codes for known information and enter an "M" where default values are desired. The completed code should not include any blanks. The computer will assign default values to items where a default code has been entered. For items that currently exist and will be used as part of the proposed project layout, enter the appropriate dimension (crest length of dam, length of waterway, etc.) and indicate that it is "existing" by entering the appropriate code. Some items having default codes also serve as a flag for whether or not a structure exists. For instance, Item 308 (Difficulty of Intake) must be entered if the project includes a new or modified intake structure. When left blank, the computer defaults to code "M" and assumes that an intake is required; it will then estimate a cost. It should be noted that although default values are used by HAM, they are not written to the database. Table 1-3 is a listing of default codes and values.

Table 1-3
DEFAULT CODES AND VALUES

ITEM NO.	ITEM NAME	DEFAULT CODE	DESCRIPTION OF DEFAULT CODE
302	Type-Difficulty	MMM	Unknown (defaults to of Dam/Diversion "rockfill, medium difficulty" for height = or <10 feet and "rolled concrete, medium difficulty" for height >10 feet).
303	Site Cross-Sectional Classification	M	Unknown (defaults to shape "A").
307	Height of Dam/ Diversion		(Defaults to 6 feet for undeveloped projects.)
308	Difficulty of Intake	M	Unknown (defaults to "medium difficulty").
309	Intake Required	M	Unknown, Not Yet determined (defaults to "YES, standard intake").
310	Fish Screen Required	M	Unknown (defaults to "YES").
311	Fish Passage Required	M	Unknown (defaults to "NO").
312,315	Waterway Type-Difficulty	MM	Unknown (defaults to "pipe, medium difficulty").
321	Penstock Type-Difficulty	MMMM	Unknown (defaults to "concrete, medium difficulty").
327	Type-Difficulty Powerhouse	MM	Unknown (defaults to of "concrete, medium difficulty").
347	Local or Remote Operation	M	Unknown (defaults to "remote").

Table 1-3 (continued)

ITEM NO.	ITEM NAME	DEFAULT CODE	DESCRIPTION OF DEFAULT CODE
348	Type-Difficulty Connecting Powerline	MM	Unknown (defaults to of difficulty")."overhead, medium
350	Connecting Powerhouse R-O-W Width	-1.O	(Defaults to 50 feet for projects <20 MW and 80 feet for projects >20 MW).
352	Type-Difficult of Upgraded Powerline	MM	Unknown (defaults to "overhead medium difficulty").
356	Substation Updating Required	M	Unknown (defaults to "NO").
360	Width of Road	-1.0	(Defaults to 12 feet for projects <20 MW and 25 feet for projects >20 MW, if a code is entered for Item 361.)
361	Road Construction Difficulty	M	Unknown (defaults to "medium difficulty").
405	Representative Gage Selected	(blank & DUR in item 871)	(Defaults to machine selection.)
871	Type of Hydrologic Analysis	(blank)	(Defaults to DUR).

Energy Analysis. The NWHS Hydropower Analysis Model (HAM) provides five options for analysis of the energy and capacity potential of potential hydropower projects, as follows (see Hydropower Analysis Model in this section for a brief description of each of the analysis options):

Type of Analysis	Code
Flow Duration	DUR
Fixed Average Monthly Flow	FXM
Fixed Annual Duration	FXA
Fixed Average Annual Flow	FXF
Fixed Capacity and Energy	FXC

Selection of the type of analysis to be used depends on data available on project physical characteristics and hydrology. The selected type of analysis may be user specified in Item 871. If user selection is not provided, the computer program defaults to the DUR analysis.

Existing Power Projects Without Additional Power Potential. The database includes information on existing power projects whether not there is any potential for additional development. Projects which are on-line (a status of "OPP" identifies federal projects not FERC - FERC is "OL" in 227) should be coded as an "existing with power" type of project. If no new potential capacity or energy exists, a zero must be entered into Item 809 (capacity) and 815 (energy). Items 808-810 and 814-816 are critical although there is no capacity or energy potential for a project, all physical characteristics should be entered for these types of projects. In cases where a project is "existing" or "existing with power" and new capacity or energy potential exists, care must be taken to identify existing physical features so that their costs will not be estimated as part of a proposed plant expansion.

Formatting, Array Fields. See NWHS Users Guide

Formatting, Embedded Blanks. Numeric entries may not include data with embedded blanks, e.g., 7_0. or _70 (where the underline character indicates a blank space in the number).

Formatting. General. The format and field length for each data item are shown in the data item descriptions contained in this manual. Also, an example entry is shown where appropriate.

Formatting Numeric Fields. Numeric fields require user input of a decimal point. However, zeros to the right of the decimal point (trailing zeros) need not be entered. The computer will add these after the data are entered and processed. Alpha characters may not be entered in the numeric fields.

Hydropower Analysis Model (HAM). HAM is a computer model developed for the purpose of making site-specific, reconnaissance level analyses of power potential and development costs. HAM consists of separate algorithms for (1) selecting a stream gage; (2) estimating flow at a site; (3) estimating minimum streamflow requirements; (4) optimizing installed capacity; (5) estimating energy generation potential; (6) estimating project costs; and, (7) producing summary hydrology, optimization, and cost reports. To accommodate differences in the quality and amount of data available for specific projects, the model includes five different types of analysis of project power potential. In addition, many of the required HAM input data items have been given default values which are used in the absence of user input (default values are defined in Table 1-3). The types of analysis available are as follows:

Type	Description
DUR	Flow duration analysis of site potential using monthly duration curves developed from daily flow data from a gage selected by HAM or input by the user.
FXM	Analysis of site potential based on user input values for average monthly flow at the site.
FXA	Flow duration analysis of site potential using annual flow duration data for the site as input by the user.
FXF	Analysis of site potential based on user input of average annual flow at the site.
FXC	Analysis of project development cost of the site based on project size (installed capacity and average annual energy) as input by the user.

The type of analysis to be used is user determined on a project by project basis and specified in Item 871 of the database.

Multiple Dams/Diversions and Penstocks. The database is designed to permit data on physical characteristics for up to nine (9) dams/diversions (items 302-317) and nine (9) penstocks (items 318-326) to be entered. If more than nine diversions (or penstocks) are proposed, data on diversions (or penstocks) in excess of nine should be combined with data for the ninth diversion (or penstock).

Special Cost Items. The project cost data section of the database (Items 600-710) includes some items for which there are no computer algorithms. These cost items have been indicated in the manual by a double asterisk (**) to the left of the data item number. The Hydropower Analysis Model (HAM) is programmed to transfer user input values to the corresponding machine output data items in order to complete the computer estimate of total project costs.

Topographic Maps. It is required that all projects included in the database be located on 7.5 or 15.0 minute USGS (US Geological Survey) topographical quadrangle maps (7.5 minute quads are preferred) and that the principle map(s) be listed in the database (Item 129) with the map containing the powerhouse listed first. It is also required that the proposed layout of the projects be shown on the maps. The completed maps are to be maintained on file at the NWHS Central Files at BPA. Instructions for locating protects on USGS topographical maps and compiling map related data are included in Appendix C.

U.S. Geological Survey Index Cards. In 1965, the USGS completed a study entitled Waterpower of the United States. The study involved a comprehensive listing of locations and configurations of existing and potential hydropower sites for the United States. The information obtained in this study was placed on "5 X 8" cards which shall be referred to as "USGS cards". The USGS cards are organized by state, then numerically by USGS stream gage number within major drainage basins in each state. The cards were originally used in developing the NHS (National Hydropower Study) site database and may be useful in identifying and entering data in the NWHS database for non-FERC project's. The cards are identified by WRC Hydrologic Unit (Item 130 of the NWHS database) and project name.

The information contained on each USGS card includes the site name, stream name, state, county, meridian, township, range, section, latitude, longitude, stream mile, drainage area, storage, capacity, stream flow data, elevations, and power head. In addition, the name and scale of the USGS quadrangle map on which the project is located, as well as other useful remarks; about the project, are usually on the card.

Location and Identification

Item Number: 101

Data Item: Project Identification Number

Description: Unique 10-character identification number for each project in the database. This number is the address of a project in the database and must be used to retrieve or modify project information. The structure and meaning of the elements of the project ID number are shown in the example below. The projects ID number shows the state and Corps district in which the project is located, the site arrangement classification of the project, and a numeric code that is unique within the Corps district. The site arrangement classification of a project is machine transferred to the project ID number (3rd character) from Item 301, which is user input during data compilation.

Source: Machine generated based on user input of the state and Corps district in which the project is located.

Requirement: Critical. When adding new projects to the database, the first and second (state code) and fourth, fifth and sixth characters (Corps district) of the project ID code must be user input. The database maintenance program will automatically assign a sequential number. The third character (site arrangement classification), is not required because it is automatically transferred from Item 301 by machine during execution of the maintenance program. The district code must be correct as it is used to generate division and district codes in Items 124 and 125. Corps District boundaries are determined by drainage basins. District boundary maps and quad maps should be checked to insure that each project has been assigned to the correct District. (see Table 2-2 for division and district codes and Table 2-3 for county assignments to Corps districts).

Format: Alphanumeric (A10)

Example: IDCNPW0003

Where:

ID	=	State Code (Idaho)
C	=	Site Arrangement Classification (machine transferred from Item 301)
NPW	=	Corps District (Walla Walla)
0003	=	Project Numeric Code

Note: If the third character (site arrangement classification code) is blank, it should be assumed that data compilation work has not been completed.

Location and Identification

Item Number: 102

Data Item: Project Name

Description: Name by which the existing or potential dam or water management project is commonly known.

Source: User input from Inventory of Dams (official name of dam), FERC permit, exemption and license applications or other available source.

Requirement: Critical. In general, project names should be entered as shown in the source document(s). However, to insure that the names are stored in the space provided, project names which exceed 28 characters should be shortened to no more than 28 characters (the length of the database field) through use of standard abbreviations shown in Table 1. In general, however, the words, "Creek," "River," etc. should not be included as part of the project name. Entries which exceed 28 characters will be truncated. To insure that projects are sorted correctly, with multiple powerhouse projects being sorted together, the principle name of these projects should be entered first (see examples below). For FERC projects use name as FERC Notice gives it. For projects with more than one name, e.g., a project which has different names for the dam and reservoir, data compilers should enter both names (space permitting) with the most commonly used name being entered first, followed by other name which should be enclosed in parentheses.

Format: Alphanumeric (A28)

Example:

Project Name	
Big Sheep Creek Number 2	BIG SHEEP CREEK NO. 2
Upper Mesa	MESA, UPPER
Lower Mesa	MESA, LOWER

Location and Identification

Item Number: 103

Data Item: Project Status

Description: As projects in the database will pass through various phases, an indicator of the current institutional and feasibility status of each project is needed for the purpose of sorting and retrieving information on projects having the same status as it relates to new or additional development of power. This code shows the institutional or licensing/study status by the first character and the economic/engineering feasibility and environmental/social acceptability by the second character.

Requirement: Critical. The feasibility and acceptability status (second character code), should be determined during data compilation and should take into consideration regional protected area status of the site as determined by the Power Council. In general, the environmental/social acceptability status will be "unknown" unless information is available to indicate an exemption or license application for the project was denied, rejected or withdrawn because it was definitely socially or environmentally unacceptable. If a license or exemption has been granted for a project, and the project does not conflict with the Correct Database Entry

Source: The first character is machine generated based user input data in Items 217 (Current Project Status) and 227 (Status of Power Facilities). Second character is user input, protected areas established by the Power Council, both economic/engineering feasibility and environmental/social acceptability status should be "yes". Projects subject to relicensing should also be considered to be environmentally and socially acceptable, even though changes in the operation of the project may be required for environmental or social reasons. Economic feasibility may be determined on the basis of criteria established by BPA and the Power Council for development of the regional power supply forecast or on the basis of marketing studies by the developer.

Format: Alphanumeric (A2)

Item Number: 103 (cont)

Categories: Codes for First Character:

Source Codes for Item 103

Item 217	Item 227	Item 103	Description
PP-UNK, EX-UNK, LC-UNK, XX-UNK, Blank	AR, NE, UC, Blank	A	Unknown new project in the database or any other project where the current institutional status is unknown.
PP-PND	"	B	Preliminary permit pending.
PP-GTD	"	C	Preliminary permit granted.
PP-CAN, PP-REV, PP-DIS, PP-SUR, PP-DND, PP-VAC PP-REJ, PP-DUP,	"	D	Preliminary permit rejected, denied, expired, withdrawn, PP-EXP, PP-WDN, surrendered, canceled, terminated vacated, dismissed, rescinded, or FERC duplicate.
EX-PND, LC-PND, LA-PND	"	E	Exemption/License pending.
EX-GTD, LC-GTD, LA-GTD, RL-GTD	"	F	Exemption/License granted.
EX-$$$, LC-$$$ LA-$$$, RL-$$$ AL-$$$	OL	G	Exemption/License power on line.
EX, LA, or LC -CAN, -REV, -DIS, -SUR, -DND, -VAC, -EXP, -WDN -REJ, -DUP	AR,NE, UC, Blank	H	Exemption/License/License Amendment canceled, dismissed, denied, expired, rejected, revoked, surrendered, vacated, withdrawn, rescinded, or FERC duplicate.
XX-FFC	"	I	Non-Federal project not subject to FERC jurisdiction which is funded for construction.
XX-OPP	OL	J	Non-Federal project not subject to FERC jurisdiction with power on-line.

Location and Identification

Item Number: 103 (cont)

Categories: Codes for First Character:

Item 217	Item 227	Item 103	Description
FA-RSP, FA-RSC, FA-FSP, FA-FSC, FA-DDP, FA-DDC	AR, NE, UC, Blank	K	Corps of Engineers (COE) project econ study in progress; recon study completed; feasibility study in progress; feasibility study completed; detailed design progress; detailed design completed.
FA-FFC	"	L	COE project funded for construction.
FA-OPP	OL	M	COE project with power-on-line.
FA-NHS, FR-NHS, XX-NHS	AR, NE, UC, Blank	N	Existing or undeveloped FO-NHS, projects where data are based on the National Hydropower Study.
FA-UNK	"	O	COE project with status unknown.
FR-RSP, FR-RSC,	"	P	USBR project under study or design.
FR-FSP, FR-FSC, FR-DDP, FR-DDC FR-FFC	"	Q	USBR project funded for construction.
FR-OPP	OL	R	USBR project with power-on-line.
FR-UNK	AR, NE, UC, Blank	S	USBR project, status unknown.
FO-RSP, FO-RSC, FO-FSP, FO-FSC, FO-DDP, FO-DDC	"	T	Other Federal agency project under study or design.
FO-FFC	"	U	Other Federal agency project funded for construction or under construction.
FO-OPP	OL	V	Other Federal agency project with power-on-line.
FA-DEA,FR-DEA, FO-DEA	AR,NE, UC, Blank	W	Deauthorized Federal project.

Item Number: 103 (cont)

Categories: Codes for Second Character:

Second Character Code	Economic/ Environmental Engineering Feasibility	Social Acceptability
0	Unknown	Unknown
1	Yes	Unknown
2	No	Unknown
3	Unknown	Yes
4	Unknown	No
5	Yes	No
6	No	Yes
7	Yes	Yes
8	No	No

Location and Identification

Item Number: 104

Data Item: Computational Status

Description: Indicates the computational status of the projects included in the database as it relates to evaluation of the power potential and development cost of the projects using the Hydropower Analysis Model (HAM).

Requirement: Critical. Data compilers should give a status of NEWR to new sites that are entered into the database. After a project has been processed, the computer will assign the appropriate status except inactive designations ICTB and ICTC. Inactive designations should only be assigned when definitive information, such as FERC notices and orders, is available to indicate FERC has taken adverse action on a project or projects. When data errors that prevent successful completion of the desired machine analysis of power potential and costs are corrected, the user must change the status back to NEWR in order to run the project through HAM again.

Format: Alphanumeric (A4)

Categories: The following types of status codes are allowed:

Code	Description
NEWR	New record, indicates that the project is yet to be analyzed by HAM for power potential (MUST BE SET TO NEWR TO USE HAM, SHOULD BE USER ENTERED WHEN A PROJECT IS ADDED TO THE DATABASE AND MUST BE RESET AFTER HAM ANALYSIS, IF REANALYSIS IS DESIRED).
FXCA	Project unable to complete capacity default analysis (FXC in Item 871) due to input data errors.
FXCC	Project successfully processed using fixed capacity default analysis (FXC in Item 871).
FXAA	Project unable to complete default flow duration analysis (FXA in Item 871) due to input data errors.
FXAC	Project successfully processed using default flow duration analysis (FXA in Item 871).
FXMA	Project unable to complete default average monthly flow analysis (FXM in item 871) due to input errors.
FXMC	Project successfully processed using default average monthly flow analysis (FXM in Item 871).
FXFA	Project unable to complete a fixed average annual flow analysis (FXF in Item 871) due to input data errors.

Code	Description
FXFC	Project successfully processed using default average annual flow analysis (FXF in Item 871).
DURA	Project unable to complete flow duration analysis (DUR in item 871) due to input data errors.
DURC	Project successfully processed using flow duration analysis (DUR in Item 871).
XXXX	Analysis not possible. (XXX in Item 871.)
ICTA	Non FERC Project used for on-line, pumped storage, and duplicate projects in the database for reference purposes and for possible future processing. Used for on-line, pumped storage, and duplicate projects.
ICTB	FERC project considered inactive but saved in database to maintain a record of FERC actions. Includes projects receiving adverse FERC action for reasons other than favorable action taken on a competing project.
ICTC	FERC project considered inactive but saved in the database to maintain a record of FERC actions. Includes all projects on which FERC has taken adverse action due to favorable action on a competing project.

Example: NEWR

Location and Identification

Item Numbers:	105 - 106	
Data Items:	Last Update (yr/mo/day)	(105)
	Last Update (time of day)	(106)
Description:	Indicates the date and time of day (hours, minutes and seconds) of the last modification to a project record.	
Source:	Machine generated when modification or HAM analysis is successfully completed.	
Requirement:	User input is not required.	
Format:	Alphanumeric (A8)	
Example:	80/03/05	(105)
	08.11.44	(106)

Location and Identification

Item Number: 107

Data Item: Last Computation Date (yr/mo/day)

Description: Indicates date of last HAM analysis.

Source: Machine generated at time of HAM analysis.

Requirement: User input is not required.

Format: Alphanumeric (A8)

Example: 80/03/05

Location and Identification

Item Number: 108

Data Item: Inventory of Dams Identification Number.

Description: Identification number of dams included in the inventory of Dams. These ID numbers are entered in the database in order to cross reference NWHS database records with the National Inventory of Dams.

Source: National Inventory of Dams. The inventory and information about the inventory are available through the Inventory of Dams representative in each Corps District.

Requirement: The data item should be added or corrected as necessary to maintain a current cross-reference record with the National Inventory of Dams. Applies only to existing dams.

Format: Alphanumeric (A7)

Example: ID00130

Where:

ID = State Code
00130 = Sequential Number

Location and Identification

Item Number: 109

Data Item: FERC Project Number

Description: For projects subject to FERC jurisdiction, this is the project identification number assigned by FERC. For non-FERC projects, this is a number which is manually assigned when the project is added to the database. The purpose of assigning "FERC" numbers to non-FERC projects is to facilitate cross-referencing of projects and to provide for verification of the Project ID Number when a database record is to be modified.

Source: FERC Projects. User input based on assignment of the number by FERC. The number appears on all applications, notices, etc., on projects which are accepted for processing by FERC.

Non-FERC Projects. Assigned by the user when the project is added to the database.

Requirement: Critical. Must be provided in order to add a project to the database. Projects with multiple power plants (same FERC No.) should indicate whether the project data are for the 1st, 2nd, etc. power plant by substituting a letter (begin with A) for the separator character ("-") in the FERC number (see example below). The last two digits should be revised to show the current number on the most recent FERC Notice or Order.

Format: The FERC number is required to modify a project record. As a result, it is essential that the format shown below be strictly followed when entering data for a new project, or modifying data for a project already in the database. For projects with FERC numbers below 10000-00, a leading zero must be used (see example below). A "quasi-FERC" number is also required for non-FERC projects.

Item Number: 109 (cont)

In cases where projects have multiple power plants (i.e., more than one power plant is associated with a FERC number), a separate data form must be completed for each power plant. The data form should include the physical, hydrologic, cost, etc. data associated with that plant. Sometimes (especially cost estimates) values will be given for the total project instead of separately for each plant. In these cases, "totaled" project data should be entered on the first data form, i.e., the form identified by "A" in Item 109, as described below. If total project costs are entered on one of the forms, enter zeros for input costs on the other form(s). Each of these data forms will have the same FERC number but each power plant will be differentiated by entering an "A", "B", etc., after the four FERC digits and in place of the "-" (which is used to separate FERC number and the number of digits). Each data form will be analyzed separately by the computer and the results will be added together manually to get the total project costs and energy. For this reason, caution must be used so that physical characteristics and costs are not duplicated between forms. However, for some projects, hydrologic data does need to be repeated when the same water is used by two or more power plants.

Format: Alphanumeric (A8)

Example:

Site with Multiple PH	Site with single PH
03257A04	03257-04

Where:

03257	=	FERC Project Number = 03257
-	=	Separator; A=1st PH; B=2nd PH, etc.
04	=	Latest FERC Notice or Order number

As shown above, 0357A04 identifies FERC project 03257 as a multiple power plant project. A project data form with the number 03257B (item 109) would indicate the second power plant included in FERC project 03257, etc.

Location and Identification

Item Number: 110

Data Item: State Project Number

Description: Project identification number assigned by a state and used for tracking projects in their own database.

Source: User input. To be obtained from state agencies responsible for tracking study and development of projects within each of the four Northwest states.

Requirement: Optional. Is intended to provide for cross referencing of projects in the NWHS database with databases maintained by state agencies.

Format: Alphanumeric (A16)

Location and Identification

Item Numbers: 111 - 116

Data Items:

Primary State Code	(111)
Primary State Name	(112)
Primary County Code	(113)
Primary County Name	(114)
Nearest Town(115)	
Road Distance to Nearest Town	(116)

Description: Project location by state, county, nearest town and distance of the project from the nearest town by road. In cases where the dam/diversion and powerhouse are located in different counties and/or states, the primary county and state are those in which the powerhouse is located. In cases where the project is located on a state or county line, the primary state and county are those on the side of the river on which the powerhouse is located or from which the project is operated.

Source: In general, Primary County Name (Item 114) should be entered by the user. Other, related data items are then machine supplied by the edit program. See Table 2-1 (FIPS PUB 6-1).

Requirement: User input of Item 114 is critical. User input of Items 115 and 116 are required. Items 111, 112 and 113 are machine supplied by the edit program based on Items 101 and 114 . Both the name of the nearest town (Item 115) and the road distance (Item 116) can be easily retrieved from the USGS Quad Maps on which projects are located if this information is not given in an application. The road distance can be approximated using a map wheel and should begin at the powerhouse site rather than the diversion. If the nearest town indicated by the quad map conflicts with the application information, enter the name of town closest to the project. For projects located along the U.S. - Canadian border, the nearest town indicated should be the nearest town located in the U.S.

Format:

Alphanumeric	(A2)	(111)
Alphanumeric	(A2)	(112)
Alphanumeric	(A3)	(113)
Alphanumeric	(A20)	(114)
Alphanumeric	(A20)	(115)
Numeric	(F3.0)	(116)

Example:

41	Primary State Code	(111)
OR	Primary State Name	(112)
055	Primary County	(113)
SHERMAN	Primary County Name	(114)
THE DALLES	Nearest Town	(115)
2.	Road Distance to nearest town	(116)

Location and Identification

Item Numbers: 117 - 119

Data Items:		
	Secondary State Name	(117)
	Secondary County Code	(118)
	Secondary County Name	(119)

Description: Supplemental project location data for projects which are located on, or cross, state or county boundaries.

Source: Items 117 and 119 must be user entered based on project location data obtained from project documents or site location maps. Item 118 is machine generated based on information entered in Item 119. See Table 2-1 (FIPS PUB 6-1).

Requirement: Data are required to be entered, if applicable.

