Embrittlement Data Base, Version 1

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ABSTRACT

The aging and degradation of light-water-reactor (LWR) pressure vessels is of particular concern because of their relevance to plant integrity and the magnitude of the expected irradiation embrittlement. The radiation embrittlement of reactor pressure vessel (RPV) materials depends on many different factors such as flux, fluence, fluence spectrum, irradiation temperature, and preirradiation material history and chemical compositions. These factors must be considered to reliably predict pressure vessel embrittlement and to ensure the safe operation of the reactor. Based on embrittlement predictions, decisions must be made concerning operating parameters and issues such as low-leakage-fuel management, possible life extension, and the need for annealing the pressure vessel. Large amounts of data from surveillance capsules and test reactor experiments, comprising many different materials and different irradiation conditions, are needed to develop generally applicable damage prediction models that can be used for industry standards and regulatory guides. Version 1 of the Embrittlement Data Base (EDB) is such a comprehensive collection of data resulting from merging version 2 of the Power Reactor Embrittlement Data Base (PR-EDB) and Version 1 of the Test Reactor Embrittlement Data Base (TR-EDB). Fracture toughness data were also integrated into Version 1 of the EDB.

For power reactor data, the current EDB lists the 1,029 Charpy transition-temperature shift data points, which include 321 from plates, 125 from forgings, 115 from correlation monitor materials, 246 from welds, and 222 from heat-affected-zone (HAZ) materials that were irradiated in 271 capsules from 101 commercial power reactors. For test reactor data, information is available for 1,308 different irradiated sets (352 from plates, 186 from forgings, 303 from correlation monitor materials, 396 from welds, and 71 from HAZs) and 268 different irradiated plus annealed data sets (89 from plates, 4 from forgings, 11 from correlation monitor materials, and 164 from weld materials).

The data files of EDB are given in dBASE format and can be accessed with any personal computer using the DOS or WINDOWS operating system. A utility program has been written to investigate radiation embrittlement using this data base. The utility programs are used to retrieve and select specific data, manipulate data, display data to the screen or printer, and to fit and plot Charpy impact data.

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1 INTRODUCTION

1.1 Background

The aging and degradation of light-water reactor (LWR) pressure vessels is of particular concern because of their relevance to plant integrity and the magnitude of the expected irradiation embrittlement. The radiation embrittlement of a reactor pressure vessel (RPV) materials depends on factors such as flux, fluence, neutron energy spectrum, irradiation temperature, and preirradiation material history and chemical compositions.^{1,2} These factors must be considered to reliably predict pressure vessel embrittlement and to ensure safe operation of the reactor. Based on embrittlement predictions, decisions must be made concerning operating parameters and issues such as low-leakage-fuel management, possible life extension, and the need for annealing the pressure vessel.³ Large amounts of data from surveillance capsules and test reactor experiments, comprising many different materials and different irradiation conditions, are needed to develop generally applicable damage prediction models that can be used for industry standards and regulatory guides. Version 1 of the Embrittlement Data Base (EDB) is such a comprehensive collection of data resulting from merging Version 2 of the Power Reactor Embrittlement Data Base (PR-EDB)⁴ and Version 1 of the Test Reactor Embrittlement Data Base (TR-EDB).⁵ The fracture toughness data were also integrated into Version 1 of EDB.

The scope and purpose of this program can be summarized as follows:

- Compile and verify a comprehensive collection of data from power reactor surveillance programs and test reactor irradiation experiments of pressure vessel materials from U.S. and foreign laboratories.
- Provide software support for use of the data base by furnishing programs and maintaining compatibility with commercially available software.
- Facilitate the exploration and verification of embrittlement prediction models.
- Facilitate the exploration and verification of the effects of annealing for pressure vessel life extension.
- Interact with standards organizations to provide the technical bases for voluntary consensus standards that can be used in regulatory guides, Standard Review Plans (SRPs), and American Society of Mechanical Engineers (ASME) codes.

To achieve these goals, the design of the data base architecture was made after much discussion and planning with prospective users and material scientists. EDB is designed for use with any personal computer using the DOS base system. Updates will be issued periodically to users. The data format chosen for EDB is dBASE; this format was initially introduced by Ashton-Tate and is now the virtual standard for relational data bases. This format allows queries and data processing not only with the

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current dBASE software but also with any of the now numerous "Xbase" developer tools, such as Clipper or Foxpro. The dBase files can also be imported into most other data base, spreadsheet, and word processing programs that run in the DOS or WINDOWS environment. More recent versions of these programs contain extensive facilities for generating reports including statistical, curve fitting, and graphic programs. For frequently-performed tasks, a customized EDB utility program based on Clipper and FORTRAN, which was written originally for PR-EDB, can be used. EDB-Utilities is menu-driven and self-explanatory, requiring no special training (description is given in Appendix A). An updated version of these programs is scheduled to be included in the current version of EDB.

The data collections in EDB originated from the Material Properties Council (MPC) data base, which contains both power and test reactor data.⁶ From this collection an unpublished version of EDB was constructed and augmented with more recently reported data. All data are traceable to a reference, including page numbers. The architecture of the data base is characteristic of a relational data base that makes it relatively simple to maintain and perform quality control. A restricted version containing only power reactor surveillance data-PR-EDB-was assembled to be used primarily for regulatory purposes. Most of the surveillance data listed in PR-EDB have been verified by the reactor vendors responsible for the insertion of the material into surveillance capsules, and any changes and corrections have been documented in special files for future reference. Version 1 of PR-EDB was released to the public in July 1991. An updated Version 2 was released in January 1994.⁴ In the meantime, the assembly and review of the MPC and other test reactor results were continued, tracing them to the original reports and adding more data. Significant additions came from Nuclear Regulatory Commission (NRC)-sponsored investigations at Materials Engineering Associates, Inc. (MEA) and Oak Ridge National Laboratory (ORNL), an International Atomic Energy Commission (IAEA)-sponsored program, and a variety of other irradiation experiments at laboratories in France, Germany, Japan, and the United Kingdom. Verification of the TR-EDB data is difficult and cannot be as thorough and comprehensive as for the PR-EDB data, mainly because of the way the results were reported. An additional problem is that laboratories and researchers responsible for the published data are often no longer available or cannot be funded for the considerable work involved for outside reviews. All data have been checked internally for correctness and consistency, and all unresolved problems are reported in the "NOTES." Every effort has been made to resolve discrepancies by contacting the original investigators. Version 1 of TR-EDB was released in January 1994.⁵

1.2 FRACTURE TOUGHNESS DATA

The mechanical test results contained in PR-EDB and TR-EDB are Charpy impact test and tensile test data. The ductile-to-brittle transition temperature approach, mainly relying on the Charpy impact test, is simple and has been used successfully. However, because this approach has the limitation of being based on correlation to a service technological test rather than a more familiar stress criterion, it cannot be used directly in the design. By including fracture mechanics test results, this shortcoming can be mitigated. Fracture mechanics test results can offer a direct linkage to stress analysis and verify the relationships between the Charpy data and fracture toughness data. Three categories of fracture toughness data are available from the reports: static fracture toughness, K_{IC} or K_{Jc} , dynamics fracture toughness, K_{Id} , and crack arrest fracture toughness, K_{Ia} data. The general specimens used in fracture

toughness experiments are single edge notch bending (SEB), compact tension (CT), arc-shaped tension (AT), disk-shaped compact (DCT), crack-line-wedge-loaded (CLWL, or WOL), and double cantilever beam (DCB) specimens and center-cracked tension (CCT) panels. The experiments carried out with those specimens are performed under different criteria and experimental procedures and are responsible for a particular kind of fracture toughness data. Thus, in EDB the three major categories of fracture toughness data are grouped into separated data files, and the criteria among the different type specimens are carefully distinguished.

Considerable controversy exists concerning upper-shelf fracture toughness. Two methods are available for such determinations: the equivalent energy method [K-EE, American Society for Testing and Materials (ASTM) E992-84] and the J-integral method. From the available reports, the most frequently used fracture toughness specimens are CT, WOL, and DCB specimens and precracked three-point bend specimens. Therefore, the main focus here is on these specimens. There are several schemes besides the ASTM specification used for the calculation of J_{IC} (ASTM E813) and these methods needed to be properly identified. Also, there is a need to identify the type of fracture behavior as A: cleavage fracture, B: stable tearing no crossing the 1.5-mm exclusion line with fast fracture at P_{max} , C: stable tearing with no cleavage, D: stable tearing extended past the 1.5-mm exclusion line with cleavage thereafter. An index for the validation of the test is registered in the field VALIDITY, which contains one or more letters for a specimen indicating that the test results did not meet one of the ASTM E813 validity criteria: A, thickness too thin; B, uncracked ligament too short; C, crack length measurement did not meet requirement; or D, specimen demonstrated brittle cleavage failure.

Data collected from different sources was obtained on different machines and with different experimental specifications. Detailed information on the test procedures and testing apparatus, such as machine type and capacity and responsible engineers, etc., should be integrated into the data base. These data allow the user to trace the original data source and pin down the difference between different experimental environments and testing methodologies.

Several methods are used to determine crack growth, including the crack opening displacement (COD) method, optical method, and the acoustic emission evaluation method, or predictions based on compliance. Each method may require different adjustments depending on the application to the particular specimens. This information must be handled carefully before being entered into the data base. For dynamic or crack arrest fracture toughness experiments, the CT or WOL specimens are normally modified with a starter, such as an embrittlement weld bead or duplex specimen, to generate higher initial stress intensity, K_O . Any additional modification among the specimens, such as a precrack or side grooves, is also recorded in EDB.

Phase 1 of this project has been completed. Three categories of fracture toughness data, available from the reports, have been integrated into the EDB: static fracture toughness, K_{IC} or K_{Jc} ; dynamic fracture toughness, K_{Id} or K_{Jd} ; and arrest fracture toughness, K_{Ia} data.

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1.3 Contents of EDB

Three major categories of data are included in EDB: preirradiation material history, irradiation environments, and mechanical test results. These categories contain the following types of data:

- chemistry data for each material;
- preirradiation heat treatment;
- data concerning the fabrication of weld material;
- fluence [$E > 1.0$ MeV, $E > 0.1$ MeV, and displacement per atom (dpa)], irradiation time, and irradiation temperature for each irradiated capsule;
- lead factor data (i.e., degree to which surveillance capsule data are accelerated relative to the pressure vessel);
- drop weight test data;
- Charpy impact test results before and after irradiation, both for individual specimens and for evaluation of transition temperature and upper-shelf energy;
- tensile test results before and after irradiation;
- fracture mechanics test results before and after irradiation; and
- postirradiated thermal anneal Charpy impact test results, both for individual specimens and for evaluation of transition temperature and upper-shelf energy.

The contents of the Charpy impact test results listed in the current version of EDB are as follows.

Power reactor data: The current EDB lists 1,029 Charpy transition-temperature shift data points, which include 321 from plates, 125 from forgings, 115 from correlation monitor materials, 246 from welds, and 222 from heat-affected-zone (HAZ) materials that were irradiated in 271 capsules from 101 commercial power reactors.

Test reactor data: Information is available for 1,308 different irradiated sets (352 from plates, 186 from forgings, 303 from correlation monitor materials, 396 from welds, and 71 from HAZs) and 268 different irradiated plus annealed data sets (89 from plates, 4 from forgings, 11 from correlation monitor materials, and 164 from weld materials).

The distribution of fast fluences and irradiation temperatures for power reactor and test reactor data are shown in Figs. 1 and 2, respectively. Most irradiations were performed at the typical operating temperature of power reactors around 550°F, but sufficient information for other temperatures is

Fig. 1. Distribution of power reactor Charpy data for fluence and irradiation temperature for base and weld materials.

Fig. 2. Distribution of test reactor Charpy data for fluence and irradiation temperature for base and weld materials.

Fig. 3. Distribution of power reactor Charpy data for copper and nickel content for base and weld materials.

Fig. 4. Distribution of test reactor Charpy data for copper and nickel content for base and weld materials.

available from the test reactor data to investigate the influence of irradiation temperature on embrittlement. The distribution of copper and nickel content is shown in Figs. 3 and 4, for commercial power reactor and test reactor data, respectively. To take full advantage of the information contained in the data base, the user of EDB is expected to have some familiarity with the dBASE philosophy and software. Noted that the data in EDB are taken directly from the quoted documents without any interpretation or evaluation. All numerical values are given in the units of the original documents. All data from any particular record in an EDB file are obtained only from the document quoted in REF_ID, except as noted. More than one record of the same quantities may be included in the files if different documents report different evaluations of the same data. For instance, several determinations of the chemistry of the same material may be performed, or fluences may have been updated based on improved methodology or cross-section data. The user must select or, perhaps, average the different values for the same quantity. Automated analysis of the raw data files in EDB is not recommended. A additional evaluation, selection, and unit conversion will be necessary whenever these data are to be used for investigations and analysis of RPV integrity issues. The creation of evaluated data files for such purposes is being considered for future releases. Further development of EDB-Utilities is required to allow the user to streamline the raw data and generate evaluated data files more efficiently, to duplicate routine functions on the update analysis, and to develop special routines to incorporate "what-if scenarios" into analysis and selection procedures.

1.4 Future EDB Data Input

The proposed EDB data inputs for the irradiation environment are irradiation-time history, group fluence spectra, and dosimetry data base, which are essential for the detailed study of the rate effect, spectrum effect, and further investigation of the damage efficiency and residual defects. The degree of embrittlement is conventionally correlated with fast neutrons or dpa, which are proportional to the production rate of point defects. However, radiation effects are driven not by the total number of atoms displaced but by the small fraction of point defects that avoid annihilation by mutual recombination, either within the displacement cascade or as they diffuse in the material.^{7 - 11} Therefore, radiation effects are determined by the survival rate of point defects, not by their production rate. The survival rate of point defects (or defect availability) depends on several factors: (1) the temperature of the material, (2) the rate at which the fluence is accumulated, and (3) the energy of the neutrons causing the displacements. Higher temperatures, higher flux levels, and higher energy neutrons all enhance recombination effects and result in lower fractional defect survival. Thus, the development rate of radiation embrittlement under different irradiation environments will not necessarily scale with fast fluence or with dpa unless the survival rate of point defects for each different irradiation also scale with the total defect production rate. Therefore, the previously mentioned proposed radiation environment data are crucial for obtaining a better correlation parameter for the prediction of the radiation embrittlement of RPV steels.

Another important category of data for future EDB data input is nondestructive test data, including the indentation and ultrasonic tests. This proposed nondestructive data is essential for the calibration and construction of the correlation between the existing destructive mechanical test data and the nondestructive test results. This may prove to be useful in the near future, especially for older plants on the verge of exhausting the available mechanical test specimens loaded in surveillance capsules.

2 ARCHITECTURE

2.1 Introduction

A data base is a collection of related information organized for a specific purpose. In dBASE, a data base is a collection of one or more tables that store and classify information and related files such as indexes and memo files. Each table in a data base is a distinct file with the extension .dbf. A table consists of one or more records. A record contains information about a specific entry in the table, such as person, reactor, or test. Each record contains one or more fields. A field is a part of a record that contains a category of information, such as a person's name, a reactor vendor, or a test result. A data base that consists of only one table is called "flat," which is the format used for older collections, including the MPC data base.⁶ This approach makes data retrieval easy, requiring no special software, but complicates data entry. For instance, chemical composition data common to a particular material must be repeated for every record that contains the same material. Also, more than one chemical composition determination may be made for the same material such that not only is the same chemical composition repeated over several records but each record must also provide room for several different chemical compositions. These requirements make a flat data base unwieldy and error prone and has led to the introduction of "relational" data bases. In a relational data base, information is split into several different tables (files), each of which contains only related data. Data from different files are connected (related) with each other by means of unique identifiers that are common to the tables. For instance, all chemical composition data are collected in a chemical composition file, where each chemical composition record contains a unique material identifier. The same material identifier is contained in each test record for that material so that test results can be combined with chemistry. In this way, duplications are avoided, and it is possible to list any number of different chemical composition determinations for the same material. The downside to this structure is that several files must be linked together to extract the desired information, and software support is necessary to do this effectively. Such software support is now widely available as is the use of relational data bases for all but the simplest data base applications.

EDB is designed as a collection of many different data files, each of which closely resembles the data tables found in the original surveillance reports or other technical documents. For instance, most reports have tables containing transition temperatures and upper-shelf energies for Charpy specimens before and after irradiation and/or the shifts in these values during irradiation; these data are collected in the file "SHFT_CV.dbf." Data are collected as reported; that is, there are fields for unirradiated, irradiated, and shift values, depending on what is reported. Fields are added for various units because different reports use different units [i.e., English units, the International System of Units (SI), and European engineering units]. Similarly, information about tensile tests is collected in the file TENSILE.dbf, information about irradiation, such as capsule fluence and temperature, in the file REAC.dbf, and so on. The linkage between different data files in EDB is provided by "key identifiers" that are common to these files. For instance, all files with data concerning a specific material, such as results of material property tests, material manufacture, heat treatment, and chemical composition contain a field for the material identifier, HEAT_ID. Similarly, files with data concerning irradiations contain fields for the identifiers of the experimental identifier (EXP_ID), reactor (PLANT_ID), and

the capsule (CAPSULE). A detailed description of the key identifiers is given in Sect. 2.2. Care has been exercised to assign the correct identifier to each record to ensure that connections between data from different records are made and made correctly. To ensure correct identifications, numerous cross checks are made, which also detect mistakes not caught by conventional proofreading. A complete list of the data files in EDB is given in Sect. 2.4. For EDB, the relational data base format has the following significant advantages:

1. The structure of the data files need not be predetermined; the data files are designed according to what is available in the original reports, and new data files can be added without disturbing the existing ones.
2. Because every record in a data file originates from a single report, and in most cases, from a single table in that report, a unique reference, including page number(s), can be given for each record. This feature allows the user to go back to the source of the data when questions arise.
3. Multiple determinations of the same quantity are given in different records, each with its proper references. Such multiple determinations occur, for instance, if the chemical composition is determined by the manufacturer of the material as well as from broken specimens. Also, fluence determinations are frequently updated in subsequent reports using improved neutron physics calculations. Different determinations are kept in EDB, and the user must decide which determination to use for a particular application or, perhaps, calculate averages from several of them. (For statistical evaluations and model fittings, only one value can be used for any given quantity; for these applications, "evaluated" data files need to be created that contain only unique data obtained from different reports by averaging or related procedures.)

The process in the construction of relational data bases by which data are distributed over different files is known in the data base literature as "normalization." A relational data base is considered normalized if no data are repeated, except key identifiers. Full normalization is a desirable goal for aesthetic as well as practical reasons, but it may lead to an unnatural separation of connected data. For instance, results of Charpy tests for irradiated materials are usually not considered in isolation but are related to the same data for unirradiated material (baseline data) to determine the changes caused by radiation. On the other hand, baseline data are the same for all irradiations of the same material and should, therefore, be listed in a separate file to avoid duplications. However, the file SHFT_CV.dbf for evaluated Charpy tests contains both irradiated and baseline data in the same record as well as the differences (shifts) between the two, although shift values can be obtained by simple arithmetic. This was done to simplify the eventual use of the data, although strict normalization was not performed in this case. Additionally, fluences and irradiation temperatures are also listed with each data set, although the same data are also collected in the file REAC.dbf. (However, in this case fluences and temperatures are relative to the specimen or sets of specimens, which may be different from the values for the whole capsule that are listed in REAC.dbf.)

All data in EDB are given in character format; that is, numerical data are represented internally in the dBASE files by the ASCII characters representing the numbers. This policy allows the data to be represented exactly as reported. For example, prefixes such as >, <, and ~ can be included in the data

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fields. Missing data are represented as blank fields. The disadvantage of using character format is that special conversion procedures are necessary if comparisons or numerical manipulations are to be performed on the data. Such procedures are included in the EDB-Utilities program, which is described in Appendix A. Also required are additional structure files (identified with the extension .str) that identify the numerical (and date) fields in the EDB files since this information is no longer contained in the regular dBASE structure files.

Data in EDB are given in units of the original reports. ASTM recommends using SI units, as described in ASTM Standard E380-93 for Metric Practice. This standard also provides the guidance and constants for unit conversion. The basic units for this system are meter (m) for length, seconds (s) for time, and kilogram (kg) for mass. Before the adoption of SI units, customary engineering practice used units of force instead of mass as the third basic unit. Pound (lb) as unit of force, in addition to foot (ft) and inch (in.) for length, has been used in the United States and other English-speaking countries and is still found in many U.S. reports (identified as US_Unit). Older European reports use kilogram (kg) or kilopond (kp) as the unit of force, in addition to with meter and second. Units used in EDB and the conversions to English or to SI units are listed in Table 1.

An overview of the data flow in EDB is given in Fig. 5, where "Evaluated data files" is proposed for future development. The source data are first transcribed as exactly as possible to "Raw Data Files" in dBASE format with complete references. Data entry is currently done using the keyboard. Direct transfer will be used whenever computer-readable documents are available. Any deviation from the norm, which was either reported or noted during transcription (such as the correction of obvious typographical errors), is indicated in the NOTES field. Data from available reports are included except when the information in a later report is simply a duplication of earlier data without any changes. More than one record of the same quantities may be included in the files if different documents report different evaluations of the same data. The user must select or, perhaps, average the different values for the same quantity. Thus, the raw data need to be streamlined and converted into an evaluated data file for further analysis.

Next, the selected evaluated data files are converted to processed files by EDB Utilities or other user-supplied software. Processed files will typically be in dBASE format, but ASCII-coded files can also be obtained from dBASE-compatible software for input into scientific software (e.g., numerical analysis programs written in FORTRAN) and word processing, and spreadsheet software. Tables and graphs can be created with the additional software for the purpose of model fitting, model verification, and other applications.

Furthermore, data acquisition from existing databases of other research organizations will be an important source for future EDB data input. Contributors can supply new data either on diskettes in the standardized format of EDB, or by using the data acquisition sheets shown in Appendix C. Appendix C contains all the blank data acquisition sheets and detailed instructions for completing each sheet.