Format:			
	Alphanumeric	(A2)	(117)
	Alphanumeric	(A3)	(118)
	Alphanumeric	(A20)	(119)

Example:			
	WA	Secondary State Name	(117)
	039	Secondary County Code	(118)
	KLICKITAT	Secondary County Name	(119)

Table 2-1
COUNTIES AND COUNTY EQUIVALENTS OF THE STATES OF THE UNITED STATES
(Federal General Data Standard, Representations and Codes)
(SD Catalog No. 13.52:6-1) (CFSTI Accession No. NPS-FIPS-PUB-6-1)
FIPS 6-1

State Name: **California**
State Abbreviation: **CA**
State Code: **06**

Code	County Name	Code	County Name
015	Del Norte	091	Siskiyou
049	Modoc		

State Name: **Idaho**
State Abbreviation: **ID**
State Code: **16**

Code	County Name	Code	County Name
001	Ada	045	Gem
003	Adams	047	Gooding
005	Bannock	049	Idaho
007	Bear Lake	051	Jefferson
009	Benewah	053	Jerome
011	Bingham	055	Kootenai
013	Blaine	057	Latah
015	Boise	059	Lemhi
017	Bonner	061	Lewis
019	Bonneville	063	Lincoln
021	Boundary	065	Madison
023	Butte	067	Minidoka
025	Camas	069	Nez Perce
027	Canyon	071	Oneida
029	Caribou	073	Owyhee
031	Cassia	075	Payette
033	Clark	077	Power
035	Clearwater	079	Shoshone
037	Custer	081	Teton
039	Elmore	083	Twin Falls
041	Franklin	085	Valley
043	Fremont	087	Washington

Table 2-l (continued)

State Name: **Montana**
State Abbreviation: **MT**
State Code: **30**

Code	County Name	Code	County Name
001	Beaverhead	059	Meagher
003	Big Horn	061	Mineral
005	Blaine	063	Missoula
007	Broadwater	065	Musselshell
009	Carbon	067	Park
011	Carter	069	Petroleum
013	Cascade	071	Phillips
015	Chouteau	073	Pondera
017	Custer	075	Powder River
019	Daniels	077	Powell
021	Dawson	079	Prairie
023	Deer Lodge	081	Ravalli
025	Fallon	083	Richland
027	Fergus	085	Roosevelt
029	Flathead	087	Rosebud
031	Gallatin	089	Sanders
033	Garfield	091	Sheridan
035	Glacier	093	Silver Bow
037	Golden Valley	095	Stillwater
039	Granite	097	Sweet Grass
041	Hill	099	Teton
043	Jefferson	101	Toole
045	Judith Basin	103	Treasure
047	Lake	105	Valley
049	Lewis + Clark	107	Wheatland
051	Liberty	109	Wibaux
053	Lincoln	111	Yellowstone
055	McConde	113	Yellowstone Natl Park Part
057	Madison		

State Name: **Nevada**
State Abbreviation: **NV**
State Code: **32**

Code	County Name
007	Elko
013	Humboldt

Table 2-l(concluded)

State Name: **Oregon**
State Abbreviation: **OR**
State Code: **41**

Code	County Name	Code	County Name
001	Baker	037	Lake
003	Benton	039	Lane
005	Clackamas	041	Lincoln
007	Clatsop	043	Linn
009	Columbia	045	Malheur
011	Coos	047	Marion
013	Crook	049	Morrow
015	Curry	051	Multnomah
017	Deschutes	053	Polk
019	Douglas	055	Sherman
021	Gilliam	057	Tillamook
023	Grant	059	Umatilla
025	Harney	061	Union
027	Hood River	063	Wallowa
029	Jackson	065	Wasco
031	Jefferson	067	Washington
033	Josephine	069	Wheeler
035	Klamath	071	Yamhill

State Name: **Utah**
State Abbreviation: **UT**
State Code: **49**

Code	County Name	Code	County Name
001	Box Elder	033	Rich
005	Cache		

Table 2-l(concluded)

State Name: **Washington**
State Abbreviation: **WA**
State Code: **53**

Code	County Name	Code	County Name
001	Adams	039	Klickitat
003	Asotin	041	Lewis
005	Benton	043	Lincoln
007	Chelan	045	Mason
009	Clallam	047	Okanogan
011	Clark	049	Pacific
013	Columbia	051	Pend Oreille
015	Cowlitz	053	Pierce
017	Douglas	055	San Juan
019	Ferry	057	Skagit
021	Franklin	059	Skamania
023	Garfield	061	Snohomish
025	Grant	063	Spokane
027	Grays Harbor	065	Stevens
029	Island	067	Thurston
031	Jefferson	069	Wahkiakum
033	King	071	Walla Walla
035	Kitsap	073	Whatcom
037	Kittitas	075	Whitman
039	Klickitat	077	Yakima

State Name: **Wyoming**
State Abbreviation: **WY**
State Code: **56**

Code	County Name	Code	County Name
013	Fremont	029	Park
023	Lincoln	035	Sublette

Location and Identification

Item Numbers: 120 - 121

Data Items:

FERC Regional Office	(120)
FERC Power Supply Area	(121)

Description: Identifies the FERC regional offices with responsibility over projects in the NWHS database and the power supply area in which the project is located. Power supply area information is provided for possible application of regional power benefit data and for possible development of reports; by power supply area.

Source: Regional responsibilities of FERC offices with jurisdiction over the northwestern states as revised following closure of the Forth Worth office and creation of the Portland office are shown in Figure 2-1. FERC regional office codes for Item 120 are as follows:

Code for Item No 120	FERC Region (office)	States Included
PE	Portland (eastern branch)	ID, MT, WY
PW	Portland(western branch)	AK, OR, WA
SF	San Francisco	CA, NV, UT

Power supply areas (Item 121) for the states of ID, MT, OR and WA are shown in Figures 2-2 through 2-5. Power supply areas for states, which are partially included in the region because they are within NPD's geographical area of responsibility, are as follows:

State	County	Power Supply Area
California	All	45
Nevada	Elko	41
	Humboldt	46
Utah	All	41
Wyoming	All	31

Requirement: Item 120, for all locations, and 121, except for counties split between power supply areas (Lincoln, Linn and Polk in OR; Rosebud in MT; and, Park and Teton in WY), are machine supplied from the data validation table in the edit program. User input (Item 121) is required for counties, which are split between power supply areas.

Format:

Alphanumeric	(A2)	(120)
Alphanumeric	(A2)	(121)

Categories:

Codes (item 120)	FERC Region
SF	San Francisco
PE	Portland (eastern branch)
PW	Portland (western branch)

FIGURE 2-1
FEDERAL ENERGY REGULATORY COMMISSION
PORTLAND REGIONAL OFFICE

FIGURE 2-2
FERC POWER SUPPLY AREA (NO. 121), IDAHO

FIGURE 2-3
FERC POWER SUPPLY AREA (NO. 121), MONTANA

FIGURE 2-4
FERC POWER SUPPLY AREA (NO. 121), OREGON

FIGURE 2-5
FERC POWER SUPPLY AREA (NO. 121), WASHINGTON

Location and Identification

Item Numbers: 122 - 123

Data Items:
Electric Reliability Council (122)
Electric Reliability Council Sub-Region (123)

Description: Identification of the Electric Reliability Council (ERC) regions and sub-regions in which projects are located.

Source: Machine generated by the database maintenance program on the basis of the county in which a project is located.

Requirement: User input is not required.

Format:
Alphanumeric (A8) (122)
Alphanumeric (A4) (123)

Categories: Codes for Item 122

Codes	ERC
WSCC	Western Systems Coordinating Council
MARCA	Mid Continent Area Reliability Coordinating Agreement

Codes for Item 123

Code	ERC Sub region
	WSCC
NW	Northwest Power Pool
RM	Rocky Mountain Power Area
AN	Arizona-New Mexico Power Area
CN	California-Nevada Power Area
	MARCA
MA	All

Example:
WSCC Western Systems Coordinating Council (122)
NW Northwest Power Pool (123)

Location and Identification

Item Number: 124 - 125

Data Item: Corps Division (124)
Corps District (125)

Description: Indicates the location of sites by Corps divisions and districts using three character abbreviations.

Source: Machine supplied from the code validation table in the edit program based on user supplied district code in Item 101. Division and district codes are shown in Table 2-2. County assignments to districts are shown in Table 2-3.

Requirement: Critical. Although machine supplied, data compilers must review the district designation in Item 101 to insure that the project is assigned to the correct district when it is added to the database.

Format: Alphanumeric (A3)

Example: NPD (North Pacific Division) (124)
NPP (Portland District) (125)

Table 2-2

LIST OF CORPS DIVISION/DISTRICT CODES

Division/District

Code	Division	District
MRD	Missouri River	(All)
MRO	Missouri River	Omaha
NPD	North Pacific	(All)
NPA	North Pacific	Alaska
NPP	North Pacific	Portland
NPS	North Pacific	Seattle
NPW	North Pacific	Walla Walla
SPD	South Pacific	(All)
SPK	South Pacific	Sacramento
SPN	South Pacific	San Francisco

Table 2-3

COUNTY ASSIGNMENTS TO CORPS DISTRICTS

State Name: **California**

County	Corps/ District(s)
Del Norte	SPN/NPP
Modoc	SPK/SPN
Siskiyou	SPN/SPK

State Name: **Idaho**

County	Corps District(s)	County	Corps District(s)
Ada	NPW	Gem	NPW
Adams	NPW	Gooding	NPW
Bannock	NPW	Idaho	NPW
Bear Lake	SPK	Jefferson	NPW
Benewah	NPS	Jerome	NPW
Bingham	NPW	Kootenai	NPS
Blaine	NPW	Latah	NPW
Boise	NPW	Lemhi	NPW
Bonner	NPS	Lewis	NPW
Bonneville	NPW	Lincoln	NPW
Boundary	NPS	Madison	NPW
Butte	NPW	Minidoka	NPW
Camas	NPW	Nez Perce	NPW
Canyon	NPW	Oneida	NPW/SPK
Caribou	NPW/SPK	Owyhee	NPW
Cassia	NPW	Payette	NPW
Clark	NPW	Power	NPW
Clearwater	NPW/NPS	Shoshone	NPW/NPS
Custer	NPW	Teton	NPW
Elmore	NPW	Twin Falls	NPW
Franklin	SPK	Valley	NPW
Fremont	NPW	Washington	NPW

Location and Identification

State Name: **Montana**

County	Corps/ District(s)
Beaverhead	MRO
Big Horn	MRO
Blaine	MRO
Broadwater	MRO
Carbon	MRO
Carter	MR0
Cascade	MRO
Chouteau	MRO
Custer	MRO
Daniels	MRO
Dawson	MRO
Deer Lodge	NPS/MRO
Fallon	MRO
Fergus	MR0
Flathead	NPS
Gallatin	MR0
Garfield	MR0
Glacier	MRO
Golden Valley	MR0
Granite	NPS
Hill	MRO
Jefferson	MRO
Judith Basin	MRO
Lake	NPS
Lewis + Clark	MRO/NPS
Liberty	MR0
Lincoln	NPS
McCone	MR0
Madison	MRO
Meagher	MRO
Mineral	NPS
Musselshell	MR0
Park	MRO
Petroleum	MRO
Phillips	MRO
Pondera	MR0
Powder River	MRO
Powell	NPS
Prairie	MRO
Ravalli	NPS
Richland	MR0
Roosevelt	MRO
Rosebud	MRO
Sanders	NPS
Sheridan	MRO
Silver Bow	NPS/MRO
Stillwater	MRO
Sweet Grass	MRO
Teton	MRO
Toole	MR0
Treasure	MRO
Valley	MRO
Wheatland	MRO
Wibaux	MRO
Yellowstone	MRO
Yellowstone Natl. Park Part	MRO

State Name: **Nevada**

County	Corps/ District(s)
Elko	SPK/NPW
Humboldt	SPK
Missoula	NPS

Location and Identification

State Name: **Oregon**

County	Corps/ District(s)	County	Corps/ District(s)
Baker	NPW	Lake	NPP/SPX/SPN
Benton	NPP	Lane	NPP
Clackamas	NPP	Lincoln	NPP
Clatsop	NPP	Linn	NPP
Columbia	NPP	Malheur	NPW/SPK
Coos	NPP	Marion	NPP
Crook	NPP	Morrow	NPP
Curry	NPP/SPN	Multnomah	NPP
Deschutes	NPP	Polk	NPP
Douglas	NPP	Sherman	NPP
Gilliam	NPP	Tillamook	NPP
Grant	NPP/NPW	Umatilla	NPP/NPW
Harney	NPP/NPW	Union	NPW/NPP
Hood River	NPP	Wallowa	NPW
Jackson	NPP/SPN	Wasco	NPP
Jefferson	NPP	Washington	NPP
Josephine	NPP	Wheeler	NPP
Klamath	SPN/NPP	Yamhill	NPP

State Name: **Utah**

County Name	Corps/ District(s)
Box Elder	SPK/NPW
Cache	SPK
Rich	SPK

Table 2-3 (concluded)
State Name: **Washington**

County	Corps/ District(s)	County	Corps/ District(s)
Adams	NPS/NPW	Lewis	NPP/NPS
Asotin	NPW	Lincoln	NPS/NPW
Benton	NPS/NPP/NPW	Mason	NPS
Chelan	NPS	Okanogan	NPS
Clallam	NPP	Pacific	NPS/NPP
Clark	NPP	Pend Oreille	NPS
Columbia	NPW	Pierce	NPS
Cowlitz	NPP/NPS	San Juan	NPS
Douglas	NPS	Skagit	NPS
Ferry	NPS	Skamania	NPP
Franklin	NPW	Snohomish	NPS
Garfield	NPW	Spokane	NPS/NPW
Grant	NPS	Stevens	NPS
Grays Harbor	NPS		
Island	NPS	Thurston	NPS
Jefferson	NPS	Wahkiakum	NPP
King	NPS	Walla Walla	NPW
Kitsap	NPS	Whatcom	NPS
Kittitas	NPS	Whitman	NPW
Klickitat	NPP/NPS	Yakima	NPS/NPP

State Name: **Wyoming**

County Name	Corps/ District(s)
Fremont	SPK/NPW
Lincoln	SPK/NPW
Park	MRO/NPW
Sublette	SPK/NPW
Teton	NPW/MRO

Location and Identification

Item Number: 126

Data Item: Bonneville Power Administration (BPA) Area/District

Description: Identifies projects within the geographical areas of responsibility of the various area/district offices of BPA.

Source: Machine supplied from the code validation table in the edit program based on user input of the primary county name (Item 114). BPA area/district office and associated county information are shown in Table 2-4. Counties located within the 4-state region and counties outside the 4-state region but located within the jurisdictional boundaries of NPD which are not shown in Table 2-4 are outside of the BPA geographical area.

Requirement: User input is not required.

Format: Alphanumeric (A3)

Table 2-4
BPA AREA/DISTRICT

Lower Columbia Area - OP
Eugene District - OPG
Puget Sound Area - OS
Upper Columbia Area - OK
Montana District - OKK
Wenatchee District - OKN
Snake River Area - OW
Idaho Falls District - OWI
Boise District - OWL

BPA Area/District Office County Assignments

Idaho

Ada	OWL	Cassia	OWI	Lewis	OK
Adams	OWL	Clark	OWI	Lincoln	OWI
Bannock	OWI	Clearwater	OK	Madison	OWI
Bear Lake	OWI	Custer	OWI	Minidoka	OWI
Benewah	OK	Elmore	OWL	Nez Perce	OK
Bingham	OWI	Franklin	OWI	Oneida	OWI
Blaine	OWI	Fremont	OWI	Owyhee	OWL
Boise	OWL	Gem	OWL	Payette	OWL
Bonner	OK	Gooding	OWI	Power	OWI
Bonneville	OWI	Idaho	OK	Shoshone	OK
Boundary	OK	Jefferson	OWI	Teton	OWI
Butte	OWI	Jerome	OWI	Twin Falls	OWI
Camas	OWI	Kootenai	OK	Valley	OWL
Canyon	OWL	Latah	OK	Washington	OWL
Caribou	OWI	Lemhi	OWI		

Montana

Beaverhead	OKK	Lake	OKK	Pondera	OKK
Broadwater	OKK	Lewis + Clark	OKK	Powell	OKK
Cascade	OKK	Lincoln	OKK	Ravalli	OKK
Deer Lodge	OKK	Madison	OKK	Sanders	OKK
Flat Head	OKK	Meagher	OKK	Silver Bow	OKK
Gallatin	OKK	Mineral	OKK	Teton	OKK
Glacier	OKK	Missoula	OKK	Toole	OKK
Granite	OKK	Park	OKK		

T**able 2-4** (concluded)

Oregon

Baker	OWL	Harney	OW	Morrow	OW
Benton	OPG	Hood River	OW	Multnomah	OP
Clackamas	OP	Jackson	OPG	Polk	OP
Clatsop	OP	Jefferson	OW	Sherman	OW
Columbia	OP	Josephine	OPG	Tillamook	OP
Coos	OPG	Klamath	OW	Umatilla	OW
Crook	OW	Lake	OW	Union	OW
Curry	OPG	Lane	OPG	Wallowa	OWL
Deschutes	OW	Lincoln	OPG	Wasco	OW
Douglas	OPG	Linn	OPG	Washington	OP
Gilliam	OW	Malheur	OWL	Wheeler	OW
Grant	OWL	Marion	OP	Yamhill	OP

Washington

Adams	OK	Grays Harbor	OS	Pierce	OS
Asotin	OK	Island	OS	San Juan	OS
Benton	OW	Jefferson	OS	Skagit	OS
Chelan	OKN	King	OS	Skamania	OP
Clallam	OS	Kitsap	OS	Snohomish	OS
Clark	OP	Kittitas	OKN	Spokane	OK
Columbia	OW	Klickitat	OW	Stevens	OK
Cowlitz	OP	Lewis	OS	Thurston	OS
Douglas	OKN	Lincoln	OK	Wahkiakum	OP
Ferry	OK	Mason	OS	Walla Walla	OW
Franklin	OW	Okanogan	OKN	Whatcom	OS
Garfield	OK	Pacific	OS	Whitman	OK
Grant	OKN	Pend Oreille	OK	Yakima	OW

Location and Identification

Item Number: 127

Data Item: Bureau of Land Management (BLM) State Office

Description: Indicates the location of projects within the geographical areas of responsibility of the various state offices of the BLM. This will enable BLM offices to identify projects affecting Federal lands and to update land status and withdrawal records.

Source: Machine supplied from the code validation table in the edit program based on user input of the state (Item 101). A listing of BLM state offices and their jurisdictional areas are shown under categories below.

Requirement: User input is not required.

Format: Alphanumeric (A16)

Categories:

BLM State Office	Jurisdictional Area
Alaska	Alaska
Arizona	Arizona
California	California
Colorado	Colorado
Eastern States	All other CONUS States
Idaho	Idaho
Montana	Montana, N Dakota, and S Dakota
Nevada	Nevada
New Mexico	New Mexico, Oklahoma + Texas
Oregon	Oregon + Washington
Utah	Utah
Wyoming	Wyoming, Nebraska + Kansas

Location and Identification

Item Numbers: 128 - 129

Data Item:
- Base Map Reference (128)
- USGS Map References (129)

Description: References to small (Item 128) and large (Item 129) scale maps on which the projects Len the data base are located. USGS maps on which projects locations are shown are located and on which site layouts, drainage areas, etc.-, have been drawn are included in the NWHS Central Files at BPA.

Source: User input from regional base maps provided by the Corps (NPD) and USGS maps. The regional base maps to be used in completing Item 128 are 1:500,000 scale maps as shown in Figure 2-6. These regional maps are digitized and are part of the NWHS database and information retrieval system. The largest scale USGS map should be used with 7.5 minute topographical maps being preferred.

Requirement: Critical. For Item 128 include map source, name, and scale as shown in Figure 2-6 (see example below). For Item 129 include the map name(s), state, and map scale (see example below). If a project (diversion and powerhouse) covers more than one quad map, the principal map is the one on which the powerhouse is located. The following guidelines regarding maps apply: (1) retain maps in the NWHS Central Files for future reference; (2) list the principal quad map in Item 129 and others as appropriate; (3) do not abbreviate the first word of the name of the principal map (USGS). The location of each project should be drawn on an overlay of the USGS map, including dam/diversion, waterway, penstock and powerhouse.

Format:
- Alphanumeric (A36) (128)
- Alphanumeric (A40) (129)

Example:
- CRT LOWER SNAKE RIVER BASIN 500K (128)
- WOOD BUTTE/TROY OREG 7.5 (129)

FIGURE 2-6
KEY TO PACIFIC NORTHWEST REGION BASE MAPS

Region Number	Map Name (Item 128)
1	CRT CLARK FK-FLATHD-KOOT-SPK R 500K
2	CRT UPPER COLUMBIA RIVER BASIN 500K
3	CRT YAKIMA RIVER BASIN 500K
4	CRT UPPER SNAKE RIVER BASIN 500K
5	CRT MIDDLE SNAKE RIVER BASIN 500K
6	CRT LOWER SNAKE RIVER BASIN 500K
7	CRT MIDDLE COLUMBIA RIVER BASIN 500K
8	CRT COWLITZ-LEWIS RIVER BASIN 500K
9	CRT WILLAMETTE RIVER BASIN 500K
10	CRT LOWER COLUMBIA RIVER BASIN 500K
11	CRT WA COASTAL + PUGET SOUND 500K
12	CRT OREGON COASTAL BASIN 500K
13	CRT KALAMATH RIVER BASIN (ORE) 500K
14	CRT OREGON CLOSED BASIN 500K
15	CRT CENTRAL MONTANA 500K
16	CRT EASTERN MONTANA 500K
17	CRT CANADIAN-OF COLUMBIA R BASIN 500K
18	CRT BEAR RIVER BASIN 500K

Location and Identification

Item Number: 130

Data Item: WRC Hydrologic Unit

Description: A nationally consistent designation of hydrologic cataloging units as defined by the Water Resources Council within which existing and potential projects are located.

Source: State Hydrologic Unit Maps and general location of each project on these maps. Maps are available from the USGS at the following address:

Branch of Distribution
US Geological Survey
Box 25286, Federal Center
Denver, CO 80225

Requirement: Yes (critical)

Format: Alphanumeric (A8)

Example: 17010111 Where:
17 = Region
01 = Sub-region
01 = Accounting Unit
11 = Cataloging Unit

Location and Identification

Item Number: 131

Data Item: Sub-region Name

Description: General project location by the name of the water resource sub-region within which a project is located.

Source: Machine generated from the data validation table in the edit program based on user input of Item 130. The list of Water Resources Council identified sub-regions is shown in Table 2-5.(Note: The sub-region name is identified by code as the third and fourth characters of the WRC hydrologic unit--refer to instructions for Item 130).

Requirement: User input is not required.

Format: Alphanumeric (A20)

Table 2-5

WRC HYDROLOGIC REGIONS AND SUBREGIONS - IDAHO, MONTANA, OREGON, WASHINGTON, AND PARTS OF CALIFORNIA, NEVADA, UTAH, AND WYOMING

Region Code	Region	Sub-region Code	Sub-region Name
10	Missouri	01	St. Mary
		02	Missouri Headwaters
		03	Missouri-Marias
		04	Missouri-Musselshell
		05	Milk
		06	Missouri-Poplar
		07	Upper Yellowstone
		08	Bighorn
		O9	Tongue-Powder
		10	Lower Yellowstone
		11	Little Missouri
		12	Cheyenne
16	Great Basin	01	Bear
		02	Great Salt Lake
		04	Humboldt
17	Pacific Northwest	01	Kootenai
		02	Upper Columbia
		03	Yakima
		04	Upper Snake
		05	Middle Snake
		06	Lower Snake
		07	Middle Columbia
		08	Lower Columbia
		09	Willamette
		10	Coastal
		11	Puget Sound
		12	Oregon Closed
18	California	01	North Coastal
		02	Sacramento Basin

Location and Identification

Item Number: 132

Data Item: FERC Region/Basin/Stream/Site Code

Description: Cross-reference of projects in the database with the FERC inventory of developed and undeveloped hydropower sites.

Source: User input from:

1. "Hydropower Sites of the United States Developed and Undeveloped, River Basin Maps showing site locations (conventional, pumped storage, retired)," Federal Energy Regulatory Commission, Office of Electric Power Regulation.

2. FERC computer database status listings. (Listings will be periodically obtained and provided to users by NPD).

Requirement: Should be input for projects that have been assigned codes by FERC. The data must be entered in the format shown in the example below, including periods and dashes.

Format: Alphanumeric (A16)

Example: 1701.400-OOOEA
.435

Where:

17	= Water Resources Region
01	= Sub-region
.400	= 1st order tributary
.435	= 2nd order tributary
435-000	= Mainstem 2nd order tributary
E	= Site alpha
A	= Primary site

Note: Additional description of this code is contained in source 1 shown above. Ignore digits following alpha characters.

Location and Identification

Item Numbers: 133 - 136

Data Item:

Name of Principal Stream	(133)
Name of Secondary Stream - 2	(134)
Name of Secondary Stream - 3	(135)
Name of Secondary Stream - 4	(136)

Description: Name of stream or streams from which water would be used for power production. For multiple diversion projects, the principal stream is the one that contributes the most water to the total flow used for power generation. Secondary streams by definition contribute less to total water quantity used by a powerplant.

Source: Developer reports, FERC notices and USGS topographical maps.

Requirement: Critical. Standard abbreviations shown in Table 1-1 and in the examples below should be used to insure that stream names are stored within the allowed space. To facilitate sorting of projects on stream name, streams with compound names that indicate that the particular stream is a tributary of another stream should be entered with the name of the main stream first followed by the tributary designation. For example, South Fork Rock Creek should be entered as ROCK CR, S FK (note that standard abbreviations should be used). Once the names of the streams are listed under Items 133-136, the order should remain consistent throughout the data form. Enter physical characteristics associated with each stream across the form in the same order as the names in items 133-136. The same is true of Items 401-404 (drainage areas), 141-144 (stream miles) and Items 146-149 (survey locations). Instream flow requirements (420), duration flows (Item 425), monthly flows (Item 427) and average annual flow (Item 424). Should depict the combined flows of all streams that will be contributing to a powerplant.

Format: Alphanumeric (A38) (133-136)

Examples:

Stream Name	Correct Database Entry
East Fork South River	SOUTH R, E FK
East Fork River	EAST FORK R
Glady Fork Sandy River	SANDY R, GLADY FK
Unnamed Trib Salmon River	SALMON R TRIB
Little North Fork Willamette River	WILLAMETTE R, LTL N FK

Note: The mainstream name before creek or river should be left unabbreviated. An unnamed tributary should be identified by the stream into which it flows, followed by the abbreviation, TRIB.

Location and Identification

Item Numbers: 137 - 140

Data Items:

Dam/Diversion Latitude	(137)
Dam/Diversion Longitude	(138)
Powerhouse Latitude	(139)
Powerhouse Longitude	(140)

Description: Location of each project in the database in terms of latitude and longitude. The data are used (1) in HAM as the basis for machine selection of stream gage in power potential analyses which use machine selected gages; (2) by HAM to verify that user selected gages (Item 405) are in the same hydrologic sub-region as the project site; and, (3) to facilitate development of computer generated site location maps, etc.

Source: User analysis of projects to locate dam and powerhouse locations on USGS topographical maps.

Requirement: Critical. Accuracy should be to the nearest second. The principal stream diversion location should be entered in the database and multiple diversion projects, locations should be entered on the transparency. See Appendix C for mapping instructions. Locations of secondary stream diversions are identified using the stream mile and survey location parameters. When entering data in the database, it is essential that the format in the example below be followed precisely as shown.

Format: Alphanumeric (A10) (137-140)

Example: The location of project XXX0000 which is 45 degrees 18 minutes and 30 seconds latitude and 124 degrees, 9 minutes and 36 seconds longitude would be entered as follows:

	Input Format	Output Format
Latitude	45.18.30	45 18 30
Longitude	124.09.36	124 09 36

Note: The above input format requires all entries to begin in the first column. Leading zeros are not required.

Location and Identification

Item Numbers: 141 - 145

Data Items:

Dam/Diversion Stream Mile	(141)
2nd Dam/Diversion Stream Mile	(142)
3rd Dam/Diversion Stream Mile	(143)
4th Dam/Diversion Stream Mile	(144)
Powerhouse Stream Mile	(145)

Description: The location of a dam/diversion structure and powerhouse in terms of the stream mile of the stream on which the structure is located as measured from the confluence of that stream with another stream whole name becomes the name of the combined streams.

Source: User input from the topographical map study or from project permit/license applications or other reports by the developer

Requirement: Yes. To be completed during initial map studies.

Format: Numeric (F6,1) (141-145)

Note: Stream miles should correspond to stream names shown in items 133 - 136 where applicable. If PH is on a different stream than the dam/diversion, then the PH stream mile (145) should be "0. and a comment (158) stating the PH stream mile on the PH stream should be included.

Location and Identification

Item Numbers: 146 - 151

Data Items:

Dam/Diversion Survey Location	(146)
2nd Dam/Diversion Survey Location	(147)
3rd Dam/Diversion Survey Location	(148)
4th Dam/Diversion Survey Location	(149)
Powerhouse Survey Location	(150)
Meridian	(151)

Description: Describes the location of the dam/diversion and powerhouse by township, range, section, and subsection. This information is needed by BLM and other Federal and state agencies to identify lands that are required by a project.

Source: Survey locations must be user input based on location of projects on USGS Quadrangle maps. Item 151 is machine generated from the data validation table in the edit program. In addition to map studies, location information on projects located on Federal lands may be available from BLM since they are responsible for monitoring development by water-power potential of rivers and streams on Federal lands.

Requirement: Items 146-150, critical. These data must be user input in the format shown in the example below. This method of showing survey locations is explained and illustrated in Figure 2-7. In cases where lesser subdivisions of a section (identification of the 1/4 section should always be possible) cannot be obtained the unknown values should be entered as "X". User input is not required for Item 151.

Format:

Alphanumeric	(A12)	(146-150)
Alphanumeric	(A2)	(151)

Note: For unsurveyed lands in topographical maps, user input should be "unsurveyed" and also in project lands. There should be a comment (158) noting the township and range (eg. Unsurveyed project lands in 09N20W).

Item Numbers: 146 - 151 (cont)

Categories:

State	Item 151 Code	Meridian
California	HM	Humboldt
California/Nevada	MD	Mt. Diablo
Idaho	BM	Boise
Montana	PM	Principal
Oregon	WM	Willamette
Utah	SL	Salt Lake
Washington	WM	Willamette
Wyoming	SP	Sixth Principal
Wyoming	WR	Wind River

A map of the principal meridians of the Federal system of rectangular surveys for the Western States is shown in Figure 2-8.

Example: O9N20W2lDAA (146,147,148,149,150)

Where: O9N is the township
20W is the range
2lDAA is the section and subsections

Note: Leading zeros for township and range are required.

WM (151)

Where: WM = Willamette meridian

Figure 2-7

LAND DESCRIPTION: TOWNSHIP - RANGE - SECTION - SUBSECTION

Townships are located by a numbered grid system consisting of Range and Township lines. The Township lines ran east and west of a principal meridian. The Range lines run north and south of an established base line. Thus, a Township is described as a number N or S of the baseline, and a number E or W of the principal meridian.

A desirable modification of the usual method of describing a location on a map is one used by several agencies, including the USGS. A location is specified by using 12 characters - the first three give the Township; the next three the Range; the next two the section number within the Township; and the next four the location within the quarter section (160 acres), the quarter-quarter section (40 acres), the quarter-quarter-quarter section (40 acres) and the quarter-quarter-quarter-quarter section (2-1/2 acres). The subdivisions of the 640-acre section are designated as A, B, C, and D in a counterclockwise direction, beginning in the northeast quadrant. For example, if a lake is located in Township 9 North, Range 20 West, Section 21, the description would be O9N20W21DAA. The letters DAA indicate the lake is in the NE 1/4 of the NE 1/4 the SE 1/4. As indicated above, a still further breakdown to a 1-1/2 acre area is possible by using a fourth letter (A, B, C, or D).

FIGURE 2-8

PRINCIPAL MERIDIANS OF THE FEDERAL SYSTEM OF RECTANGULAR SURVEYS

United States Department of the Interior
Bureau of Land Management
Principal Meridians and Base Lines
Governing the Western States, 1968

Location and Identification

Item Numbers: 152 - 153

Data Items:
Transmission Interconnection Latitude (152)
Transmission Interconnection Longitude (153)

Description: The latitude and longitude of the point where power lines from a proposed or existing project would connect with an existing transmission line (proposed project) or the regional transmission grid (existing project). For existing projects, the connection point is considered to be the point where ownership of the line changes, e.g., Corps project connecting to a BPA line, or in the case of single-ownership, where the line from the project ceases to serve just the project.

Source: User input based on map studies.

Requirement: Critical for new projects. Optional for existing projects.

Format: Alphanumeric (A10) (152-153)

Example: See instructions for items 137-140.

Location and Identification

Item Numbers: 154 - 157

Data Items:

Project Lands	(154)
Project Lands - 2	(155)
Project Lands - 3	(156)
Project Lands - 4	(157)

Description: The township, range and section numbers of a sections within a township that would be directly impacted by a project; i.e., required in part or in whole for project facilities including dams, waterways, powerhouses, roads and transmission lines.

Source: User input from information available in applications or reports on the project or from map studies.

Requirement: Critical. These parameters are for distinguishing the survey sections; directly affected by the project. Data entry should begin in Item 154, Project Lands - 1. The first entry and subsequent entries should be limited to a single township and range. Thus, only one entry would be used if all affected sections are located in the same township.

Format: Alphanumeric (A24) (154-157)

Example: 092N20Wl,2,3,10-13

Where: O9N is the Township
20W is the Range
1,2,3, 10-13 are Sections

Note: More than 2 consecutive sections need not all be entered individually but may be entered as shown above for sections 10, 11, 12, and 13. Leading zeros for township and range are required.

Location and Identification

Item Number: 158

Data Item: Comment on General Location

Description: A general comment describing the location of the project relative to local points of reference, etc.

Source: User input from information available in permit/license applications or other reports.

Requirement: Enter unique information such as direction or nearness to a landmark or a town other than that mentioned in Item 115. Repeated reference to other parameters such as county, state, or stream is not necessary and waste of storage space.

Format: Alphanumeric (A48)

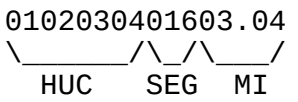
Location and Identification

Item Numbers: 159 - 162

Data Items:

EPA Stream Reach Code, Powerhouse	(159)
EPA Stream Reach Code, 1st Dam/Diversion	(160)
EPA Stream Reach Code, 2nd Dam/Diversion	(161)
EPA Stream Reach Code, 3rd Dam/Diversion	(162)

Description: The EPA stream reach codes are unique identifiers for stream and shoreline reaches. They consist of the eight-digit Water Resource Council Hydrologic Unit Code (see Item 130), a three-digit segment number, and a four-digit fixed decimal number as shown in the following example.



Note that these data items contain only the SEG and MI portions of the EPA stream reach code. The HUC is stored in Item 130. Following are descriptions of the components of the EPA stream reach code.

HUC: Hydrologic Unit Code (See Item 130).

SEG: A three-digit segment number. This number, in combination with the HUC number, forms an eleven-digit number that uniquely identifies a sector. Sectors are lineal elements of streams and shorelines. At present, their average length is close to 10 miles.

MI: This number is a mile point, which identifies a reach within a sector. It is a four-digit fixed decimal number with two digits to the left and two digits to the right of the decimal point. This number, combined with the eleven-digit sector number, consisting of the Hydrologic Unit Code (HUC) and the segment number (SEG), forms a reach number, which is unique within the United States. The value of this number is the distance measured from the base of the sector to the base of the reach. The "base" of a stream sector is its downstream end; the same is true for a stream reach. A more detailed description and

Item Numbers: 159 - 162 (cont)

explanation of the EPA stream reach coding system, including a description and explanation of the application of stream reach codes to lakes and shorelines, is contained in the report, Reach File Manual, December l985, Environmental Protection Agency, Criteria and Standards Division, Nonpoint Sources Branch (WH-585) 401 M Street, SW, Washington, DC 20460.

Source: EPA stream reach codes are determined and assigned by EPA. BPA has the responsibility for coordinating with EPA to obtain current stream reach code listings.

Requirement: Critical. The EPA stream reach codes are required to interface the NWHS database with the Pacific Northwest Rivers Study database. Stream reach codes are to be determined from the above-mentioned listings and added to the database as part of normal data compilation activities. The powerhouse stream reach is that reach of the stream where powerhouse discharges. Dam/diversion stream reaches correspond to physical locations of the first four dam/diversions shown in Items 133-136 (name of stream), Items 141-144 (stream mile) and Items 146-149 (survey location). It is important that the same dam/diversion sequence is maintained for these related data fields: i.e., Items 133, 141, 146 and 160 all should be in reference to the same (first) dam/diversion. For waterways, which have not been assigned reach codes, if the next downstream segment has been assigned a segment number, enter that number plus 99.99 for the mile. For other waterways without assigned reach codes, the segment and mile codes should be entered as 99999.99 .

Examples:

Input	Output
1603.4	01603.40

Note: User input of the decimal point is required.

Format: Alphanumeric (A8)

Project Status

Item Numbers: 201-240

General Description and Data Compilation Instructions:

The purpose of this section of the database is to record the status of projects in terms of study, development, operation, ownership, and relationship with other projects and project proposals. During data compilation project status data items must be reviewed and updated to insure that the information in the database is current. The current institutional status of the project should be shown Item 217. It should be noted that nearly all data on a project can change between a permit and a license. Changes in project status specifically require review and update of the following Data Items:

Item Changed	Potentially Affected Data Items
202	103, 203, 204, 217, 218, 239, 240
206	103, 207, 208, 217, 218, 239, 240
210	103, 211, 217, 218, 239, 240 (Other physical status and cost items extracted from license documents)
227	103, 221, 223, 224, 228, 229, 301, 302, 308-311, 312, 315, 321, 327, 348, 352, 356, 361, 808, 809, 814, 815, 822-845, 871

Other data, which may be affected, must be determined on a case-by-case basis through a detailed review of documents containing information on the change in project status.

Project Status

Item Numbers: 201, 205, 209

Data Items:

FERC Permit Filing Date (yr/mo/day)	(201)
FERC License Filing Date (yr/mo/day)	(205)
FERC Exemption Filing Date (yr/mo/day)	(209)

Description: The date of filing of any of the types applications with FERC as indicated by the FERC notice regarding the project. Applications, which are not accepted by FERC for filing, will not have a filing date.

Source: User input from information contained in FERC notices, applications or FERC project status computer listings. The best source is the FERC "Notice of Application Filed with the Commission". This document is normally the initial public notice of application and is often included in subsequent orders affecting the application. The filing date is typically shown as Item C of the Notice, Date Filed.

Requirement: Required. Where only year or year and month are known, the missing month and day or day information should be entered as 01. Use of 00 (an invalid date value) to indicate an unknown value will result in an error message from the Edit Program.

Format: Alphanumeric (A8) (201,205,209)

Examples: 83/06/20 (year/month/day)

Note: Leading zeros; e.g., 06, must be used.

Project Status

Item Numbers: 202, 206, 210

Data Item:
- FERC Permit Status (202)
- FERC License Status (206)
- FERC Exemption Status (210)

Description: The institutional status of projects as related to a FERC action on an application for a permit, license, or exemption, excluding actions taken on license amendments and applications for project relicensing. It should be noted that the FERC status of the project may or may not reflect the physical or operational status of the project. The current institutional status of projects is shown in Item 217. For specific reference to the physical or operational status of the power facilities of a project, see Item 227. Definitions of the status codes for Items 202, 206, and 210, which are listed below under the heading, Categories, are shown in Table 3-1.

Source: User input from FERC notices and applications or FERC project status computer listings.

Requirement: Critical. Project status is to be initially determined or verified during project data compilation. Status codes of projects in residence on the database and with data compilation completed are to be reviewed and updated by BPA on the basis of information contained in notices and other FERC documents and in project status computer printouts obtained from FERC.

Format: Alphanumeric (A3) (202,206,210)

Categories:

Code	Status
CAN	Canceled or terminated
DIS	Dismissed
DND	Denied
DUP	FERC Duplicate
EXP	Expired
GTD	Granted
PND	Pending
REJ	Rejected
REV	Revoked or Rescinded
SUR	Surrendered
UNK	Status Unknown
VAC	Vacated
WDN	Withdrawn

Example: GTD

Project Status

Table 3-1

DEFINITIONS OF FERC STATUS CODES

Code	Code Definition
CAN =	Cancel or Terminate (result of FERC action) Negative action taken by the Commission, on an application while it is still pending (after it is accepted, as a filing).
DIS =	Dismissed (result of FERC action) Negative Commission action on an intervention or some other periphery legal filing attached to an application.
DND =	Denied (result of FERC action) Negative action taken after a permit, exemption or license has been granted or some other decision has been made on a project by the Commission (sometimes because of competition).
DUP =	FERC Duplicate Cases where the same project has been assigned more than one project number. This results (occasionally) when FERC loses track of number assignments to projects and a new number is assigned to a project, which has already been assigned a number, thus leaving the project with two numbers (or more). It may also result from the issuance of a new number for a project whose license has been allowed to expire. In either case, all project numbers are retained in the database with "duplicate" ones being coded "DUP".
EXP =	Expired (result of non-action by the applicant) Indication that the current date is later than the expiration date of the permit or license, thus indicating that the permit or license has expired and is no longer in effect.
GTD =	Granted (result of FERC action) Favorable action taken by the commission in issuing an order granting a permit, license or exemption.

Table 3-1 (concluded**)**

Code	Code Definition
PND =	Pending
	Indication that an application for a permit, exemption, license, or relicense has been accepted for filing by FERC but that action by the Commission on the disposition of the application has not yet been taken.
REJ =	Rejected (result of FERC action)
	Action taken by Commission before an application has been accepted as a filing, because the document does not conform to FERC regulations.
REV =	Revoked or Rescinded (result of FERC action)
	Issuance of a permit, exemption or license is reversed (negated) by the Commission because the applicant did not comply with the terms and conditions of the issuance.
SUR =	Surrendered (result of applicant action)
	Negative action by the applicant after the Commission has made an issuance or some other decision.
UNK =	Status is unknown.
VAC =	Vacated (result of FERC action)
	The granting of a permit, exemption or license was an erroneous action on the part of the Commission, so Commission negated the initial issuance (for instance, permits are automatically issued after 120 days unless this period is suspended with a notice, so a permit issuance can occur by mistake).
WDN =	Withdrawn (result of applicant action)
	Negative action taken by the applicant while an application is still pending.

Project Status

Item Numbers: 203, 207, 211

Data Items:
FERC Permit Effective Date (yr/mo/day) (203)
FERC License Effective Date (yr/mo/day) (207)
FERC Exemption Effective Date (yr/mo/day) (211)

Description: The date, as noticed by FERC, that a permit, license or exemption was issued. This date is the date on which the issuance of the permit, license or exemption became effective. Effective dates are established by FERC and are usually stated within paragraph A of the Director Orders text in the order issuing the permit, license or exemption. Usually, the order states that the effective date is the first day of the month the order is issued or the following month.

Source: User input from information contained in FERC notices or FERC project status listings.

Requirement: Required. To be entered during initial compilation for the project and subsequently updated by BPA. As a basis for verifying the accuracy of the database, BPA will periodically obtain a project listing from FERC and compare it with the database.

Format: Alphanumeric (A8) (203,207,211)

Example: 86/06/01 (year/month/day)

Note: See General Instructions for data entry format requirements.

Project Status

Item Numbers: 204, 208

Data Items: FERC Permit Expiration Date (yr/mo/day) (204)
FERC License Expiration Date (yr/mo/day) (208)

Description: The date on which a permit (or license) will expire as noticed by FERC or as determined by adding the life of a permit (or license) to the effective date of the permit (or license). Also, within paragraph A of the Director Orders text in the order issuing permit or license.

Source: User input from information contained in FERC notices, FERC project status listings, or estimated from the term and effective date of the permit or license.

Requirement: Required. Expiration dates are to be computed on the basis of the term and effective date of the permit or license and entered on the database during initial data compilation for projects. In cases where extensions are granted, the expiration date should be revised accordingly.

Format: Alphanumeric (A8) (204, 208)

Example: 85/06/30 (year/month/day)

Note: See General Instructions for data entry format requirements.

Item Number: 205

Data Item: FERC License Filing Date

Description: (See Item 201)

Item Number: 206

Data Item: FERC License Status

Description: (See item 202)

Item Number: 207

Data Item: FERC License Effective Date

Description: (See Item 203)

Item Number: 208

Data Item: FERC License Expiration Date

Description: (See Item 204)

Item Number: 209

Data Item: FERC Exemption Filing Date

Description: (See Item 201)

Item Number: 210

Data Item: FERC Exemption Status

Description: (See Item 202)

Item Number: 211

Data Item: FERC Exemption Effective Date

Description: (See Item 203)

Project Status

Item Numbers: 212 - 215

Data Items:		
	Applicant/Developer	(212)
	Applicant/Developer Contact	(213)
	Applicant/Developer Address	(214)
	Applicant/Developer Telephone Number	(215)

Description: The name of the applicant for a FERC project or the developer of a project which does not require FERC approval (Item 212). And, the name, address and telephone number of the person or entity identified as the contact for the project.

Source: User input from information obtained from applications submitted to FERC, FERC notices, and through direct contact with developers not subject to FERC jurisdiction.

Requirement: Required. (Item 212 critical). For Federal agencies (Corps and Bureau of Reclamation), the address of the field office responsible for project study and development should be shown. Names of individuals should be entered, last name first as shown in the example. To facilitate sorting of data by developer name and/or address, it is important that commas be used as shown in the example below, and that the dash be included in the telephone number. When multiple names are present, use a "+" for the word "and."

Format:			
	Alphanumeric	(A28)	(212)
	Alphanumeric	(A28)	(213)
	Alphanumeric	(A48)	(214)
	Alphanumeric	(A12)	(215)

Example:

Item	Example Entry
212	HYDRO DEVELOPER INC
213	ANYBODY, AJ
214	PO BOX 4, ANYTOWN OR 97140
215	503 221-3333

Note. See General Instructions for instructions on data entry on names and the use of abbreviations.

Project Status

Item Number: 216

Data Item: FERC Applicant/Developer Code

Description: Code for use in sorting projects by category of applicant or developer.

Source: User input in accordance with the codes shown below on the basis of information in applications submitted to FERC or other documentation available on a project.

Requirement: Yes (critical)

Format: Alphanumeric (A2)

Categories:

Code	Category
First Character	
F	Federal
H	Hybrid (private & municipal application)
M	Municipal
P	Private
S	State
O	Other
Second Character	
A	US Army Corps of Engineers
B	Indian Tribes
C	County
D	Public Utility District
F	US Forest Service
I	Investor Owned Company (non-utility)
M	Bureau of Land Management
P	Private Individual or Partnership
R	US Bureau of Reclamation
S	State
T	Town or City Owned Utility
U	Investor Owned Utility
W	Irrigation or Other Water District, Coops or Companies
X	REA Coop
O	Other

Example: FR (Federal-Bureau of Reclamation)

Project Status

Item Numbers: 217, 218

Data Items:

Current Project Status	(217)
Date of Current Status (yr/mo/day)	(218)

Description: The current institutional or study status of a project and a reference date indicating how recent the current status is. Project status (Item 217), as it relates to study and licensing of non-Federal projects and study and authorization of Federal projects, is shown by a five-character code where the first two characters indicate the type of application filed by a developer with FERC and the last three characters indicate the action (or inaction) taken by FERC. For Federal projects the first two characters indicate the developer agency and the last three, the status; of the project with respect to study or authorization. Codes for Item 217 are shown below under the heading, Categories, and are defined in Table 3-1. The operational status of power facilities at projects in the database is shown in Item 227.

For FERC projects the date of the current status (Item 218) is the date on which FERC issued the notice or order which established the current status. Normally this date is shown in parenthesis immediately under the title of the order of notice. (This date may be different from the "effective" dates entered in previous items.) For Federal projects, the initial date will be the date when the data form was completed. This date will be revised periodically as required by changes in the status of these projects.

Sources: User input from information contained in FERC notices or project status listings and Federal agency and other developer reports.

Requirement: Yes (critical). This item will be used to identify and sort projects by computer according to their current status. If only the first two characters of Item 217 are entered, the machine will enter UNK (unknowns in the last three character fields.