Table 1. Units used in Embrittlement Data Base (EDB) files

Description	Symbol used in EDB	Type of unit	Conversion factors			
			to English units		to SI units	
Mil (1/1000 inch)	mil	Length	0.001	inch	0.00254	cm
Millimeter	mm	Length	0.03937	inch	0.1	cm
Centimeter	cm	Length	0.3937	inch	1.0	cm
Inch	in.	Length	1.0	inch	2.54	cm
Fahrenheit	F	Temperature	1.0	F	(F - 32)/1.8	C
Centigrade	C	Temperature	1.8 C + 32	F	1.0	C
Kelvin	K	Temperature	1.8 K - 460	F	1.0 K - 273	C
Foot-pounds	ft-lb	Energy	1.0	ft-lb	1.3558	joules
Joules	J	Energy	0.7376	ft-lb	1.0	joules
Kilogram-meters	kgm	Energy	7.2330	ft-lb	9.8066	joules
Mkp ^a	MKP	Energy	7.2330	ft-lb	9.8066	joules
Mkp/cm ^{2 b}	MK/C2	Energy	5.78	ft-lb	7.92	joules
KJ/m ²	KJ/m ²	Energy			1.0	KJ/m ²
Kilogram/mm ²	K/MM	Stress	1.4223	ksi	9.8066	MPa ^c
Kip/inch ²	KSI	Stress	1.0	ksi	6.895	MPa ^c
Pound/inch ²	PSI	Stress	0.001	ksi	6.895	kPa ^c
Mega Pascal	MPa	Stress	0.145	ksi	1.0	MPa ^c
MPa√m	MPa·m ^(1/2)	Stress	0.910	ksi√in	1.0	MPa√m
Ksi√in	KSI·in ^(1/2)	Stress	1.0	ksi√in	1.099	MPa√m
Second	S	Time	1.0	s	1.0	s
Hour	H	Time	3,600	s	3,600	s
Day	D	Time	86,400	s	86,400	s
Year (365 Days)	Y	Time	31,536,000	s	31,536,000	s

^aSame as kilogram-meters.^bEnergy relative to the cross section of the Charpy minus notch = 0.80 cm² (reported for the Beznau reactors).^ckPa = kilo Pascal = 10³ Pascal; MPa = Mega Pascal = 10⁶ Pascal.

Fig. 5. An overview of the data flow in the EDB.

2.2 Key Identifiers

One or more fields in each data file are occupied by "key identifiers," which provide the means for combining data from several files through "relations" that link the corresponding records in these files. These fields differ from other data fields in that the key identifiers are assigned by the manager of the data base so that the same unique identifiers are used to label the data among the various data files that refer to the same experiments, materials, or source documents. Identifiers used in source reports do not always provide such unambiguous labeling. The following key identifiers are used in the current version of EDB:

1. **EXP_ID**

Up to ten characters may be used in **EXP_ID** to identify specific experiments carried out in material test reactors or in commercial power reactors. For data related to a commercial power reactor surveillance program, the first three characters of **EXP_ID** are designated as "PR-" followed by the reactor's **PLANT_ID**. For example, for the surveillance program of Arkansas Nuclear Unit 1, the **EXP_ID** is identified as "PR-AN1." For test reactor experiments that were performed in support of a power reactor surveillance program, the **PLANT_ID** of the power reactor is used as **EXP_ID**. A detailed description of each experiment is listed in the **EXP_LST.dbf** file. Note that any given experiment is usually described in more than one reference and that the same reference may report more than one experiment.

2. **PLANT_ID**

Up to six characters may be used in **PLANT_ID** to identify the reactor in which the irradiation was performed. Only the first three characters in **PLANT_ID** are used for the identification of commercial power reactors. For commercial power reactor surveillance data, the reactor code in **PLANT_ID** is also used to identify the surveillance program as a source of data, even if these data do not refer specifically to irradiation (as in files about chemical composition or heat treatment; for details see Sect. 2.4). Detailed information about the reactors identified by **PLANT_ID** is given in the files **REAC_LST.dbf** and **REAC_GEO.dbf**.

3. **CAPSULE**

Up to six characters may be used to identify the irradiation capsule. In most cases, the capsule identifications in the original reports were used. Sometimes specimens that come from different capsules with similar fluences are lumped together; in these cases, special identifiers for data sets from combined capsules are assigned.

4. **HEAT_ID**

The material identifier can have up to ten characters. A simple scheme was devised for the EDB, which works as follows: The coding assigns the first letter to the material type, namely

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P_late, F_orging, W_eldment, H_eat-Affected-Zone material, or S_tandard R_eference M_aterial (correlation monitor materials). The next three characters contain a general code related to the origin of the material (the first three characters of reactor identifier PLANT_ID are used here for commercial power reactor data) with two additional characters to distinguish between different materials of the same origin. Other identification letters are used, namely, SASTM for the A302B ASTM reference plate and SHSS02 for the HSST plate 02, for standard reference materials that are not restricted to a particular experiment or a commercial power reactor surveillance program. The last four letters are reserved to distinguish between different parts of the same material (e.g., between surface and 1/2T or between several sections of a plate) if different parts show markedly different material properties as documented in the reports. For instance, SASTM S1 and SASTM S2 denote pieces of the 6-in. ASTM A302B reference plate used in the Garigliano and Yankee Rowe reactors, respectively, the baseline properties of which vary considerably from the same material used in Westinghouse reactors, which is denoted simply by SASTM. The four-character suffix is also used to identify material that has been annealed after irradiation. The "anneal tag" has the form "Axy" for the initial anneal and "Rxy" for any subsequent reanneal. Details are given in the description of the file SHFTA_CV.dbf. The file HEAT_LST.dbf gives a complete list of identifiers used as HEAT_ID together with the corresponding identifiers in the referenced reports.

Although using the identifiers given in the reports for HEAT_ID, a practice used in the MPC data base was considered initially, this proved to be impractical. Base material (plates or forgings) is usually characterized by the heat number (assigned to the ingot) or a manufacturer's number (assigned to the plate or forging after fabrication; see, for instance, BAW-1820), and only one of these numbers, or neither, is used in reports, frequently with different choices of identification in different reports. For welds, a weld code such as SA-1585 or WF-232 is sometimes used, but the same code may be applied to different welds of the same type (BAW-1820). Alternatively, the wire heat number are used for identification or just the heat numbers of the two plates joined by the weld. A distinct identification is rarely given for the HAZ material.

HEAT_ID provides the link between the material test data and the fabrication and chemical composition data. In many cases, chemical composition and fabrication data are available only for the "generic" material, that is, for the plate or weldment as a whole and not for a particular section depth as identified by the last four characters in the HEAT_ID. Thus, linkage may be possible only by restricting it to the first six characters of HEAT_ID when no link exists for the full ten-character identifier. To find the chemical composition data for annealed material, it is necessary to go back to the parent material or, again, the first six characters of HEAT_ID. A similar situation exists for the HAZ materials; their chemical composition is rarely determined separately. Thus, the data from the parent (plate) material must be used. The parent material for each HAZ is listed in the file HAZ.dbf.

5. SPEC_ORI

Different orientations of the material test specimens may lead to substantially different property test results. Thus, this identifier is needed to correctly link the properties of irradiated specimens to the corresponding baseline values. Orientations are assigned in the now customary T-L-S system as described in ASTM Standard E399, where L is the primary rolling or forging direction, or for welds and HAZ, the direction of the weld seam; T is perpendicular to L and parallel to the plate surface; and S is perpendicular to the plate surface. The first letter describes the longitudinal direction of the specimen (perpendicular to the crack surface, if any), and the second letter describes the direction of the crack propagation (perpendicular to the notch). The orientation for each specimen set was determined as accurately as possible, preferably from drawings, making sure that the same orientations are assigned to corresponding specimen sets. SPEC_ORI is left blank if no information is available.

6. REF_ID

In most files, each record is assigned a reference that indicates the source of the data. This reference is a 20-character field REF_ID and is usually a report number or a similar code that links it uniquely to the complete bibliographic information (i.e., author, title, and date of publication) given in the file REF_TITL.dbf. The linkage between experiments (EXP_ID) and reports (REF_ID) is given in the file REF_LST.dbf. If the source document is an article in a larger volume that contains other unrelated material, the reference includes the initial page number of the article.

2.3 Organization of EDB Raw Data Files

The current version of EDB is organized as shown in Fig. 6. At the top of the EDB architecture is the file EXP_LST.dbf, which contains a complete list of experiments results of which are included in EDB. This file can be linked via the key identifier EXP_ID with any other EDB file, except the reactor list, REAC_LST.dbf, that does not refer to any particular experiment. Immediately below is the file SPEC_LST.dbf, containing a complete list of test specimen sets that are used in the test reactor experiments or commercial power reactor surveillance programs. The specimen sets are characterized by type of specimen, such as Charpy, Tensile, the various forms of fracture mechanics specimens listed in the field SPEC_TYPE, and the five key identifiers, EXP_ID, PLANT_ID, CAPSULE, HEAT_ID, and SPEC_ORI, which link the sets to the other data files. Specimen sets for testing the baseline properties of unirradiated materials are characterized by leaving the CAPSULE field blank. The detailed descriptions of dimension for fracture mechanics specimens and other nonstandard sizes of test specimens are stored in SPEC_GEO.dbf. Testing information, such as machine type, operation engineers, etc., are listed in SYSTEM.dbf.

Data relevant to radiation embrittlement are distributed over three major categories in EDB: preirradiation material history, irradiation environment, and mechanical test results. The detailed

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Fig. 6. EDB Architecture

architecture of the EDB data is illustrated in Fig. 6, and descriptions of each major category of data follow:

- The first category (left-hand side of Fig. 6) consists of results of material mechanical property tests. Charpy, both individual tests and results of curve fittings, tensile, drop weight nil-ductility-transition temperature (NDTT) data, and fracture toughness data are currently available (SHFT_CV.dbf, SHFTX_CV.dbf, SHFTA_CV.dbf, CHARPY.dbf, and CV_REF.dbf for Charpy data; TENSILE.dbf for tensile; DW_NDT.dbf for drop weight NDTT; and KIC.dbf, KJC.dbf, KID.dbf, KJD.dbf, and KIA.dbf for fracture toughness). Tables 6-17 show the structures of these files. (SHFTA_CV.dbf contains summaries of annealing experiments and SHFTX_CV.dbf unconventional measures of Charpy transition temperature). Each record in these files is uniquely characterized by the combination EXP_ID, PLANT_ID, CAPSULE, HEAT_ID, and SPEC_ORI. Other test results, such as instrumented Charpy, hardness, and dynamic tearing will be included later.
- The second category (middle of Fig. 6) contains data describing the reactor and radiation environment for each surveillance capsule. The file REAC.dbf (Table 18) contains a detailed description of the fluence, irradiation temperature and irradiation time for each irradiation capsule. This file is linked with the others via the key identifiers EXP_ID, PLANT_ID, and CAPSULE. This linkage will not be needed in most cases because fluence and irradiation temperature are also given in the data files, such as SHFT_CV.dbf and TENSILE.dbf. Note that the fluence values given in REAC.dbf apply only for the capsule as a whole (i.e., average or capsule center), which is not necessarily the same as for the individual specimen or group of the specimen listed in the test data files. However, many details such as values for fluence ($E > 0.1$ MeV) or dpa are listed, when available, in REAC.dbf. The file REAC_LST.dbf (Table 19) is a list of irradiation facilities used in the experiments. The key identifier field in this file is PLANT_ID. The file REAC_GEO.dbf contains the detailed dimensions of the reactor structure, and the LEAD.dbf contains the lead factor data of pressure vessels of commercial power reactors. Under consideration is the addition of more detailed files containing the irradiation history, the group fluence spectra, and dosimetry data to allow for fluence determination by independent investigators and more detailed investigation on the rate effect, spectrum effect, and residual defects to the embrittlement prediction models.
- The third category (right-hand side of Fig. 6) contains information about the chemical composition and fabrication of materials used in experiments or power reactor surveillance programs. HEAT_LST.dbf lists all HEAT_IDs with reported codes, and CHEM.dbf, HEAT.dbf, WELD.dbf, and HAZ.dbf list the actual chemical composition and fabrication data. All of these files are linked via HEAT_ID to the rest of the EDB files. The key identifier EXP_ID is also included but is not specifically needed for linkage; it only identifies the experiment for which the listed data were reported.

Any record in most of the EDB files has a reference in the field REF_ID and one or more page numbers that permit verification of the data sources and the finding of additional information. Exceptions are again the files REAC_LST.dbf and EXP_LST.dbf, in which information comes from

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many different sources. References are also not listed in CHARPY.dbf because the associated file CV_REF.dbf has the necessary references. A detailed list of all references with complete title, authors, and date of publication is given in the REF_TITL.dbf. Linkage to the other files is via REF_ID. The associated file REF_LST.dbf links all REF_IDs with the EXP_IDs (i.e., experiments with publications).

EDB files with the suffix _LST are somewhat different from the other data files in that they provide a sort of directory of the other files and their relations to key identifiers. SPEC_LST.dbf is a directory of capsules and baseline specimen sets. REAC_LST.dbf is a directory of power reactors and material test reactors. Finally, HEAT_LST.dbf is a directory of the materials contained in the EDB files. More detailed descriptions of these data files follow in Sect. 2.4.

2.4 List of EDB Files

1. EXP_LST.dbf

EXP_LST.dbf (Table 2) lists all EXP_IDs with brief descriptions of the experiment or group of experiments, the laboratory, authors, and irradiation facilities involved. A detailed description of the experiments included is in Appendix B. It was intended to include this information in the file in the form of memo fields, but the current software does not support this extension.

**Table 2. Structure file for EXP_LST.dbf
Experimental Identification**

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	EXP_DESCR	80	Description of Experiment
4	LABORATORY	30	Laboratory Responsible for Experiment and Evaluation
5	AUTHORS	50	List of Principal Investigators
6	REACTORS	30	List of Reactors used in Experiment
7	LOCATION	30	Reactor Location
8	REF_ID	20	Reference Identifier
9	PAGES	20	Page Number(s)
10	NOTES	30	Pertinent Information Related to Data Entries, If Needed

2. SPEC_LST.dbf

SPEC_LST.dbf (Table 3) provides a complete list of all specimen sets the test data for which are contained in other EDB files. A "set" is here defined as a group of test specimens that share the same combination of EXP_ID, PLANT_ID, CAPSULE, HEAT_ID, and SPEC_ORI and are of the same specimen type, such as Charpy, tensile, etc. EXP_ID + PLANT_ID + CAPSULE identifies a particular experiment, and HEAT_ID + SPEC_ORI identifies a particular material. SPEC_TYPE indicates the type of specimen; and its size, for nonstandard specimens, specimen thickness can be added in front of specimen type. The detailed specimen geometry is listed in SPEC_GEO.dbf. SPEC_POS indicates the layer(s) relative to the surface from which the specimens were cut. (This is 1/4T in most cases; 1/4T + 3/4T means that the set consists of a mixture of specimens cut from the 1/4T and 3/4T layers, and 1/4T - 3/4T means that the specimens are cut from the whole range between 1/4T and 3/4T.) Also listed if available, is the number of specimens in each set.

For test reactor data, the information given in the reports is often sketchy in contrast to the commercial power reactor surveillance reports that contain detailed lists and capsule drawings. The field REPORT_TAG has been used in SPEC_LST.dbf to indicate in what form the test results are reported: "R" indicates that individual test results are given instead of just averages ("A"), "G" means that plots of the Charpy fits showing individual test results are reported, and "L" if only lines without points are presented in the graph. A blank field means that only numerical summaries are provided.

**Table 3. Structure file for SPEC_LST.dbf
Specimen Information**

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT_ID	10	Identification Code for Given Material
6	SPEC_TYPE	6	Type of Specimen: S_tandard Charpy (CV), or M_initure CV, TEN_sile, 1T C_ompact T_ension, 1/2T WOL, etc., for Non-standard specimen, specimen thickness can be added in front of specimen type
7	SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
8	SPEC_POS	10	Specimen Position: 1/4T, 1/2T, 3/4T, etc.

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Table 3. (continued).

Field	Field_Name	Width	Description
9	NO_OF_SPEC	2	Number of Specimens in Capsule or Experimental Set
10	REPORT_TAG	1	Type of Reporting: R_aw data, A_verages, G_raphs, L_ine Drawings
11	REF_ID	20	Reference Identifier
12	PAGES	20	Page Number(s)
13	NOTES	30	Pertinent Information Related to Data Entries, If Needed

3. SPEC_GEO.dbf

SPEC_GEO.dbf (Table 4) contains the details of specimen dimensions, such as Charpy test specimens and fracture mechanics test specimens, for a particular experiment. The details of gage length and specimen cross section or diameter for tensile specimens are listed in TENSILE.dbf.

Table 4. Structure file for SPEC_GEO.dbf
Specimen Geometry

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	HEAT_ID	10	Identification Code for given Material
5	PROD_ID	3	Material Type
6	SPEC_ORI	2	Specimen Orientation
7	SPEC_POS	4	Specimen Position: 0T, 1/4T, 1/3T, 1/2T, 3/4T, or 1T
8	SPEC_ID	8	Specimen Identifier
9	SPEC_TYPE	6	Type of Specimen: S_tandard Charpy (CV), M_initure CV, TEN_sile, 1T C_ompact T_ension, 1/2T WOL, etc., for Nonstandard specimen, specimen thickness can be added in front of specimen type
10	GROOVE	3	Percentage of Specimen Side Groove (20%, 10%, etc.)

Table 4. (continued).

Field	Field_Name	Width	Description
11	SPEC_WIDTH	6	Nominal Width of Specimen
12	SPEC_WIDTT	6	Total Width of Specimen
13	SPEC_HEGHT	6	Specimen Height or Specimen Length
14	SPEC_THICK	6	Specimen Thickness or Diameter
15	SPEC_NTHIC	6	Net Thickness or Diameter of Specimen
16	SPEC_UNIT	4	Unit Associated with Specimen Dimension
17	REF_ID	20	Reference Identifier
18	PAGES	20	Page Number(s)
19	NOTES	30	Pertinent Information Related to Data Entries

4. SYSTEM.dbf

SYSTEM.dbf (Table 5) contains details of the test procedures and testing apparatus such as machine type and capacity, loading rate, responsible engineers, and test date for a particular experiment.

Table 5. Structure file for SYSTEM.dbf
System Information

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal operation
2	EXP_ID	6	Experiment Identification
2	PLANT ID	6	Reactor Identification
3	HEAT_ID	10	Identification Code for given Material
4	PROD_ID	3	Material Type
8	SPEC_TYPE	6	Specimen Type: ITCT, 1/2TWOL, ITSEB, TEN, or CV
9	OPERATOR	10	Responsible Engineer
10	LOAD_RATE	20	Loading Rate
11	ULOAD_RATE	20	Unloading Rate

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Table 5. (continued).

Field	Field_Name	Width	Description
12	LOAD_UNIT	12	Unit Associated with Load and Unload Rate
13	MACHINE	20	Machine Type
14	CAPACITY	10	Machine Capacity
15	CPT_UNIT	10	Unit Associated with Machine Capacity
16	CROSS HDV	6	Cross Head Velocity
17	CHDV_UNIT	6	Unit Associated with Cross Head Velocity
18	TUP_VEL	6	Velocity of Tup on Impact
19	TUP_TYPE	6	Tup type, ASTM or the ISO
20	TUP_V_U	6	Unit Associated with Tup Velocity
21	TEST_DATE	10	Test Date
22	REF ID	20	Reference Identifier
23	PAGES	20	Page Number(s)
24	NOTES	30	Pertinent Information Related to Data Entries

5. SHFT_CV.dbf

SHFT_CV.dbf (Table 6) lists transition temperatures and upper-shelf energies as determined by the evaluator of the report. It lists 30 ft-lb, 50 ft-lb, and 35-mil transition temperatures (irradiated and unirradiated) and shift (difference between the two) as shown in the report and similarly lists upper-shelf energy with both absolute and relative shift values. The tags U_FIT and I_FIT were added to indicate the type of fitting procedure used to determine transition temperature and upper-shelf values for unirradiated and irradiated data, respectively. Also included are data describing irradiation as applied to the Charpy specimen set. These data include fluences ($E > 1.0$ MeV) and irradiation temperature at the location of the specimen, taking into account the differences within the capsule between different specimen sets. Also included is the available information concerning the fluence rate since the rate effect appears to be quite important, especially if test reactor data are to be applied to embrittlement predictions in power reactors, which have much lower fluence rates. The rates are sometimes given directly and in other cases can be determined from the equivalent full-power irradiation time; fields are provided in the file to contain either or both types of information. The transition temperature at 50% shear is not included since it is seldom reported and is difficult to determine reliably. It can also be readily reconstructed from the individual Charpy test data, whenever available. Also omitted are transition temperatures at other energy levels or lateral expansions such as 15 ft-lb or 3 kgm (see Table 1 for units), which are sometimes listed in older reports. These data are relegated to the special file SHFTX_CV.dbf.

Table 6. Structure file for SHFT_CV.dbf
Charpy Transition Temperature and Upper-Shelf Energy

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT_ID	10	Identification Code for Given Material
6	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or S_tandard R_eference M_aterial (SRM)
7	SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
8	CSP_F1	10	Fluence > 1 MeV at Charpy Specimen Location (n/cm ²)
9	FLU_TAG	1	Tag for Fluence Determination: F_ission, S_caling, and A_djustment
10	EFP_TIME	10	Effective Full-Power Time of Irradiation
11	TIME_U	1	Unit of Time: S_econds, M_inutes, H_ours, D_ays, and Y_ears
12	F1_RATE	10	Fluence Rate > 1 MeV at Specimen Location [n/(cm ² -s)]
13	CSP_TEMP	4	Irradiation Temperature of Charpy Specimen
14	UTT30	5	Charpy V-notch Transition Temperature (CVT) at 30 ft-lb, Unirradiated Charpy Specimen
15	UTT50	5	CVT at 50 ft-lb, Unirradiated Charpy Specimen
16	ULE35	5	CVT at Lateral Expansion = 35 mils, Unirradiated. Charpy Specimen.
17	UUSE	5	Upper Shelf Energy, Unirradiated Charpy Specimen
18	U_FIT	1	Tag for Fitting (Unirradiated. Data): H_and drawn, hyperbolic T_angent, or O_ther
19	ITT30	5	CVT at 30 ft-lb, Irradiated Charpy Specimen
20	ITT50	5	CVT at 50 ft-lb, Irradiated Charpy Specimen
21	ILE35	5	CVT at Lateral Expansion = 35 mils, Irradiated Charpy Specimen
22	IUSE	5	Upper Shelf Energy, Irradiated Charpy Specimen
23	I_FIT	1	Tag for Fitting (Irradiated Data): H_and drawn, hyperbolic T_angent, or O_ther

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Table 6. (continued).

Field	Field_Name	Width	Description
24	DTT30	5	CVT Shift at 30 ft-lb (ITT30 - UTT30)
25	DTT50	5	CVT Shift at 50 ft-lb (ITT50 - UTT50)
26	DLE35	5	CVT Shift at Lateral Expansion = 35 mils (ILE35 - ULE35)
27	DUSE_ABS	5	Absolute Drop in Upper Shelf Energy (UUSE - IUSE)
28	DUSE_REL	5	Percent Drop in Upper Shelf Energy
29	TEMP_U	1	Unit used for Temperature Data
30	USE_U	5	Unit used for Energy Data (in Upper Shelf Energy)
31	REF_ID	20	Reference Identifier
32	PAGES	20	Page Number(s)
33	NOTES	30	Pertinent Information Related to Data Entries, If Needed

6. SHFTA_CV.dbf

SHFTA_CV.dbf (Table 7) provides a summary of the annealing processes studied in the experiments. To fit the results of annealing experiments into the existing framework of EDB, it was decided to identify annealed material by changing the last three characters in the HEAT_ID. Any steel that was irradiated and annealed is distinguished from the parent material with an "anneal tag," which has the form Axy, where x and y are each a digit or letter, with x characterizing the irradiation and y the annealing procedure. Any subsequent reannealing is indicated by an Rxy tag. This tag replaces any other appendix in the last four characters of HEAT_ID. This procedure allows the listing of the test results from annealing experiments without changing the file structures by considering material as a newly created steel. Both raw Charpy and tensile data are listed in this manner in CHARPY.dbf and TENSILE.dbf, respectively.

The study of annealing effects requires information about how each annealed material came into being, and this is the primary content of SHFTA_CV.dbf. This file gives a complete list of all anneal tags that are used with any parent material together with fluence, irradiation temperature, and anneal temperature and anneal duration together with the reactor (PLANT_ID) and capsule identification (CAPSULE). Because the anneal tags are unique, the information in SHFTA_CV.dbf allows tracing of the HEAT_ID of any annealed material (i.e., any HEAT_ID containing an anneal tag) to the parent material and reconstruction of the irradiation and anneal history.

To make the file more or less self-contained, information from Charpy tests was added, which is the predominant means for assessing annealing effects. (However, anneal conditions, for which only

tensile data are available, are also listed in this file.) Also included are the data for reirradiation after annealing, if applicable. Listed are the transition temperature at 30 ft-lb (41 J) and upper-shelf energy for each stage of the baseline-irradiation-annealing-reirradiation cycle together with the shifts in these parameters, depending on what is reported. Reannealing after reirradiation is placed in a second record in which the material with the first anneal tag serves as parent material and a new Rxy tag is defined for the second cycle. This procedure can be repeated as often as necessary. Frequently whole capsules filled with specimens were irradiated and subsequently annealed (and sometimes reirradiated, etc.) without determining embrittlement status after irradiation. Irradiated values before annealing are then determined in a separate irradiation run that is included in the file even though no annealing is connected with that particular run. These and other Charpy data in the file that are related to the first irradiation are duplicated (with some additions such as transition temperatures at 50 ft-lb and 35 mil lateral expansion) in SHFT_CV.dbf.

Table 7. Structure file for SHFTA_CV.dbf
Charpy Transition Temperature and USE per Annealing Experiment

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT_ID	10	Identification Code for Given Material
6	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
7	SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
8	CSP_F1	10	Fluence > 1 MeV at Charpy Specimen Location (n/cm ²)
9	CSP_TEMP	4	Irradiation Temperature of Charpy Specimen
10	ANN_TAG	4	Tag Added to the HEAT_ID to Identify Annealed Material
11	ANN_TEMP	3	Annealing Temperature
12	ANN_HRS	4	Duration of Annealing in Hours (h)
13	PLANT_ID_R	6	Reactor Identification for Reirradiation
14	CAPSULE_R	6	Capsule Identification for Reirradiation
15	CSP_F1_R	10	Fluence > 1.0 MeV During Reirradiation (n/cm ²)
16	FLU_TAG	1	Tag for Fluence Determination: F_ission, S_caling, and A_djustment
17	CSP_TEMP_R	4	Irradiation Temperature During Reirradiation

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Table 7. (continued).

Field	Field_Name	Width	Description
18	UTT30	5	CVT at 30 ft-lb, Unirradiated Charpy Specimen
19	ITT30	5	CVT at 30 ft-lb, Irradiated Charpy Specimen
20	DTT30	5	CVT Shift at 30 ft-lb (ITT30 - UTT30)
21	IATT30	5	CVT at 30 ft-lb, After Annealing
22	RTT30	5	Recovery of TT30 After Annealing (ITT30 - IATT30)
23	IARTT30	5	CVT at 30 ft-lb, After Annealing and Reirradiation
24	UUSE	5	Upper Shelf Energy, Unirradiated Charpy Specimen
25	IUSE	5	Upper Shelf Energy, Irradiated Charpy Specimen
26	DUSE_ABS	5	Absolute Drop in Upper-Shelf Energy (UUSE - IUSE)
27	IAUSE	5	Upper Shelf Energy, After Annealing
28	RUSE_ABS	5	Recovery of Upper Shelf Energy (IAUSE -IUSE)
29	IARUSE	5	Upper-Shelf Energy, After Annealing and Reirradiation
30	TEMP_U	1	Unit used for Temperature Data
31	USE_U	5	Unit used for Energy Data (in Upper-Shelf Energy)
32	REF_ID	20	Reference Identifier
33	PAGES	20	Page Number(s)
34	NOTES	30	Pertinent Information Related to Data Entries, If Needed

7. SHFTX_CV.dbf

SHFTX_CV.dbf (Table 8) lists the nonstandard determinations for Charpy transition temperature before and after irradiation, with appropriate definitions for the nonstandard data. Fluence data are the same as in SHFT_CV.dbf.

Table 8. Structure file for SHFTX_CV.dbf
Charpy Transition Temperature per Nonstandard Index

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT_ID	10	Identification Code for Given Material
6	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
7	SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
8	CSP_F1	10	Fluence > 1 MeV at Charpy Specimen Location (n/cm ²)
9	FLU_TAG	1	Tag for Fluence Determination: F_ission, S_caling, and A_djustment
10	EFP_TIME	10	Effective Full Power Time of Irradiation
11	TIME_U	1	Unit of Time: S_econds, M_inutes, H_ours, D_ays, and Y_ears
12	F1_RATE	10	Fluence Rate > 1 MeV at Capsule Center [n/(cm ² -s)]
13	CSP_TEMP	4	Irradiation Temperature of Charpy Specimen
14	UTTX	5	CVT at Specified Nonstandard Impact Energy, Unirradiated Charpy Specimen
15	ITTX	5	CVT at Specified Nonstandard Value, Irradiated Charpy Specimen
16	DTTX	5	CVT Shift at Specified Nonstandard Value (ITTX - UTTX)
17	TT_DEF	5	Quantity of Impact Energy for which Transition Temperature is Specified
18	TT_DEF_U	5	Unit of Quantity of Impact Energy
19	ULEX	5	CVT at Specified Nonstandard Lateral Expansion, Unirradiated Specimen
20	ILEX	5	CVT at Specified Nonstandard Value, Irradiated Charpy Specimen
21	DLEX	5	CVT Shift at Specified Nonstandard Value (ILEX - ULEX)
22	LEX_DEF	5	Quantity of Lateral Expansion for which Transition Temperature is Specified
23	LEX_DEF_U	5	Unit of Quantity of Lateral Expansion
24	UUSE	5	Upper-Shelf Energy, Unirradiated Charpy Specimen

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Table 8. (continued).

Field	Field_Name	Width	Description
25	IUSE	5	Upper-Shelf Energy, Irradiated Charpy Specimen
26	DUSE_ABS	5	Absolute Drop in Upper Shelf Energy (UUSE - IUSE)
27	TEMP_U	1	Unit used for Temperature Data
28	USE_U	5	Unit used for Energy Data (in Upper-Shelf Energy)
29	REF_ID	20	Reference Identifier
30	PAGES	20	Page Number(s)
31	NOTES	30	Pertinent Information Related to Data Entries, If Needed

8. CHARPY.dbf and CV_REF.dbf

CHARPY.dbf (Table 9) gives a complete list of individual Charpy test results. In addition to the materials test results, the key identifiers are listed to link the raw data with the evaluations in SHFT_CV.dbf and related files. Also included are fluence and irradiation temperature that may be different for each specimen. Fields for measuring units permit the entering of data in different units, as reported. Data that share the same combination of key identifiers are considered a "set," and a list of the different sets in CHARPY.dbf is contained in the associated file CV_REF.dbf (Table 10). In addition to the key identifiers, CV_REF.dbf includes the references for the raw Charpy data that are not included in CHARPY.dbf to save space, since each specimen in the same set has the same reference. Information about the Charpy test equipment that is common to each whole set is also included in CV_REF.dbf. Some sets of individual Charpy test data are combined from several irradiation capsules for the determination of transition temperature and upper-shelf energy in different sets since each individual capsule does not contain enough specimens. Different CAPSULE identifications are assigned to those combined sets, and the resulting evaluations are listed in SHFT_CV.dbf. To avoid duplication of data, these combination capsules are not listed in CHARPY.dbf. Instead, these combination sets were placed in a separate file, CV_FT.dbf, to aid the user in determining their content. These combinations are also contained in the ASCII file CHARPY.dat, which is used for the EDB fitting programs.

Table 9. Structure file for CHARPY.dbf
Charpy Impact Test

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT ID	10	Identification Code for Given Material
6	ANN_TAG	4	Tag Added to the HEAT_ID to Identify Annealed Material
7	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or S_tandard R_eference M_aterial (SRM)
8	SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
9	SPEC_ID	8	Specimen Identifier
10	TST_TEMP	4	Test Temperature of Specimen
11	TST_TEMP_U	1	Unit of Temperature used in TST_TEMP
12	IMP_E	6	Impact Energy of Charpy Specimen
13	IMP_E_U	5	Unit Associated with Impact Energy
14	FRACT_APP	3	Fracture Appearance Value (% shear)
15	LAT_EXP	4	Lateral Expansion of Charpy Specimen
16	LAT_EXP_U	5	Unit Associated with Lateral Expansion
17	CSP_F1	10	Fluence > 1 MeV at Charpy Specimen Location (n/cm ²)
18	CSP_TEMP	4	Irradiation Temperature of Charpy Specimen
19	CSP_TEMP_U	1	Unit of Temperature used in CSP TEMP

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**Table 10. Structure file for CV_REF.dbf
References for Charpy Data Sets**

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT_ID	10	Identification Code for Given Material
6	ANN_TAG	4	Tag Added to the HEAT_ID to Identify Annealed Material
7	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
8	SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
9	TUP_TYPE	6	Type of Tup Used: ASTM or ISO, etc.
10	TUP_VEL	5	Velocity of Tup on Impact
11	VEL_U	5	Unit used for Tup Velocity
12	MAX_E	4	Maximum Impact Energy
13	USE_U	5	Unit used for Energy Data (in Upper-Shelf Energy)
14	REF_ID	20	Reference Identifier
15	PAGES	20	Page Number(s)
16	NOTES	30	Pertinent Information Related to Data Entries, If Needed

9. TENSILE.dbf

TENSILE.dbf (Table 11) lists the results of tensile tests with separate entries for each individual test. Averages from several experiments are included if no other information is available but are omitted if individual test data are given. Such cases are indicated by the character @, followed by the number of specimen averaged in the field SPEC_ID. The character \$ is used to indicate individual test data if no specimen identification is given. A blank in SPEC_ID means that the report does not indicate whether the test result is from a single specimen or an average. Dimensions of specimens are included in the file since a large variety of different diameters are used in the experiments, which may influence the measured results. Fluences and irradiation temperatures are included and may differ from specimen to specimen as in CHARPY.dbf. Units from the original reports are used as specified in the unit fields.

**Table 11. Structure file for TENSILE.dbf
Tensile Test**

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT_ID	10	Identification Code for Given Material
6	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
7	SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
8	TSP_F1	10	Fluence > 1 MeV at Tensile Specimen Location (n/cm ²)
9	TSP_TEMP	4	Irradiation Temperature of Tensile Specimen
10	SPEC_ID	8	Specimen Identifier
11	TST_TEMP	4	Test Temperature of Specimen
12	TEMP_UNIT	1	Unit Associated with Temperature
13	YLS	5	Material Yield Stress
14	UTS	5	Ultimate Tensile Strength (UTS)
15	FRAS	5	True Fracture Stress
16	STRESS_U	6	Unit Associated with Stress
17	ULG	4	Uniform Elongation of Tensile Specimen (%)
18	TLG	4	Total Elongation of Tensile Specimen (%)
19	RA	4	Reduction in Area of Tensile Specimen (%)
20	SPEC_DIAM	4	Diameter (or Cross Section) of Tensile Specimen
21	GAGE_LEN	4	Gage Length of Tensile Specimen
22	TOTAL_LEN	4	Total Length of Tensile Specimen
23	LENGTH_U	3	Unit of Length
24	REF_ID	20	Reference Identifier
25	PAGES	20	Page Number(s)
26	NOTES	30	Pertinent Information Related to Data Entries, If Needed

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10. KIC.dbf

Three categories of the fracture toughness data are available from the reports: static fracture toughness, K_{IC} or K_{Jc} ; dynamic fracture toughness, K_{Id} or K_{Jd} ; and crack arrest fracture toughness, K_{Ia} data. The general specimens used in fracture toughness experiments are SEB, CT, AT, DCT, CLWL or WOL, and DCB specimens, and CCT panels. Experiments carried out on these specimens are performed using different criteria and experimental procedures and are responsible for a particular kind of fracture toughness data. Thus, in EDB the three major fracture toughness data categories are grouped into separate data files, and the criteria among the different types of specimens are carefully distinguished. Where KIC.dbf stores the "static plane-strain fracture toughness," KJC.dbf stores "static elastic-plastic fracture toughness," KID.dbf stores "dynamic plane-strain fracture toughness," KJD.dbf stores "dynamic elastic-plastic fracture toughness," and KIA.dbf stores "crack arrest fracture toughness." Details of specimen dimensions are listed in SPEC_GEO.dbf, and the details of test procedures and testing apparatus, such as machine type and capacity, and responsible engineers are listed in SYSTEM.dbf, if data are available.

In the field VALIDITY of KIC.dbf (Table 12), one or more letters indicates that the test results did not meet one of the criteria of the ASTM E399 validity criteria: A_Thickness too thin; B_Crack length too short; C_Fatigue crack length measurement did not meet requirement; and D_Pmax/PQ > 1.1.

Table 12 Structure file for KIC.dbf
Static Plane-Strain Fracture Toughness

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT_ID	10	Identification Code for given Material
6	PROD_ID	3	Material Type: P_late, F_oring, W_eld, HAZ, or SRM
7	SPEC_ORI	2	Specimen Orientation
8	SPEC_POS	4	Specimen Position: OT, 1/4T, 1/3T, 1/2T, 3/4T, or IT
9	SPEC_ID	8	Specimen Identifier
10	TEST_LAB	10	Testing Laboratory
11	SPEC_TYPE	6	Specimen Geometry: ITCT, 1/2TWOL, or ITSEB
12	FLUENCE	10	Fluence > 1 MeV at Specimen Location (n/cm ²)

Table 12. (continued).

Field	Field_Name	Width	Description
13	TEMP_IRR	4	Irradiation Temperature
14	TEST_TEMP	4	Specimen Test Temperature
15	TEMP_UNIT	1	Temperature Unit
16	CRACK LENG	6	Initial Crack Length
17	CRACK_UNIT	4	Unit Associated with Crack Length
18	KQ	6	Fracture Toughness per Load PQ
19	VALIDITY	5	One or More Letters for a Specimen Indicates that the Test Results Did Not Meet One of the Criteria of the ASTM E399 Validity Criteria. A_Thickness too thin; B_Crack length too short; C_Fatigue crack length measurement did not meet the requirement; and D_Pmax/PQ > 1.1, F_Anomalous result for unknown reason.
20	K_METHOD	10	Method Associated with Fracture Toughness K, or ASTM standard version date
21	KIC	6	Validated Static Plane Strain Fracture Toughness
22	KIC_UNIT	9	Unit Associated with KIC
23	PQ	6	Load Determined in 9.1.1 of ASTM E399
24	P_MAX	6	Maximum Test Load
25	P_RATIO	5	Ratio of P_max/PQ
26	P_UNIT	4	Test Load Unit
27	LOAD_RATE	10	Fracture Test Loading Rate, in term of stress intensity factor rate
28	LOAD_R_U	12	Unit Associated with Loading Rate
29	COD	6	Crack Mouth Opening Displacement (COD)
30	COD_TAG	1	P_COD at PQ, M_COD at P_MAX, F_COD at Fracture
31	COD_UNIT	4	Unit Associated with COD
32	GAGE_LOC	15	Displacement Gage Location
33	YLS	5	Static Material Yield Stress
34	UTS	5	Ultimate Tensile Strength
35	YLS_UNIT	4	Unit Associated with Yield Stress
36	REF_ID	20	Reference Identifier
37	PAGES	20	Page Number
38	NOTES	30	Pertinent Information Related to Data Entries

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11. KJC.dbf

KJC.dbf (Table 13) contains static elastic-plastic fracture toughness. The field FRAC_TAG is used to specify the fracture type code: A_Cleavage fracture, B_Stable tearing but not crossing the 1.5-mm exclusion line with fast fracture at P_{max}, C_Stable tearing with no cleavage, or D_Stable tearing extended past the 1.5-mm exclusion line with cleavage thereafter. One or more letters in VALIDITY field indicate that the test results did not meet one of the ASTM E813 validity criteria: A_Thickness too thin, B_Uncracked ligament too short, C_Crack length measurement does not meet requirement, or D_Specimen demonstrated brittle cleavage failure. The field J_METHOD is used to indicate that the J value is obtained from M_oving C_rack C_orrection, M_odified J_integral method by E_rnst, S_ingl S_pecimen T_echnique, or M_ultiple S_pecimen T_echnique and the agency that carried out the evaluation if available.

Table 13. Structure file for KJC.dbf
Static Elastic-Plastic Fracture Toughness

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT_ID	10	Identification Code for given Material
6	PROD_ID	3	Material Type
7	SPEC_ORI	2	Specimen Orientation
8	SPEC_POS	4	Specimen Position: OT, 1/4T, 1/3T, 1/2T, 3/4T, or IT
9	SPEC_ID	8	Specimen Identifier
10	GROOVE	3	Percentage of Specimen Side Groove
11	SPEC_TYPE	10	Specimen Geometry, ITCT, 1/2TWOL, and ITSEB
12	TEST_LAB	10	Testing Laboratory
13	FLUENCE	10	Fluence, E > 1 MeV at Specimen Location (n/cm ²)
14	F1_RATE	10	Flux, E > 1 MeV at Specimen Location [n/(cm ² ·s)]
15	DPA	10	Displacement per Atom (dpa)
16	TEMP_IRR	4	Irradiation Temperature
17	TEST_TEMP	5	Specimen Test Temperature
18	TEMP_UNIT	1	Temperature Unit
19	JQ	6	The Calculated J-integral value per ASTM E813

Table 13. (continued).

Field	Field_Name	Width	Description
20	JC	6	Calculated J Integral at Cleavage
21	FRACT_TAG	2	Fracture Type Code: A_Cleavage fracture, B_Stable tearing but no crossing the 1.5-mm exclusion line with fast fracture at Pmax, C_Stable tearing with no cleavage, or D_Stable tearing extended past the 1.5-mm exclusion line with cleavage thereafter.
22	J_METHOD	20	Nonstandard Method Used for the Determination of J value: M_oving C_rack C_orrection/evaluated by B&W; M_odified J_integral by E_rnst/evaluated by HSST, M_erkle C_orten J method; S_ingle S_pecimen T_echnique; M_ultiple S_pecimen T_echnique; etc., or ASTM standard version date.
23	VALIDITY	5	One or More Letters for a Specimen Indicates That the Test Results Did Not Meet One of The ASTM E813 Validity Criteria: A_Thickness too thin, B_Uncracked ligament too short, C_Crack length measurement does not meet requirement, or D_Specimen demonstrated brittle cleavage failure.
24	JIC	6	Validated Elastic-Plastic Plane-Strain J value per ASTM E813
25	JIC_UNIT	9	Unit Associated with J value
26	KIC_JIC	6	Elastic-plastic Plane-strain Fracture Toughness Obtained from JIC
27	KJC	6	Elastic Plastic Fracture Toughness Calculated from JC
28	K_UNIT	9	Unit Associated with Fracture Toughness K
29	T_AVG	6	Average Tearing Modulus
30	CRACK LENG	6	Initial Crack Length
31	CRACK_L_F	6	Final Crack Length
32	CRACK_UNIT	4	Unit Associated with Crack Length
33	LOAD_RATE	10	Test Loading Rate in Terms of Cross Head or Actuator Speed
34	LOAD_R_U	12	Unit Associated with Loading Rate
35	YLS	5	Material Yield Stress
36	UTS	5	Ultimate Tensile Strength
37	FLOW_STRS	5	Average of YLS and UTS
38	YLS_UNIT	4	Unit Associate with Yield Stress
39	REF_ID	20	Reference Identifier
40	PAGES	20	Page Number
41	NOTES	30	Pertinent Information Related to Data Entries

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12. KID.dbf

KID.dbf (Table 14) contains dynamic plane-strain fracture toughness. One or more letters in the VALIDITY field indicates that the test results did not meet one of the ASTM E399 validity criteria: A_Thickness too thin, B_Crack length too short, C_Fatigue crack length measurement does not meet requirement, and D_Pmax/PQ > 1.1.

Table 14. Structure file for KID.dbf
Dynamic Plane-Strain Fracture Toughness

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT_ID	10	Identification Code for given Material
6	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
7	SPEC_ORI	2	Specimen Orientation
8	SPEC_POS	4	Specimen Position: OT, 1/4T, 1/3T, 1/2T, 3/4T, or IT
9	SPEC_ID	8	Specimen Identifier
10	SPEC_TYPE	10	Specimen Geometry: ITCT, 1/2TWOL, ITSEB, or PCCV
11	TEST_LAB	10	Testing Laboratory
12	FLUENCE	10	Fluence > 1 MeV at Specimen Location (n/cm ²)
13	F1_RATE	10	Flux, E > 1 MeV at Specimen Location [n/(cm ² · s)]
14	DPA	10	Displacement per Atom (dpa)
15	TEMP_IRR	4	Irradiation Temperature
16	TEST_TEMP	5	Specimen Test Temperature
17	TEMP_UNIT	1	Unit associated with Temperature
18	CRACK LENG	6	Initial Crack Length
19	CRACK_UNIT	4	Unit Associated with Crack Length
20	AW_RATIO	6	Ratio of Initial Crack Length to Specimen Width
21	KQ	6	Fracture Toughness per Load PQ

Table 14. (continued).