Format:

Alphanumeric	(A6)	(217)
Alphanumeric	(A8)	(218)

Project Status

Item Numbers: 217, 218 (cont)

Categories:

First Two Characters

FERC Projects

Code	Type of Application
AL	Annual license
LA	License Amendment
LC	License
PP	Preliminary Permit
RL	Relicense
EX	Exemption
XX	Non Federal Project without FERC status or not in FERC's jurisdiction

Federal Projects

Code	Developer
FA	Corps of Engineers
FR	Bureau of Reclamation
FO	Other Federal

Last Three Characters

FERC Projects

Code	Type of Application
CAN	Canceled or terminated
DIS	Dismissed
DND	Denied
DUP	FERC duplicate
EXP	Expired
GTD	Granted
PND	Pending
REJ	Rejected
REV	Revoked or rescinded
SUR	Surrendered
UNK	Unknown
VAC	Vacated
WDN	Withdrawn

Federal Projects

Code	Developer
DEA	Deauthorized
DDC	Detailed Design Completed
DDP	Detailed design in progress
FFC	Funded for construction
FSC	Feasibility study completed
FSP	Feasibility study in progress
NHS	Based on National Hydropower Study
ONP	Operating non-power project
OPP	Operating Power Project
RSC	Recon study completed
RSP	Recon study in progress
UNK	Unknown

Example: PP-GTD (Preliminary permit granted) (217)
83/06/30 (year/month/day) (218)

Note: Leading zeros are required. Where the year is known but month and/or day are missing enter 01 for the unknown values. Use of 00 to indicate an unknown month or day will result in an error message.

Project Status

Item Numbers: 219, 220, 225, 226, 230, 231

Data Items:

Landowner	(219)
Landowner Code	(220)
Owner of Dam	(225)
Owner of Dam Code	(226)
Owner of Power Facilities	(230)
Owner of Power Facilities Code	(231)

Description: The name of the owner of lands (219), dams (225), and power facilities (230), which are included in an existing project or would be utilized by a proposed project. Power facilities include the powerhouse structure and generating equipment (turbines generators, etc.).

Sources: Applications submitted to FERC or other documentation available on a project.

Requirement: Yes. Data compilers should standardize names and use abbreviations where appropriate. Federal agencies should be uniformly designated according to the list of owners in Table 3-2. Standard codes for use in Items 220, 226, and 231 are listed below under the section, Categories. If there is more than one owner, list as many as possible beginning with the most prominent (largest ownership share). Since only one owner code is allowed, it should correspond to the most prominent owner. Data on land ownership should be compiled for all projects. However, ownership of dams and power facilities apply only to facilities that exist or are under construction.

Format:

Alphanumeric	(A28)	(219,225,230)
Alphanumeric	(Al)	(220,226,231)

Categories: Codes for use in items 220 226 231:

Code	Name or Type of Owner
A	U.S. Army Corps of Engineers
C	County
D	Utility District
F	U.S. Forest Service
I	Investor Owned Company
M	U.S. Bureau of Land Management
P	Private Individual or Partnership
R	U.S. Bureau of Reclamation
S	State
T	Town or City
U	Investor Owned Utility
X	Other Federal
O	Other

Table 3-2

UNIFORM OWNER DESIGNATIONS (FEDERAL AGENCIES)

Name	Abbreviation	Type	
U.S. Department of Agriculture			
A.	Soil Conservation Service	USDA SCS	X
B.	Forest Service (Also include Forest name after USFS)	USFS	F
Federal Energy Regulatory Commission		FERC	X
U.S. Department of Interior.			
A.	Fish and Wildlife Service	DOI FWS	X
B.	Geological Survey	DOI GS	X
C.	Office of Surface Mining Reclamation and Enforcement	DOI SMR	X
D.	Bureau of Land Management	DOI BLM	M
E.	Bureau of Reclamation	DOI USBR	R
F.	Bureau of Indian Affairs	DOI BIA	X
G.	National Park Service	DOI NPS	X
Corps of Engineers:			
A.	Missouri River Division	DAEN MRD	A
	1. Kansas City District	DAEN MRK	A
	2. Omaha District	DAEN MRO	A
B.	North Pacific Division	DAEN NPD	A
	1. Alaska District	DAEN NPA	A
	2. Portland District	DAEN NPP	A
	3. Seattle District	DAEN NPS	A
	4. Walla Walla District	DAEN NPW	A
C.	South Pacific Division	DAEN SPD	A
	1. Sacramento District	DAEN SPK	A
	2. San Francisco District	DAEN SPN	A
Department of Defense			
A.	U.S. Army	DOD USA	X
B.	U.S. Navy	DOD USN	X
C.	U.S. Air Force	DOD USAF	X
D.	U.S. Marine Corps	DOD USMC	X
Others not listed above		USA Agency Name	X

Project Status

Item Number: 221

Data Item: Status of Dam

Description: Indication of the physical status of the dam or diversion structure or other man-made water structure, as it currently exists, regardless of its current use. For example, an existing dam currently operated for irrigation would be coded "OP" (project in operation). Proposed dams, diversions and other waterway structures are identified sites and should be coded "IS".

Source: User input from available sources.

Requirement: Yes

Format: Alphanumeric (A2)

Categories:

Code	Description
IS	Identified site
NO	Existing dam which is not operational
RN	None required, intake only
OP	Existing dam, which is in operation
UC	Dam, which is under construction

Example: OP

Project Status

Item Number: 222

Data Item: Purposes

Description: Identifies authorized purposes, actual purposes, or probable purposes, served or to be served by existing or proposed projects.

Source: User input from Inventory of Dams, developer reports, or other available sources.

Requirement: Yes. List all uses for which the project is currently operated and any proposed purposes (such as hydropower). If known, purposes should be listed in descending order of importance (benefits).

Format: Alphanumeric (A12)

Categories:

Code	Description
C	Flood Control
D	Debris Control
F	Fisheries
H	Hydropower
I	Irrigation
N	Navigation
P	Farm Pond
Q	Water Quality
R	Recreation
S	Water Supply
Z	Other

Example: HFN

Project Status

Item Numbers: 223, 224

Data Items: Dam Construction Beginning Date (yr/mo) (223)
Dam Construction Completion Date (yr/mo) (224)

Description: The month and year, of the initiation and completion of construction, of an existing or under construction dam, or other diversion structure. For the purposes of the database, the dam should be considered to be completed when it becomes available to serve a major purpose for which it was constructed, e.g., flood control, irrigation, power, etc.

Source: User input from records of the builder and/or operator of the dam or other structure or other information sources.

Requirement: Optional, but should be included if the information is available.

Format: Alphanumeric (A5) (223,224)

Example: 39/01 (January 1939)

Note: Leading zeros are required. Where only the year is known enter 01 for the month. Use of 00 to indicate an unknown month will result in an error message.

Item Number: 225

Data Item: Owner of Dam

Description: (See Item 219)

Item Number: 226

Data Item: Owner of Dam Code

Description: (See Item 219)

Project Status

Item Numbers: 227

Data Item: Status of Power Facilities

Description: The operational status of power facilities that are a part of the proposed or existing project whose features, etc., are described in the project data form. It also provides for identification of additional "assured" resources, which are scheduled for construction or acquisition by BPA or other utilities in the region.

Source: User input from FERC applications and other project reports. The status of additional "assured" resources is determined from the current PNUCC Northwest Regional Forecast as supplemented by BPA.

Requirement: Critical. This information is required to identify existing and "additional assured" projects which should be excluded from power supply forecasts. As a proposed project is developed, this item should be updated to reflect the current status of power facilities included in the proposed project. If the project is an existing power project without additional power potential, the status of the existing facilities should be indicated. To avoid possible double counting of resources in making resource supply forecasts, "additional assured" resources must be identified by the code "AR." When the status of power facilities changes from "NE" to "OL", capacity and energy estimates must be changed from new potential to existing.

Note: Also include comments for operating projects with additional capacity and energy where 227 is changed form "OL" to "NE" since we want the additions included in the supply forecast.

Format: Alphanumeric (A2)

Categories:

Code	Status
AR	Additional assured resource
NE	Non-existing
OL	On-Line
UC	Under construction

Note: Additional assured resources include projects for which a developer has obtained all licenses for construction and has made a commitment to proceed with construction. This includes resources which are currently held in a state of preservation but the developer has a specified a commercial operation date.

Project Status

Item Numbers: 228, 229

Data Items:

Powerhouse Construction Beginning Date (yr/mo)	(228)
Power-on-Line Date (yr/mo)	(229)

Description: For existing projects, the dates (year and month) when construction was initiated on the power facilities of the project and when the project first began producing power. Unless other information is available for projects where the powerhouse was constructed as part of the initial project, initiation of construction of the powerhouse should be assumed to be the same as the initiation of the construction of the dam.

Note: Only fill in for projects on-line.

Source: User input from information available through the developer, news media, or other sources.

Requirement: Required if available.

Format:

Alphanumeric (A5)	(228)
Alphanumeric (A5)	(229)

Example:

81/07 (year/month)	(228)
83/11 (year/month)	(229)

Note: Leading zeros are required. Where only the year is known, enter 01 for the month. Use of 00 (zero) to indicate an unknown month will result in an error message.

Item Number: 230

Data Item: Owner of Power Facilities

Description: (See Item 219)

Item Number: 231

Data Item: Owner of Power Facilities Code

Description: (See Item 219)

Project Status

Item Number: 232

Data Item: Comment on Existing Dam or Power Facilities

Description: General comment to describe any unique condition that might require specific explanation.

Source: User input from available information.

Requirement: Optional.

Format: Alphanumeric (A48)

Project Status

Item Numbers: 233, 234

Data Items:		
	Owner of Transmission Line	(233)
	Owner of Transmission Grid	(234)

Description: The name of the owner of the existing transmission line to which the project would be connected (Item 233) and the owner of the grid to which the transmission line is connected (Item 234).

Sources: User input from information included in applications filed with FERC or included in other reports about the project.

Requirement: Yes, if readily available in primary references on the project. Standard abbreviations should be used where appropriate (see Table 1-1).

Format:			
	Alphanumeric	(A28)	(233)
	Alphanumeric	(A28)	(234)

Example:		
	Grays Harbor PUD	(233)
	BPA	(234)

Project Status

Item Numbers: 235, 236

Data Items:		
	Power Purchaser	(235)
	Terms of Power Purchase Contract	(236)

Description: The name of the power purchaser (Item 235) and the general terms of the power purchase contract (Item 236) including derivation, price, future adjustment allowances, etc.

Source: User input from information from the Applicant/Developer or Power Purchaser.

Requirement: Yes, required for a proposed project if a contract has been negotiated and for all operating projects where a power sales contract is in effect.

Format:			
	Alphanumeric	(A28)	(235)
	Alphanumeric	(A48)	(236)

Project Status

Item Numbers: 237, 238

Data Items:		
	Indian Treaty Rights	(237)
	Comments on Treaty Rights	(238)

Description: An indication of whether or not (enter Y for yes or N for no in Item 237) the project would directly impact any Indian Treaty rights. Comments in item 238 should summarize the nature and extent of the impact. Also, the tribe(s) involved should be identified.

Source: User input from available information.

Requirement: Yes, if identified in primary references. Tribal organizations will be given an opportunity to review the database and provide additional information. If it is "probable" that treaty rights would be impacted, a "Y" for Yes should be entered in Item 237 and an appropriate comment entered in item 238. If no information is available, enter a "U" for unknown.

Format:			
	Alphanumeric	(Al)	(237)
	Alphanumeric	(A48)	(238)

Categories: Codes for Item 237

Code	Definition
Y	Yes
N	No
U	Unknown

Project Status

Item Numbers: 239, 240

Data Items:

Dependent or Independent	(239)
Comment on Project Dependency	(240)

Description: Identifies a project as an independent project or as an alternative (dependent project) to some other project proposal. This item (239) also indicates which one of the possible alternative projects should be included in estimates of total regional potential. Dependent projects are those that compete for the same physical location or water source such that the construction and operation of one would preclude or exclude the construction and operation of the others. Independent projects are those whose construction and operation would not compete with any other project in terms of location or source of water. Assigning each project one of three codes indicates project dependency. These codes are "I" (independent), "D" (dependent or competing project which is determined to be the "best" alternative proposal for site development), and "E" (dependent or competing project which excluded from development by a "better" alternative). The codes are described further in the section, "Categories." Information in item 240 identifies competing projects.

Source: User input based on analysis of project location and operational and institutional status. Principal sources of information available for use in determining dependency are USGS topographical maps with all proposed and existing projects properly located; notices from FERC; project data stored in the database; and information or lists from Corps districts and Bureau of Reclamation offices, summarizing detailed hydropower studies. The following database information is considered relevant and may be retrieved from the database through the *Routine Reports* sub-menu, "Project Interdependency Report":

Data Item	Description
101	Project Identification Number
109	FERC Project Number
129	USGS Map Reference
130	WRC Hydrologic Unit
133	Name of Principal Stream
137	Dam/Diversion Latitude
138	Dam/Diversion Longitude
141	Dam/Diversion Stream Mile
146	Dam/Diversion Survey Location
217	Current Project Status
239	Dependent or Independent
240	Comment on Project Dependency
307	Height of Dam
335	Length of Impoundment

Item Numbers: 239, 240 (cont)

Requirement: Critical. Data compilation is not complete until project dependency has been determined. Project dependency is established based on conflicting demands for a source of water or physical location. Projects are considered dependent if two or more projects compete for the same site or use of the same water. This holds true regardless of the type of project or the type of action taken or application filed on the site: preliminary permit, exemption from licensing, license, or Federal project proposal. As part of database maintenance, project dependency should be reviewed and revised, if appropriate, whenever a new project is entered on the database or the status of a "D" project changes.

A suggested sequence of steps to follow in determining project dependency and for revising project dependency data as new projects are added to the database is as follows:

Example:

E	(239)
8713(D) 3487 3715	(240)

Note: To facilitate cross-referencing of projects, the comment should list all of the competing projects in numerical order with the dependent project first that is identified in parentheses following the project FERC number (item 109). It should be noted that, since all projects in the database have unique FERC numbers in item 109 even if they are not subject to FERC licensing and regulations, values in item 109 can be used for all projects. Generally, only the "unique" portion of the number should be used; i.e., leading zeros can be left off as well as the last two digits of numbers actually assigned by the FERC. In cases where a project operates with a re-regulating dam (or is the re-regulating dam for another project), it would be appropriate to indicate that relationship in item 240.

Item Numbers: 239, 240 (cont)

1. Identify potentially dependent projects by obtaining a printout of information from the database (see data items listed above) for all projects within each hydrologic unit.

2. Identify all obviously independent projects through use of USGS quadrangle maps and/or project location information included in the printout. All of these projects should be coded independent by inputting an "I" in item 239.

3. Evaluate mutually inclusive projects (projects which compete for the same physical location) to determine which project represents the "best" proposal or alternative. The best proposal or alternative (projects in cases where a system type of operation is proposed) should be coded dependent by inputting a "D" in Item 239. All other projects should be coded "E" to indicate that their development is precluded by the development of another project(s).

Comments in Item 240 should list all of the competing projects by FERC or project ID number. Although selection of the best project for possible development at a particular location requires engineering judgment, the following example situations will establish a basis for consistency in the application of engineering judgment for most cases:

a. Competing FERC projects. In this situation, if all of the proposals have a known FERC status other than pending, the project with granted or higher active status should be coded "D" and all other projects should be coded "E". In cases where more than one project has the same active status, i.e., pending, the project with the earliest filing date should be coded "D" provided that all applicants are of the same type, e.g., private. In cases of competition between public and private applicants, the public applicant has preference even though the public application has a later filing date. In most instances of such competition, the relative status of projects at the same location can be found in FERC order, notices, or letters (of rejection), or in the printout from the database (Item 217). FERC notices and orders, which announce the granting of a permit, exemption, or license to one applicant usually, list competing applications, which are denied (not granted). In cases where all of the proposals have an inactive FERC status, the proposal with the latest active status date should be coded " D".

Item Numbers: 239, 240 (cont)

b. Competing FERC and Federal (non-FERC) proposals. Due to current Federal agency policies, which establish preference for private development of hydropower projects, a FERC proposal should be selected over a proposal by a Federal agency. The only exception to this rule is when a congressionally authorized project (authorized for construction) is involved. In such cases, the Federal project should be selected (coded "D").

c. Competing Federal or other non-FERC projects. If the competing projects are all non-FERC projects, the "best" project must be determined by engineering judgment. However, if the projects were included in the NHS database, the use of dependency codes assigned during that study should be considered. In general, the objective should be to select, as the best project, the proposal that provides the highest level of site development while minimizing the average cost of energy. If unit energy costs and NHS coding are not available, preliminary selection of the "best" project should be made on the basis of judgment. In such instances, the dependency coding will be reviewed and revised, where appropriate, based on results of evaluation of the projects with the Hydropower Analysis Model.

Format:

Alphanumeric	(Al)	(239)
Alphanumeric	(A48)	(240)

Categories: Codes for use in Item 239:

Code	Description
I	Independent project whose development and operation would not adversely impact upon the development or operation of any other project. Also may include a project that would be operated together with other projects as a system.
D	Project whose development and operation would adversely impact upon the development and operation of another project. A project in this category is the project that is considered to be the best alternative among all projects competing for use of a site (physical location).
E	Projects whose development and operation are precluded by a category "D" project. Theoretical power potential available through development of these projects will not be included in summaries of regional power potential.

Physical Characteristics

Item Number: 301

Data Item: Site Arrangement Classification

Description: Describe the layout and physical status of existing and potential hydropower projects. Site arrangement classification codes listed below under categories specify possible project layout and status alternatives which are defined as follows:

Layout of Operation

o Run-of-River Reservoir Non-storage projects in which the powerhouse is an integral part of the dam. These are projects which are normally operated to pass inflow and do not have a significant amount of storage relative to inflow, e.g., Bonneville Dam. These projects typically would not have a significant seasonal variation in power head.

o Diversion Run-of-River project in which water is diverted from the natural stream for any distance such that the powerhouse is structurally separate from the diversion structure. In general, the diversion structure height of these projects should be limited to a maximum of 10 feet above the streambed. Power head at these projects is normally constant.

o Run-of-River Reservoir/ w/Diversion Run-of-river project in which water is drawn from the a reservoir through pressurized outlet which is connected directly to a penstock leading to a remote powerhouse. Head created by dam, therefore, contributes to total power head which remains relatively constant throughout the year.

o Storage Reservoir Projects utilizing a dam and storage reservoir for regulation of stream flow for power production and other purposes. The powerhouse is integral with the dam structure. Power head at these projects typically will vary significantly on a seasonal basis.

o Storage Reservoir w/Diversion Reservoir operation same as above with the exception that water is drawn from the reservoir through a pressurized conduit leading to a powerhouse which is structurally separate from the dam. Power head typically will vary significantly due to seasonal fluctuations of pool elevation.

Item Number: 301 (cont)

o Canal Projects located on an irrigation canal either as a diversion or run-of-river layout and discharges into the same or another irrigation canal.

o Conduit Project layouts such as municipal, fish hatchery, or irrigation conduit facilities.

o Off-Stream or Pumped Storage Storage reservoir projects which are not located on the river which is their primary (greater water than 50 percent) source of water. Water may be conveyed into the reservoir either by gravity flow, by pumping, or by a combination of both.

Status of Waterway Structure

o Existing Protects where the dam/diversion/canal or other waterway features are now existing and require relatively minor (compared to new construction) modification. Also includes projects involving renovation of retired power plants.

"Existing" projects are assumed to include certain structure that are presently in place, require few modifications, and will be utilized as part of the proposed project. Machine cost estimates will not be made for these physical project components. If an existing structure requires significant renovation, enter the project as "Undeveloped." The name is true of "Existing-with-Power" projects, except the assumption is made that the project is currently operational and producing electricity. Below is a table indicating the physical features that the computer considers to be in place and functional for both "Existing" and “Existing-with-Power” projects.

Layout-of-Operation	Existing Water Structure*
Run-of-River	Dam/Diversion
Diversion	Dam/Diversion or Weir
Reservoir	Dam
Reservoir w/Diversion	Dam
Canal	Canal
Conduit	Conduit

Item Number: 301 (cont)

*Intake structures, waterways, penstocks, powerhouses, turbomachinery, etc. are not assumed to be present. If these structures/machinery exist and will not be replaced, enter the appropriate codes in data items which describe the physical characteristics of these features.

Except for those structures listed above, the computer will make cost estimates based on the physical characteristics data input by the data compiler. If some other usable project component is now in place (such as a waterway or intake structure), then the appropriate code must be input. The only way the computer can determine whether or not a project feature exists is by the presence or absence of correct input codes.

o Existing w/ Power Projects where all features including power facilities are existing and currently operational. Minor structural upgrading required in new proposal (compared to new construction). Projects with power on line and no additional power potential should be coded existing with power. Physical project characteristics should be entered but new potential should be shown as zero for both capacity (809) and energy (815).

o Undeveloped Project proposals where completely new major project features are proposed, or significant modifications are required. Includes breached dams.

Source: User input based on a review of information available about the project and map studies.

Requirement: Yes (critical). Required for cost computations by the Hydropower Analysis Model. This item is the basis for computer selection of algorithms for power potential and Cost estimating purposes. In addition, the absence of this data item is used as a flag to identify projects for which data compilation work has not been completed. Therefore, this data item must not be completed until data compilation work is essentially complete.

Format: Alphanumeric: (Al)

Item Number: 301 (cont)

Categories: Site Arrangement Classification Codes:

Layout of Operation

Status of Waterway Structures	Run-of-River Res	Diversion	Run of-River Res w/ Diver	Stor Res	Storage Res w/ Diver	Canal	Conduit	Off-Stream or Pumped Storage
Existing	A	D	G	J	M	P	S	V
Existing with Power	B	E	H	K	N	Q	T	W
Undeveloped	C	F	I	L	O	R	U	X

Physical Characteristics

Item Numbers: 302 - 326

Special Notes:

1. A project consists of dams, waterways, penstocks, etc. required to support a power plant. Therefore, a separate data form and project are required for each power plant.

2. Items 302-326 have multiple entry fields (up to 9) to permit entry and analysis of data on projects where a power plant utilizes multiple diversions. Note that item number 301 can have only one entry.

3. To obtain the cost of a project, computer hydrology and cost algorithms will analyze and sum the costs of all of the dams/diversions, waterways, and penstocks required to supply the power plant with water.

4. Computer format for entering or modifying data in these fields for multiple entries is the same as for other unpaired array data items.

5. For critical items without default values or codes, the field must be completed. Blank spaces left for these items will be fatal. When default codes are available and no information is available about that item, the field may be left blank and the machine will assign a code. See instructions on specific items for default codes and definitions.

6. For multiple diversion projects, complete the data for physical characteristics using "columns." The order that values are written on the form for each diversion should correspond to the stream names given in items 133-136, and the stream miles and survey locations given in items 141-144 and 146-149, respectively. Note that the database is designed to store data (stream names, stream mile, survey locations, and drainage area) for just 4 streams. If additional streams are involved, these may be optionally entered in item 158, if space permits.

7. For multiple diversion projects utilizing one powerhouse but separate turbines having unique head and flow combinations, (i.e., the penstock inlets are at different elevations) enter the data the same as any other project with more than one diversion. If the head or elevations are different for each diversion, then enter the appropriate values. In these cases it is especially important to maintain the consistency described in 6 above.

Physical Characteristics

Item Numbers: 302,362

Data Items:

Type and Difficulty of Dam/Diversion	(302)
Comment on Other Type of Dam	(362)

Description: Identifies the type (structural and materials) of dam or diversion, and describes the difficulty of constructing the dam/diversion structure. Computer algorithms in HAM are limited to calculations based on only two types of dam/diversion structures. For projects involving a dam/diversion structure over 10 feet in height (defined as dams the dam type included in HAM is rolled concrete (RC). For projects with dams/diversions 10 feet or less in height (defined as a diversion) the type of diversion structure is rockfill (ER). Although these default dam/diversion types will be used in making machine cost estimates, an appropriate type code based on the following guidelines (see categories below) or the developer proposal should be input along with the appropriate difficulty code. The difficulty code is also used to determine the difficulty of constructing fish passage facilities.

Source: User input from available sources.

Requirement: Yes, Required for both new and existing structures. Enter the appropriate codes for dam type and construction difficulty (Item 302). Input a code combination (item 302) for each diversion if a project utilizes multiple diversions. Codes for type of dam and construction difficulty are shown below under categories. A comment to describe the materials, type and condition of the dam/diversion structure (Item 362) is required for "other" dam types (Item 302 = OT) and should be provided for the remaining categories as appropriate.

Format:

Alphanumeric	(A3)	(302)
Alphanumeric	(A48)	(362)

Item Numbers: 302, 362 (cont)

Categories: **Type of Dam (lst two characters)**

The type of dam/diversion that is constructed for each project is dependent upon several factors. These factors include: the topography of the site; the crest length of the dam; the height of the dam; and the project arrangement. The various types of dams are described as follows:

Code	Dam Type and Description
RE	Earthfill **Topography:** Broad, flat valley **Crest Length:** Moderate to long **Height**: Up to 300 ft **Protect Arrangement:** When used for storage reservoir type projects with either an integral or remote powerhouse, earthfill dam construction requires a penstock to be built through the base of the a dam. The choice between earth and rockfill is usually based on the availability of materials
ER	Rockfill **Topography:** Broad, flat valley **Crest Length:** Moderate to long **Height:** Up to 300 ft. **Project Arrangement:** When used for storage reservoir type projects with either an integral or remote powerhouse, rockfill dam construction requires a penstock to be built through the base of the dam. The choice between earth and rockfill is usually based on the availability of materials.