Field	Field_Name	Width	Description
22	VALIDITY	5	One or More Letters for a Specimen Indicates that the Test Results Did Not Meet One of the ASTM E399 Validity Criteria: A_Thickness too thin, B_Crack length too short, C_Fatigue crack length measurement does not meet requirement, D_Pmax/PQ > 1.1, and F_Anomalous result for unknown reason.
23	K_METHOD	20	Method Associated with K, or ASTM standard version.
24	KID	6	Dynamic Plane-Strain Fracture Toughness
25	KID_UNIT	9	Unit Associated with KID
26	PQ	6	Load Determined in 9.1.1 of ASTM E399
27	TIME_PQ	4	Test Time to Reach the Load PQ.
28	TIME_UNIT	3	Unit Associated with Test Time .
29	P_MAX	6	Maximum Test Load
30	P_RATIO	5	Ratio of P_MAX/PQ
31	P_UNIT	4	Test Load Unit
32	LOAD_RATE	10	Fracture Test Loading Rate, in Stress Intensification Rate
33	LOAD_R_U	12	Unit Associated with LOAD_RATE
34	COD	6	Crack Opening Displacement (COD)
35	COD_TAG	1	P_COD at PQ, M_COD at P_MAX, and F_COD at Fracture
36	GAGE_LOC	15	Displacement Gage Placement Location
37	COD_UNIT	4	Unit Associated with COD
38	YLS	5	Static Material Yield Stress
39	YLS_DYN	5	Dynamic Material Yield Stress
40	UTS	5	Ultimate Tensile Strength
41	YLS_UNIT	4	Unit Associated with Yield Stress
42	REF_ID	20	Reference Identifier
43	PAGES	20	Page Number
44	NOTES	30	Pertinent Information Related to Data Entries

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13. KJD.dbf

KJD.dbf (Table 15) contains dynamic elastic-plastic fracture toughness. One or more letters in the VALIDITY field indicates that the test results did not meet one of the ASTM E813 validity criteria: A_Thickness too thin, B_Uncracked ligament too short, C_Crack length measurement does not meet the requirement, and D_Specimen demonstrated brittle cleavage failure.

Table 15. Structure file for KJD.dbf
Dynamic Elastic-Plastic Fracture Toughness

Field	Field Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT_ID	10	Identification Code for given Material
6	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
7	SPEC_ORI	2	Specimen Orientation
8	SPEC_POS	4	Specimen Position: OT, 1/4T, 1/3T, 1/2T, 3/4T, or IT
9	SPEC_ID	8	Specimen Identifier
10	GROOVE	3	Percentage of Specimen Side Groove
11	SPEC_TYPE	10	Specimen Type, ITCT, 1/2TWOL, ITSEB, or PCCV
12	TEST_LAB	10	Testing Laboratory
13	FLUENCE	10	Fluence > 1 MeV at Specimen Location(n/cm ²)
14	F1_RATE	10	Flux, E > 1 MeV at Specimen Location [n/(cm ² ·s)]
15	DPA	10	Displacement per Atom (dpa)
16	TEMP_IRR	4	Irradiation Temperature
17	TEST_TEMP	5	Specimen Test Temperature
18	TEMP_UNIT	1	Irradiation Temperature Unit
19	JQ	6	Calculated J-integral per ASTM E813
20	JC	6	Calculated J-integral at Cleavage

Table 15. (continued).

Field	Field Name	Width	Description
21	VALIDITY	5	One or More Letters for a Specimen Indicates that the Test Results Did Not Meet One of the ASTM E813 Validity Criteria: A_Thickness too thin, B_Uncracked ligament too short, C_Crack length measurement does not meet requirement, D_Specimen demonstrated brittle cleavage failure, and F_Anomalous result for unknown reason.
22	J_METHOD	20	Method Used for the Determination of J-integral Value
23	JID	6	Validated Elastic-Plastic Plane Strain J-integral Value
24	JID_UNIT	9	Unit Associated with J-integral
25	KIC_JID	6	Dynamic Elastic-Plastic Fracture Toughness Calculated from JID
26	KJCD	6	Dynamic Elastic-Plastic Fracture Toughness Calculated from JC
27	K_UNIT	9	Unit Associated with Fracture Toughness K
28	LOAD_RATE	10	Fracture Test Loading Rate in Stress Intensity Factor Rate
29	LOAD_R_U	12	Unit Associated with Fracture Test Loading Rate
30	CRACK LENG	6	Initial Crack Length
31	CRACK_L_F	6	Final Crack Length
32	CRACK_UNIT	4	Unit Associated with Crack Length
33	AW_RATIO	6	Ratio of Initial Crack Length to Specimen Width
34	YLS	5	Static Yield Stress
35	YLS_DYN	5	Dynamic Yield Stress
36	UTS	5	Ultimate Tensile Strength
37	FLOW_STRS	5	Average of YLS and UTS
38	YLS_UNIT	4	Unit Associated with Yield Stress
39	REF_ID	20	Reference Identifier
40	PAGES	20	Page Number
41	NOTES	30	Pertinent Information Related to Data Entries

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14. KIA.dbf

KIA.dbf (Table 16) contains crack arrest fracture toughness. One or more letters in the VALIDITY field indicates that the test results did not meet one of the minimum lengths of the ASTM E1221-88 Validity Criteria: A,B_Unbroken Ligament too short, C_Specimen too thin, and D,E_Insufficient Crack-jump length.

**Table 16. Structure file for KIA.dbf
Crack Arrest Fracture Toughness**

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	HEAT_ID	10	Identification Code for given Material
6	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
7	SPEC_ORI	2	Specimen Orientation
8	SPEC_POS	4	Specimen Position: 0T, 1/4T, 1/3T, 1/2T, 3/4T, or 1T
9	SPEC_ID	8	Specimen Identifier
10	GROOVE	3	Percentage of Specimen Side Groove
11	SPEC_TYPE	10	Specimen Geometry, ITCT, or 1/2TWOL
12	CRACK_TYPE	6	Crack Starter Type: B_rittle W_eld or DUPLEX
13	TEST_LAB	10	Testing Laboratory
14	FLUENCE	10	Fluence > 1 MeV at Specimen Location(n/cm ²)
15	F1_RATE	10	Flux, E > 1 MeV at Specimen Location [n/(cm ² -s)]
16	DPA	10	Displacement per Atom (dpa)
17	TEMP_IRR	4	Irradiation Temperature
18	TEST_TEMP	5	Specimen Test Temperature
19	TEMP_UNIT	1	Unit Associated with Temperature
20	KA	9	Crack Arrest Fracture Toughness

Table 16. (continued).

Field	Field_Name	Width	Description
21	VALIDITY	5	One or More Letters for a Specimen Indicates that the Test Results Did Not Meet One of the Minimum Lengths of the ASTM E1221-88 Validity Criteria: A,B_Unbroken Ligament too short, C_Specimen too thin, and D,E_Insufficient Crack-jump length.
22	KIA	6	Plane-Strain Crack Arrest Fracture Toughness
23	KO	6	Toughness Associated with the Initiation of Crack Propagation at Initial Crack Length
24	K_UNIT	9	Unit Associated with fracture toughness K
25	CRACK LENG	6	Initial Crack Length
26	CRACK_L_F	6	Average Final Crack Length
27	CRACK_A1	6	Crack Length at arrest, measured at 1/4 net thickness
28	CRACK_A2	6	Crack Length at arrest, measured at middle thickness
29	CRACK_A3	6	Crack Length at arrest, measured at 3/4 net thickness
30	CRACK_UNIT	4	Unit Associated with Crack Length
31	CMOD_O	6	Crack Mouth Opening Displacement at Crack Initiation
32	CMOD_A	6	Crack Mouth Opening Displacement at Final Crack Arrest
33	COD_UNIT	4	Unit Associated with Crack Mouth Opening Displacement
34	YLS	5	Static Yield Stress
35	YLS_DYN	5	Dynamic Yield Stress
36	UTS	5	Ultimate Tensile Strength
37	YLS_UNIT	4	Unit Associated with Yield Stress
38	REF_ID	20	Reference Identifier
39	PAGES	20	Page Number
40	NOTES	30	Pertinent Information Related to Data Entries

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15. DW_NDT.dbf

DW_NDT.dbf (Table 17) contains data for the NDTT by the drop weight test, initial reference temperature (RT_{NDT}), and related material heat number and chemical compositions for the commercial power reactor surveillance programs.

Table 17. Structure file for DW_NDT.dbf
Drop Weight Nil-Ductility Transition Temperature

Field	Field_Name	Width	Field Description
1	TAG	1	For Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	HEAT_ID	10	Identification Code for Given Material
5	HEAT_NO	10	Material Heat Number
6	MAT_ID	10	Material Classification
7	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
8	SPEC_ORI	2	Specimen Orientation
9	REGION	40	Source and Location of Material in Reactor Pressure Vessel
10	URT_NDT	5	Initial Reference Temperature
11	T_NDT	5	Drop Weight NDTT
12	CU	5	Copper Content (wt %)
13	P	5	Phosphorous content (wt %)
14	NI	5	Nickel content (wt %)
15	NDT_UNIT	1	Unit of Transition Temperature
16	REF_ID	20	Reference Identifier
17	PAGES	20	Page number
18	NOTES	30	Pertinent Information Related to Data Entries

16. REAC.dbf

REAC.dbf (Table 18) lists fluences for $E > 1.0$ MeV, $E > 0.1$ MeV, and dpa with uncertainties, as well as fluence rates at full power, full-power-equivalent irradiation times, and startup and removal dates of the surveillance capsules. In some cases, the capsules had been moved from one reactor to another or had been irradiated more than once and annealed in between. The different irradiations are listed in separate records with the same CAPSULE identification; the sequence of irradiations is indicated in the CONFIG field. Irradiation temperatures within the capsule are reported either as maxima and minima or as a nominal (target) value, sometimes with a temperature range. Included in the temperature data is a TEMP_TAG that indicates how the irradiation temperature was determined. For test reactor data, a letter is used with C for calculated (or estimated) temperatures, M for melt wires, and T for thermocouples, the most frequently used technique in test reactor experiments. Many uncertainties about capsule temperatures exist for commercial power reactors. Because these values are difficult to determine and there are some questions concerning the reported data, the Electric Power Research Institute (EPRI) has assigned seven categories that characterize the reported data and their suggested use. Category numbers are listed in the TEMP_TAG field and denote the following:

<u>Category</u>	<u>Description</u>
1	Temperatures reflect the best known capsule environment during irradiation
2	Temperatures reflect the normal cycle operating range, applicable to the capsule during irradiation
3	Maximum temperature can be considered nominal capsule temperature
4	Minimum temperature can be considered nominal capsule temperature
5	Maximum temperature is not known or not reported
6	Minimum temperature is not known or not reported
7	No temperatures reported (listed temperatures, if any, are assumed on the basis of operating temperature or other capsules of the same reactor)

Fluence determination in test reactor experiments is much more varied than in power reactors, surveillance programs for which are subject to regulation by the NRC or equivalent authorities in countries outside the United States. In addition to the standard fluence $E > 1.0$ MeV, $E > 0.1$ MeV and dpa, "fission equivalent fluence" is often reported in early experiments. Fission fluences are determined directly from dosimetry, mostly assuming a 68-mb cross section of the $^{54}\text{Fe}(n,p)$ reaction. Conversion to standard damage fluences is done by scaling the fission fluences with a factor that is determined by comparing the fission spectrum with that of a neutron transport calculation. This factor is listed, when it is reported, together with the standard damage fluences with uncertainties. The field

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FLU_TAG is used to indicate the type of fluence determination: F indicates that fission fluence only is reported, S indicates the scaling procedure just described, and A stands for a full-fledged neutron physics calculation with adjustment for dosimetry data. Also included are the fluence rates at full power, full-power-equivalent irradiation times, and startup and removal dates of the experiment capsules.

**Table 18. Structure file for REAC.dbf
Irradiation Environment**

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	CAPSULE	6	Surveillance or Experiment Capsule Identification
5	START_DATE	10	Date at Start of Irradiation (MM/DD/YYYY)
6	STOP_DATE	10	Date at End of Irradiation (MM/DD/YYYY)
7	CONFIG	6	Indicator for Change in Irradiation Environment
8	EFP_TIME	10	Effective Full-Power Time of Irradiation
9	TIME_U	1	Unit of Time: S_econds, M_inutes, H_ours, D_ays, and Y_ears
10	CAP_T_MIN	4	Minimum Irradiation Temperature at Capsule Center
11	CAP_T_MAX	4	Maximum Irradiation Temperature at Capsule Center
12	CAP_T_NOM	4	Nominal Irradiation Temperature for Capsule
13	TEMP_RANGE	4	Temperature Variations within the Capsule
14	TEMP_U	1	Unit used for Temperature Data
15	TEMP_TAG	1	Irradiation Temperature Determination: C_alculated, T_hermocouples, M_elt wires; or Category 1 - 7
16	TEMP_CTRL	10	Irradiation Temperature Control Method
17	CAP_F1	10	Fluence E > 1 MeV at Capsule Center (n/cm ²)
18	F1_UNC	3	Uncertainty of Fluence E > 1.0 MeV (Percentage of Standard Deviation)
19	FLU_TAG	1	Tag for Fluence Determination: F_ission, S_caling, and A_djustment
20	F1_RATE	10	Fluence Rate E > 1 MeV at Capsule Center [n/(cm ² ·s)]

Table 18. (continued).

Field	Field_Name	Width	Description
21	CAP_FP1	10	Fluence E > 0.1 MeV at Capsule Center (n/cm ²)
22	FP1_TO_F1	4	Ratio of Fluence E > 0.1 MeV to Fluence E > 1.0 MeV
23	FP1_UNC	3	Uncertainty of Fluence E > 0.1 MeV (Percentage of Standard Deviation)
24	CAP_FTHM	10	Fluence E < 0.414 eV at Capsule Center (n/cm ²)
25	FTHM_UNC	3	Uncertainty of Fluence E < 0.414 eV (Percentage of Standard Deviation)
26	CAP_FISS	10	Equivalent Fission Fluence E > 1 MeV as Determined from Dosimetry
27	F1_TO_FISS	4	Ratio of Calculated to Equivalent Fission Fluence, E > 1.0 MeV
28	CAP_DPA	10	Dpa of Iron at Capsule Center
29	DPA_E_TAG	6	Lower Energy Boundary (MeV) in Dpa Calculation (If E > 0.0 MeV).
30	DPA_TO_F1	10	Ratio of dpa to Fluence E > 1.0 MeV
31	DPA_UNC	3	Uncertainty of Dpa (Percentage of Standard Deviation)
32	FLU_MONITOR	10	Radiometric, HAFM, and SSTD Monitors Used in Fluence Determination.
33	TRANSPORT	10	Neutron Transport Code Used in Fluence Evaluation
34	ADJUSTMENT	10	Neutron Adjustment Code used in Fluence Evaluation.
35	ENGINEER	15	Responsible Engineer on the Experiment and Fluence Evaluation.
36	REF_ID	20	Reference Identifier
37	PAGES	20	Page Number(s)
38	NOTES	30	Pertinent Information Related to Data Entries, If Needed

17. REAC_LST.dbf

For each reactor code given in PLANT_ID, REAC_LST.dbf (Table 19) lists the full name of the reactor, utility, vendor, pressure vessel manufacturer, and the architect/engineer of the plant. No references are included since these data come from many different sources and are easily verifiable. The NOTES field has been added to augment the information concerning the reactor and two fields concerning the power output, both thermal and electric.

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**Table 19. Structure file for REAC_LST.dbf
Reactor Identification**

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	PLANT_ID	6	Reactor Identification
3	REAC_TYPE	5	Reactor Type: Pressurized-Water Reactor (PWR), Boiling Water Reactor (BWR), or Test Reactor (TR)
4	REAC_NAME	50	Reactor Name
5	LOCATION	30	Reactor Location
6	PLANT_OP	50	Reactor Operator or Utility
7	PLANT_DES	25	Reactor Designer or Vendor
8	ARCH_ENG	50	Reactor Architect/Engineer
9	VESSEL_MFG	50	Reactor Vessel Manufacturer
10	OPER_DATE	10	Plant Start Operating Date
11	OUTPUT_TH	5	Thermal Output of the Reactor (MW)
12	OUTPUT_E	5	Electricity Output of the Reactor (MW)
13	OPER_TEMP	4	The Average Coolant Inlet Temperature
14	TEMP_UNIT	1	Temperature Unit
15	RPV_THICK	5	Reactor Pressure Vessel Thickness
16	RPV_ID	5	Inner Diameter of Reactor Pressure Vessel
17	RPV_T_U	4	Unit Associated with Reactor Pressure Vessel Dimension
18	NOTES	30	Pertinent Information Related to Data Entries, If Needed

18. REAC_GEO.dbf

REAC_GEO.dbf (Table 20) contains the details of specifications and dimensions for the reactor core and RPV, such as vessel thickness and inner radius, core dimensions, and the configuration of fuel elements.

Table 20. Structure file for REAC_GEO.dbf
Reactor Geometry

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	PLANT_ID	6	Reactor Identification
3	REAC_TYPE	3	Reactor Type: PWR, BWR, or TR
4	PV_THICK	6	Reactor Pressure Vessel Thickness
5	PV_THICK_U	4	Unit used for PV_THICK
6	PV_ID	6	Reactor Pressure Vessel Inner Diameter
7	PV_OD	6	Reactor Pressure Vessel Outer Diameter
8	PV_IR	6	Reactor Pressure Vessel Inner Radius
9	PV_OR	6	Reactor Pressure Vessel Outer Radius
10	PV_HIGHT	6	Reactor Pressure Vessel Height
11	PV_UNIT	4	Unit used for PV_ID, OD, IR, or OR.
12	CORE_HIGHT	6	Height of Active Core
13	CORE_DIAM	6	Equivalent Core Diameter
14	NO_FUEL	5	Number of Fuel Elements
15	FUEL_GEO	8	Fuel Assembly Configuration
16	CORE_P_DEN	8	Core average Power Density
17	U_P_DEN	8	Units Used for Core Power Density.
18	LOOP	6	Number of Loops for PWR, or Type of BWR
19	D_PRESSURE	5	Design Pressure of Reactor Pressure Vessel
20	O_PRESSURE	5	Operation Pressure of Reactor Pressure Vessel
21	PRESSURE_U	5	Units used for Pressure
22	REF_ID	20	Reference Identifier
23	PAGES	20	Page Number(s)
24	NOTES	30	Pertinent Information Related to Data Entries, If Needed

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19. LEAD.dbf

Details of lead factors, surveillance capsule flux and fluence, and fluence at RPV positions from commercial power reactor surveillance reports have been entered into LEAD.dbf under specific fields of classifications. Notice was paid to missing reference values and inconsistent values, and input was independently checked for accuracy. Initially, three data files and three programs were used to "clean up" and evaluate each reported surveillance capsule result. The first data file, LEADOLD.dbf, contains the basic lead factor information for each specific surveillance capsule. These reference values are archived without any changes to their content. A second data file, LEADSTUF.dbf, was contains engineering values, measured and calculated fluxes, fluences, etc., as well as extra fields to house self-consistency calculations for effective full-power time, flux, fluence, and lead factors. Calculations use reference values to cross-check other reference values and to complete missing field information within each record. A comparison is made between reference and calculated values using an 'error point' system, outlined subsequently, to check on the quality of each record's contents. Missing information and inconsistent information for each record are compiled and the error points compared with other records for a relative ranking against other surveillance capsule reports. A relative ranking of each record is stored as part of that record. The third data file, LEAD.dbf (Table 21), is the culmination of the first two data files, with missing information supplied where available and differences in reference and calculated values noted and replaced as needed. LEAD.dbf is the most complete and self-consistent archive for the surveillance capsule dosimetry. The records' relative self-ranking and accompanying notes and "Change" codes, described subsequently, are valuable tools in determining the overall quality assurance of the records' contents.

The "CHANGED" field in LEAD.dbf contains codes that represent replaced or inserted lead factors, exposure time, fluences, and/or fluxes for that record. The Visual FoxPro (VFP) program, leadfill.prg, compares the data file LEADSTUF.dbf to the reference data file LEADOLD.dbf values and inserts missing values from calculations using reference values, and checks and replaces reference values that are in error from the calculated values by more than 5%. The following codes are reported in the CHANGED field:

- "T" - Efp Time has been inserted by calculated value. (Flu_cap/Flux_cap)
- "LID1" Lead Id was "1.00" or reference value to inner diameter wall, not capsule location.
- "LID" - Lead_Id was incorrect, replaced by fluence calculation, (flu_cap/flu_id)
- "LQT" - Lead_Qt "was incorrect, replaced by fluence calculation, (flu_cap/flu_qt)
- "LHT" - Lead_Ht "was incorrect, replaced by fluence calculation, (flu_cap/flu_ht)
- "L3QT" - Lead_3Qt "was incorrect, replaced by fluence calculation, (flu_cap/flu_3Qt)
- "LOD" - Lead_Od "was incorrect, replaced by fluence calculation, (flu_cap/flu_Od)
- "FxCap0" - Flux at capsule was blank and replaced with calculated flux, (flu_cap/efp_time)
- "FxCap" - Flux was different than calculated (> 5% difference), replaced with calculated flux. (flu_cap/efp_time)
- "FxId0" - Flux at Inner diameter was zero .. Replace with calculated flux (flu_id/efp_time)
- "FxId" - Flux was different (>5%) than calculated,
- "FxQt0, FxQt, FxHt0, FxHt, Fx3Qt0, Fx3Qt, FxOd0, FxOd" - Flux was different (>5%)
- "FnCap0" - Fluence at Capsule was missing, use calculated fluence. (Flux_cap*efp_time)

"FnCap" - Capsule fluence replace with calculation due to >5% difference ($\text{Flux_cap} \times \text{efp_time}$)
 "FnId0, FnId, FnQt0, FnQt, FnHt0, FnHt, Fn3Qt0, Fn3Qt, FnOd0, FnOd" - similar explanation.

These "codes" are placed into the CHANGED field, separated by commas, providing a quick review of replaced or missing values for each record.

A program for checking self-consistency was developed that compares the reported values of flux, fluence, lead factors, efp time, etc., with calculations using the reported values. For instance, if a flux and fluence are reported for the surveillance capsule, the program calculation would multiply the flux by the effective full-power time (in seconds) and then compare it with the reported fluence value. If there is a difference greater than 5%, the program compiles "error points" for that value. A tally of the record's error points are saved in an intermediate file as an absolute rating for the record. This absolute rating is then compared to all other records for all the reactors, and a relative quality factor is calculated based on a linear scale of 1 to 7, 1 being the best relative quality, 7 the worst. These values of relative quality are then reported in the LEAD.dbf "QUALITY" field. The error point used to evaluate each reported value of flux, fluence, lead factor, effective full-power time, and distance from center of core is based on the following schedule: 5 points for a missing value and 1 point for each 5% difference between calculated and reference values (up to a maximum of 100 points per comparison). An intermediate file houses the tally or absolute rating for each record. High values in this field (>200) are generally caused by inconsistent lead factors or by lead factors related to the inner wall and not the surveillance capsule as defined in standards manuals.

Table 21. Structure file for LEAD.dbf
Lead factor data

Field	Field_Name	Width	Description
1	TAG	1	Special Internal Operation Signifier
2	PLANT_ID	6	Reactor Identification
3	ID_ADD	1	Uniqueness Identifier
4	CAPSULE	6	Surveillance Capsule or Experiment
5	AZIMUTH	6	Azimuthal Location of Surveillance Capsule
6	CONFIG	6	Indicator for Change in Irradiation Environment
7	CORE_DIST	6	Distance from Core to Surveillance Capsule
8	CORE_DST_U	4	Surveillance Capasle Distance Units
9	EFP_TIME	10	Effective Full Power time of Irradiation (EFP)
10	EFP_T_U	1	EFP Time Units
11	LEAD_ID	5	Lead Factor - Inside Surface of PV

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Table 21. (continued).

Field	Field_Name	Width	Description
12	LEAD_QT	5	Lead Factor - Quarter Thickness of PV
13	LEAD_HT	5	Lead Factor, Half Thickness of Pressure Vessel (PV)
14	LEAD_3QT	5	Lead Factor, 3/4 Thickness of PV
15	LEAD_OD	5	Lead Factor, Outside Surface of PV
16	FLUX_CAP	10	Flux > 1.0 MeV (n/cm ² /s), Surveillance Capsule (Dosimeter Avg.)
17	FLUX_ID	10	Flux > 1.0 MeV (n/cm ² /s), Inner Surface of PV (At Max. PV Position)
18	FLUX_QT	10	Flux > 1.0 MeV (n/cm ² /s), 1/4 Thickness of PV (At Max. PV Position)
19	FLUX_HT	10	Flux > 1.0 MeV (n/cm ² /s), 1/2 Thickness of PV (At Max. PV Position)
20	FLUX_3QT	10	Flux > 1.0 MeV (n/cm ² /s), 3/4 Thickness of PV (At Max. PV Position)
21	FLUX_OD	10	Flux > 1.0 MeV (n/cm ² /s), Outer Diameter of PV (At Max. PV Position)
22	FLU_CAP	10	Fluence > 1.0 MeV (n/cm ²), Surveillance Capsule (Dosimeter Avg.)
23	FLU_ID	10	Fluence > 1.0 MeV (n/cm ²), Inner Surface of PV (At Max. PV Position)
24	FLU_QT	10	Fluence > 1.0 MeV (n/cm ²), 1/4 Thickness of PV (At Max. PV Position)
25	FLU_HT	10	Fluence > 1.0 MeV (n/cm ²), 1/2 Thickness of PV (At Max. PV Position)
26	FLU_3QT	10	Fluence > 1.0 MeV (n/cm ²), 3/4 Thickness of PV (At Max. PV Position)
27	FLU_OD	10	Fluence > 1.0 MeV (n/cm ²), Outer Diameter of PV (At Max. PV Position)
28	EOL_ID	10	End of Life (EOL) Predicted Fluence > 1.0 Mev (n/cm ²), Inner Surface of
29	EOL_QT	10	EOL Predicted Fluence > 1.0 Mev (n/cm ²), 1/4 Thickness of PV
30	EOL_HT	10	EOL Predicted Fluence > 1.0 Mev (n/cm ²), 1/2 Thickness of PV
31	EOL_3QT	10	EOL Predicted Fluence > 1.0 Mev (n/cm ²), 3/4 Thickness of PV
32	EOL_OD	10	EOL Predicted Fluence > 1.0 Mev (n/cm ²), Outer Surface of PV
33	EOL_YEARS	4	EOL Number of Years (Used in Prediction of EOL Fluences)
34	REF_ID	20	Reference Identifier
35	PAGES	20	Reference Page Number(s)
36	NOTES	30	Pertinent Information Related to Data Entries, If Needed
37	CHANGED	100	Quality Assurance Changes to Lead Factors, Flux, and Fluences
38	QUALITY	2	Relative Quality Assurance Rating for Record, 1(best) to 7 (worst)

20. HEAT_LST.dbf

HEAT_LST.dbf (Table 22) relates the material codes given in HEAT_ID to the descriptions and heat numbers given in the reports and the MPC data base. It also includes the ASTM (or foreign standard) material classification, the supplier of the material, and the thickness. The SOURCE field gives specific information about the origin of the material (if available). SCR_ap indicates that the material was obtained from excess material during fabrication of a pressure vessel (this applies also to welds); CUTOUT, a nozzle cutouts; SIM_ulated weld, if the material was not obtained from an actual weld seam but fabricated from excess plate material using the same filler and flux; and FABR_icated, the material was fabricated exclusively for irradiation experiments.

**Table 22. Structure file for HEAT_LST.dbf
List of Heat Identification**

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	HEAT_ID	10	Identification Code for Given Material
5	RPT_ID	20	Identifier Used in Surveillance Reports
6	HEAT_NO	10	Heat Number of Material Used by Supplier
7	PROD_ID	3	Material Type: P_late, F_oring, W_eld, HAZ, or SRM
8	MAT_ID	10	Material Classification: A302B, A5082, A533B1, etc.
9	SUPPLIER	20	Supplier of Material
10	THICKNESS	10	Thickness of Given Material
11	LENGTH_U	3	Unit of Thickness
12	SOURCE	10	Source of Material: FABR_icated, SCR_ap, SIM_ulated Weld, or CUTOUT
13	REF_ID	20	Reference Identifier
14	PAGES	20	Page Number(s)
15	NOTES	30	Pertinent Information Related to Data Entries, If Needed

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21. CHEM.dbf

CHEM.dbf (Table 23) lists the chemical compositions for the given materials together with information about the laboratory and method used, if reported, and whether it is derived from test specimens or represents generic values given by the supplier of the material. Generic values are identified in SPEC_ID as LADLE, CHECK, or HEAT, depending on what is revealed in the reports. The term WIRE is used if the chemical composition of the filler wire, rather than that of the actual weld material, has been reported. Other terms listed in SPEC_ID are identifiers of the test specimen, the chemical composition of which was determined. All different chemical composition determinations for the same material are listed as reported, but duplications are omitted.

Table 23. Structure file for CHEM.dbf
Chemical Composition

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	HEAT_ID	10	Identification Code for Given Material
5	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
6	MAT_ID	10	Material Classification: A302B, A5082, A533B1, etc.
7	CHEM_LAB	15	Chemistry Laboratory or Procedure Identification
8	METHOD	30	Method for Determining the Chemistry
9	SPEC_ID	8	Specimen Identifier
10	C	5	Carbon
11	MN	5	Manganese Content (wt %)
12	P	5	Phosphorus Content (wt %)
13	S	5	Sulfur Content (wt %)
14	SI	5	Silicon Content (wt %)
15	NI	5	Nickel Content (wt %)
16	CR	5	Chromium Content (wt %)
17	MO	5	Molybdenum Content (wt %)
18	CU	5	Copper Content (wt %)

Table 23. (continued).

Field	Field_Name	Width	Description
19	V	5	Vanadium Content (wt %)
20	B	5	Boron Content (wt %)
21	CS	5	Cesium Content (wt %)
22	TI	5	Titanium Content (wt %)
23	CO	5	Cobalt Content (wt %)
24	N	5	Nitrogen Content (wt %)
25	O	5	Oxygen Content (wt %)
26	SB	5	Antimony Content (wt %)
27	AS	5	Arsenic Content (wt %)
28	ZR	5	Zirconium Content (wt %)
29	AL	5	Aluminum Content (wt %)
30	PB	5	Lead Content (wt %)
31	W	5	Tungsten Content (wt %)
32	SN	5	Tin Content (wt %)
33	ZN	5	Zinc Content (wt %)
34	TA	5	Tantalum Content (wt %)
35	H	5	Hydrogen Content (wt %)
36	NB	5	Niobium Content (wt %)
37	REF_ID	20	Reference Identifier
38	PAGES	20	Page Number(s)
39	NOTES	30	Pertinent Information Related to Data Entries, If Needed

22. HEAT.dbf

HEAT.dbf (Table 24) lists up to eight different steps of heat treatment with temperature ranges, duration, quench method, and an indication of whether the particular step was intended for normalizing, austenizing, tempering, or stress relief, as far as reported. The supplier of the material and the facility performing the heat treatment, plus the identification used for the ingot (HEAT_NO) and the code used for the finished material (SUPPL_ID), are also included. Field NOMTEMP_x is

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the nominal temperature of the treatment step, if no MAXTEMP_x and MINTEMP_x is reported. RANGE, if reported, indicates the deviation from the nominal temperature (in both directions if $\pm$ is attached).

Table 24. Structure file for HEAT.dbf
Heat Treatment Information

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	HEAT_ID	10	Identification Code for Given Material
5	PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
6	SUPPLIER	15	Supplier of Material
7	HEAT_TREAT	15	Facility Performing Heat Treatment
8	HEAT_NO	10	Heat Number of Material Used by Supplier
9	SUPPL_ID	10	Identifier Used by Supplier
10	MINTEMP_1	4	Heat Treatment Minimum Temperature, Run 1
11	MAXTEMP_1	4	Heat Treatment Maximum Temperature, Run 1
12	NOMTEMP_1	4	Nominal Temperature, Run 1
13	RANGE_1	3	Heat Treatment Temperature Range, Run 1
14	HOURS_1	6	Heat Treatment Duration, Run 1 (h)
15	QCHM_1	2	Quench Method, Run 1
16	ID_1	1	N_ormalizing, A_ustenizing, T_empering, and Stress R_elief, Run 1
17	MINTEMP_2	4	Heat Treatment Minimum Temperature, Run 2
18	MAXTEMP_2	4	Heat Treatment Maximum Temperature, Run 2
19	NOMTEMP_2	4	Nominal Temperature, Run 2
20	RANGE_2	3	Heat Treatment Temperature Range, Run 2
21	HOURS_2	6	Heat Treatment Duration, Run 2 (h)
22	QCHM_2	2	Quench Method, Run 2

Table 24. (continued).

Field	Field_Name	Width	Description
23	ID_2	1	N_ormalizing, A_ustenizing, T_empering, and Stress R_elief, Run 2
24	MINTEMP_3	4	Heat Treatment Minimum Temperature, Run 3
25	MAXTEMP_3	4	Heat Treatment Maximum Temperature, Run 3
26	NOMTEMP_3	4	Nominal Temperature, Run 3
27	RANGE_3	3	Heat Treatment Temperature Range, Run 3
28	HOURS_3	6	Heat Treatment Duration, Run 3 (h)
29	QCHM_3	2	Quench Method, Run 3
30	ID_3	1	N_ormalizing, A_ustenizing, T_empering, and Stress R_elief, Run 3
31	MINTEMP_4	4	Heat Treatment Minimum Temperature, Run 4
32	MAXTEMP_4	4	Heat Treatment Maximum Temperature, Run 4
33	NOMTEMP_4	4	Nominal Temperature, Run 4
34	RANGE_4	3	Heat Treatment Temperature Range, Run 4
35	HOURS_4	6	Heat Treatment Duration, Run 4 (h)
36	QCHM_4	2	Quench Method, Run 4
37	ID_4	1	N_ormalizing, A_ustenizing, T_empering, and Stress R_elief, Run 4
38	MINTEMP_5	4	Heat Treatment Minimum Temperature, Run 5
39	MAXTEMP_5	4	Heat Treatment Maximum Temperature, Run 5
40	NOMTEMP_5	4	Nominal Temperature, Run 5
41	RANGE_5	3	Heat Treatment Temperature Range, Run 5
42	HOURS_5	6	Heat Treatment Duration, Run 5 (h)
43	QCHM_5	2	Quench Method, Run 5
44	ID_5	1	N_ormalizing, A_ustenizing, T_empering, and Stress R_elief, Run 5
45	MINTEMP_6	4	Heat Treatment Minimum Temperature, Run 6
46	MAXTEMP_6	4	Heat Treatment Maximum Temperature, Run 6
47	NOMTEMP_6	4	Nominal Temperature, Run 6

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Table 24 (continued)

Field	Field_Name	Width	Description
47	RANGE_6	3	Heat Treatment Temperature Range, Run 6
48	HOURS_6	6	Heat Treatment Duration, Run 6 (h)
49	QCHM_6	2	Quench Method, Run 6
50	ID_6	1	N_ormalizing, A_ustenizing, T_empering, and Stress R_elief, Run 6
51	MINTEMP_7	4	Heat Treatment Minimum Temperature, Run 7
52	MAXTEMP_7	4	Heat Treatment Maximum Temperature, Run 7
53	NOMTEMP_7	4	Nominal Temperature, Run 7
54	RANGE_7	3	Heat Treatment Temperature Range, Run 7
55	HOURS_7	6	Heat Treatment Duration, Run 7 (h)
56	QCHM_7	2	Quench Method, Run 7
57	ID_7	1	N_ormalizing, A_ustenizing, T_empering, and Stress R_elief, Run 7
58	MINTEMP_8	4	Heat Treatment Minimum Temperature, Run 8
59	MAXTEMP_8	4	Heat Treatment Maximum Temperature, Run 8
60	NOMTEMP_8	4	Nominal Temperature, Run 8
61	NOMTEMP_1	4	Nominal Temperature, Run 1
62	RANGE_8	3	Heat Treatment Temperature Range, Run 8
63	HOURS_8	6	Heat Treatment Duration, Run 8 (h)
64	QCHM_8	2	Quench Method, Run 8
65	ID_8	1	N_ormalizing, A_ustenizing, T_empering, and Stress R_elief, Run 8
66	TEMP_U	1	Unit used for Temperature Data
67	REF_ID	20	Reference Identifier
68	PAGES	20	Page Number(s)
69	NOTES	30	Pertinent Information Related to Data Entries, If Needed

23. WELD.dbf

WELD.dbf (Table 25) gives additional information for weldments such as weld method, type and heat number of the filler material, and type and lot number of the flux used. The weld code and the supplier of the weld are also listed.

**Table 25. Structure file for WELD.dbf
Weldment Information**

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	HEAT_ID	10	Identification Code for Given Material
5	WLD_TYPE	3	Weld Type
6	WLD_CODE	10	Identification Code used by Weld Manufacturer
7	HEAT_1	10	HEAT_ID of Plate on one side of Weld
8	HEAT_2	10	HEAT_ID of Plate on other side of Weld
9	WELD_SUPLY	15	Supplier of Weld Material
10	WIRE_TYPE	10	Type of Weld Wire
11	WIRE_HEAT	10	Weld Wire Heat Identifier
12	FLUX_TYPE	10	Type of Flux
13	FLUX_LOT	10	Weld Flux Lot Identifier
14	REF_ID	20	Reference Identifier
15	PAGES	20	Page Number(s)
16	NOTES	30	Pertinent Information Related to Data Entries, If Needed

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24. HAZ.dbf

HAZ.dbf (Table 26) identifies the base material and weldments used to prepare the HAZ specimens.

Table 26. Structure file for HAZ.dbf
Identification of Heat-Affected-Zone Materials

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
4	HEAT_ID	10	Identification Code for Given Material
5	HEAT_B	10	HEAT_ID of the Base Material
6	HEAT_W	10	HEAT_ID of Weld Material Connected to HAZ
7	REF_ID	20	Reference Identifier
8	PAGES	20	Page Number(s)
9	NOTES	30	Pertinent Information Related to Data Entries, If Needed

25. REF_TITL.dbf

All EDB files, with the exception of CHARPY.dbf and REAC_LST.dbf, contain a reference in the REF_ID field, plus page numbers for each record. The complete bibliographic listing, including author, title, report number, and date of publication, is located in REF_TITL.dbf (Table 27). Each listing may extend to more than one record because of the limited length the title field REF_TITLE may occupy in the current version of dBASE. A set of linked records is characterized by the same REF_ID and a sequence of numbers in the CONT field (1, 2, etc.). The list of authors and experiments described in the reference may also extend to more than one record.

Table 27. Structure file for REF_TITL.dbf
Reference Information

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	PLANT_ID	6	Reactor Identification
3	REF_ID	20	Reference Identifier
4	ALT_REF	20	Alternate Reference (not used as REF_ID)
5	CONT	2	Continuation Tag for References Occupying More than One Record
6	AUTHOR_1	25	First Author (or continued reference from preceeding record.)
7	AUTHOR_2	25	Next Author (same reference may be continued in the next record)
8	REF_TITLE	80	Bibliographic Reference
9	PUB_DATE	10	Date of Publication

26. REF_LST.dbf

REF_LST.dbf (Table 28) links the key identifier EXP_ID with REF_ID (i.e., it lists all references associated with a particular experiment and vice versa). The linkage is not one to one since many experiments are reported in more than one reference and some publications include more than one experiment. The MPC_ID field identifies the reports and data that were included in the MPC data base.

Table 28. Structure file for REF_LST.dbf
Reference List

Field	Field_Name	Width	Description
1	TAG	1	Used for Internal Operation
2	EXP_ID	6	Experiment Identification
3	REF_ID	20	Reference Identifier
4	MPC_ID	3	Reference Number Assigned by Combustion Engineering (Material Properties Council)

Tables 29 through 54 give partial listings of the EDB files the structures of which are shown in Tables 2 - 28.

Table 29. Partial listing of EXP_LST.dbf

EXP ID	EXP DESCR	LABORATORY	AUTHORS	LOCATION	REACTORS
BET-AN	Annealing Experiments Performed by Westinghouse at the Bettis Laboratory	Bettis Laboratory	J.F. Hall, D.J. Seeman	Pittsburgh, PA	ETR
BWREXP	Irradiation Experiments Performed by GE with a Variety of BWR-PV Materials	General Electric Co.	J.N. Kase, et al.	San Jose, CA	HM3
CEA	Experiments in French Reactors Sponsored by Commissariat à l'Énergie Atomique		C. Guilomet, P. Petroquin, P. Soulat, et al.		
EPR-AN	Annealing Experiments Sponsored by the Electric Power Research Institute (EPRI)		T.R. Major		UVAR
FKS-G	Irr. Program at Geesthacht to Verify Safety Margins for German Licensing Rules	OKSS-Forschungszentrum	J. Alf, D. Bollmann, et al.	Geesthacht, Germany	FRG-2
FKS-K	Irr. program by KWU to verify safety margins for German licensing rules	Kraftwerkunion AG	J. Föhl, Ch. Lektz, D. Anders	Erlangen	VAK
HAW-AN	Compilation of Results from Annealing Experiments by J.R. Hawthorne		J.R. Hawthorne		
HFIR	HFIR Surveillance Program and Related Experiments at ORNL	Oak Ridge National Laboratory	R.K. Nanstad, et al.	Oak Ridge, TN	HFIR, ORR
HSST-0	Heavy Section Steel Technology (HSST) Program, Initial Characterization	Oak Ridge National Laboratory	C.E. Childress, W.J. Steltzman	Oak Ridge, TN	
HSST-1	Heavy Section Steel Irradiation (HSSI) Experiments, Series 1, at ORNL	Oak Ridge National Laboratory	W.J. Steltzman, G.R. Borggren, et al.	Oak Ridge, TN	ORR
HSST-2	Heavy Section Steel Irradiation (HSSI) Experiments, Series 2, at ORNL	Oak Ridge National Laboratory	R.K. Nanstad, G.R. Borggren, et al.	Oak Ridge, TN	BSR
HSST-3	Heavy Section Steel Irradiation (HSSI) Experiments, Series 3, at ORNL	Oak Ridge National Laboratory	R.K. Nanstad, G.R. Borggren, et al.	Oak Ridge, TN	BSR
HSST-4	Heavy Section Steel Irradiation (HSSI) Experiments, Series 4, at ORNL	Oak Ridge National Laboratory	R.K. Nanstad, G.R. Borggren, et al.	Oak Ridge, TN	BSR
IAEA	IAEA Co-ordinated Research Program for Irradiation of Advanced RPV Steels	Int. Atomic Energy Agency		Vienna, Austria	
IAEAB	IAEA Co-ordinated Research Program: AERE Contribution	UK Atomic Energy Authority	L.M. Davies, et al.	Harwell, Oxfordshire, U.K.	HERALD
IAEAC	IAEA Co-ordinated Research Program: Skoda Contribution	Skoda National Corporation	M. Brumovsky	Ptzen, Czechoslovakia	WWR
IAEAD	IAEA Co-ordinated Research Program: RISO Contribution	Riso National Laboratories	C.P. Debel	Roskilde, Denmark	
IAEAF	IAEA Co-ordinated Research Program: CEN Contribution	Centre d'Études Nucléaires	P. Petroquin, et al.	Saclay, France	TRITON
IAEAG	IAEA Co-ordinated Research Program: GKSS Contribution	GKSS	W. Spalthoff, et al.	Geesthacht, Germany	FRG-2, KKS, VAK
IAEAI	IAEA Co-ordinated Research Program: Bhabha Contribution	Bhabha Atomic Research Centre	K.S. Sivasubramanian	Bombay, India	CIRUS
IAEAJ	IAEA Co-ordinated Research Program: Japan At. Res. Inst. Contribution	Japan Atomic Energy Res. Inst.	S. Miyazono	Tokyo, Japan	JMTR
IAEAK	IAEA Co-ordinated Research Program: KFA Contribution	Kernforschungsanstalt	D. Pacher	Jülich, Germany	FRJ-1, FRJ-2
IAEAM	IAEA Co-ordinated Research Program: Steel manufacturer's Contribution				
IAEAU	IAEA Co-ordinated Research Program: NRL Contribution	Naval Research Laboratory	J.R. Hawthorne	Washington, DC	UBR
JPDR	Japan Power Demonstration Reactor (JPDR) Surveillance Program	Japan Atomic Energy Res. Inst.	M. Kawasaki, et al.	Tokyo, Japan	JPDR
KFA	Misc. Irradiation Experiments Performed at the Kernforschungsanstalt (KFA), FRG	Kernforschungsanstalt	D. Pacher	Jülich, Germany	FRJ-1, FRJ-2, HFR
KRB	Experiments Concerning the Decommissioned Reactor KRB-A, Gundersmungen, Germany	Materials Engineering Ass., Inc	J.R. Hawthorne	Lanham, MD	UBR
KWU-PR	Compilation of German Irradiated RPV Data for Transfer to NRC	Kraftwerk Union			
LAC	Test Reactor Irradiations in Support of the LaCrosse Reactor		C.Z. Serpan, Jr.		LJTR, UCRR
MCD-AN	Compilation of Results from Annealing Experiments by B. McDonald		B. McDonald		
MEA-AN	Post-Irradiation Annealing Experiments at Materials Engineering Ass., Inc. (MEA)	Materials Engineering Ass.	J.R. Hawthorne	Lanham, MD	UBR
MEA-RT	Study of the Influence of Fluence Rates on Irradiation Embrittlement at MEA	Materials Engineering Ass.	J.R. Hawthorne	Lanham, MD	UBR
MOLBR3	Irradiation Experiments in Support of the BR3 Reactor at Mol, Belgium	Materials Engineering Ass.	A. Fabry, et al.	Lanham, MD	UBR
MRI-1	Test of Hydrogen Influence in Steels performed at Materials Research, Maho		C.R. Brinkman, J.M. Meeston		ETR, MTR
NRL-1	Exploratory Irradiation Studies of A533, A543, and A302 Steels at NRL	Naval Research Laboratory	J.R. Hawthorne	Washington, DC	LJTR, MTR, UCRR
NRL-2	Irradiation Experiments with HSST Material at the Naval Research Laboratory	Naval Research Laboratory	J.R. Hawthorne	Washington, DC	MTR, UCRR
NRL-3	Test of Irradiation Sensitivity for Commercial and Improved Steels at NRL	Naval Research Laboratory	J.R. Hawthorne	Washington, DC	UCRR
NRL-4	Notch Ductility Degradation of Low Alloy Steels with Low-to-Intermediate Fluence	Naval Research Laboratory	J.R. Hawthorne	Washington, DC	UBR
NRL-AN	Investigation of Cyclic Irradiation and Annealing Effects in A533-B Welds	Naval Research Laboratory	J.R. Hawthorne, H.E. Watson, F.J. Loe	Washington, DC	UBR
NRL-EP	NRL-EPRI Research Program (RP886-2)	Naval Research Laboratory	J.R. Hawthorne, H.E. Watson	Washington, DC	BSR
ORRPSF	Surveillance Dosimetry Improvement Program, ORR-PSF Metallurgical Irradiation	Oak Ridge National Laboratory	J.R. Hawthorne, et al.	Oak Ridge, TN	
PR-EDB	Experiments in Support of U.S. Power Reactor Surveillance	Metal Properties Council	L.E. Steele, C.Z. Serpan, Jr.		
PR-AN1	Power Reactor Surveillance Program of Arkansas Nuclear One, Unit One			Russellville, Arkansas	AN1
PR-AN2	Power Reactor Surveillance Program of North Anna Unit 1			Russellville, Arkansas	AN2
PR-BF3	Power Reactor Surveillance Program of Browns Ferry Unit 3			Decatur, Alabama	BF3
PR-CC1	Power Reactor Surveillance Program of Calvert Cliffs Unit 1			Luhy, Maryland	CC1
PR-DC1	Power Reactor Surveillance Program of Donald C. Cook Unit 1			Avila Beach, California	DC1
PR-GIN	Power Reactor Surveillance Program of Robert E. Ginna Nuclear Plant Unit 1			Ontario, New York	GIN
PR-NA1	Power Reactor Surveillance Program of Arkansas Nuclear One, Unit Two			Mineral, Virginia	NA1
PR-OC1	Power Reactor Surveillance Program of Oconee Nuclear Station Unit 1			Seneca, South Carolina	OC1