Item Numbers: 302, 362 (cont)

Code	Dam Type and Description
PG	Concrete Gravity **Topography:** Narrow valley, steep sided canyon **Crest Length:** Short to moderate **Height:** Any **Project Arrangement:** Depending on the height, this type can be used for either run-of-river or storage projects. Powerhouses are usually integral with the dam.
CB	Buttress **Topography:** Steep sided canyon **Crest Length**: Moderate to long **Height:** Any **Project Arrangement:** Used mainly for existing dams of this type. Buttress dams are rarely specified in proposed projects.
VA	Arch **Topography:** Steep sided, narrow, broad bottom canyon **Crest Length:** Moderate **Height:** Any **Protect Arrangement:** Usually used for storage projects and are built to considerable height. Powerhouses are not usually integral because of the topographical constraints imposed by steep, narrow canyons.
MV	Multiple Arch **Topography:** Steep sided, narrow, broad bottomed canyon **Crest Length:** Long **Height:** Any **Project Arrangement:** Usually used for storage projects and are built to considerable height. Powerhouses are not usually integral because of the topographical constraints imposed by steep, narrow canyons.

Item Numbers: 302, 362 (cont)

Code	Dam Type and Description
RC	Rolled Concrete **Topography:** Broad valley **Crest Length:** Any **Height:** Up to 300 ft. **Project Arrangement:** Project configurations suitable for this type of material are similar to those of earthfill or rockfill.
TC	Timber/steel crib **Topography:** Small narrow canyon **Crest Length:** Short, less than 60 ft. **Height:** Less than 10 ft. **Project Arrangement:** Used for diversion projects operated run-of-river.
OT	Other
NR	None Required
MM	Unknown. Machine defaults to rockfill for heights of 10 feet or less and rolled concrete for heights greater than 10 feet.

Item Numbers: 302, 362 (cont)

Construction Difficulty (3rd character)

Code	Difficulty Description
1	Easy: Compact soils; bedrock at a depth of 8 ft: stream in mildly sloping canyon(20% to 50% side slopes).
2	Medium: Very erosive soils with some large boulders; some blasting required; less than 20% or 50% to 80% side slopes.
3	Difficult: Significant amounts of rock; large amount of blasting required; steep side slopes (greater than 80%); adverse conditions for diverting stream flow during construction.
E	Suitable dam exists.
M	Unknown (machine defaults to medium (2))
N	None required.

Example: ER3

Physical Characteristics

Item Number: 303

Data Item: Site Cross-sectional Classification

Description: Provides an indication of valley shape at the dam for use in determining the total volume of embankment required and dam costs. Valley shape is defined as the shape of the valley at the longitudinal axis of the dam/diversion.

Source: User input from available topographical information such as FERC applications, developer/applicant studies or topographic maps. Sites should be assigned one of the valley shape codes listed below.

Requirement: Yes, required for all undeveloped reservoir and reservoir with diversion projects (projects with Site Arrangement Classifications of C, I, L, and 0). Optional for existing reservoir projects. If not user supplied, machine will use the code "A" as the default value, if required for cost computations.

Format: Alphanumeric (Al)

Categories:

Code	Valley Shape	Valley Shape Coefficient
A		Ks = 2.85
B		Ks = 1.00
C		Ks = 0.60
M	Unknown (machine defaults to Valley shape "A".	
N	Not Applicable	
(blank)	Data field initialization value	

Where H = Height of Dam (ft)
L = Crest Length (ft)
Ks = Valley Shape Coefficient

Item Number: 304

Data Item: Crest Length of Dam/Diversion (ft)

Description: Physical length of the crest of the dam or diversion structure in feet. Used in making machine estimates of dam/diversion costs. Input a value for each diversion if the project utilizes multiple diversions.

Source: User input from information included in FERC applications, other developer reports, or from analysis of USGS topographical maps.

Requirement: Yes, critical for all undeveloped projects. Optional for existing projects.

Format: Numeric (F6.0)

Item Number: 305

Data Item: Elevation of Top of Dam (ft msl)

Description: Elevation in feet with respect to mean sea level of the physical top of a dam structure.

Source: User input from information included in FERC applications or from analysis of USGS topographical maps.

Requirement: Yes, for all undeveloped sites. Optional for existing sites.

Format: Numeric (F6.0)

Item Number: 306

Data Item: Hydraulic Height of Dam/Diversions (ft)

Description: Height of maximum water level behind dam or diversion structure in feet above streambed (not from the base of the foundation). This height is associated with the maximum storage volume and serves as an indication of gross power head only if PH is integral to dam. Otherwise, gross head can be indicated by the elevation at the top of dam (item 305) minus (-)PH tailrace elevation (item 331). The hydraulic height could be greater than the structural (physical) height (Item 307) such as for weir type dams or diversions.

Source: User input from available sources.

Requirement: Yes, required for all undeveloped sites. Optional for existing sites.

Format: Numeric (F5.0)

Item Number: 307

Data Item: Height of Dam/Diversion (ft)

Description: Height of physical dam or diversion structure in feet above streambed (not above the base of the foundation). Used for machine cost computations.

Source: User input from available sources.

Requirement: Yes, critical for all undeveloped sites. Optional for existing sites.

Format: Numeric (F5.0)

Physical Characteristics

Item Number: 308

Data Item: Difficulty of Intake

Description: This item serves as a rating for describing the difficulty of constructing the intake structure. An intake is generally a "headwork's" box structure (usually concrete) which serves as a supporting and funneling mechanism for diverting water from a river, reservoir or canal into a pipeline or another canal. Used for machine cost calculations.

Source: User input from available sources.

Requirement: Yes, critical for all undeveloped sites and for existing projects with additional power potential. Enter the appropriate code number if one or more of the corresponding listed conditions exists. Input a code for each diversion if project utilizes multiple diversions.

Format: Alphanumeric (Al)

Code	Difficulty Description
1	Easy: Compact soils, bedrock at a depth of 8 feet: stream in mildly sloping canyon (20% to 50% side slopes); no cofferdam required.
2	Medium: Very erosive soils with some large boulders; some blasting required; less than 20% or 50% to 80% side slopes; small cofferdam required.
3	Difficult: Significant amounts of rock; large amount of blasting required; steep side slopes (greater than 80%); adverse conditions for diverting stream flow during construction; cofferdam required or excessive excavation required; access difficult.
E	Suitable Intake Exists
M	Unknown (machine defaults to medium (2)).

Physical Characteristics

Item Number: 309

Data Item: Intake Required

Description: Indicates whether or not a new or replacement intake structure will be required as part of the project, and if so, what type of intake will be installed. Used for machine cost computations.

Source: User input from available sources.

Requirement: Yes, critical. If not supplied by user, machine will default to the assumption that a new standard intake is required.

Format: Alphanumeric (Al)

Categories:

Code	Description
T	Tower intake
S	Standard "headwork's" type intake
N	No intake required
M	Unknown (machine defaults to standard intake)
E	A suitable intake currently exists

Physical Characteristics

Item Number: 310

Data Item: Fish Screen Required

Description: Indicates whether or not fish screens are required at the dam/diversion site(s). Used for machine cost computations.

Source: User input from available sources or machine input based on presence of fish as shown in Item 503.

Requirement: Yes, required for all types of projects. A code should be input for each diversion if the project utilizes multiple diversion. If left blank, machine will assume that screens are required (Y), unless there are no fish present (Item 503).

Format: Alphanumeric (Al)

Categories:

Code	Definition
Y	Yes (Do not input "Y" if screens already exist, unless they would be replaced as part of the new project.)
N	No
M	Unknown. User input option to indicate that a machine selection is desired (machine defaults to yes, unless fish are not present).
E	Suitable fish screens already exist
(blank)	Data field initialization value. If left blank, the machine defaults to yes, unless fish are not present).

Item Number: 311

Data Item: Fish Passage Required

Description: Indicates whether or not upstream fish passage is required at the dam/diversion site(s). Used for machine cost computations.

Source: User input from available sources, or machine input based on presence of anadromous fish as shown in Item 503.

Requirement: Yes, required for all types of projects. A code should be input for each diversion if the project utilizes multiple diversions. Unless otherwise specified, when anadromous species are present in a stream, costs will be automatically calculated for fish passage; i.e., a fish ladder.

Format: Alphanumeric (Al)

Categories:

Code	Definition
Y	Yes
N	No
M	Unknown. (machine default based on anadromous fish).*
E	Suitable fish passage already exist
(blank)	Data field initialization value. If left blank, the machine defaults to yes, if anadromous fish are not present).*

***Note:** If the field is left blank, the computer will check Item 503 for the type of fish present. If anadromous fish are present, default is yes, otherwise the default is no.

Physical Characteristics

Item Numbers: 312, 315

Data Item: Waterway Type-Difficulty let Segment (312)
Waterway Type-Difficulty 2nd Segment (315)

Description: A waterway is normally a low-pressure conduit, canal, or tunnel that carries diverted flow from the dam/diversion structure to the entrance of a penstock. Waterways are a part of diversion type projects, although all diversions do not necessarily utilize waterways. They are employed because the most practical or convenient location for a diversion structure is not always at the top of the steepest portion of the gradient that will be used for power production. To reduce the cost of installing expensive high-pressure pipeline along flat areas where less benefit can be realized, lower-cost low-pressure materials are used.

To facilitate analysis of multiple diversion projects utilizing penstocks instead of waterways to divert water which is then combined into one (or parallel) penstock(s) leading to a powerhouse, the code "H" for high pressure pipe has been provided as a type of waterway. This type of pipeline must be categorized as a waterway because the data form and HAM programs are not designed to handle penstocks which join together in a Y-type of arrangement; only waterways which join together and feed a single penstock or parallel penstocks are allowed. These high pressure conduit waterways will be analyzed for head losses, as are penstocks.

These data items, identify the type(s) (design and materials) of the waterway(s), and serve as a rating for describing the difficulty of constructing the waterway(s). Two waterway segments are provided for to accommodate situations where the waterway(s) consists of more than one type.

Source: User input based on information in reports on the developer's proposal or engineering judgment based on analysis of project layout and site topography as shown on USGS quad or other topographical maps.

Requirement: Yes, <u>critical</u> for all diversion projects. Used for making machine cost estimates. Enter the type code (see lst character codes below) followed by the appropriate difficulty code (see 2nd character codes below). If a project utilizes multiple diversions, enter a code combination for the waterway type(s) associated with each diversion. The waterway for a specific diversion should be divided into segments only if it consists of more than one type. In cases where the waterway changes types such that sections of the same type are separated by a section of a different type, the sections of the same type should be combined into a single segment for data entry purposes.

Item Number: 312, 315 (cont)

Format: Alphanumeric (A2)

Categories: Types of Waterways

1st Character:

Code	Waterway Type
T	Tunnel
C	Canal
P	Pipe
H	High pressure pipe
M	Unknown (machine defaults to pipe (P))

2nd Character:

Code	Difficulty Description
l	Easy: Straight line, flat terrain, not swampy, no blasting required, no flooding, minimal clearing required.
2	Medium: Hilly terrain, some unstable soils in area, minimal blasting required, minimal flooding, forest (default value if not user supplied).
3	Difficult: Mountainous terrain, alignment confined by topography, significant blasting required, flood areas, dense forest.
E	Suitable waterway already exists.
M	Unknown (machine defaults to medium (2)).

Item Numbers: 313, 314, 316, 317

Data Item:		
	Waterway Length 1st Segment (ft)	(313)
	Waterway Design Flow 1st Segment (cfs)	(314)
	Waterway Length 2nd Segment (ft)	(316)
	Waterway Design Flow 2nd Segment (cfs)	(317)

Description: Waterway length in feet and design flow in cfs of each waterway segment. Used for machine cost computations.

Source: User input based on information contained in reports describing the proposed project or engineering judgment based on map analysis of project layout and site topography.

Requirement: Yes, required for all diversion projects. Length (313, 316) is critical. If an unusually long tailrace channel is required, its length should be added to the length of the waterway. This will ensure that the extra cost of such a tailrace structure is added to the total project cost. Include a comment if possible, to indicate that this has been done.

Format:			
	Numeric	(F8.0)	(313,316)
	Numeric	(F8.1)	(314,317)

Item Number: 315

Data Item: Waterway Type-Difficulty 2nd Segment

Description: (See Item 312)

Item Numbers: 316 - 317

Data Item:		
	Waterway length 2nd segment	(316)
	Waterway design flow 2nd segment	(317)

Description: (See item 313)

Physical Characteristics

Item Number: 318

Data Item: Normal Net Power Head (ft)

Description: Net head (gross elevation difference less head losses), in feet, utilized by the turbine(s) for power production.

Source: User input based on information contained in proposals by the developer.

Requirement: Yes (critical). Enter this value only as it is given in an application or other report on project. Do not attempt to calculate the losses due to pipe friction if only the gross head is given. Table 4-1 for list of the various ways in which the computer can calculate gross and net head. Table 4-1 has been provided to assist data compilers in determining which parameters are absolutely necessary and which can be bypassed if an application lacks detailed project characteristics data. Based on the type of project arrangement classification, at least one of the combinations of parameters given in Table 4-1 must be input in order for the computer to perform energy and cost analyses. The equations are given in order of preference (also accuracy) within the site arrangement categories and turbine type subcategories. All equations, except those labeled "h = Normal Net Head", are calculations for gross head (differences between elevations). The computer will then compute losses due to pipe friction. For those applications that contain a gross head value rather than net head, the appropriate elevations must be entered. There is no parameter for gross head to be entered on the data form. Enter a combination of elevations according to Table 4-1 that will match the gross head given in the application, but check the quad map to determine if it is a reasonable value. Also use the quad map to derive elevations if necessary.

Table 4-1

ALTERNATIVE DERIVATIONS OF POWERHEAD

Site Arrangement Classifications (Item 301)	Order of Preference	Type of Turbine	Alternative Derivations of Head	Data Items Required
Run of River, Storage Reservoir, and Storage Reservoir w/Diversion				
(A,B,C,J,K,L,M N,O)	1	F,K	H=(Eamp-Etw)	346 & 333 or 331 or 330 or 332
	1	I	H=(Eamp-Et)	346 & 332
	2	F,K,I	h=Normal Net Head	318
	3	F,K	H=.75 (Emax-Emin)+ (Emin-Etw)	344 & 345 & 333 331 or 330 or 332
	3	I	H=.75 (Emax-Emin)+ (Emin-Et)	344 & 345 & 332
	4	F,K	H=Emax-Etw	344 & 333 or 331 or 330 or 332
	4	I	H=Emax-Etw	344 & 332
Diversion				
(D,E,F)	1	F,K,I	h=Normal Net head	318
	2	F,K	H=(Epi-Etw)	320, 333 or 331 330 or 332
	2	I	H=(Epi-Et)	320, 332
Run-of-River Reservoir with Diversion				
(G,H,I)	1	F,K,I	h=Normal Net Head	318
	2	F,K	H=(Eamp-Etw)	346, 333 or 331
	2	I	H=(Eamp-Etw)	346, 332
	3	F,K	H=(.75(Emax-Emin) +Emin)-Etw	344,345,333 or 331, 330, or 332
	3	I	H=(.75 (Emax-Emin) +Emin)-Et	344, 345, 332
	4	F,K	H=Emax-Etw	344, 333 or 331 or 330 or 332
	4	I	H=Emax-Et	344, 332

Table 4-1 (cont)

Site Arrangement Classifications (Item 301)	Order of Preference	Type of Turbine	Alternative Derivations of Head	Data Items Required
Canal, Conduit and Offstream and Pumped Storage				
(P,Q,R,S,T,U,V, W, X)	1	F,K,I		h=Normal Net Head
	2	F,K	H=(Eamp-Etw)	346,333 or 331 or 330 or 332
	2	I	H=(Eamp-Et)	346, 332
	3	F,K	H=(Epi-Etw)	320, 331
	3	I	H=(Epi-Et)	320, 332

Note: Item 333 (Discharge vs. Elevation Relationship for Tailwater) is more accurate than Item 331 (Powerhouse Tailrace Elevation) and is therefore preferable. Where Item 331 alone is specified, negligible tailwater fluctuation is assumed.

ABBREVIATIONS:

Type of Turbine: F = Francis; K = Kaplan, I s Impulse
Head: h = Net Head; H = Gross Head
Elevations: Eamp = Average Monthly Pool Elevation;
Etw = tailwater Elevation;
Et = Powerhouse Turbine Elevation;
Emax = Maximum Pool Elevation
Emin = Minimum Pool Elevation
Epi = Penstock Inlet Elevation

Item Number: 319

Data Item: Weighted Net Power Head (ft)

Description: Net head, in feet, used by the turbines, for power production.

Source: Machine calculated (see Table 4-1).

Requirement: Not applicable.

Format: Numeric (F6.1)

Item Number: 320

Data Item: Penstock Inlet Elevation (ft)

Description: Elevation in feet above mean sea level of the centerline of the penstock inlet.

Source: User input from developer's proposal or map studies.

Requirement: Yes (critical) - see Table 4-1). Many projects utilize multiple parallel penstocks which can either converge at the powerhouse or remain separate and connect with individual turbines. Parallel penstocks should be handled exactly like multiple diversion projects with waterways. List the values that correspond for elevation, type-difficulty, length, etc. in columns across the data form. Data for multiple penstocks may be entered even if a project has only one diversion/dam structure. The penstock inlet elevation for a storage project should be located at the base of the dam, in order to utilize the head created by the dam. Storage projects with diversions cannot have low pressure waterways.

Format: Numeric (F6.0)

Note: Use only 1 penstock if there is only 1 turbine/generator unit even though project may utilize multiple parallel penstocks that converge at the powerhouse. Identify the other penstocks as waterways.

Physical Characteristics

Item Number: 321

Data Item: Penstock Type-Difficulty

Description: Penstocks are high pressure pipelines or tunnels which convey water to the turbines for power production. They are used on diversion, run-of-river reservoir w/diversion, storage reservoir w/diversion, canal, conduit and off-stream or pumped storage projects only. Penstocks are utilized when an integral powerhouse is not feasible due to the project arrangement or topographic constraints, or when additional power head may be gained in addition to that created by the dam. This data item is used to identify the type (design and materials) of the penstock (see codes below for 1st two character and 3rd character) and to give a rating to the difficulty of construction (see below for codes for the 4th character).

Source: User input based on information contained in developer proposals or map studies of the project layout and site topography.

Requirement: Yes, (critical) for all projects. Required for machine cost calculations. For projects utilizing multiple penstock input a code combination for each penstock.

Format: Alphanumeric (A4)

Categories: **Type of Materials** (lst two Characters)

Code	Material
ST	Steel
DU	Ductile Iron
PO	Polyethylene (High Density)
CO	Concrete (Steel-supported)
TU	Tunnel
MM	Unknown (machine defaults to "Steel" (ST))

Item Number: 321 (cont)

Types of Installation (3rd Character)

Code	Method
B	Buried
E	Elevated
M	Unknown (machine defaults to "Buried" (B))

Construction Difficulty (4th Character)

Code	Difficulty Description
1	Easy: Stable soils or rock with uniform slopes up to 30%, minimal blasting required.
2	Medium: Reasonably stable soils or rocks with slopes 30-80%;, moderate blasting required, access difficult.
3	Difficult: Unstable areas, slopes greater than 80%, significant blasting required, access difficult.
E	Suitable penstock exists (length required for head loss calculation - penstock cost is not computed).
M	Unknown Conditions machine defaults to "medium" (2).

Example: STB3

Physical Characteristics

Item Numbers: 322, 323, 324

Data Item:		
	Penstock Length (ft)	(322)
	Penstock Diameter (in)	(323)
	Penstock Design Flow (cfs)	(324)

Description: The penstock length in feet, inside diameter in inches, and design or rated flow in cfs. Penstock length is a function of topography and economic feasibility in relation to the head gained by including a penstock. A penstock should be utilized for projects with dams when a steep gradient exists. The penstock should extend no further than the point where the gradient becomes less than the benefit of the head gained by the cost of building a longer penstock.

Source: User input (322) and user or machine input (323, 324). User input should be based on information contained in the developer's proposal or topographical map study of project layout and the topography.

Requirement: Yes, required for all projects. Length (322) is critical. If diameter and design flow are left _1. machine estimates will be made.

Format:			
	Numeric	(F5.0)	(322)
	Numeric	(F4.0)	(323)
	Numeric	(F8.1)	(324)

Item Number: 325

Data Item: Exceedence Frequency of Design Flow

Description: Exceedence percentage(s) from the project flow duration curve(s) of the penstock(s) design flow. Value will be machine selected for each penstock if a project utilizes multiple penstocks. Where fixed analysis procedures are desired, users should input appropriate values (on the data form) in the order corresponding to Item 321.

Source: User input from available information, or machine selected.

Requirement: Optional. Computer will calculate where required for machine cost calculations.

Format: Numeric (F5.1)

Example: 25.0 (25% exceedence frequency)

Item Number: 326

Data Item: Length of Penstock Tunnel (ft)

Description: Length of tunneling required, in feet, for constructing or installing a portion or all of the penstock. A penstock tunnel is assumed to include steel lining. Therefore, the tunnel length should not be included in Item 322. If an applicant proposes to line an existing tunnel, the lining would be a continuation of the penstock. The boring or excavation involved in constructing a penstock tunnel is the largest cost.

Sources: User input from available information, including the developer's proposal and topographical map study of the project layout and site topography.

Requirement: Yes, required for machine cost calculations. If left -1.0 a value of zero will be assumed.

Format: Numeric (F8.0)

Item Number: 327

Data Item: Type-Difficulty of Powerhouse

Description: Identifies the type of powerhouse (1st character) and serves as a rating for describing the difficulty of constructing the powerhouse and evaluates soil, flooding and topographic characteristics (2nd character).

Source: User input from available sources.

Requirement: Yes, critical for all projects. Required for machine cost calculations.

Format: Alphanumeric (A2)

Categories: **Type of Powerhouse** (lst character)

Code	Description
A	Open
B	Prefabricated Building
C	Concrete
D	Underground (does not apply to projects less than 10 MW installed capacity)
E	Suitable Powerhouse Exists
M	Unknown (machine defaults to "concrete" (C))

Construction Difficulty (2nd character)

Code	Description
1	Easy: Not subject to flooding, stable soils, powerhouse not confined by topography, no blasting.
2	Medium: Subject to minimal flooding, relatively stable soils, some blasting required, some topographical restrictions.
3	Difficult: Subject to significant flooding, erosive soils or serious topographic restrictions, significant blasting.
E	Suitable Powerhouse Exists
M	Unknown Conditions: (machine defaults to "medium" (2))

Item Numbers: 328, 329

Data Items:		
	Powerhouse Floor Area (sq ft)	(328)
	Powerhouse Height (ft)	(329)

Description: The floor surface area, in square feet, and height, in feet, of the project powerhouse.

Source: User input from available sources, or machine computed based on installed plant capacity.

Requirement: User input optional. Used in machine cost calculations.

Format:			
	Numeric	(F8.0)	(328)
	Numeric	(F4.0)	(329)

Item Numbers: 330 - 332

Data Items:		
	Powerhouse Streambed Elevation (ft)	(330)
	Powerhouse Tailrace Elevation (ft)	(331)
	Powerhouse Turbine Elevation (ft)	(332)

Description: Elevations in feet above mean sea level of the streambed (natural river bottom), tailrace water level, and turbine centerline. Powerhouse streambed elevation is measured from the natural river bottom at the powerhouse. If design drawings indicate that a considerable amount of excavation is to take place, making it difficult to determine the elevation of the natural streambed, enter the elevation of the ground in the tailrace area.

Source: User input from available sources, including the developer's proposal and topographical map study of the project layout and site topography.

Requirement: Yes (critical) - see Table 4-1).

Format: Numeric (F6.0)

Item Number: 333

Data Items: Tailwater Discharge (cfs) (333)
Tailwater Elevation (ft) (333)

Description: Indication of tailwater elevation with respect to each of four different levels of discharge for use in defining a tailwater discharge curve. Tailwater height is computed as the difference between streambed elevation and tailwater elevation.

Source: User input from available information or estimates made specifically for this study.

Requirement: Yes (critical). May be required for estimating powerhead - see Table 4-1.