Table 30. Partial listing of SPEC_LST.dbf

TAG	EXP_ID	PLANT_ID	CAPSULE	HEAT_ID	SPEC_TYPE	SPEC_ORI	SPEC_POS	NO_OF_SPEC	REPORT_TAG	REF_ID	PAGES	NOTES
C	BET-AN			PBETOS	CV	LT				WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOS A13	CV	LT		6	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOS A14	CV	LT		7	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOS A15	CV	LT		5	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOS A16	CV	LT		6	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOS A17	CV	LT		7	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOS A18	CV	LT		5	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOS A19	CV	LT		6	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOS A1A	CV	LT		7	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOU	CV	LT				WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOU A13	CV	LT		7	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOU A14	CV	LT		6	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOU A15	CV	LT		4	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOU A16	CV	LT		6	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOU A17	CV	LT		7	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOU A18	CV	LT		7	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOU A19	CV	LT		7	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN			PBETOU A1A	CV	LT		7	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN	ETR	C-7	PBETOS	CV	LT		31	R	WAPD-TM-1095	2; 3; 4; 17	
C	BET-AN	ETR	C-7	PBETOU	CV	LT		32	R	WAPD-TM-1095	2; 3; 4; 17	
C	BWREXP			F98340	CV					NEDO-21708	4-11	
C	BWREXP			FE28VW	CV					NEDO-21708	4-11	
C	BWREXP			FKKM01	CV					NEDO-21708	4-11	
C	BWREXP			PCPR02	CV	TL				NEDO-21708	4-10	
C	BWREXP			PHA101	CV	TL				NEDO-21708	4-10	
C	BWREXP			PML10X	CV	TL				NEDO-21708	4-10	
C	BWREXP			PVY 01	CV	TL				NEDO-21708	4-10	
C	BWREXP			WML102	CV	TL				NEDO-21708	4-11	
C	BWREXP			WVY 01	CV	TL				NEDO-21708	4-10	
C	BWREXP	HM3	X01	F98340	CV					NEDO-21708	4-11	
C	BWREXP	HM3	X01	FE28VW	CV					NEDO-21708	4-11	
C	BWREXP	HM3	X01	FKKM01	CV					NEDO 21708	4-1; 4-11	
C	BWREXP	HM3	X01	PCPR02	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X01	PHA101	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X01	PML10X	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X01	PVY 01	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X01	WCPR01	CV	TL				NEDO 21708	4-1; 4-11	
C	BWREXP	HM3	X01	WML102	CV	TL				NEDO 21708	4-1; 4-11	
C	BWREXP	HM3	X01	WVY 01	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X02	F98340	CV					NEDO-21708	4-11	
C	BWREXP	HM3	X02	FE28VW	CV					NEDO-21708	4-11	
C	BWREXP	HM3	X02	FKKM01	CV					NEDO 21708	4-1; 4-11	
C	BWREXP	HM3	X02	PCPR02	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X02	PHA101	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X02	PML10X	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X02	PVY 01	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X02	WCPR01	CV	TL				NEDO 21708	4-1; 4-11	
C	BWREXP	HM3	X02	WML102	CV	TL				NEDO 21708	4-1; 4-11	
C	BWREXP	HM3	X02	WVY 01	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X03	F98340	CV					NEDO-21708	4-11	
C	BWREXP	HM3	X03	FE28VW	CV					NEDO-21708	4-11	

Table 31. Partial listing of SPEC_GEO.dbf

TAO	EXP ID	PLANT ID	HEAT ID	PROD ID	SPEC ORI	SPEC POS	SPEC ID	SPEC TYPE	GROOVE	SPEC WIDTH	SPEC WIDTT	SPEC HBOHT	SPEC THICK	SPEC NTHIC	SPEC UNIT	REF ID	PAGES	NOTES
	HSSI-6		WHSS72	W	TL		A72W01	1TWOL	24	127.00	152.45	152.37	25.40	19.25	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W02	1TWOLX	25	126.99	152.45	152.37	33.05	24.73	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W03	1TWOL	30	126.94	152.45	152.40	25.40	17.86	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W04	1TWOLX	25	126.96	152.45	152.37	33.05	24.94	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W05	1TWOL	30	127.00	152.45	152.40	25.40	17.86	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W07	1TWOLX	24	126.93	152.43	152.37	33.02	25.12	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W08	1TWOL	29	127.01	152.43	152.40	25.43	17.96	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W12	1TWOLX	24	126.93	152.43	152.40	33.05	25.07	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W19	1TWOLX	24	127.01	152.43	152.37	33.02	25.04	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W20	1TWOL	28	126.94	152.43	152.43	25.37	18.15	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W24	1TWOL	25	63.42	76.20	76.17	25.35	19.13	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W25	1TWOL	24	63.52	76.17	76.17	25.35	19.15	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W28	1TWOL	24	63.41	76.17	76.17	25.27	19.10	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W31	1TWOL	24	63.40	76.17	76.17	25.27	19.20	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W34	1TWOL	25	63.54	76.20	76.15	25.40	19.15	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W35	1TWOL	25	63.44	76.23	76.20	25.40	19.08	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W36	1TWOL	25	63.50	76.23	76.17	25.40	19.15	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W37	1TWOL	25	63.39	76.23	76.17	25.40	19.02	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W38	1TWOL	25	63.46	76.20	76.20	25.37	19.05	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W39	1TWOL	25	126.87	152.40	152.37	25.40	19.00	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W40	1TWOLX	25	126.76	152.40	152.37	32.99	24.74	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W41	1TWOL	25	126.81	152.43	152.37	25.43	19.00	mm	NUREG/CR/5584	47	
	HSSI-6		WHSS72	W	TL		A72W43	1TWOL	25	126.84	152.37	152.40	25.43	19.00	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W44	1TWOL	25	126.87	152.37	152.37	25.40	19.02	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W45	1TWOLX	25	126.92	152.40	152.40	32.99	24.74	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W46	1TWOL	26	126.84	152.37	152.37	25.43	18.92	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W47	1TWOLX	25	126.80	152.40	152.37	33.02	24.74	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W48	1TWOL	26	126.78	152.40	152.37	25.40	18.87	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W57	1TWOLX	25	127.14	152.40	152.40	32.97	24.79	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W62	1TWOLX	25	126.97	152.40	152.40	32.99	24.82	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W63	1TWOLX	25	126.90	152.37	152.35	32.99	24.84	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W64	1TWOLX	25	127.03	152.35	152.45	33.02	24.79	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W65	1TWOLX	25	126.95	152.40	152.40	33.05	24.79	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W66	1TWOLX	25	127.02	152.43	152.40	33.02	24.77	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W68	1TWOLX	25	127.01	152.40	152.40	32.99	24.79	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W71	1TWOLX	25	127.04	152.43	152.43	33.02	24.79	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W73	1TWOLX	25	127.07	152.40	152.43	33.05	24.82	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W83	2TWOL	8	169.46	197.74	203.23	50.85	46.99	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W84	2TWOL	8	169.46	197.71	203.20	50.90	46.99	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS72	W	TL		A72W85	2TWOL	25	168.68	197.76	203.33	50.84	38.13	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS73	W	TL		A73W01	1TWOL	25	63.50	76.15	76.15	25.45	19.02	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS73	W	TL		A73W02	1TWOL	25	63.42	76.12	76.17	25.45	19.02	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS73	W	TL		A73W03	1TWOL	25	63.48	76.12	76.15	25.45	19.10	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS73	W	LT		A73W04	1TWOL	25	63.61	76.12	76.17	25.45	19.00	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS73	W	TL		A73W05	1TWOL	25	63.36	76.10	76.17	25.45	19.13	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS73	W	TL		A73W06	1TWOL	25	63.31	76.02	76.17	25.45	19.02	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS73	W	TL		A73W07	1TWOLX	24	126.94	152.27	152.35	32.97	24.93	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS73	W	TL		A73W08	1TWOLX	24	127.00	152.37	152.37	32.97	24.97	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS73	W	TL		A73W09	1TWOLX	24	127.03	152.37	152.35	32.94	24.94	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS73	W	TL		A73W10	1TWOLX	25	127.05	152.40	152.37	32.99	24.88	mm	NUREG/CR/5584	48	
	HSSI-6		WHSS73	W	TL		A73W11	1TWOL	25	127.07	152.43	152.43	25.43	18.97	mm	NUREG/CR/5584	49	

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U	FTT	TT30	TT50	LE35	USE	FTT	DTT30	DTT50	LE35	DUSE_ABS	DUSE_REL	TEMP	U	USE	REF ID	PAGES	NOTES
	465						335					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	460						330					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	465						335					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	460						330					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	440						310					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	450						320					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	440						310					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	450						320					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	315						280					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	365						330					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	315						280					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	365						330					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	365						330					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	340						305					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	365						330					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
	340						305					F	A-B		WAPD-TM-1095	2; 3; 4; 17	
							0			5		F	A-B		NEDO-21708	4-11	
							18			10		F	A-B		NEDO-21708	4-11	
							0			2		F	A-B		NEDO-21708	4-11	
							75			0		F	A-B		NEDO-21708	4-10	
							22			0		F	A-B		NEDO-21708	4-10	
							5			4		F	A-B		NEDO-21708	4-10	
							0			0		F	A-B		NEDO-21708	4-10	
							0			13		F	A-B		NEDO-21708	4-11	
							0			8		F	A-B		NEDO-21708	4-11	
							0			10		F	A-B		NEDO-21708	4-10	
							17			4		F	A-B		NEDO-21708	4-11	
							18			5		F	A-B		NEDO-21708	4-11	
							21			13		F	A-B		NEDO-21708	4-11	
							93			10		F	A-B		NEDO-21708	4-10	
							35			0		F	A-B		NEDO-21708	4-10	
							5			2		F	A-B		NEDO-21708	4-10	
							0			5		F	A-B		NEDO-21708	4-10	
							0			3		F	A-B		NEDO-21708	4-11	
							65			19		F	A-B		NEDO-21708	4-11	
							0			3		F	A-B		NEDO-21708	4-10	
							36			5		F	A-B		NEDO-21708	4-11	
							46			8		F	A-B		NEDO-21708	4-11	
							32			11		F	A-B		NEDO-21708	4-11	
							113			19		F	A-B		NEDO-21708	4-10	
							30			0		F	A-B		NEDO-21708	4-10	
							85			36		F	A-B		NEDO-21708	4-10	
							0			8		F	A-B		NEDO-21708	4-10	
							18			0		F	A-B		NEDO-21708	4-11	
							100			28		F	A-B		NEDO-21708	4-11	
							18			0		F	A-B		NEDO-21708	4-10	
	37	62	53				81	95	94			C	J		ASTM STP 725/20	22; 28	
				139						56		C	J		ASTM STP 725/20	22; 32	
	29	44	41				68	69	74			C	J		ASTM STP 725/20	22; 28	
				162						38		C	J		ASTM STP 725/20	22; 32	
	11	20	16				42	32	44			C	J		ASTM STP 725/20	22; 28	
				169						23		C	J		ASTM STP 725/20	22; 32	
	-3	8	2				39	41	43			C	J		ASTM STP 725/20	22; 28	
				189						-5		C	J		ASTM STP 725/20	22; 32	
	39	50	44				63	63	65			C	J		ASTM STP 725/20	22; 28	
				153						39		C	J		ASTM STP 725/20	22; 32	
				186						46		C	J		ASTM STP 725/20	22; 32	
	-16	-2	4				62	68	74			C	J		ASTM STP 725/20	22; 28	
	46	59	50				78	80	80			C	J		ASTM STP 725/20	22; 28	
				150						61		C	J		ASTM STP 725/20	22; 32	
	26	45	35				63	67	68			C	J		ASTM STP 725/20	22; 28	
				173						25		C	J		ASTM STP 725/20	22; 32	
	41	68	48				60	73	64			C	J		ASTM STP 725/20	22; 28	

Architecture

Table 32. Partial listing of

TAO	EXP ID	PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	CSP FI	FLU TAO	BFP TIME	TIME U FI RATE	CSP TEMP	UTT30	UTT50	ULE35	UUSE
C	BET-AN	ETR	C-7	PBETOS	P	LT	1.830E+19				450	130			
C	BET-AN	ETR	C-7	PBETOS	P	LT	1.590E+19				450	130			
C	BET-AN	ETR	C-7	PBETOS	P	LT	1.980E+19				450	130			
C	BET-AN	ETR	C-7	PBETOS	P	LT	1.590E+19				450	130			
C	BET-AN	ETR	C-7	PBETOS	P	LT	9.600E+18				450	130			
C	BET-AN	ETR	C-7	PBETOS	P	LT	1.730E+19				450	130			
C	BET-AN	ETR	C-7	PBETOS	P	LT	1.220E+19				450	130			
C	BET-AN	ETR	C-7	PBETOS	P	LT	1.510E+19				450	130			
C	BET-AN	ETR	C-7	PBETOU	P	LT	9.800E+18				450	35			
C	BET-AN	ETR	C-7	PBETOU	P	LT	2.490E+19				450	35			
C	BET-AN	ETR	C-7	PBETOU	P	LT	1.200E+19				450	35			
C	BET-AN	ETR	C-7	PBETOU	P	LT	2.880E+19				450	35			
C	BET-AN	ETR	C-7	PBETOU	P	LT	1.780E+19				450	35			
C	BET-AN	ETR	C-7	PBETOU	P	LT	8.500E+18				450	35			
C	BET-AN	ETR	C-7	PBETOU	P	LT	2.150E+19				450	35			
C	BET-AN	ETR	C-7	PBETOU	P	LT	9.600E+18				450	35			
C	BWREXP	HM3	X01	F98340	F		2.000E+17				545				
C	BWREXP	HM3	X01	FE28VW	F		2.000E+17				545				
C	BWREXP	HM3	X01	FKKM01	F		2.000E+17				545				
C	BWREXP	HM3	X01	PCPR02	P	TL	2.000E+17				545				
C	BWREXP	HM3	X01	PHA101	P	TL	2.000E+17				545				
C	BWREXP	HM3	X01	PML10X	P	TL	2.000E+17				545				
C	BWREXP	HM3	X01	PVY 01	P	TL	2.000E+17				545				
C	BWREXP	HM3	X01	WCPR01	W	TL	2.000E+17				545				
C	BWREXP	HM3	X01	WML102	W	TL	2.000E+17				545				
C	BWREXP	HM3	X01	WVY 01	W	TL	2.000E+17				545				
C	BWREXP	HM3	X02	F98340	F		1.500E+18				545				
C	BWREXP	HM3	X02	FE28VW	F		1.500E+18				545				
C	BWREXP	HM3	X02	FKKM01	F		1.500E+18				545				
C	BWREXP	HM3	X02	PCPR02	P	TL	1.500E+18				545				
C	BWREXP	HM3	X02	PHA101	P	TL	1.500E+18				545				
C	BWREXP	HM3	X02	PML10X	P	TL	1.500E+18				545				
C	BWREXP	HM3	X02	PVY 01	P	TL	1.500E+18				545				
C	BWREXP	HM3	X02	WCPR01	W	TL	1.500E+18				545				
C	BWREXP	HM3	X02	WML102	W	TL	1.500E+18				545				
C	BWREXP	HM3	X02	WVY 01	W	TL	1.500E+18				545				
C	BWREXP	HM3	X03	F98340	F		3.700E+18				545				
C	BWREXP	HM3	X03	FE28VW	F		3.700E+18				545				
C	BWREXP	HM3	X03	FKKM01	F		3.700E+18				545				
C	BWREXP	HM3	X03	PCPR02	P	TL	3.700E+18				545				
C	BWREXP	HM3	X03	PHA101	P	TL	3.700E+18				545				
C	BWREXP	HM3	X03	PML10X	P	TL	3.700E+18				545				
C	BWREXP	HM3	X03	PVY 01	P	TL	3.700E+18				545				
C	BWREXP	HM3	X03	WCPR01	W	TL	3.700E+18				545				
C	BWREXP	HM3	X03	WML102	W	TL	3.700E+18				545				
C	BWREXP	HM3	X03	WVY 01	W	TL	3.700E+18				545				
C	CEA	MELUS	CHOUCA	PFRA1A	P	LT	5.400E+19	S	0.25	Y	285	-44	-33	-41	
C	CEA	MELUS	CHOUCA	PFRA1A	P	LT	6.560E+19	S	0.25	Y	285				195
C	CEA	MELUS	CHOUCA	PFRA1B	P	LT	4.690E+19	S	0.25	Y	285	-39	-25	-33	
C	CEA	MELUS	CHOUCA	PFRA1B	P	LT	5.250E+19	S	0.25	Y	285				200
C	CEA	MELUS	CHOUCA	PFRA1C	P	LT	4.750E+19	S	0.25	Y	285	-31	-13	-28	
C	CEA	MELUS	CHOUCA	PFRA1C	P	LT	5.320E+19	S	0.25	Y	285				192
C	CEA	MELUS	CHOUCA	PFRA1D	P	LT	6.080E+19	S	0.25	Y	285	-42	-32	-40	
C	CEA	MELUS	CHOUCA	PFRA1D	P	LT	7.370E+19	S	0.25	Y	285				184
C	CEA	MELUS	CHOUCA	PFRA1E	P	LT	6.060E+19	S	0.25	Y	285	-24	-13	-21	
C	CEA	MELUS	CHOUCA	PFRA1E	P	LT	6.690E+19	S	0.25	Y	285				192
C	CEA	MELUS	CHOUCA	PFRA1F	P	LT	4.750E+19	S	0.25	Y	285				232
C	CEA	MELUS	CHOUCA	PFRA1F	P	LT	5.690E+19	S	0.25	Y	285	-78	-66	-70	
C	CEA	MELUS	CHOUCA	PFRA1G	P	LT	5.880E+19	S	0.25	Y	285	-32	-21	-30	
C	CEA	MELUS	CHOUCA	PFRA1G	P	LT	7.110E+19	S	0.25	Y	285				211
C	CEA	MELUS	CHOUCA	PFRA1H	P	LT	6.320E+19	S	0.25	Y	285	-37	-22	-33	
C	CEA	MELUS	CHOUCA	PFRA1H	P	LT	7.590E+19	S	0.25	Y	285				198
C	CEA	MELUS	CHOUCA	PFRA1K	P	LT	5.530E+19	S	0.25	Y	285	-19	-5	-16	

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	CSP	TEMP	R	UTT30	ITT30	DTT30	IATT30	RTT30	IARTT30	UUSE	IUSE	DUSE	ABS	LAUSE	RUSE	ABS	IARUSE	TEMP	U	USE	U	REF ID	PAGES
				10	85	75	10	75		127	106	21		127	21			F	A-B			NRL 8287	10; 24
						40		20		161	152	9		161	9			F	A-B			NRL 8287	24
						125		75		137		21						F	A-B			NRL 8287	24
						205		80		139	108	31		130	22			F	A-B			NRL 8287	24
						205		80		139		31						F	A-B			NRL 8287	24
						110		<20		155	110	45		132	22			F	A-B			NRL 8287	24
				-20	235	255	55	180		69	40	29		57	17			F	A-B			NRL 8287	24
				-20	235	255	100	135		69	40	29		59	19			F	A-B			NRL 8287	24
						150		65		120		18						F	A-B			NRL 8287	24
						150		130		120		18						F	A-B			NRL 8287	24
				-30	14	44	-15	29		103	94	9		114	20			C	J			NUREG/CR-3228/V5/36	40; 41; 42
				-30	14	44	-28	42		103	94	9		114	20			C	J			NUREG/CR-3228/V5/36	40; 41; 43
+18	288			-23	96	119	54	42	93	79	52	27		79	27	60		C	J			NUREG/CR-5469	18; 19
+18	288			-23	96	119	13	83	35	79	52	27		87	35	75		C	J			NUREG/CR-5469	18; 19
+18	288			-62	27	89	-21	48	10	156	114	42		145	31	118		C	J			NUREG/CR-5469	18; 19
+18	288			-62	27	89	-29	56	-23	156	114	42		165	51	153		C	J			NUREG/CR-5469	18; 19
+18	288			-37	13	50	-34	47	2	129	106	23		142	36	117		C	J			NUREG/CR-5469	18; 20
+18	288			-37	13	50	-34	47	-7	129	106	23		148	42	129		C	J			NUREG/CR-5469	18; 20
+18	288			-15	66	81	21	45	54	84	60	24		85	25	68		C	J			NUREG/CR-5469	18; 20
+18	288			-15	66	81	7	59	27	84	60	24		103	43	84		C	J			NUREG/CR-5469	18; 20
+19	288			-23	96	119	54	42	93	79	52	27		79	27	58		C	J			NUREG/CR-5469	18; 19
+19	288			-23	96	119	13	83	41	79	52	27		87	35	76		C	J			NUREG/CR-5469	18; 19
+19	288			-62	27	89	-21	48	18	156	114	42		145	31	117		C	J			NUREG/CR-5469	18; 19
+19	288			-62	27	89	-29	56	-21	156	114	42		165	51	153		C	J			NUREG/CR-5469	18; 19
+19	288			-37	13	50	-34	47	16	129	106	23		142	36	111		C	J			NUREG/CR-5469	18; 20
+19	288			-37	13	50	-34	47	16	129	106	23		148	42	129		C	J			NUREG/CR-5469	18; 20
+19	288			-15	66	81	21	45	60	84	60	24		85	25	74		C	J			NUREG/CR-5469	18; 20
+19	288			-15	66	81	7	59	38	84	60	24		103	43	86		C	J			NUREG/CR-5469	18; 20
				-23	96	119	54	42		79	52	27		79	27			C	J			NUREG/CR-5469	18; 19
				-23	96	119	13	83		79	52	27		87	35			C	J			NUREG/CR-5469	18; 19
				-62	27	89	-21	48		156	114	42		145	31			C	J			NUREG/CR-5469	18; 19
				-62	27	89	-29	56		156	114	42		165	51			C	J			NUREG/CR-5469	18; 19
				-37	13	50	-34	47		129	106	23		142	36			C	J			NUREG/CR-5469	18; 20
				-37	13	50	-34	47		129	106	23		148	42			C	J			NUREG/CR-5469	18; 20
				-15	66	81	21	45		84	60	24		85	25			C	J			NUREG/CR-5469	18; 20
				-15	66	81	7	59		84	60	24		103	43			C	J			NUREG/CR-5469	18; 20
				-23	91	114				79	53	26						C	J			NUREG/CR-5469	18; 19
				-62	27	89				156	117	39						C	J			NUREG/CR-5469	18; 19
				-37	4	41				129	108	21						C	J			NUREG/CR-5469	18; 20
				-15	60	75				84	68	16						C	J			NUREG/CR-5469	18; 20
+18	550			-10			130		200	58				57		42		F	A-B			NUREG/CR-3228/V3/136	136; 139; 1
+18	550			-80			15		65	115				107		18		F	A-B			NUREG/CR-3228/V3/136	136; 140; 1
+18	550			-10			130		210	58				57		42		F	A-B			NUREG/CR-3228/V3/136	136; 139; 1
+18	550			-80			15		80	115				107		84		F	A-B			NUREG/CR-3228/V3/136	136; 140; 1
				-10	205	215				58	40	18						F	A-B			NUREG/CR-3228/V3/136	136; 139; 1
				-80	90	170				115	84	31						F	A-B			NUREG/CR-3228/V3/136	136; 140; 1
+18	550			-10			130		200	58				57		40		F	A-B			NUREG/CR-3228/V3/136	136; 139; 1
+18	550			-80			15		80	115				107		82		F	A-B			NUREG/CR-3228/V3/136	136; 140; 1
+19	550			-10			130		215	58				57		38		F	A-B			NUREG/CR-3228/V3/136	136; 139; 1
+19	550			-80			15		105	115				107		77		F	A-B			NUREG/CR-3228/V3/136	136; 140; 1
				-10	240	250				58	38	20						F	A-B			NUREG/CR-3228/V3/136	136; 139; 1
				-80	110	190				115	77	38						F	A-B			NUREG/CR-3228/V3/136	136; 140; 1
				-10	290	300				58	34	24						F	A-B			NUREG/CR-3228/V3/136	136; 139; 1
				-80	130	210				115	73	42						F	A-B			NUREG/CR-3228/V3/136	136; 140; 1
+19	550			-10			130		215	58				57		38		F	A-B			NUREG/CR-3228/V3/136	136; 139; 1
+19	550			-80			15		80	115				107		90		F	A-B			NUREG/CR-3228/V3/136	136; 140; 1
+18	550			-10			130		195	58				57		42		F	A-B			NUREG/CR-3228/V3/136	136; 139; 1
+18	550			-80			15		65	115				107		90		F	A-B			NUREG/CR-3228/V3/136	136; 140; 1
				-10	270	280				58	34	24						F	A-B			NUREG/CR-3228/V3/136	136; 139; 1
				-80	130	210				115	74	41						F	A-B			NUREG/CR-3228/V3/136	136; 140; 1
				-35	93	128	27	66		150	106	44						C	J			NUREG/CR-3229	2; 5; 6; 9
				-35	93	128	-7	100		150	106	44		156	50			C	J			NUREG/CR-3229	2; 5; 6; 9
				-35	93	128	7	86		150	106	44		146	40			C	J			NUREG/CR-3229	2; 5; 6; 9

Table 33. Partial

SXP ID	PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORJ	CSP F1	CSP TEMP	ANN TAG	ANN TEMP	ANN HRS	PLANT ID R	CAPSULE R	CSP F1
HAW-AN	UCRR	D3 55	PMBU	P	LT	2.000E+19	550	A12	750	168			
HAW-AN	UCRR	D3 72	FNRQ41	F		2.200E+19	550	A11	650	168			
HAW-AN	UCRR	D3 72	FNRQ71	F		3.000E+19	550	A11	650	168			
HAW-AN	UCRR	D3 74	PNRQ98	P		2.700E+19	550	A11	650	168			
HAW-AN	UCRR	D3 74	PNRQ98	P		2.700E+19	550	A13	650	336			
HAW-AN	UCRR	D3 74	WNRO96	W		2.700E+19	550	A11	650	168			
HAW-AN	UCRR	D3 78	WB&W60	W		3.600E+19	550	A32	750	168			
HAW-AN	UCRR	D3 78	WB&W60	W		3.600E+19	550	A34	700	168			
HAW-AN	UCRR	D3 78	WNRL0A	W		3.600E+19	550	A11	650	168			
HAW-AN	UCRR	D3 78	WNRL0A	W		3.600E+19	550	A12	750	168			
KRB	UBR	UB-68	FKRB06	F	TL	8.780E+18	288	A12	399	168			
KRB	UBR	UB-68	FKRB06	F	TL	8.780E+18	288	A13	454	168			
MEA-AN	UBR	B4-70	WMEA8A	W	TL	1.420E+19	288	A22	399	168	UBR	B4-70	3.700E
MEA-AN	UBR	B4-70	WMEA8A	W	TL	1.420E+19	288	A23	454	168	UBR	B4-70	3.700E
MEA-AN	UBR	B4-70	WMEA9A	W	TL	1.420E+19	288	A22	399	168	UBR	B4-70	3.700E
MEA-AN	UBR	B4-70	WMEA9A	W	TL	1.420E+19	288	A23	454	168	UBR	B4-70	3.700E
MEA-AN	UBR	B4-70	WMEAW4	W	TL	1.420E+19	288	A22	399	168	UBR	B4-70	3.700E
MEA-AN	UBR	B4-70	WMEAW4	W	TL	1.420E+19	288	A23	454	168	UBR	B4-70	3.700E
MEA-AN	UBR	B4-70	WMEAW7	W	TL	1.420E+19	288	A22	399	168	UBR	B4-70	3.700E
MEA-AN	UBR	B4-70	WMEAW7	W	TL	1.420E+19	288	A23	454	168	UBR	B4-70	3.700E
MEA-AN	UBR	B4-71	WMEA8A	W	TL	1.520E+19	288	A32	399	168	UBR	B4-71	1.090E
MEA-AN	UBR	B4-71	WMEA8A	W	TL	1.570E+19	288	A33	454	168	UBR	B4-71	1.120E
MEA-AN	UBR	B4-71	WMEA9A	W	TL	1.520E+19	288	A32	399	168	UBR	B4-71	1.090E
MEA-AN	UBR	B4-71	WMEA9A	W	TL	1.570E+19	288	A33	454	168	UBR	B4-71	1.120E
MEA-AN	UBR	B4-71	WMEAW4	W	TL	1.520E+19	288	A32	399	168	UBR	B4-71	1.090E
MEA-AN	UBR	B4-71	WMEAW4	W	TL	1.570E+19	288	A33	454	168	UBR	B4-71	1.120E
MEA-AN	UBR	B4-71	WMEAW7	W	TL	1.520E+19	288	A32	399	168	UBR	B4-71	1.090E
MEA-AN	UBR	B4-71	WMEAW7	W	TL	1.570E+19	288	A33	454	168	UBR	B4-71	1.120E
MEA-AN	UBR	C2-62	WMEA8A	W	TL	1.440E+19	288	A12	399	168			
MEA-AN	UBR	C2-62	WMEA8A	W	TL	1.440E+19	288	A13	454	168			
MEA-AN	UBR	C2-62	WMEA9A	W	TL	1.440E+19	288	A12	399	168			
MEA-AN	UBR	C2-62	WMEA9A	W	TL	1.440E+19	288	A13	454	168			
MEA-AN	UBR	C2-62	WMEAW4	W	TL	1.440E+19	288	A12	399	168			
MEA-AN	UBR	C2-62	WMEAW4	W	TL	1.440E+19	288	A13	454	168			
MEA-AN	UBR	C2-62	WMEAW7	W	TL	1.440E+19	288	A12	399	168			
MEA-AN	UBR	C2-62	WMEAW7	W	TL	1.440E+19	288	A13	454	168			
MEA-AN	UBR	C2-72	WMEA8A	W	TL	1.060E+19	288	A43	454	168			
MEA-AN	UBR	C2-72	WMEA9A	W	TL	1.060E+19	288	A43	454	168			
MEA-AN	UBR	C2-72	WMEAW4	W	TL	1.060E+19	288						
MEA-AN	UBR	C2-72	WMEAW7	W	TL	1.060E+19	288	A43	454	168			
MEA-AN	UBR	IAR-1A	WMEA8A	W	TL	1.320E+19	550	A52	750	168	UBR	IAR-1A	3.200E
MEA-AN	UBR	IAR-1A	WMEA9A	W	TL	1.320E+19	550	A52	750	168	UBR	IAR-1A	3.200E
MEA-AN	UBR	IAR-1B	WMEA8A	W	TL	1.440E+19	550	A62	750	168	UBR	IAR-1B	7.500E
MEA-AN	UBR	IAR-1B	WMEA9A	W	TL	1.440E+19	550	A62	750	168	UBR	IAR-1B	7.500E
MEA-AN	UBR	IAR-1C	WMEA8A	W	TL	1.340E+19	550						
MEA-AN	UBR	IAR-1C	WMEA9A	W	TL	1.340E+19	550						
MEA-AN	UBR	IAR-2A	WMEA8A	W	TL	1.280E+19	550	A72	750	168	UBR	IAR-2A	9.600E
MEA-AN	UBR	IAR-2A	WMEA9A	W	TL	1.280E+19	550	A72	750	168	UBR	IAR-2A	9.600E
MEA-AN	UBR	IAR-2B	WMEA8A	W	TL	1.460E+19	550	A82	750	168	UBR	IAR-2B	1.490E
MEA-AN	UBR	IAR-2B	WMEA9A	W	TL	1.460E+19	550	A82	750	168	UBR	IAR-2B	1.490E
MEA-AN	UBR	IAR-2C	WMEA8A	W	TL	2.030E+19	550						
MEA-AN	UBR	IAR-2C	WMEA9A	W	TL	2.030E+19	550						
MEA-AN	UBR	IAR-3C	WMEA8A	W	TL	2.720E+19	550						
MEA-AN	UBR	IAR-3C	WMEA9A	W	TL	2.720E+19	550						
MEA-AN	UBR	IAR-6A	WMEA8A	W	TL	2.670E+19	550	AA2	750	168	UBR	IAR-6A	1.430E
MEA-AN	UBR	IAR-6A	WMEA9A	W	TL	2.670E+19	550	AA2	750	168	UBR	IAR-6A	1.430E
MEA-AN	UBR	IAR-6B	WMEA8A	W	TL	2.630E+19	550	A92	750	168	UBR	IAR-6B	6.100E
MEA-AN	UBR	IAR-6B	WMEA9A	W	TL	2.630E+19	550	A92	750	168	UBR	IAR-6B	6.100E
MEA-AN	UBR	IAR-6C	WMEA8A	W	TL	3.250E+19	550						
MEA-AN	UBR	IAR-6C	WMEA9A	W	TL	3.250E+19	550						
MEA-AN	UBR	UB-33	PLUK03	P	TL	2.400E+19	288	A11	343	168			
MEA-AN	UBR	UB-33	PLUK03	P	TL	2.400E+19	288	A12	399	168			
MEA-AN	UBR	UB-33	PLUK03	P	TL	2.400E+19	288	A13	399	24			

Table 35. Partial listing of CHARPY.dbf

TAG	EXP ID	PLANT ID	CAPSULE	HEAT ID	PROD ID	SPBC ORI	SPBC ID	TST TBMP	TST TBMP U	IMP B	IMP B U	FRACT APP	LAT EXP	LAT EXP U	CSP F1	CSP TBMP	CSP TBMP U
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E6	-40.0	F	5.0	ft-lb	0	1.5	mil	8.800E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E8	-40.0	F	3.5	ft-lb	5	3.5	mil	8.800E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E36	32.0	F	12.5	ft-lb	10	10.0	mil	7.200E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E63	32.0	F	17.0	ft-lb	15	13.0	mil	7.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E86	79.0	F	12.0	ft-lb	25	9.5	mil	8.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E96	79.0	F	19.0	ft-lb	20	15.5	mil	8.600E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E58	104.0	F	27.0	ft-lb	30	16.0	mil	8.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E79	149.0	F	29.0	ft-lb	60	23.0	mil	8.500E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E73	150.0	F	19.0	ft-lb	45	16.0	mil	8.100E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E68	184.0	F	34.0	ft-lb	60	32.0	mil	8.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E37	210.0	F	32.0	ft-lb	80	32.0	mil	7.900E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E39	210.0	F	32.0	ft-lb	85	0.0	mil	7.900E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E107	257.0	F	39.0	ft-lb	100	39.0	mil	8.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E19	258.0	F	47.0	ft-lb	95	34.0	mil	8.800E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E53	303.0	F	40.0	ft-lb	100	41.5	mil	8.600E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E51	304.0	F	47.0	ft-lb	100	40.0	mil	8.600E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E91	392.0	F	40.0	ft-lb	100	41.0	mil	7.500E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR19	W	TL	E28	393.0	F	40.0	ft-lb	100	45.0	mil	9.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P72	-40.0	F	8.0	ft-lb	0	7.5	mil	8.200E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P18	-40.0	F	7.0	ft-lb	0	74.0	mil	8.800E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P43	32.0	F	19.0	ft-lb	10	14.5	mil	8.800E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P36	32.0	F	5.5	ft-lb	0	0.0	mil	9.000E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P29	76.0	F	24.0	ft-lb	20	18.5	mil	8.100E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P44	122.0	F	39.0	ft-lb	50	33.0	mil	8.800E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P21	150.0	F	29.0	ft-lb	30	14.0	mil	9.300E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P7	150.0	F	39.0	ft-lb	60	36.5	mil	9.000E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P107	205.0	F	36.0	ft-lb	80	37.0	mil	8.100E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P24	206.0	F	34.5	ft-lb	90	36.0	mil	9.300E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P66	257.0	F	43.0	ft-lb	100	40.5	mil	8.500E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P12	257.0	F	53.0	ft-lb	100	52.5	mil	8.800E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P58	301.0	F	44.0	ft-lb	100	47.5	mil	7.200E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P65	303.0	F	47.0	ft-lb	100	47.5	mil	8.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P86	391.0	F	44.0	ft-lb	100	46.0	mil	7.600E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR23	W	TL	P85	391.0	F	50.0	ft-lb	100	43.0	mil	7.600E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R58	-57.0	F	9.0	ft-lb	0	0.0	mil	8.100E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R29	-20.0	F	21.0	ft-lb	0	5.0	mil	9.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R72	-20.0	F	16.5	ft-lb	10	5.0	mil	7.600E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R28	32.0	F	28.0	ft-lb	20	20.5	mil	9.100E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R87	32.0	F	27.0	ft-lb	15	18.5	mil	8.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R12	54.0	F	50.0	ft-lb	20	36.5	mil	8.300E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R91	54.0	F	57.0	ft-lb	40	36.5	mil	8.000E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R50	79.0	F	69.0	ft-lb	60	54.0	mil	7.800E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R51	79.0	F	69.0	ft-lb	60	48.0	mil	7.800E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R71	96.0	F	43.0	ft-lb	40	33.5	mil	8.300E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R45	96.0	F	74.0	ft-lb	80	72.5	mil	8.500E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R27	167.0	F	88.0	ft-lb	100	61.5	mil	8.900E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R19	167.0	F	97.0	ft-lb	100	68.5	mil	8.800E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R99	256.0	F	108.0	ft-lb	100	76.5	mil	7.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R100	257.0	F	105.0	ft-lb	100	70.0	mil	7.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R23	346.0	F	102.0	ft-lb	100	74.0	mil	8.400E+18	550	F
*	EPR-AN	UVAR	EX1	WEPR24	W	TL	R97	348.0	F	97.0	ft-lb	100	74.5	mil	8.500E+18	550	F

Architecture

Table 36. Partial listing of CV_REF.dbf

TAO	EXP ID	PLANT ID	CAPSULE	HEAT ID	PROD ID	SPBC' ORI	TUP TYPE	TUP VEL	VEL U	MAX E	USE U	REF ID	PAGES	NOTES
	EPR-AN	UVAR	EX1	WEPR19	W	TL						EPRI NP-2712/V2	APP. G, P. 787	
	EPR-AN	UVAR	EX1	WEPR23	W	TL						EPRI NP-2712/V2	APP. G, P. 828	
	EPR-AN	UVAR	EX1	WEPR24	W	TL						EPRI NP-2712/V2	APP. G, P. 867	
	EPR-AN	UVAR	EX2	WEPR19 A23	W	TL						EPRI NP-2712/V2	APP. G, P. 1548	IAR
	EPR-AN	UVAR	EX2	WEPR19 A26	W	TL						EPRI NP-2712/V2	APP. G, P. 1806	IAR
	EPR-AN	UVAR	EX2	WEPR19 A28	W	TL						EPRI NP-2712/V2	APP. G, P. 1680	IAR
	EPR-AN	UVAR	EX2	WEPR19 A2A	W	TL						EPRI NP-2712/V2	APP. G, P. 1482	IAR
	EPR-AN	UVAR	EX2	WEPR19 A2B	W	TL						EPRI NP-2712/V2	APP. G, P. 1614	IAR
	EPR-AN	UVAR	EX2	WEPR19 A2C	W	TL						EPRI NP-2712/V2	APP. G, P. 1744	IAR
	EPR-AN	UVAR	EX2	WEPR23 A23	W	TL						EPRI NP-2712/V2	APP. G, P. 1570	IAR
	EPR-AN	UVAR	EX2	WEPR23 A26	W	TL						EPRI NP-2712/V2	APP. G, P. 1828	IAR
	EPR-AN	UVAR	EX2	WEPR23 A28	W	TL						EPRI NP-2712/V2	APP. G, P. 1702	IAR
	EPR-AN	UVAR	EX2	WEPR23 A2A	W	TL						EPRI NP-2712/V2	APP. G, P. 1504	IAR
	EPR-AN	UVAR	EX2	WEPR23 A2B	W	TL						EPRI NP-2712/V2	APP. G, P. 1636	IAR
	EPR-AN	UVAR	EX2	WEPR23 A2C	W	TL						EPRI NP-2712/V2	APP. G, P. 1766	IAR
	EPR-AN	UVAR	EX2	WEPR24 A23	W	TL						EPRI NP-2712/V2	APP. G, P. 1592	IAR
	EPR-AN	UVAR	EX2	WEPR24 A26	W	TL						EPRI NP-2712/V2	APP. G, P. 1846	IAR
	EPR-AN	UVAR	EX2	WEPR24 A28	W	TL						EPRI NP-2712/V2	APP. G, P. 1722	IAR
	EPR-AN	UVAR	EX2	WEPR24 A2A	W	TL						EPRI NP-2712/V2	APP. G, P. 1526	IAR
	EPR-AN	UVAR	EX2	WEPR24 A2B	W	TL						EPRI NP-2712/V2	APP. G, P. 1658	IAR
	EPR-AN	UVAR	EX2	WEPR24 A2C	W	TL						EPRI NP-2712/V2	APP. G, P. 1784	IAR
	EPR-AN	UVAR	EX3	WEPR19	W	TL						EPRI NP-2712/V2	APP. G, P. 2050	
	EPR-AN	UVAR	EX3	WEPR23	W	TL						EPRI NP-2712/V2	APP. G, P. 2070	
	EPR-AN	UVAR	EX3	WEPR24	W	TL						EPRI NP-2712/V2	APP. G, P. 2092	
	HFIR			FHFR01	F	TL						ORNL/TM-10444	14; 89	CODES HB1 AND HB4
	HFIR			FHFR02HB2	F	ST						ORNL/TM-10444	14; 16; 91	CODE HB2
	HFIR			FHFR02HB3	F	ST						ORNL/TM-10444	14; 16; 92; 116	CODE HB3
	HFIR			PHFR01	P	TL						ORNL/TM-10444	93; 117	CODES IC3, HB1A, AND HB4A
	HFIR			PHFR01	P	TL						ORNL/TM-10444	143	1/4" DEPTH
	HFIR			PHFR01 10	P	LS						ORNL/TM-10444	123	1" DEPTH; D92N DID NOT BREAK
	HFIR			PHFR01 10	P	TL						ORNL/TM-10444	143	1" DEPTH
	HFIR			PHFR01 10	P	TS						ORNL/TM-10444	142	1" DEPTH; ND25 FROM 1/4" LAYER
	HFIR			PHFR01X	P	LT						ORNL/TM-10444	120	ND6D, ND6E, ND2A, ND6A:NO PWHT
	HFIR			WHFR01	W	TL						ORNL/TM-10444	148; 125	
	HFIR			WHFR02	W	TL						ORNL/TM-10444	147; 112	
	HFIR	HFIR	1-1	FHFR01	F	TL						ORNL/TM-10444	14; 16; 87; 221	CODES HB1 AND HB4
	HFIR	HFIR	1-2	FHFR01	F	TL						ORNL/TM-10444	14; 16; 87; 221	CODES HB1 AND HB4
	HFIR	HFIR	1-3	FHFR01	F	TL						ORNL/TM-10444	14; 16; 87; 221	CODES HB1 AND HB4
	HFIR	HFIR	1-4	FHFR01	F	TL						ORNL/TM-10444	14; 16; 87; 221	CODES HB1 AND HB4
	HFIR	HFIR	1-6	FHFR01	F	TL						ORNL/TM-10444	14; 16; 87; 221	CODES HB1 AND HB4
	HFIR	HFIR	1-9	FHFR01	F	TL						ORNL/TM-10444	14; 16; 87; 222	CODES HB1 AND HB4
	HFIR	HFIR	2-1	FHFR02HB2	F	ST						ORNL/TM-10444	14; 16; 87; 222; 1	CODE HB2
	HFIR	HFIR	2-13	FHFR02HB2	F	ST						ORNL/TM-10444	14; 16; 87; 223; 1	CODE HB2
	HFIR	HFIR	2-14	FHFR02HB2	F	ST						ORNL/TM-10444	14; 16; 87; 223; 1	CODE HB2
	HFIR	HFIR	2-2	FHFR02HB2	F	ST						ORNL/TM-10444	14; 16; 87; 222; 1	CODE HB2
	HFIR	HFIR	2-4	FHFR02HB2	F	ST						ORNL/TM-10444	14; 16; 87; 222; 1	CODE HB2
	HFIR	HFIR	2-5	FHFR02HB2	F	ST						ORNL/TM-10444	14; 16; 87; 222; 1	CODE HB2
	HFIR	HFIR	2-7	FHFR02HB2	F	ST						ORNL/TM-10444	14; 16; 87; 222; 1	CODE HB2
	HFIR	HFIR	3-1	FHFR02HB3	F	ST						ORNL/TM-10444	14; 16; 87; 223; 1	CODE HB3
	HFIR	HFIR	3-2	FHFR02HB3	F	ST						ORNL/TM-10444	14; 16; 87; 223; 1	CODE HB3
	HFIR	HFIR	3-3	FHFR02HB3	F	ST						ORNL/TM-10444	14; 16; 87; 223; 1	CODE HB3