Format: Numeric (F8.1) (discharge)
Numeric (F8.1) (height)

Item Number: 334

Data Item: Maximum Storage (ac ft)

Description: Indication of the maximum storage space in the reservoir.

Source: User input based on information contained in the developer's proposal or study of the topographical map of the project area.

Requirement: Yes, for reservoir projects. If a project feature such as dam height is changed, storage parameters (334-343) must also be changed.

Format: Numeric (F8.0)

Physical Characteristics

Item Numbers: 335, 336

Data Items:
- Length of Impoundment (mi) (335)
- Length of Shoreline (mi) (336)

Description: The length of the impoundment at maximum pool elevation as measured from the dam or diversion structure to the head of longest (greatest distance from the dam) arm. The length of shoreline is the perimeter distance around the maximum pool.

Source: User input from available sources or from field office estimates based on topographical map studies.

Requirement: Yes, for reservoir projects.

Format: Numeric (F6.1) (335,336)

Item Numbers: 337 - 341

Data Item:

Flood Control Storage (ac ft)	(337)
Conservation Storage (ac ft)	(338)
Irrigation Storage (ac ft)	(339)
Fisheries Storage (ac ft)	(340)
Water Supply Storage (ac ft)	(341)

Description: The amount of storage allocated to each purpose served by a reservoir project. It should be noted that storage for flood control represent empty space in the reservoir which is required during the flood season. It is not, therefore, mutually exclusive of storage for other purposes. As a result, the sum of the storage available to each purpose may not be the same as the total amount of storage actually available.

Source: User input from available documents, including feasibility and detailed design reports.

Requirement: Optional. Applies to existing and proposed projects with storage.

Format: Numeric (F8)

Item Numbers: 342, 343

Description:

Surface Area at Top of Maximum Pool (ac)	(342)
Surface Area at Top of Inactive Pool (ac)	(343)

Description: The maximum and minimum pool size in acres. This information will be used in assessing the magnitude of the environmental impacts of the project. Surface area at the top of maximum pool will be used to estimate dam and reservoir land requirements in making machine estimates of project costs. For flood control projects, maximum pool will be assumed to be the top of flood control pool, unless otherwise specified.

Source: User input from available information or estimated from study of USGS or other topographical maps of the projects

Requirement: Yes <u>critical</u> for reservoir projects.

Format: Numeric (F8.0)

Physical Characteristics

Item Numbers: 344 - 346

Data Items:

Max Pool Elevation (ft)	(344)
Min. Pool Elevation (ft)	(345)
Average Monthly Pool Elevation (ft)	(346)

Description: Reservoir pool elevations in feet above mean sea level. Used for machine computation of weighted net power head (see Table 4-1). For storage projects, average monthly pool elevations are preferred for this purpose and will be used, if provided. Otherwise, for these projects, machine estimates of gross head will be based on the equation:

H = .75 (Emax-Emin)+(Emin-Et)(impulse turbines)
H = .75 (Emax-Emin)+(Emin-Etw)(reaction turbines)

Where:
H = gross head
Emax = maximum pool elevation
Emin = minimum pool elevation
Et = powerhouse turbine centerline elevation
Etw = mean tailwater elevation

Source: User input from available information or from map study.

Requirement: Yes (critical - see Table 4-1). If an application contains a "normal" or "average" annual pool elevation and no other water level information, then enter the "normal" value into Items 344, 345, and 346 (the elevation would be the same for all of the 12 months).

Format: Numeric (F6.0)

Note: Item 346 is an array (see Appendix B Example Computer Entries).

Item Number: 347

Data Item: Local or Remote Operation

Description: Describes the type of operation of a powerplant for the purpose of determining annual operation and maintenance costs. Local operation is indicated by an L and remote operation is indicated by an R.

Source: User input from available information on the proposed project or best estimate by the user.

Requirement: Yes, for all projects. if left blank, machine computations will assume remote operation (R).

Format: Alphanumeric (Al)

Categories: **Type of Operation**

Code	Description
L	Local operation
R	Remote operation
M	Indicates machine selection of default value "R" (remote)
(blank)	When field is left "blank" the machine uses the default value "R" (remote) and writes "M" to the database.

Item Number: 348

Data Item: Type-Difficulty of Connecting Powerline

Description: Identifies the type (layout and materials) of the connecting powerline, and serves as a rating for describing the difficulty of constructing the powerline. Used for machine calculations. The connecting powerline joins a project's powerplant with a utility's transmission or grid line. There are no limits on the voltage specified for the connecting line.

Source: User input from available sources or topographical map studies.

Requirement: Yes (critical). Required for machine cost calculations. Enter type code followed by the appropriate difficulty code number. Since database items are required for machine cost estimates, approximations based on topographical map information should be made if necessary.

Item Number: 348 (cont)

Format: Alphanumeric (A2)

Categories: **Type of Transmission Line** (lst character)

Code	Line Type
H	Overhead
U	Underground (conduit)
M	Unknown (machine defaults to "overhead"(H))

Construction Difficulty (2nd character)

Code	Difficulty Description
1	Easy: Straight line, flat, not swampy lands, no blasting required, no flooding, minimal clearing required.
2	Medium: Hilly terrain, some unstable soils in area, minimal blasting required, minimal flooding, forest.
3	Difficult: Mountainous terrain, alignment confined by topography, significant blasting required, flood areas, dense forest.
E	Suitable connecting powerline exists.
M	Unknown Conditions: (machine defaults to "medium" (2))

Example: H2

Item Numbers: 349 - 351

Data Items:
- Length of connecting Powerline (mi.) (349)
- Connecting Powerline R-O-W Width (ft) (350)
- Voltage of Connecting Powerline (kV) (351)

Description: The length (miles), right-of-way width (feet) and voltage (kilovolts) of the powerline which would be required to connect a proposed project with an existing transmission line.

Source: User input from available information or from assumptions based on standardized designs (right-of-way width and line voltage).

Requirement: Yes, for all projects except existing projects with power where a new connecting powerline would not be needed. Length (item 349) is critical. If R-O-W width and voltage (items 350 and 351) are left -1. the machine will use default values. Required for computer estimate of connecting powerline costs.

Format:

Numeric	(F5.2)	(349)
Numeric	(F5.1)	(350,351)

Item Numbers: 352, 353

Data Items:
- Type-Difficulty of Upgraded Transmission Line (352)
- Length of Upgraded Transmission Line (mi.) (353)

Description: The type of transmission line which would require upgrading, expected construction difficulty, and the length of transmission line to be upgraded.

Source: User input from available reports or through analysis of regional transmission system.

Requirement: Yes, critical, if transmission line upgrading would be required. The transmission line length should be estimated from project area topographical maps, if necessary.

Format:

Alphanumeric	(A2)	(352)
Numeric	(F4.1)	(353)

Categories: See categories for item 348 above.

Item Numbers: 354, 355

Data Items:
Voltage of Existing Transmission Line (kV) (354)
Voltage of Grid Line (kV) (355)

Description: A file reference of the voltage of existing transmission line and system grid lines which would serve a proposed project.

Source: User input from available information or from regional transmission grid system analysis.

Requirement: Yes, if upgrading of the existing transmission line is required. When upgrading is required, input the voltage after upgrading will have taken place. If left -1.0, the computer will automatically select the necessary voltage for transmission of a project's capacity.

Format: Numeric (F5.1) (354,355)

Item Number: 356

Data Item: Substation Upgrading Required

Description: Indicates whether or not the substation into which the project connecting lines lead must be upgraded due to the proposed hydropower project.

Source: User input from available sources.

Requirement: Optional. Input if known.

Format: Alphanumeric (Al)

Categories:

Code	Description
Y	Substation upgrading will be necessary because of the project.
N	No upgrading required.
M	Unknown - Machine defaults to no upgrading required.
(blank)	No data available

Item Number: 357

Data Item: Number of Projects on Connecting Line

Description: Indicates the number of separate projects which currently and/or may use the same connecting transmission line as the project under consideration.

Source: User input from available sources.

Requirement: Optional. Input if known.

Format: Alphanumeric (A2)

Item Number: 358

Data Item: Number of Bridges Required.

Description: Indicates the number of bridges that will be constructed to provide permanent access to the projects.

Source: User input from available sources including project area topographical maps.

Requirement: Yes, for all new projects. Required for machine cost estimates. If left blank, machine assumes no bridges are required.

Format: Alphanumeric (A2)

Item Numbers: 359, 360

Data Item:		
	Length of Road (ft)	(359)
	Width of Road (ft)	(360)

Description: Length and width, in feet, of roads built for construction or permanent access purposes. Length should be measured from the powerhouse location.

Source: User input from available sources including project area topographical maps.

Requirement: Yes, for all projects. Length is critical. If width is left -1.0, machine will use a default value. If an application or other project report, gives no information about road lengths, refer to the appropriate quad map in order to make an estimate. For diversion projects, measure the distance from the powerhouse location. For reservoir projects, measure the distance from the dam. If no new roads are proposed as part of the project, length of road (359) and width of road (360) should be entered as zero (0.).

Format:			
	Numeric	(F8.0)	(359)
	Numeric	(F4.1)	(360)

Physical Characteristics

Item Number: 361

Data Item: Road Construction Difficulty

Description: Serves as a rating for describing the difficulty of constructing access-roads. Evaluates soil, flooding and topographic characteristics.

Source: User input based on information contained in the developer's proposal or analysis of project area topographical maps.

Requirement: Yes, for all projects requiring construction of access roads. Enter code which mostly nearly describes expected construction conditions. If left blank and a road is required, the computer will default to code 2 (medium conditions) in calculating estimated costs. If no road construction is proposed, assume that a suitable road exists and enter code "E".

Format: Alphanumeric (Al)

Categories:

Code	Difficulty Description
1	Easy: Stable soils, uniform side slopes of less than 30%, few large rocks, no blasting, no flood protection required.
2	Medium: Reasonably stable soils, side slopes 30-60%, minimal blasting required, minimal flood protection required.
3	Difficult: Unstable soils; side slopes of greater than 60%, significant blasting required, significant flood protection required.
E	Suitable road exists.
M	Unknown Conditions: (machine defaults to "medium" (2))

Example: E

Item Number: 362

Data Item: Comment of Type or Condition of Dam.

Description: For types not covered by codes in Item 302, describe the type of dam and provides pertinent information on the condition of existing dams (also see description for Item 302 and check Item 232 for comments on the condition or status of the dam.)

Source: Reports on the project prepared by the developer; dam safety reports; and, other available references.

Requirement: Required for existing structures as the basis for determining if major rehabilitation work would be required or if the structure is usable in its present condition. If major rehabilitation work would be required, the project should be coded as "undeveloped".

Format: Alphanumeric (A48)

Example: EARTH/ROCKFILL DAM W TIMBER CORE; NOT SOUND

Item Numbers: 363,364

Data Items: Number of Dams/Diversions (363)
Number of Penstock (364)

Description: These data establish a count of the number of dams/diversions and penstocks associated with each project. This information is needed to enable database users to readily identify and retrieve data on projects on the basis of the number of the dams/diversions and/or penstocks.

Source: Both data fields are machine generated by NWHS programs.

Requirement: No user input is required.

Format: Alphanumeric (A2)

Hydrologic Characteristics

Item Numbers: 401 - 404

Data Items:

Site Drainage Area of Principal Stream-l (sq mi)	(401)
Site Drainage Area of Secondary Stream-2 (sq mi)	(402)
Site Drainage Area of Secondary Stream-3 (sq mi)	(403)
Site Drainage Area of Secondary Stream-4 (sq mi)	(404)

Description: Area in square miles of the drainage basin above the project dam or diversion, for use in hydrologic analyses.

Source: User input from available sources or approximate determination using project area and regional topographic maps, as appropriate.

Requirement: Yes, critical. Required for machine hydrologic analyses. For multiple diversion projects, input the drainage areas in the order corresponding to stream names in Items 133-136. If more than four streams are evaluated, list the four major streams (Items 133-136) and the drainage areas of the three most important streams in Items 401-403. Enter the aggregate drainage area of all other streams in Item 404. Where this is done, comments (Item 429) should so indicate. If a drainage area is too large to measure directly on a map (perhaps several thousand square miles), then attempt to find the area from some other source of information. For instance, a major project will very likely be located on a river where there are USGS streamflow gages, for which drainage areas have been calculated. Depending on whether the gage is upstream or downstream, find the difference between the two basins and add or subtract the amount from the gage drainage area respectively. If appropriate, this gage could then be entered in Item 405, the representative gage selected. Projects not having drainage areas; e.g., canals, conduits, spring-fed streams, etc., must have flows (Items 424, 425, or 427) input by the user. (See Appendix C for additional instructions).

Format: Numeric (F10.1)

Hydrologic Characteristics

Item Number: 405

Data Item: Representative Gage Selected

Description: USGS streamflow gage selected for use in making hydrologic analyses. Selection of only one specific representative gage is permitted. All diversion sites within the diversion basin are analyzed using the selected gage and flow duration curves are derived.

Source: User input or result of machine selection. Machine selection of gages is available. However, users may select a gage from the list of gages included in Appendix D.

Requirement: Yes, critical for machine flow duration analysis of projects where flows cannot be correlated with natural streamflow or where the flow is not related to drainage area. Specifically, machine selection of a gage is not available for the following project types (see Item 301): canals, conduits and off-stream or pumped storage projects, (project types P, Q, R, S, T, U, V, W and X). For all types of projects, when a user selected gage is entered, a "U" or "C" code must be entered as the first character, followed by the 8-digit gage number. Machine corrections for precipitation, elevation, decade, and drainage are computed for "U" gages. If machine corrections are not desired, the gage number must be preceded by the code "C". Use of the "C" code does not, however, require a user selected gage. A "C" is used to indicate that no corrections except for drainage area ratio are desired. If use of a gage to estimate flow is not appropriate, the code "N" should be entered. If the first character is left blank and a DUR analysis is specified (see Item 871) for a type of project where machine selection of a gage is available, the machine will default to "M" (machine selected gage) and select a gage and apply the machine flow corrections to estimate flow at the site.

Format: Alphanumeric (A9)

Item Number: 405 (cont)

Categories: Codes for lst Character

Codes	Category Description
U	User input gage (limited to gages on GETUSGS file, see Appendix D), machine selected gage not desired.
M	Machine selected gage (machine will add after gage selection).
N	No representative gage exists on GETUSGS file (user must input Item 424 or 425 or 427).
C	User input or machine selected gage. Computer correction of gaged flows not desired. Flows will be assigned to the project site on the basis of the site to gage drainage area ratio.
(blank)	Defaults to machine selection of gage.

Examples:

Example Entry	Description
U12076500	User selected gage where machine correction of flows for precipitation, elevation, decade, and drainage area are to be computed
C12076500	User selected gage where correction of flows for precipitation, elevation and decade are not to be computed
M	Machine will select gage and make corrections for precipitation, elevation, decade, and drainage area.
C	Machine will select gage but will limit corrections to drainage area.
N	Use of a gage is not possible.

Item Number: 406

Data Item: Length of Record

Description: Number of years of record for the selected representative gage. Used in the machine hydraulic analysis for making decade corrections to gaged flows.

Source: Machine input from data stored on the GETUSGS data files.

Requirement: Not applicable.

Format: Numeric (F4.0)

Hydrologic Characteristics

Item Number: 407

Data Item: Gage Reliability Index

Description: Serves as a rating of the accuracy and reliability of the selected representative gage data for using in basin correlations with project diversion sites.

Source: Machine selected from GETUSGS data files.

Requirement: Not applicable. Used in machine selection of representative gage.

Format: Numeric (Al)

Categories:

Code	Description
1	No significant diversion or regulation, accuracy fair or better, at least five complete years of daily record ("some" or "small" regulation and "minor" diversions allowed).
2	No significant diversion or regulation. Record length of complete years less than 5 years or seasonally missing records or accuracy poor.
3	Significant or unknown regulation, includes drains and canals, significant lake or reservoir area (over 5% or over 20% of flow affected in any month, "partial" or "considerable" regulation).
4	Significant or unknown diversions upstream (over 10% of mean flow duration or over 2% of gaged area under irrigation, "many" or "numerous" diversions).
5	Significant or unknown channel losses or spring gains, or upstream losses due to ground water pumping (over 20% of flow in any month).
6	Other. (Includes canals and other miscellaneous gages).

Item Number: 408

Data Item: Selected Gage Drainage Area (sq mi)

Description: Drainage basin area in square miles of the selected representative gage.

Source: Machine supplied from GETUSGS data files.

Requirement: Not applicable. Used for flow duration computations by the Hydrologic Analysis Model (HAM).

Format: Numeric (F10.1)

Number: 409

Data Item: Elevation at Gage (ft)

Description: Elevation in feet above MSL of selected representative gage location.

Source: Machine supplied from GETUSGS data files.

Requirement: Not applicable. Used in elevation correction equations included in HAM.

Format: Numeric (F6.0)

Item Number: 410

Data Item: Average Basin Elevation Above Gage (ft)

Description: Average elevation in feet above MSL of the drainage area upstream from the selected representative gage.

Source: Machine supplied from GETUSGS data files.

Requirement: Not applicable. Used in elevation correction equations included in HAM.

Format: Numeric (F6.0)

Item Number: 411

Data Item: Average Annual Gage Runoff (cfs/sq mi)

Description: Average annual discharge or runoff, in cfs per square mile, of drainage area for the selected gage. This ratio value applies to the selected representative gage and provides a method for checking whether the computer value of flow available at a project diversion site is reasonable.

Source: Machine calculated from GETUSGS data files.

Requirement: Not applicable

Format: Numeric (F4.1)

Item Number: 412

Data Item: Average Annual Gage Flow (cfs)

Description: Average annual streamflow in cfs for the representative gage selected in item 405.

Source: Machine supplied from GETUSGS data files.

Requirement: Not applicable.

Format: Numeric (F8.1)

Item Number: 413

Data Item: Average Site Basin Precipitation (in)

Description: Average annual precipitation (area-weighted), in inches, over the complete drainage basin above the dam/diversion site.

Source: User input from analysis of isoheytal maps. (Contact NPDPL-EC, (503) 326-2088 or FTS 423-2088 for copies of isoheytal maps for the region).

Requirement: Yes, critical for all projects where a DUR analysis and machine correction of the selected gage for site basin precipitation are desired. In general, unless a project is at or very near the location of the selected gage, adjustments for precipitation effects on runoff and streamflow should be requested. If precipitation adjustments to flows are not desired, the appropriate code must be input in Item 405 (representative gage selected). Instructions for computing average basin precipitation are included in Appendix C.

Format: Numeric (F5.1)

Item Number: 414

Data Item: Elevation at Site (ft)

Description: Elevation in feet above MSL of the streambed of the principal stream at the diversion or dam location.

Source: User input from available sources, such as FERC applications or topographic maps.

Requirement: Yes, critical for elevation correction equations within the HAM. For projects with dams or weirs, the streambed elevation should be entered, if possible. Otherwise, input an approximate value. If elevation correction to flows is not desired, appropriate code must be input in item 405 (representative gage selected). (See Appendix C additional instructions).

Format: Numeric (F6.0)

Item Number: 415

Data Item: Maximum Site Basin Elevation (ft)

Description: Maximum elevation of the stream basin (principal stream for multiple diversion projects) in which the project is located in feet above MSL.

Source: User input from analysis topographic maps.

Requirement: Yes critical. For projects with relatively small drainage areas, maximum basin elevation can be determined from the quad maps on which the project has been located and drainage area outlined. The maximum elevation may not necessarily be located along the perimeter of the basin so caution must be used in making this determination. (See Appendix C for additional instructions).

Format: Numeric (F6.0)

Item Number: 416

Data Item: Average Elevation Above Site (ft)

Description: Average elevation (area-weighted) in feet above MSL of the drainage area of the stream diversion site. For sites with multiple drainage areas, the average elevation is the weighted average elevation of all the drainage areas.

Source: User input based on analysis of the topographical map(s) of the site drainage area (machine calculation possible based on Items 414 and 415 but should only be relied on as a last resort).

Requirement: Yes, critical for all projects where a DUR analysis and machine correction of the selected gage for site basin elevation are desired. In general, unless a project is at or very near the location of the selected gage/ adjustments for elevation effects on runoff and streamflow should be requested. If adjustments to flows are not desired, the appropriate code must be input in Item 405 (representative gage selected). Computations should be made using a grid method similar to that used in calculating average basin precipitation. Specific instructions for computing average basin elevation are included in Appendix C.

Format: Numeric (F6.0)

Hydrologic Characteristics

Item Number: 417

Data Items: Net Lake Evaporation (in)

Description: Utilized to define actual flow available for generation of hydroelectric power at reservoir projects requiring new dams. Average net monthly surface evaporation rates are applied to the computed reservoir surface area each month during the energy analysis . These items correspond to the months of the calendar year, i.e., January through December.

Source: User input from available sources or machine selected based on regional evaporation data included in HAM.

Format: Numeric (F4.1)

Data Entry: There data are entered, modified and stored as an array. The entire array may be entered or modified by entering a data string with separate values being separated by a slash (/) mark. In this string, January would occupy the first position, and so on. To enter or change a single item, that item may be located by use of decimal with the item number; e.g., 417.6 would locate the sixth month, June. (See Appendix B - Example Computer Entries.) \

Note: This data item is initialized to -999.0.

Item Number: 418

Data Item: Net Consumptive Use (ac ft)

Description: Monthly streamflow, in acre-feet, diverted upstream of the hydropower diversion or dam site, for consumptive use purposes such as water supply or irrigation. Water that is allocated for use downstream of the diversion/dam or powerhouse should not be included.

Source: User input from available sources.

Requirement: Yes, if known. Enter net consumptive use; i.e., diverted flow less return flow (if returns are upstream of diversion). Where multiple diversions are proposed, net consumptive use for all water sources should be computed and entered in the database.

Format: Numeric (F6.1)

Note: This data item is initialized to -999.0.

Item Number: 419

Data Item: Comment on Consumptive Use

Description: To identify authorized purposes of upstream diversions that are specified in item 418, such as irrigation, navigation, water supply, recreation, etc.

Source: User input from available sources.

Requirement: Yes, if known.

Format: Alphanumeric (A48)

Hydrologic Characteristics

Item Number: 420

Data Item: Instream Flow Requirements

Description: Aggregate minimum monthly stream flows that are required to be left unaltered in all streams contributing flows to a project. The purpose of minimum stream flows is to mitigate the affects of hydropower projects on fish and wildlife. These items correspond to the months of the calendar year, January through December.

Source: User input from available sources such as FERC applications, resource agency correspondence or machine computed.

Requirement: Yes, if known. Since the computer will always subtract instream flows from computed or input flow values (items 425-427), input flows must represent natural flow before minimum flow requirements have been subtracted. For multiple diversion projects, input the total of instream flows for all diversion utilized by a powerplant. Machine will separate these by drainage area ratio for energy evaluation of each site. Reservoirs without diversion, canal, and conduit projects normally do not have instream flow requirements.

Format: Numeric (F8.1)

Hydrologic Characteristics

Item Number: 421

Data Item: Status of Instream Flow Requirements

Description: Identification of the status of the instream flow determination process. Because the process of establishing minimum flows can be lengthy and complex, this item is used to evaluate the accuracy or reliability of the values specified in item 420.

Source: User input from available sources.

Requirement: Optional. Input if known.

Format: Alphanumeric (A2)

Categories: **Status of Instream Flow**

Code	Description
DR	Developer recommendation
SR	State agency recommendation
FR	Federal agency recommendation
SL	Set by State agency (State law)
FL	Set by FERC or other Federal action (Federal law)
ES	Estimates
UK	Not able to determine
MC	Machine computed (default code)
NR	None Required
ME	Machine estimate completed (cannot be input by user. To get new machine estimate user must recode to MC).

Item Number: 422

Data Item: Comment on Instream Flow

Description: Comment with reference to Items 420 or Item 421, to provide additional status information or explain methods used to calculate (or estimate) minimum flows. Should also indicate instream flow requirements for individual streams where multiple diversions are involved, if appropriate, or indicate where additional detailed data are available.

Source: User input from available sources.

Requirement: Optional. Input if known.

Format: Alphanumeric (A48)

Item Number: 423

Data Item: Average Annual Site Runoff (cfs/sq mi)

Description: Average annual discharge or runoff, in cfs per square mile of site drainage area(s). This ratio value provides a method for checking whether the machine estimate of flow available at the site is reasonable, by comparing with item 411. This is computed for the principal stream, but will be assumed to apply to all streams involved in a project.

Source: Machine computed.

Requirement: Not applicable.

Format: Numeric (F4.1)

Hydrologic Characteristics

Item Number: 424

Data Item: Average Annual Site Flow (cfs)

Description: Average annual streamflow in cfs for the project diversion site. This value is used to compute item 423 and to calculate spillway cost for reservoir projects. Where multiple diversions are involved, it is the aggregate flow available to the project.

Source: User input from available sources or machine computed if a machine flow duration analysis is completed.

Requirement: Yes, critical if the type of hydrologic analysis desired is FXF (fixed average annual flow). Flows entered should be total flow available at the site before adjustments for instream flow requirements for diversion projects. Instream flows requirements, if known, should be entered in Item 420.

Format: Numeric (F8.1)

Item Number: 425

Data Item: Input Annual Duration Flows (cfs)

Description: Streamflow in cfs for annual exceedence frequencies of 10, 15, 20, 30, 50, 70, 80, 90, 95, and 99 percent, for the aggregate of all streams contributing flows to a project. This duration curve is used to select design parameters and to calculate energy if the FXA (fixed annual duration) analysis is specified in item 871.

Source: User input from available sources.

Requirement: Yes, critical if FXA is specified in item 871. Otherwise, these data should always be input whenever available for the purpose of making comparisons between computer analysis results and streamflow values submitted by a project applicant or developer. Enter the natural streamflow, except for canal or conduit type projects (in these cases, enter "powerplant" flows). If available, should be input for projects on canals or conduits with consistent flows and where no USGS gage records are available. Where multiple diversions and waterways are proposed, flow should be the total flow available to the project. Total flow will be allocated to each diversion site on the basis of respective drainage areas. If drainage areas are not given for secondary streams, flows will be divided equally among the waterways. Flows should be entered in the sequence shown above. It should be noted that the flow at the 10 percent exceedence frequency will be the largest and that flow for all other successive points should be equal or successively smaller. Data entered which are inconsistent with this pattern will result in a fatal error, if the project is processed through HAM.

Format: Numeric (F8.1)

Example: Example data entry, w/o field delimiters (See Appendix B - Example Computer Entries.)

800./650./500./425./350./325./300./225./150./90.

Item Number: 426

Data Item: Computed Annual Duration Flows (cfs)

Description: Stream flows in cfs for annual exceedences of 10, 15, 20, 30, 50, 70, 80, 90, 95, and 99 percent, for the aggregate of all streams contributing flows to a project. The Hydrologic Analysis Model (HAM) uses the flow duration curve to select design parameters.

Source: Machine computed

Requirement: Not applicable

Format: Numeric (F8.1)

Item Number: 427

Data Item: Input Average Monthly Flow (cfs)

Description: Aggregate average monthly streamflow in cfs available to the project for each month of the year, starting with January and going through December. Monthly flows are used to calculate energy if FXM (fixed monthly flow) analysis is specified in Item 871.

Source: User input from available sources.

Requirement: Yes. Critical if FXM is specified in item 871. Otherwise, these data should always be input whenever available for the purpose of making comparisons between the HAM analysis results and streamflow values submitted by a project applicant or developer. Enter natural streamflow except for canal or conduit type projects (in these cases enter "power plant" flow). If multiple diversions are proposed, flows from all sources should be summed to obtain aggregate monthly flows.

Format: Numeric (F8.1)

Data Item: 428

Data Item: Computed Average Monthly Flows (cfs)

Description: Aggregate average monthly streamflow in cfs at the site for each month of the year, starting with January and going through December. Flow values represent total streamflow before consideration of instream flow requirements and powerplant operating limits; i.e., maximum and minimum flow operating limits of the turbines. Where multiple diversions are involved, flow from all sources is to be included.

Source: Machine computed

Requirement: Not applicable

Format: Numeric (8.1)

Item Number: 429

Data Item: General Comment on Hydrology

Description: Comments, reference information, or data used in computer or applicant/developer hydrologic analyses. Most important are the following topics: existence of diversions or regulation upstream of the diversion site; flow data are available at a gage other than a USGS gage (such as, the applicant/developer has measured stream flows for several years, or reliable data is available from another agency or source); there are no representative gages; the project is located on a non natural waterway such as a canal; and, reliability of the hydrologic analysis; unique hydrologic characteristics (especially presence of springs, glaciers, lakes, upstream diversions and regulation).

Source: User input from available sources, especially developer prepared reports, etc.

Requirement: Optional. Input if any information known.

Format: Alphanumeric (A48)

Examples: OTHER HYDROLOGIC DATA AVAILABLE
SIGNIFICANT UPSTREAM DIVERSIONS
SIGNIFICANT STREAM REGULATION
SIGNIFICANT SPRING FLOWS
SIGNIFICANT LAKE AREA
NO GAGE MEETS CRITERIA

Hydrologic Characteristics

Item Number: 430

Data Item: Hydrologic Region

Description: The name of the hydrologic region (as defined for this study) in which the project and associated stream gage are located. The regions consist of combinations of WRC hydrologic units as shown in Table 5-1. Hydrologic unit numbers are defined in the description for data Item 130.

Source: Machine input from data stored in the edit program data validation tables (see Table

Requirement: Not applicable

Format: Alphanumeric (A28)

TABLE 5-1
HYDROLOGIC REGIONS AND ASSOCIATED WATER RESOURCES
COUNCIL HYDROLOGIC UNIT NUMBERS

IDAHO

Coeur D'A1ene/C1earWater (15)
17010301
17010302
17010304
17060301
17060302
17060303
17060304
17060305
17060306
17060307
17060308

Salmon River (16)
17060201
17060202
17060203
17060205
17060206
17060207
17060208
17060209

Idaho Central MTS (17)
17040214
17040215
17040216
17040217
17040218
17040219
17040220
17040221
17050111
17050112
17050113
17050120
17050121
17050123
17050124
17060210

IDAHO (cont)

SW Idaho (19)
17040213 (NV)
17050102 (NV)
17050103 (OR)
17050104 (NV)
17050105 (OR, NV)
17050106 (OR, NV)
17050107 (OR)
17050108 (OR)

SE Idaho (20)
16010101 (UT,WY)
16010102 (WY,UT)
16010201 (UT)
16010202 (UT)
16010203 (UT)
16010204 (UT)
16020309 (UT)
17040104 (WY)
17040105 (WY)
17040202 (WY)
17040203 (WY)
17040204 (WY)
17040205
17040207
17040208
17040210 (UT)
17040211 (NV,UT)

Snake Plateau (18)
17040201
17040206
17040209
17040212
17050101
17050114
17050115 (OR)
17050122

Hydrologic Characteristics

TABLE 5-1 (cont)

MONTANA

W Montana (21)
17010101 (ID)
17010102
17010103
17010104 (ID)
17010105 (ID)
17010201
17010202
17010203
17010204
17010205
17010208
17010210
17010211
17010212
17010213 (ID)

NW Montana (22)
10010001
10010002
10030104
10030201
17010206
17010207
17010209

SW Montana (233)
10020001
10020002
10020003
10020004
10020005
10020006
10020007 (WY)

Montana Central Mts (24)
10020008 (WY)
10030101
10030103
10030105
10070001 (WY)
10070002 (WY)

MONTANA (cont)

10050009

Northern Plains (25)
10030102
10030202
10030203
10030204
10030205
10040101
10040102
10040103
10050001
10050002
10050003
10050004
10050005
10050006
10050007
10050008
10050010
10050011
10050012
10050013
10050014
10050015
10050016
10060003
10060004
10060006
10060007

Central Plains (26)
10040104
10040105
10040106
10040201
10040202
10040203
10040204
10040205
10060001
10060002

Hydrologic Characteristics

TABLE 5-1 (cont)

MONTANA (cont)

Montana Central Mts (24)(cont)
10070003
10070005
10070006 (WY)
10080010 (WY)
10080014 (WY)

Central Plains (26)
10080015
10080016
10100001
10100002
10100004
14060001
14060002
14060005
14070004
14070007
14070008
14080015
14080016
14100001
14100002
14100004

SE Plains (27)
10090101 (WY)
10090102
10090207 (WY)
10090208 (WY)
10090209
10090210
10100003
10100005
10110201 (WY)
10110202
10110203
10110204
10120202 (WY)

Central Plains (26)(cont)
10060005
10070004
10070005
10070007
10070008

OREGON

Oregon Coast (8)
17080006 (WA)
17100201
17100202
17100203
17100204
17100205
17100206
17100304
17100306
17100312 (CA)

Willamette (9)
17080001 (WA)
17080003 (WA)
17090001
1709O002
17090003
17090004
17090005
17090006
17090007
17090008
17090009
17090010
17090011
17090012

Hydrologic Characteristics

TABLE 5-1 (cont)

OREGON (cont)

SW Oregon (10)
17100301
17100302
17100303
17100305
17100307
17100308
17100309 (CA)
17100310
17100311 (CA)
18010101 (CA)
18010209 (CA)

Oregon E Cascades (11)
17070105 (WA)
17070301
17070302
17070306
18010201
18010202
18010203
18010204
18010205 (CA)
18010206 (CA)

NC Oregon (12)
17070101 (WA)
17070104
17070105 (WA)
17070204
17070303
17070304
17070305
17070307

Blue Wallowa Mts (13)
17050201 (ID)
17050202
17050203
17060101 (ID)
17060102
17060103 (ID)
17060104
17060105
17060106 (WA)
17070102 (WA)
17070103
17070201
17070202
17070203

SE Oregon (14)
16040201
16040205
17050109
17050110
17050116
17050117
17050118
17050119
17120001
17120002
17120003
17120004
17120005
17120006
17120007
17120008
17120009
18020001
18080001 (CA)

Hydrologic Characteristics

TABLE 5-1 (concluded)

WASHINGTON

Washington Coast (1)
17080006
17100101
17100102
17100104
17100105
17100106
17110021

Puget Sound (2)
17110001
17110002
17110003
17110004
17110005
17110006
17110007
17110008
17110009
17110010
17110011
17110012
17110013
17110014
17110015
17110016
17110017
17110018
17110019
17110020

SW Washington (3)
17080001 (0R)
17080002
17080003 (0R)
17080004
17080005
17100103
17070106

WASHINGTON (cont)

WA East Cascades (4)
17020007
17020008
17020009
17020010
17020011
17030001
17030002
17070105 (OR)

Columbia Plateau (5)
17020005
17020012
17020013
17020014
17020015
17020016
17030003
17060110
17070101 (OR)

NE Washington/N Idaho (6)
17010214 (ID)
17010215 (ID)
17010216 (ID)
17010305 (ID)
17010307
17010308 (ID)
17020001
17020002
17020003
17020004
17020006

EC Washington/N Idaho (7)
17010303 (ID)
17010306 (ID)
17060107
17060108 (ID)
17060109 (ID)

Other Pertinent Data

Item Number: 501

Data Item: Land Value Category

Description: Indicates the value of land to be purchased for project development and rights-of-way purposes. Applied to all lands and damages including project site, roads, and transmission lines. Developed land is not accounted for as a possible category.

Source: User input from available sources.

Requirement: Yes, for all projects where the purchase of land or rights-of-way is necessary. Used for machine cost calculations. No machine estimates will be made for items 602 and 603 unless a code (1, 2, 3, or 4) has been entered. There are two options for including the cost of purchasing land and rights-of-way for project development purposes: 1) allow the computer to calculate costs; 2) enter the dollar amount as given in the application. If the user desires to enter the developer's estimate a "5" must be coded for 501. The "5" indicates to the computer that this dollar amount should be "transferred" from user input to machine output columns in the 600's section.

Format: Alphanumeric (Al)

Categories:

Code	Description
1	High mountain desert or open range
2	Large crop farmland
3	Small farmland, semi-urban, orchards
4	Productive timberlands
5	User specified cost to be used for lands and damages, and rights-of-way (items 602, 603). These amounts will be transferred to the machine output column.

Other Pertinent Data

Item Number: 502

Data Item: Location of Anadromous Fish Barrier (mi.)

Description: The distance in miles downstream from the project to any physical barrier to anadromous fish migration. The barrier may be natural (such as a waterfall) or man-made (such as a dam). The barrier may be located on the same stream as the project or on a stream to which the project stream is a tributary. Of course, if the barrier is on the major stream, it must be downstream from the confluence of the two streams so that it effectively prevents fish from reaching the project stream.

Source: User input from available sources.

Requirement: Optional. Should be provided for projects when information is known.

Format: Numeric (F6.1)

Item Number: 503

Data Item: Type of Fish Present

Description: Indicates the type of game fish that are present in the stream on which the project is located. Applies to all streams on which diversions or powerhouses are proposed.

Source: User input from available sources.

Requirement: Yes. Used in machine cost calculations.

Format: Alphanumeric (A2)

Categories:

Code	Type of Fish
RG	Resident game species
AA	Anadromous species
GA	Both resident game and anadromous species
XX	No game fish present
MM	Unknown (assumed that resident game species are present)

Example: AA

Other Pertinent Data

Item Number: 504

Data Item: Comment on Type of Fish Present and Barriers

Description: General comment to note types of fish present (other than those coded in item 510), locations of significant populations, habitat characteristics, significance of stocks, potential impacts, etc. Also, the locations of fish barriers on secondary streams should be noted.

Source: User input from available information sources.

Requirement: Optional. Should be provided if available and would be required if fisheries impacts are expected to be a significant issue.

Format: Alphanumeric (A48)

Item Number: 505

Data Item: Other Mitigation Required

Description: Indicates whether or not the developer is required to implement measures to mitigate the affects of constructing the project on fish, wildlife, recreation or other uses of the project area. Other mitigation includes fish, wildlife, recreation or other resource mitigation or enhancement measures, excluding installation of fish screens and passage systems, multi-level intake works and the establishment of minimum instream flows (other data items have been specifically provided for these mitigation measures).

Source: User input from available sources.

Requirement: Yes, required for all projects if the information is known. This information is used in the machine estimate of project costs as special cost items. The estimated cost of "other" mitigation measures, except recreation, should be entered in Item 626. The estimated cost of recreation facilities should be entered in Item 627.

Format: Alphanumeric (Al)

Categories:

Code	Description
Y	Mitigation measures required or offered by developer/applicant
N	No requirements
U	Unknown (assumes no requirements)

Item Number: 506

Data Item: Comment on Other Mitigation

Description: Refers to Item 505.

Source: User input from available sources.

Requirement: Yes, input if information is known. Comments should refer to resource mitigation or enhancement.

Format: Alphanumeric (A48)

Example: DEVELOPER WILL PLANT 1000 TROUT EACH YEAR

Item Number: 507

Data Item: Comment on Prior Studies

Description: References previous studies on project sites.

Source: User input from available reports.

Requirement: Yes, if known.

Format: Alphanumeric (A96)

Other Pertinent Data

Item Numbers: 508, 509

Data Items:
Regional Site Ranking (508)
Comment: Basis of Ranking (509)

Description: Regional ranking of the site following completion of interim site ranking by the fish and wildlife agencies and Tribes or final site ranking by the Power Council. The ranking of sites is not an ordinal ranking of all sites against each other but a classification of sites within categories based on their potential environmental impacts. The comment in Item 509 should indicate whether the ranking is from the interim or final site ranking and should provide a summary explanation of the basis for the classification of a site in the category entered in Item 508. These rankings are subject to revision and developers must consult with Federal and state agencies and Indian tribes in accordance with existing laws and regulations during the hydropower licensing process. The categories within which sites are ranked or classified are described below in the section "Categories."

Source: The interim site ranking is from state reports prepared by the fish and wildlife agencies and Tribes represented in the region on the interim categorization of proposed hydroelectric projects in the Pacific Northwest. The final site ranking is from studies by the Power Council.

Requirement: Critical. Required for development of hydropower supply forecasts. This information is to be added to the database as interim and final reports on reports on site ranking become available. In cases where site ranking is done only for active projects, the database should be reviewed and appropriate site ranking classifications assigned to projects which are excluded from development by the ranked active projects: i.e., the excluded projects should be given the same ranking as the projects which excludes their development (refer to Item 239 and 240 for information on project dependency).

Format:
Alphanumeric (A8) (508)
Alphanumeric (A48) (509)

Other Pertinent Data

Item Numbers: 508, 509 (cont)

Categories:

Category	Description
1	Construction and operation of hydropower facilities will have insignificant adverse effects on fish and wildlife populations and habitats.
2A	Construction and operation of hydropower facilities will have significant site specific adverse effects on fish and wildlife populations and habitat but which may be reduced to an insignificant level by development and implementation of proven on site mitigation techniques.
2B	Projects for which site specific or cumulative impacts are not clearly determinable by the appropriate fish and wildlife agencies and tribes. Additional information is required for project ranking.
3	Construction and operation of hydropower facilities s will have significant adverse effects on fish and wildlife populations and habitat which cannot be reduced satisfactorily because of the critical nature of the habitat or populations affected, the lack of proven mitigation techniques, expense and delay, or any other reason.

Other Pertinent Data

Item Number: 510

Data Item: Type of Fish Species Present

Description: Indicates the species of fish that are present in the stream on which the project is located. Applies to all streams on which diversions or powerhouses are proposed.

Source: User input from available sources.

Requirement: Yes, Critical. Required for machine estimates of minimum instream flows. The appropriate code or codes should be entered depending on the species present. An "X" indicates the presence of Chinook when no specifics are given about migration period, i.e., when a differentiation cannot be made between spring, summer, and fall-types of Chinook. A "Y" is the code for steelhead if no information is available regarding summer or winter types.

Format: Alphanumeric (A16)

Example: ABCXY

Categories:

Code	Species
Salmon - Anadromous Unless Otherwise Noted	
A	Spring Chinook (King)
B	Summer Chinook (King)
C	Fall Chinook (King)
X	Chinook(King)-type not specified
D	Chum (Dog)
E	Coho (Silver)
F	Kokanee - Resident
G	Pink (HumpbacK, Humpie)
H	Sockeye (Blueback)

Item Number: 510 (cont)

Code	Species
Trout - Resident Unless Otherwise Noted	
I	Brook
J	Brown
K	Cutthroat - Anadromous
L	Cutthroat - Resident
M	Dolly Varden
N	Lake
O	Rainbow - Resident
P	Summer Steelhead - Anadromous
Q	Winter Steelhead - Anadromous
Y	Steelhead-type not specified
Other - Warm Water Groups	
R	Sunfish (Crappie, Bluegill, Pumpkinseed, Green Sunfish), Catfish (Bullheads), Perch, Large Mouth Bass
Other - Cold Water Groups	
S	Dace Sculpins
T	Sturgeon
U	Whitefish
V	Small Mouth Bass
Other Species or Groups	
W	Other Species or Groups

Note: Alternate common names of species; or groups are given in parentheses.

Project Cost Data

Item Numbers: 601 - 710

General Description and Data Compilation Instructions:

- Description: This section of the database contains the estimated construction and O&M costs of projects with new or additional hydropower potential. Separate sections are provided for user or developer cost estimates and estimates made by HAM. User input estimates of costs for FERC projects are to be taken from FERC permit, license, or exemption applications, or other available reports. User input estimates for non-FERC projects are to be taken from reports prepared by the project developer. Except for certain special cost items (designated by **), the machine estimate is developed using computer algorithms included in HAM. The purpose of the user input estimate is to provide a record of the developer's estimate of project costs. The purpose of the machine estimate is to provide a common basis estimate of costs that can be used to establish the relative economic ranking of projects included in the database. The machine estimate is not intended as an estimate of the actual construction costs.

- Transfer of Developer's Estimate to the Data Form: When transferring a complete cost analysis from an application or other report to the data form, the categories or cost items may not exactly match. For instance, Items 637 and 638 are often grouped together as one cost. In this case, place the total value in one of the items and enter zero in the other (also make a note on the data entry form). All cost categories which are non-existent or grouped differently, should be entered as zero. This is required because the machine will assign a default "-1.0" to all numeric parameters left blank. A negative one indicates to future users of the database that no information was available about a particular variable.

*Special Note: Cost Items are in units of thousands of dollars ($000) e.g. $1000000. is to be entered an database as 1000.

Item Numbers: 601 - 710 (cont)

- O Comprehensive Developer Estimates: When an application (usually a license or an exemption), contains a comprehensive cost estimate, zero should be entered for all component cost parameters (Items 601-630) for which there are no values given. In general, it is desired that the cost section (600's) be completed up to Items 636 or 639. Economic parameters such as Items 640 and 643 may be ignored if information is missing or the developer's analysis is too confusing or complex to discern. However, fixed annual costs such as Items 644-646 are vital data and should be input, if available. Developer estimates are to be updated whenever a report is received which post dates the report from which the cost estimate was previously taken.

- O Price Level: All project cost items listed in the "user input" column must be of the same base price level; i.e., the same year of cost estimation. For example, part of the cost items should not be given in 1981 prices while the other items are 1983 prices. If an application contains cost estimates at two levels, then the older values must be escalated at a rate given by the applicant or at an appropriate index factor (to be established by NPDPL-EC), in order to maintain consistency. The year of the price-level should be entered in Item 650.

- O Special Cost Items: Special cost items (denoted with a "**") are those project components for which there are no cost algorithms. If a dollar value is placed in the user input column, it will be used in the machine output column. The computer will not make independent estimates when a zero is entered for these parameters, nor when it is left blank.

*Special Note: Cost Items are in units of thousands of dollars ($000) e.g. $1000000. is to be entered an database as 1000.

Item Numbers: 601 - 710 (cont)

Data Items: All items associated with project costs are described in the following:

User Input	Item No. Machine Input	Item	Description
601	656	Mobilization	Includes cost of moving equipment and personnel to site, initial site access, setting up field office, sanitary facilities, utilities for construction, fences for security, other security costs for construction, and all items required for construction which will not be required as part of the finished product.
**602	657	Lands & Damages	Cost of lands purchased and the cost of associated severance damages, etc.
**603	658	Right-of-way	Includes cost of acquisition of right-of-way for access roads and transmission line. (User input transferred to machine input if code "5" is specified in item 501). Does not include cost of labor or negotiations (see item 638, Supervision & Administration), pipeline installation (see items 612, 613, 614), or cost of lands on which to place hydraulic structures (see item 602, Lands & Damages).
**604	659	Relocation's	Move utilities, roads & bridges, railroads, towns, and houses for constructing a project.
605	660	Reservoir	Clearing of pool area. Land preparation work only.

** Special Cost items which also will be used in the machine generated column, if input by the user.

Item Numbers: 601 - 710 (cont)

Input	Item No. Input	Item	Description
606	661	Dam	For all dam/diversion projects, includes the costs listed below. New Diversion/Dam including: Dewatering Excavation Coffer dam Dam Section including cutoff wall Spillway (diversion projects only) Sluiceway & Sluicegate
**607	662	Spillway	Excavation, construction of spillways, and spillway gates (not included in diversion or canal projects).
**608	663	Auxiliary Dam	Secondary dam required by special circumstances associated with a reservoir project.
609	664	Intake	Works For all projects requiring Without an intake, includes the costs Fish Screens listed below: **New Intake Structure including:** Structural elements (walls, floor, ceilings, weir, etc.) Stop logs Shutoff Gates Debris Gates Excavation Dewatering Coffer dam (existing dam) Gate Operators **Intake Structure does not include:** Fish Screens Dam (see 606) Fish Passage (see Item 625) Automatic Control (see Item 617)

** Special Cost items which also will be used in the machine generated column, if input by the user.

Item Numbers: 601 - 710 (cont)

User Input	Item No. Machine Input	Item	Description
610	665	Intake Works with Fish Screens	**For all projects requiring an intake structure, includes the costs listed below.** **Screens including:** Costs of all features listed under Item 609. Fish Screens Fish Screen Frame Cleaning Mechanisms Service Crane or Hoist
611	666	Outlet Works & Tailrace	Tailrace excavation, valves, piping, piles, stilling basin, etc.
612	667	Waterway, 1st Segment	**New Low Pressure Water Line including:** Excavation Bedding Backfill Pipe & Fittings Installation Air Vents & Stand Pipes Access Road for Waterway Construction Canal Lining Fence along Canal Rock Tunnel
613	668	Waterway, 2nd Segment	Same as 612
614	669	Penstock	**New Penstock including:** Excavation Pipe & Fittings Installation Backfill Anchoring System Surge Protection Corrosion Protection Pipe Transportation Bypass Pipe Supports

Item Numbers: 601 - 710 (cont)

Item No. User Input	Machine Input	Item	Description
615	670	Powerhouse	**Structural components, materials, and construction of a new powerhouse including:** Clearing Excavation Structural Elements (floor, walls, roof) Service Crane
615	670 (cont.)		Flood Protection HVAC Sump Pump Communications Equip. Auxiliary Equip. Grounding System **Does not include:** Tailrace turbo machinery bypass valve
616	671	Turbines & Generators	**Turbines generators and associated hydraulic and mechanical equipment including:** Turbines Runner Casing Governor wicket gates Needle valve Shutoff valve Draft tube Lubricating system Lubricant cooling system Valve and gate operators Sensors (oil temperature, oil pressure, vibration bearing, and gear temperature, etc.) Installation Generator Generator housing Fans connecting box Misc. powerplant equipment Installation applies only to projects over 10 MW installed capacity. Turbines & generators are included in powerplant for projects under 10 MW).

Item Numbers: 601 - 710 (cont)

User Input	Item No. Machine Input	Item	Description
617	672	Accessory Equipment	**Switchgear, and electrical control station services** Electrical**including:** Switchgear Batteries and charger Station service transformers Grounding power conduit Control board Micro processor Installation Station Service (Applies only to projects over 10 MW installed capacity. Accessory electrical equipment is included in powerplant costs for projects under 10 MW).
618	673	Powerplant	For projects over 10 MW, Item 618 is the sum of Items 616 and 617. Machine input is the sum of items 671 and 672. For projects 10 MW and under, the machine estimate is developed using a comprehensive powerplant cost algorithm. **Powerplant consists of Turbine- Generator, units and switchgear including):** Hydraulic Turbine Induction or Synchronous Generator Switchgear Governor Excitation System Automatic Controls Instrumentation Lubrication Systems Installation Batteries & Charger Station Service Misc. Powerplant Equipment

Item Numbers: 601 - 710 (cont)

User Input	Item No. Machine Input	Item	Description
618	673 (cont)		**Powerplant does not include:** Bypass Valve (See 614) Pipe (See 614) Powerhouse (See 615) Fire Protection HVAC (See 615) Switchyard (See 619)
619	674	Switchyard	**For all projects includes:** Transformer Lightening protection Breaker switch 50 ft busswork Fuses Concrete pad Fence & gate One Pole w/crossarms & insulators Excavation **Switchyard does not include:** Switchgear & Control (see 617, 618) Transmission Line (see 620)
620	675	Transmission Line	**New Transmission including:** Access Right-of-way clearing Poles and towers Crossarms Insulators Conductors Underground conduit Transmission Line **Does not include:** Switchyard (see 619) Interconnection (see 621)

Item Numbers: 601 - 710 (cont)

Item No. User Input	Machine Input	Item	Description
621	676	Interconnection	All first costs charged by the receiving and wheeling utilities to connect the transmission line from the project to the power grid. These costs are used by the utilities to install meters, install protection equipment, and to modify or build a switchyard necessary for accepting power. Interconnection does not include the monthly wheeling charge (see 646) or cost required for upgrading existing are transmission line (see 620).
622	677	Roads & Bridges	**New Roads and Bridges including:** Excavation Grading Surface treatment Drainage facilities Bridge decks Piers Abutments Guardrail Signing Roads and Bridges **Does not include:** Construction roads for pipelines and waterways
623	678	Buildings, Grounds & Utilities	**New Buildings, Grounds, & Utilities including:** Fences Walkways Parking areas Landscaping Erosion control Outbuildings Visitor facilities Drainage

Item Numbers: 601 - 710 (cont)

Item No. User Input	Machine Input	Item	Description
624	679	Fish screens	Screens required for retrofit projects at existing dams (with or without power) where an intake structure is not required. To be used only for reservoir type projects.
625	680	Fish Passage	**New Fish Passage facilities, including:** Fish ladder Diffusion water supply Fish entrance pool
**626	681	Other Mitigation	Measures to mitigate fish and wildlife or cultural resources, not specifically included as a cost component (excludes fish and wildlife enhancement).
**627	682	Recreation Facilities	Project related recreation facilities proposed by the developer or required by regulating agencies.
**628	683	Fish & Wildlife	A proposed or required measure Enhancement which would result in an increase in fish or wildlife resources over the without project condition.
**629	684	Navigation	Includes locks, channels, Features channel markers, hazardous condition warning markers, navigation lights, etc.

** Special cost items which also will be used in the machine generated column, if input the user.

Item Numbers: 601 - 710 (cont)

Item No. User Input	Machine Input	Item	Description
**630	685	Other	Includes sales tax, bond discount, capitalized interest, capitalized bond reserve, and replacement funds. Denote in comment what "other" costs are.
631	686	Contingencies-Civil Works (%)	Not used for machine estimate (see Item 690).
632	687	Contingencies-Equipment (%)	Not used for machine estimate (see Item 690).
633	688	Contingencies-Lands (%)	Not used for machine estimate (see Item 690).
634	689	Contingencies-Mitigation (%)	Not used for machine estimate (see Item 6g0).
635	690	Contingency-Composite (%)	Machine estimates based on 25 percent.
636	691	Total Construction	The sum of all construction costs including contingencies. Machine estimate includes special cost items as input by user.
**637	692	Engineering & Design (%)	The cost of engineering & design as a percent of total construction cost. Input values may be provided by the field and will be used for the machine estimate if available, otherwise, the machine estimate will use a default value of 15 percent.

** Special cost items which also will be used in the machine generated column, if input by the user.

Item Numbers: 601 - 710 (cont)

User Input	Item No. Machine Input	Item	Description
**638	693	Supervision & Administration(%)	Cost of supervision and administration as a percent (whole percent) of total construction cost. Input values will be used in the machine estimate if provided, otherwise, a default value of 5 percent will be used.
639	694	Total First Cost	Total construction cost plus the cost of engineering & design and supervision & administration.
640	695	Interest During Construction	Estimated cost of interest accrued during project construction, based on either a user input construction budget and schedule (indicated by the project cost budget shown in Item 712) or the default budget included in HAM. The default construction budget values are shown in the description of Item 712.
641	696	Total Investment	The sum of total first cost and interest duringconstruction.
642	697	Annual Interest Amortization	Level annual payments required & to pay off the total investment cost.
643	698	Annual Operation Maintenance, & Replacement (OM&R)	**Costs associated with including:** Ongoing project security Project monitoring Preventive Maintenance Sediment removal Debris removal Equipment replacement Sinking fund Insurance Accounting Administration

** Special cost items which also will be used in the machine generated column, if input by the user.

Item Numbers: 601 - 710 (cont)

Item No. User Input	Machine Input	Item	Description
**644	699	Falling or Other Water Cost	Estimated cost to the developer of the power facilities for the use of an existing dam.
**645	700	Headwater Benefit	Estimated annual credit to project resulting from storage which would increase power generating capability of project downstream.
**646	701	Wheeling Cost	Total annual cost of wheeling electricity over existing power lines to the purchaser of power from a project.
**647	702	Other Annual Cost	Includes royalty payments or charges for land use, etc.
648	703	Total Annual Cost	The sum of all annual costs for a project.
649	704	Interest Rate	The interest or discount rate to be used for economic evaluation of proposed projects. Discount rate will be established and applied on a regional basis.
650	705	Base Price Level	The price level (year) of the Cost estimate. User should input the stated price level if given, or the year of the application. All user input cost data must be at a consistent price level. Costs for machine estimates are based on October 1983 prices.
651	706	Index Price Level	The price level (year) of an index used to inflate or escalate prices shown in the base price level year to the current year.

** Special cost items which also will be used in the machine generated column, if input by the user.

Item Numbers: 601 - 710 (cont)

User Input	Item No. Machine Input	Item	Description
652	707	Price Level Index	Index to be used to escalate or inflate base price levels to current price levels. Index may be changed from time to time by future
653	708	Economic Life	Expected economic life of a project. Machine estimates of economic costs will be based on 100 years for major storage projects and 50 years for diversion projects unless otherwise specified by the input.
654	709	Financing	Time period over which period, project costs are expected to be financed.
655	710	Financing Interest	Interest rate at which project costs would be financed.

Source: User input from available sources or machine calculated, as appropriate.

Requirement: User input is Optional. Should be included if developer/applicant cost estimate is available.

Format: Numeric (F9.1) (601-630, 636, 639-648, 656-685, 691, 694-703)

(F6.3) (631-635, 637, 638, 649, 655, 686, 690, 692, 693, 704, 710)

(F6.0) (650-652, 705-707)

(F4.0) (653, 654, 708, 709)

Item Number: 711

Data Item: Comment on Other Annual Costs

Description: Refers to costs specified in item 647.

Source: User input from available sources.

Requirement: Optional, input if known. Should indicate the name or purpose of additional annual costs.

Format: Alphanumeric (A48)

Item Number: 712

Data Item: Project Cost Budget

Description: The actual or estimated construction cost budget of a project as indicated by the percent of total construction funds expended during each construction year. Costs incurred prior to initiation of construction will be assigned to year 0. Interest during construction will be charged to these costs on the basis of their having been expended one year prior to initiation of construction.

Source: User input from information in FERC applications and other reports available on the project. If left blank, HAM will use the default values shown in Tables 7-1.

Requirement: Optional, but should be provided if available.

Format: Numeric (F7.3)

Data Entry: This item is an array. Refer to instructions in Appendix B for entering and modifying data stored in arrays.

Table 7-1

LENGTH OF CONSTRUCTION PERIOD AND
YEARLY DISTRIBUTION OF CONSTRUCTION COSTS
(HAM Default Values)

(Length Of Construction Period)

Length Const Prd (Yrs)	Project Type	Project Size
1	A B D E F G H J K M N P Q R S T U	<5 MW
2	A B D E F G H J K M N P Q R S T U	5<20 MW
4	A B D E F G H J K M N P Q R S T U	>20 MW <100 MW
4	C I L O V W X	(DAM HT) <100 FT
5	C I L O V W X <250 FT	(DAM HT) >100
6	C I L O V W X	(DAM HT) >250 FT
6	A B D E F G H J K M N P Q R S T U	>100 MW

(Yearly Distribution Of Construction Costs)

Const Period	1	2	3	4	5	6
1 Year	100.0	-	-	-	-	-
2 Years	77.4	22.6	-	-	-	-
3 Years	37.3	55.5	7.2	-	-	-
4 Years	15.7	61.7	18.6	4.0	-	-
5 Years	9.2	49.3	29.9	9.2	2.4	-
6 Years	6.0	31.3	40.1	15.4	5.6	1.6

Project Cost Data

Item Numbers: 713 - 720

Data Items: Allocation of Annual Costs:

Power	(713)
Navigation	(714)
Flood Control	(715)
Irrigation	(716)
Water Supply	(717)
Fish and Wildlife	(718)
Recreation	(719)
Total	(720)

Description: Summarizes the allocation of annual project costs, where appropriate, to indicate the cost of various features or purposes served by the project.

Source: Cost allocation or other studies where allocation of costs to various project purposes has been determined.

Requirement: Yes, for projects where costs have been allocated. For projects where power is the only function, total project costs should be shown as being allocated to power since the determination of the average cost of energy will be based on costs allocated to the power feature rather than on total project costs.

Format: Numeric (F9.1)

Project Cost Data

Item Numbers: 721-742

Data Items: Project Benefits:

	Input	Computed	
Capacity		(721)	(732)
Energy		(722)	(733)
Total Power		(723)	(734)
Navigation		(724)	(735)
Flood Control		(725)	(736)
Irrigation		(726)	(737)
Water Supply		(727)	(738)
Fish and Wildlife		(728)	(739)
Recreation		(729)	(740)
Employment & Other		(730)	(741)
Total		(731)	(742)

Description: Summarizes project benefits by project function.

Source: FERC applications or other available on the project.

Requirement: User input is optional. Should be provided if available.

Format: Numeric (F9.1)

Power Data

Item Numbers: 801, 802

Data Item: Average Cost of Energy ($/MWh) Input (801)
Average Cost of Energy (S/MWh) Computed (802)

Description: Average cost of energy as computed by dividing the total annual project costs by the average annual energy production.

Source: User input from available references or machine calculated.

Requirement: Optional. Should be provided if available.

Value: Numeric (F6.2)

Item Numbers: 803 - 806

Data Item: Capacity Values:	Input	Computed
Dependable Capacity Value ($/MW/YR.)	(803)	(805)
Interruptible Capacity Value ($/MW/YR.)	(804)	(806)

Description: Dependable and interruptible capacity values for future reference and comparison with prevailing regional values, and for machine economic analyses. These items represent the value or price a hydro developer would receive for the capacity of a project's powerplant. Dependable capacity is usually defined as the sustained peaking capacity of a powerplant during critical flow and load conditions. If this is less then the installed capacity, the balance is defined as interruptible capacity.

Source: User input from available sources such as FERC, power purchaser, or other available reference sources.

Requirement: Optional. Should be provided if available.

Format: Numeric (F6.2)

Item Number: 807

Data Item: Monthly Energy Values

Description: Summary of monthly energy values. These energy values may be used in estimating economic feasibility of projects.

Source: User input from available sources.

Requirement: Optional. Should be provided if available. Some utilities offer seasonally adjusted rates by monthly increments or some other period, while others have energy prices fixed for the year. If a single price is given, this value should be entered for each month.

Format: Numeric (F6.2)

Item Numbers: 808 - 813

Data Items:

Installed Capacity	Input	Computed
Existing (kW)	(808)	(811)
New Potential (kW)	(809)	(812)
Total Capacity (kW)	(810)	(813)

Description: Summary of input and computed estimates of existing, additional potential, and total turbine capacity installed at projects included in the database. Nameplate ratings stated in terms of horsepower should be converted to kW using the following equations:

(1 horsepower = .7457 kw)

Source: User input from available sources (808,809,810) or machine computed (811,812,813).

Note: Where a range of estimate of new potential energy is shown in a project report, the highest estimate should be entered.

Requirement: Yes, if available. Machine computed estimates will be provided from the results of the hydrologic analyses. User input of existing capacity (Item 808) is critical. User input of new potential capacity item 809) is critical for fixed capacity and energy analysis (FXC in item 871).

Format: Numeric (F9.1) (all items)

Power Data

Item Numbers: 814 - 819

Data Items:	Input	Computed
Average Annual Energy, Existing (MWh)	(814)	(817)
Average Annual Energy, New Potential (MWh)	(815)	(818)
Average Annual Energy, Total (MWh)	(816)	(819)

Description: User input and machine calculated estimates of average annual energy production from existing and potential new or additional power facilities. Total average annual energy is the sum of existing and new potential. Average annual energy is defined as the amount of energy which would be produced under average water (period of record) conditions. Where a range of estimate of new potential energy is shown in a project report, the highest estimate should be entered.

Source: User input from available sources (814,815,816) or machine computed (817,818,819).

Requirement: Yes, Item 814 is critical for all existing power projects. Item 815 may be critical for fixed capacity and energy analysis (FXC in item 871).

Format: Numeric (F10.1)

Item Number: 820

Data Items: Average Monthly Energy - Input (MWh)

Description: Estimate of project energy production by month.

Source: User input from available sources such as FERC applications, feasibility reports, or other reference sources.

Requirement: Yes, if available. May be critical for fixed capacity and energy analysis (FXC in item 871).

Format: Numeric (F10.1)

Data Entry: This item is an array. Refer to instructions in Appendix B for entering and modifying data stored in arrays.

Item Number: 821

Data Items: Average Monthly Energy - Computed (MWh)

Description: Estimate of average energy production by month as computed by HAM or as input by the user where a fixed capacity analysis is specified (FXC in item 871). If based on user input (FXC analysis) values stored in Item 820 are transferred to Item 821.

Source: Machine calculated.

Requirement: Not applicable.

Format: Numeric (F10.1)

Item Numbers: 822 - 833

Data Items: Turbine-Generator Configuration, Existing

Number of Units	(822,826,830)
Type	(823,827,831)
Capacity (kW)	(824,828,832)
Year	(825,829,833)

Description: Summary information on number of units, type, capacity, and year (of manufacture) turbine-generator units installed at a project with existing operational power facilities. Separate entries are be used to distinguish between units of differing types and/or capacity. Whether a turbine is horizontal or vertical is determined according to the orientation of the shaft. If no mention is made in the text of an application or other report, refer to drawings submitted within an application, as these often show the type of turbine to be installed. In general, horizontal shaft turbines are the most common type because of lower cost.

Source: User input from available reference sources or operators of existing projects.

Requirement: Yes, for existing power projects. Machine selection of the type of turbine is based on head, size, and cost criteria. The default specification for the type of generator is synchronous.

Format:

Numeric (F3.0)	(822,826,830)
Alphanumeric (A3)	(823,827,831)
Numeric (F7.0)	(824,828,832)
Alphanumeric (A4)	(825,829,833)

Item Numbers: 822 - 833 (Cont)

Categories: **Codes for turbine type (1st two Characters)**

Code	Turbine Type
CF	Cross Flow
FH	Francis, Horizontal
FV	Francis, Vertical
KB	Kaplan, Bulb
KV	Kaplan, Vertical
OI	Other, Impulse
OR	Other, Reaction
PL	Pelton, Vertical
PH	Pelton, Horizontal
PV	Propeller, Vertical
RM	Rim
TF	Tubular, Fixed Blade
TV	Tubular, Variable Blade
TU	Turgo
UU	Unknown

Codes for Generator Type (3rd Character)

Code	Generator Type
I	Induction
S	Synchronous
U	Unknown

Note: The letter "U" should be entered in all cases where the generator type is unknown. Projects processed through HAM will have the generator type (new generators) set to a default (see Table 3).

Item	Data	Item	Data
822	2.	826	1.
823	FVS	827	TUS
824	250.	828	400.
825	1980	829	1980

Item Numbers: 822 - 833 (cont)

Example: These parameters are used to describe the turbine/generator equipment so that differences in type, capacity, and year of manufacture (use year of expected installation for proposed projects) can be determined. If more than one unit is installed in a powerhouse, separate the units into groups according to "existing" (items 822-833) or "proposed"' (items 834-84S) type, capacity and year of manufacture (year of installation for "proposed" projects). Begin entering data in the first column (starting with Item 822 and/or 834) and move across the columns when one of the three characteristics changes. In the example above, the project has two vertical Francis turbines of 250 kW and one turgo turbine of 400 kW which were manufactured in 1980. All three turbines are equipped with synchronous generators.

The capacity items in these two turbine/generator configuration sections are for <u>each</u> unit, not the total (which should be entered in Items 808-813). In the example above, 500 kW would be an incorrect input for Item 824, because the computer would assume that the two Francis units will output a total capacity of 1,000 kW (which is 500 kW higher than actually installed).

Item Numbers: 834 - 845

Data Items: Turbine-Generator Configuration - New Potential

Number	(834,838,842)
Type	(835,839,843)
Capacity (kW)	(836,840,844)
Year	(837,841,845)

Description: Summary information on number, type, capacity and year (of installation) of new turbines and generators proposed to be available and should be used to distinguish between units of differing types and/or capacity.

Source: User input from available sources.

Requirement: Yes, for all projects.

Format:			
	Numeric	(F3.0)	(834,838,842)
	Alphanumeric	(A3)	(835,839,843)
	Numeric	(F7.0)	(836,840,844)
	Alphanumeric	(A4)	(837,841,845)

Categories: (See categories for items 822-833)

Item Number: 846

Data Item: Number of Units-Total

Description: Total number of units installed at a project including existing and potential new units.

Source: User input from available sources or machine calculated by summation of the number of existing units and potential new units.

Requirement: Yes, for all projects.

Format: Numeric (F3.0)

Power Data

Item Numbers: 847 - 868

Data Items: Capacity - Energy Summary

Description: Provides a summary record of existing, new and total dependable capacity potential. The exceedence frequency at which new potential has been optimized; the existing, new and total firm energy production; the maximum and minimum annual energy production; and seasonal energy production for summer and winter seasons. Descriptions are provided below:

Item No.		Item	Description
User	Machine		
847,	858	Dependable	Sustained peaking capacity
848,	859	Capacity	under adverse water and
849,	860		load conditions expected.
850,	861	Optimum Exceedence Frequency	Exceedence frequency from the period of record flow duration curve associated with the optimum project size.
851,	862	Annual Firm	Annual energy produced
852,	863	Energy	under the most adverse
853,	864		water conditions expected.
854,	865	Maximum Annual Energy	Annual energy generated based on the highest annual streamflow of record.
855,	866	Minimum Annual Energy	Annual energy generated based on the lowest annual streamflow of record.
856,	867	Summer Energy	Energy production during hydrologic average summer months (July and August).
857,	868	Winter Energy	Energy production during hydrologic average winter months (December and January).

Item Numbers: 847 - 868 (cont)

Source: User input values from available project documents. The computed values will be supplied from the results of the machine analysis.

Requirement: Yes

Format:			
	Numeric	(F9.1)	(847,848,849,858,859,860)
	Numeric	(F3.0)	(850,861)
	Numeric	(F10.1)	(all other items)

Item Numbers: 869, 870

Data Item:		
	Optimization Criteria	(869)
	Comment on Optimization Criteria	(870)

Description: Criteria used in the Hydropower Analysis Model as the basis for establishing the size of the project in term of installed capacity.

Requirement: Optional. Analysis of all projects will initially be made based on the objective of the minimization of average unit energy costs. Future analysis may be made based on user input criteria. Comments on the basis of user input optimization criteria should be provided in item 870.

Format:			
	Alphanumeric	(A32)	(869)
	Alphanumeric	(A48)	(870)

Item Number: 871

Data Item: Type of Hydrologic Analysis

Description: Indicates the type of analysis to be used in estimating project energy and capacity potential. The flow duration (DUR) analysis is the process where by the computer will access a computer tape, i.e., to select a representative gage (optional) and use the daily flow record for that gage to create monthly flow duration curves for the diversion/dam site. All other types of analyses are performed using input flow or energy and capacity values. The types of analysis available are listed below under "Categories."

Source: User input based on data available on stream flow.

Requirement: Critical for all projects. The selection of the type of energy and capacity analysis to be used should be based on an assessment of the hydrologic data available (input to the database) for the project. In general, the analysis specified should be the one which the user believes will yield the most accurate estimate of the actual power potential of the project. For canal or conduit projects (codes P, Q, R, S, T, and U in Item 301), a DUR analysis with a machine selected gage would be inappropriate because canals and conduits cannot be correlated to natural streams. Further, flow is generally not related to drainage area. In these cases, flow or energy and capacity data for the project must be input by the user. If a DUR analysis is specified, a user selected gage must be provided (Item 405). Otherwise, a fatal error will result and HAM will abort the analysis. For existing or undeveloped projects without power, a fixed capacity (FXC) analysis should normally be specified only after all possibilities for use of machine generated or user input flow data have been exhausted. However, for existing projects with power, the FXC analysis may be the best choice, particularly if the developer's estimate is from a license application or feasibility report. Flow, capacity and energy data requirements for fixed capacity and fixed flow analyses are shown below under "Categories". Other data requirements vary depending on the type and status of the project being analyzed. To insure required data are included in the database, users should carefully follow data compilation instructions for each data item.

Item Number: 871 (cont)

Format: Numeric (A3)

Categories: Types of analysis provided for the Hydropower Analysis Model (HAM) are as follows:

Type of Analysis	Code
Flow Duration Analysis	DUR
Fixed Annual Duration Analysis	FXA
Fixed Capacity & Energy Analysis	FXC
Fixed Average Annual Flow Analysis	FXF
Fixed Average Monthly Flow Analysis	FXM
Analysis Not Possible	XXX

Flow, capacity and energy data requirements for fixed capacity and fixed flow analysis are as follows:

Type of Analysis	Status of Waterway Structure	Data Items Required		
		Flow	Capacity	Energy
FXA	Existing	425	N/A	N/A
	Existing w/power	425	808	814
	Undeveloped	425	N/A	N/A
FXC	Existing	N/A	809	(1)820 or (2)815
	Existing w/power	N/A	808 & 809	(1)814 & 820 or (2)814 & 815
	Undeveloped	N/A	809	(1)815 & 820 or (2)814 & 815
FXF	Existing	424	N/A	N/A
	Existing W/Power	424	808	814
	Undeveloped	424	N/A	N/A
FXM	Existing	427	N/A	N/A
	Existing w/power	427	808	814
	Undeveloped	427	N/A	N/A
XXX	Pumped storage and Ferc Duplicate projects			

Item Number: 871 (cont)

Note:
1. N/A = Not applicable

2. Numbers in ( ) indicate order of preference among options.

3. Projects proposed for construction on canals, onduits, or waterways having flows which cannot be elated to GETUSGS stream gages must include estimates of average monthly flows in item 427, annual duration curve in item 425, average annual site flow in item 424, or a fixed capacity and energy analysis must be specified.

4. All types of analysis require head (See Item 318).