Partial listing of TENSILE.dbf

UTS	STRESS U	UTG	TLG	RA	SPEC DIAM	GAGE LEN	TOTAL LEN	LENGTH U	REF ID	PAGES	NOTES
104.0	kai	12.1	24.1	58.0					EPRI NP-2712/V2	G-249	
103.0	kai	10.9	21.8	52.0					EPRI NP-2712/V2	G-249	
104.0	kai	12.1	24.1	58.0					EPRI NP-2712/V2	G-249	
103.0	kai	10.9	21.8	52.0					EPRI NP-2712/V2	G-249	
97.0	kai	11.0	20.3	57.0					EPRI NP-2712/V2	G-249	
97.0	kai	11.9	23.5	55.0					EPRI NP-2712/V2	G-255	
97.0	kai	11.3	22.5	54.0					EPRI NP-2712/V2	G-255	
91.0	kai	10.0	19.9	58.0					EPRI NP-2712/V2	G-255	
107.0	kai	11.3	24.8	66.0					EPRI NP-2712/V2	G-261	
107.0	kai	11.3	25.6	61.0					EPRI NP-2712/V2	G-261	
102.0	kai	10.4	22.4	65.0					EPRI NP-2712/V2	G-261	
95.0	kai	11.8	23.1	49.0					EPRI NP-2712/V2	G-251	
105.0	kai	12.5	23.3	58.0					EPRI NP-2712/V2	G-251	
95.0	kai	11.3	23.4	61.0					EPRI NP-2712/V2	G-251	
107.0	kai	11.3	21.3	58.0					EPRI NP-2712/V2	G-251	
102.0	kai	11.3	23.1	58.0					EPRI NP-2712/V2	G-251	
95.0	kai	12.2	23.1	63.0					EPRI NP-2712/V2	G-251	
92.0	kai	13.1	26.4	61.0					EPRI NP-2712/V2	G-257	
99.0	kai	12.2	23.8	63.0					EPRI NP-2712/V2	G-257	
68.0	kai	12.2	25.7	61.0					EPRI NP-2712/V2	G-257	
100.0	kai	12.2	23.3	57.0					EPRI NP-2712/V2	G-257	
102.0	kai	13.1	26.3	63.0					EPRI NP-2712/V2	G-257	
95.0	kai	12.2	23.3	57.0					EPRI NP-2712/V2	G-257	
98.0	kai	11.3	24.2	73.0					EPRI NP-2712/V2	G-263	
107.0	kai	11.3	23.1	64.0					EPRI NP-2712/V2	G-263	
100.0	kai	11.8	25.7	64.0					EPRI NP-2712/V2	G-263	
110.0	kai	10.3	22.9	63.0					EPRI NP-2712/V2	G-263	
109.0	kai	11.3	26.3	63.0					EPRI NP-2712/V2	G-263	
103.0	kai	10.3	23.8	73.0					EPRI NP-2712/V2	G-263	
108.0	kai	9.9	20.6	58.0					EPRI NP-2712/V2	G-251	
101.0	kai	9.9	19.7	54.0					EPRI NP-2712/V2	G-257	
113.0	kai	10.7	24.4	64.0					EPRI NP-2712/V2	G-263	
586.0	MPa		25.0	55.0					ASTM STP 909/34	35; 41	
547.0	MPa		20.0	45.0					ASTM STP 909/34	35; 41	
656.0	MPa		20.0	62.0					ASTM STP 909/34	35; 41	
580.0	MPa		21.0	56.0					ASTM STP 909/34	35; 41	
886.0	MPa		19.0	64.0					ASTM STP 909/34	35; 41	
786.0	MPa		14.0	58.0					ASTM STP 909/34	35; 41	
679.0	MPa		21.0	60.0					ASTM STP 909/34	35; 41	
764.0	MPa		18.0	42.0					ASTM STP 909/34	35; 41	
617.0	MPa		17.0	44.0					ASTM STP 909/34	35; 41	
699.0	MPa		14.0	40.0					ASTM STP 909/34	35; 41	
687.0	MPa		21.0	66.0					ASTM STP 909/34	35; 41	
792.0	MPa		19.0	66.0					ASTM STP 909/34	35; 41	
634.0	MPa		17.0	60.0					ASTM STP 909/34	35; 41	
719.0	MPa		15.0	59.0					ASTM STP 909/34	35; 41	
944.0	MPa		20.0	61.0					ASTM STP 909/34	35; 41	
1014.0	MPa		18.0	57.0					ASTM STP 909/34	35; 41	
867.0	MPa		17.0	60.0					ASTM STP 909/34	35; 41	
909.0	MPa		15.0	51.0					ASTM STP 909/34	35; 41	
600.8	MPa		25.6	56.2		55.0		mm	ASTM STP 782/520	528	DATA OBTAINED FROM GRAPHS
586.0	MPa		25.0	55.0					ASTM STP 782/520	527	
552.2	MPa		20.5	45.9		55.0		mm	ASTM STP 782/520	528	DATA OBTAINED FROM GRAPHS
552.0	MPa		20.0	45.0					ASTM STP 782/520	527	
712.1	MPa		20.5	56.2		55.0		mm	ASTM STP 782/520	528	DATA OBTAINED FROM GRAPHS
694.0	MPa		20.0	56.0					ASTM STP 782/520	524; 527	
617.6	MPa		15.4	50.0		55.0		mm	ASTM STP 782/520	528	DATA OBTAINED FROM GRAPHS
604.0	MPa		15.0	46.0					ASTM STP 782/520	524; 527	
716.4	MPa		23.5	68.6		55.0		mm	ASTM STP 782/520	528	DATA OBTAINED FROM GRAPHS
705.0	MPa		23.0	67.0					ASTM STP 782/520	524; 527	
647.4	MPa		19.6	59.3		55.0		mm	ASTM STP 782/520	528	DATA OBTAINED FROM GRAPHS
627.0	MPa		21.0	62.0					ASTM STP 782/520	524; 527	
577.0	MPa		27.0	73.0					ASTM STP 782/520	527	

Table 37. Pa

TAG	EXP ID	PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	TSP FI	TSP TEMP	SPEC ID	TST TEMP	TEMP U	YSL	YSL
T	EPR-AN	UVAR	EX1	WEPR19	W	T	8.400E+18	550	E11	75	F	91.0	
T	EPR-AN	UVAR	EX1	WEPR19	W	T	8.400E+18	550	E12	75	F	91.0	
T	EPR-AN	UVAR	EX1	WEPR19	W	T	8.400E+18	550	E11	75	F	91.0	
T	EPR-AN	UVAR	EX1	WEPR19	W	T	8.400E+18	550	E12	75	F	91.0	
T	EPR-AN	UVAR	EX1	WEPR19	W	T	8.400E+18	550	E9	300	F	83.0	
T	EPR-AN	UVAR	EX1	WEPR23	W	T	8.400E+18	550	P11	75	F	83.0	
T	EPR-AN	UVAR	EX1	WEPR23	W	T	8.400E+18	550	P12	75	F	88.0	
T	EPR-AN	UVAR	EX1	WEPR23	W	T	8.400E+18	550	P9	300	F	76.0	
T	EPR-AN	UVAR	EX1	WEPR24	W	T	8.400E+18	550	R11	75	F	95.0	
T	EPR-AN	UVAR	EX1	WEPR24	W	T	8.400E+18	550	R12	75	F	96.0	
T	EPR-AN	UVAR	EX1	WEPR24	W	T	8.400E+18	550	R9	300	F	91.0	
T	EPR-AN	UVAR	EX2	WEPR19 A21	W	T	6.600E+18	550	E17	75	F	80.0	
T	EPR-AN	UVAR	EX2	WEPR19 A23	W	T	6.600E+18	550	E20	75	F	91.0	
T	EPR-AN	UVAR	EX2	WEPR19 A28	W	T	6.600E+18	550	E14	75	F	81.0	
T	EPR-AN	UVAR	EX2	WEPR19 A2A	W	T	6.600E+18	550	E21	75	F	93.0	
T	EPR-AN	UVAR	EX2	WEPR19 A2B	W	T	6.600E+18	550	E15	75	F	88.0	
T	EPR-AN	UVAR	EX2	WEPR19 A2C	W	T	6.600E+18	550	E16	75	F	82.0	
T	EPR-AN	UVAR	EX2	WEPR23 A21	W	T	6.600E+18	550	P17	75	F	76.0	
T	EPR-AN	UVAR	EX2	WEPR23 A23	W	T	6.600E+18	550	P20	75	F	84.0	
T	EPR-AN	UVAR	EX2	WEPR23 A28	W	T	6.600E+18	550	P14	75	F	78.0	
T	EPR-AN	UVAR	EX2	WEPR23 A2A	W	T	6.600E+18	550	P21	75	F	85.0	
T	EPR-AN	UVAR	EX2	WEPR23 A2B	W	T	6.600E+18	550	P15	75	F	84.0	
T	EPR-AN	UVAR	EX2	WEPR23 A2C	W	T	6.600E+18	550	P16	75	F	80.0	
T	EPR-AN	UVAR	EX2	WEPR24 A21	W	T	6.600E+18	550	R17	75	F	84.0	
T	EPR-AN	UVAR	EX2	WEPR24 A23	W	T	6.600E+18	550	R20	75	F	95.0	
T	EPR-AN	UVAR	EX2	WEPR24 A28	W	T	6.600E+18	550	R14	75	F	71.0	
T	EPR-AN	UVAR	EX2	WEPR24 A2A	W	T	6.600E+18	550	R21	75	F	101.0	
T	EPR-AN	UVAR	EX2	WEPR24 A2B	W	T	6.600E+18	550	R15	75	F	95.0	
T	EPR-AN	UVAR	EX2	WEPR24 A2C	W	T	6.600E+18	550	R16	75	F	92.0	
T	EPR-AN	UVAR	EX3	WEPR19	W	T	1.500E+19	550	E27	75	F	95.0	
T	EPR-AN	UVAR	EX3	WEPR23	W	T	1.500E+19	550	P27	75	F	88.0	
T	EPR-AN	UVAR	EX3	WEPR24	W	T	1.500E+19	550	R27	75	F	102.0	
T	FKS-G			FKS 01	F	T				23	C	438.0	
T	FKS-G			FKS 01	F	T				300	C	375.0	
T	FKS-G			FKS 02	F	T				23	C	500.0	
T	FKS-G			FKS 02	F	T				300	C	426.0	
* FKS-G				FKS 7B	F	L				23	C	739.0	
* FKS-G				FKS 7B	F	L				300	C	622.0	
T FKS-G	FRG-2	XX		FKS 01	F	T	1.960E+19	290		23	C	549.0	
T FKS-G	FRG-2	XX		FKS 01	F	T	8.020E+19	290		23	C	669.0	
T FKS-G	FRG-2	XX		FKS 01	F	T	1.950E+19	290		300	C	462.0	
T FKS-G	FRG-2	XX		FKS 01	F	T	7.560E+19	290		300	C	549.0	
T FKS-G	FRG-2	XX		FKS 02	F	T	2.170E+19	290		23	C	569.0	
T FKS-G	FRG-2	XX		FKS 02	F	T	7.050E+19	290		23	C	694.0	
T FKS-G	FRG-2	XX		FKS 02	F	T	2.090E+19	290		300	C	502.0	
T FKS-G	FRG-2	XX		FKS 02	F	T	7.270E+19	290		300	C	599.0	
T FKS-G	FRG-2	XX		FKS 7B	F	L	1.500E+19	290		0	C	824.0	
T FKS-G	FRG-2	XX		FKS 7B	F	L	5.500E+19	290		0	C	909.0	
T FKS-G	FRG-2	XX		FKS 7B	F	L	1.500E+19	290		300	C	729.0	
T FKS-G	FRG-2	XX		FKS 7B	F	L	5.500E+19	290		300	C	779.0	
T FKS-K				FKS 01	F	T			⊗	0	C	441.0	
T FKS-K				FKS 01	F	T			⊗	23	C	438.0	
T FKS-K				FKS 01	F	T			⊗	275	C	415.4	
T FKS-K				FKS 01	F	T			⊗	350	C	379.0	
T FKS-K				FKS 12	F	T			⊗	0	C	543.6	
T FKS-K				FKS 12	F	T			⊗	23	C	535.0	
T FKS-K				FKS 12	F	T			⊗	275	C	430.8	
T FKS-K				FKS 12	F	T			⊗	350	C	433.0	
T FKS-K				FKS 12 ESR	F	T			⊗	0	C	559.0	
T FKS-K				FKS 12 ESR	F	T			⊗	23	C	558.0	
T FKS-K				FKS 12 ESR	F	T			⊗	275	C	446.2	
T FKS-K				FKS 12 ESR	F	T			⊗	350	C	436.0	
T FKS-K				FKS 13	F	T				23	C	437.0	

listing of KIC.dbf

CRACK LENG	CRACK UNIT	KQ	VALIDITY	KIC	KIC METHOD	KIC UNIT	PQ	P MAX	P UNIT	P RATIO	YLS	UTS	YLS UNIT	REF ID	PAGES
26.70	mm	60.6	A,B			MPa ^{1/2}				1.00	571		MPa	NUREG/CR/5913	D-5
27.60	mm	61.8	A,B			MPa ^{1/2}				1.00	571		MPa	NUREG/CR/5913	D-5
13.34	mm	66.2	A,B			MPa ^{1/2}				1.00	571		MPa	NUREG/CR/5913	D-5
27.50	mm	66.8	A,B			MPa ^{1/2}				1.00	571		MPa	NUREG/CR/5913	D-5
13.51	mm	76.7	A,B			MPa ^{1/2}				1.02	571		MPa	NUREG/CR/5913	D-5
26.10	mm	78.2	A,B			MPa ^{1/2}				1.06	571		MPa	NUREG/CR/5913	D-5
27.00	mm	85.2	A,B			MPa ^{1/2}				1.00	571		MPa	NUREG/CR/5913	D-5
27.00	mm	87.4	A,B			MPa ^{1/2}				1.07	543		MPa	NUREG/CR/5913	D-5
26.70	mm	88.6	A,B			MPa ^{1/2}				1.09	543		MPa	NUREG/CR/5913	D-5
28.10	mm	63.8		63.8	ASTM E399	MPa ^{1/2}				1.00	571		MPa	NUREG/CR/5913	D-6
53.10	mm	67.6		67.6	ASTM E399	MPa ^{1/2}				1.00	571		MPa	NUREG/CR/5913	D-6
53.20	mm	72.7		72.7	ASTM E399	MPa ^{1/2}				1.00	571		MPa	NUREG/CR/5913	D-6
53.20	mm	100.1	A,B			MPa ^{1/2}				1.00	571		MPa	NUREG/CR/5913	D-6
53.40	mm	74.3		74.3	ASTM E399	MPa ^{1/2}				1.00	543		MPa	NUREG/CR/5913	D-6
52.70	mm	96.6	A,B			MPa ^{1/2}				1.00	543		MPa	NUREG/CR/5913	D-6
52.80	mm	114.8	A,B			MPa ^{1/2}				1.06	543		MPa	NUREG/CR/5913	D-6
52.90	mm	116.8	A,B			MPa ^{1/2}				1.00	529		MPa	NUREG/CR/5913	D-6
52.60	mm	117.7	A,B			MPa ^{1/2}				1.00	529		MPa	NUREG/CR/5913	D-6
53.40	mm	122.4	A,B			MPa ^{1/2}				1.00	529		MPa	NUREG/CR/5913	D-6
52.60	mm	141.7	A,B			MPa ^{1/2}				1.04	520		MPa	NUREG/CR/5913	D-6
103.30	mm	85.5		85.5	ASTM E399	MPa ^{1/2}				1.00	543		MPa	NUREG/CR/5913	D-6
108.20	mm	86.9		86.9	ASTM E399	MPa ^{1/2}				1.00	543		MPa	NUREG/CR/5913	D-6
103.90	mm	115.8	A,B			MPa ^{1/2}				1.00	529		MPa	NUREG/CR/5913	D-6
105.03	mm	118.5	A,B			MPa ^{1/2}				1.00	529		MPa	NUREG/CR/5913	D-6
105.03	mm	133.1	A,B			MPa ^{1/2}				1.00	529		MPa	NUREG/CR/5913	D-6
102.40	mm	171.8	A,B			MPa ^{1/2}				1.09	529		MPa	NUREG/CR/5913	D-6
106.55	mm	105.4	B			MPa ^{1/2}				1.02	520		MPa	NUREG/CR/5913	D-6
106.28	mm	117.1	A,B			MPa ^{1/2}				1.00	520		MPa	NUREG/CR/5913	D-6
107.70	mm	122.2	A,B			MPa ^{1/2}				1.00	520		MPa	NUREG/CR/5913	D-6
103.10	mm	155.5	A,B			MPa ^{1/2}				1.00	520		MPa	NUREG/CR/5913	D-6
156.01	mm	171.8	A,B			MPa ^{1/2}				1.01	504		MPa	NUREG/CR/5913	D-7
236.61	mm	175.2	A,B			MPa ^{1/2}				1.00	504		MPa	NUREG/CR/5913	D-7
222.55	mm	200.3	A,B			MPa ^{1/2}				1.05	504		MPa	NUREG/CR/5913	D-7
120.50	mm	142.6	B			MPa ^{1/2}				1.00	500		MPa	NUREG/CR/5913	D-7
127.41	mm	187.2	A,B			MPa ^{1/2}				1.00	500		MPa	NUREG/CR/5913	D-7
26.50	mm	40.8		40.8	ASTM E399	MPa ^{1/2}				1.00	621		MPa	NUREG/CR/5913	D-8
27.10	mm	68.9	B			MPa ^{1/2}				1.00	621		MPa	NUREG/CR/5913	D-8
25.69	mm	48.6		48.6	ASTM E399	MPa ^{1/2}				1.00	655		MPa	NUREG/CR/5913	D-8
26.61	mm	60.5		60.5	ASTM E399	MPa ^{1/2}				1.00	655		MPa	NUREG/CR/5913	D-8
26.70	mm	96.8	A,B			MPa ^{1/2}				1.00	621		MPa	NUREG/CR/5913	D-8
26.42	mm	68.3	A,B			MPa ^{1/2}				1.00	618		MPa	NUREG/CR/5913	D-8
26.50	mm	92.5	A,B			MPa ^{1/2}				1.03	618		MPa	NUREG/CR/5913	D-8
26.29	mm	87.3	A,B			MPa ^{1/2}				1.03	607		MPa	NUREG/CR/5913	D-8
27.94	mm	81.6	A,B			MPa ^{1/2}				1.00	607		MPa	NUREG/CR/5913	D-8
26.80	mm	55.9		55.9	ASTM E399	MPa ^{1/2}				1.00				NUREG/CR/5913	D-8
53.14	mm	84.2		84.2	ASTM E399	MPa ^{1/2}				1.00	552		MPa	NUREG/CR/5913	D-9
53.14	mm	101.5	A,B			MPa ^{1/2}				1.00				NUREG/CR/5913	D-9
		115.0	A,B			MPa ^{1/2}				1.00				NUREG/CR/5913	D-9
53.40	mm	126.3	A,B			MPa ^{1/2}				1.04	591		MPa	NUREG/CR/5913	D-9
105.41	mm	93.2		93.2	ASTM E399	MPa ^{1/2}				1.03	607		MPa	NUREG/CR/5913	D-10
105.41	mm	111.4		111.4	ASTM E399	MPa ^{1/2}				1.00				NUREG/CR/5913	D-10
106.78	mm	174.9	A,B			MPa ^{1/2}				1.01	597		MPa	NUREG/CR/5913	D-10
106.78	mm	144.4	A,B			MPa ^{1/2}				1.00				NUREG/CR/5913	D-10
		169.8	A,B			MPa ^{1/2}				1.00				NUREG/CR/5913	D-10
27.30	mm	44.3		44.3	ASTM E399	MPa ^{1/2}				1.00	621		MPa	NUREG/CR/5913	D-11
27.80	mm	57.3		57.3	ASTM E399	MPa ^{1/2}				1.00	621		MPa	NUREG/CR/5913	D-11
27.24	mm	40.5	POP-IN			MPa ^{1/2}				1.00	675		MPa	NUREG/CR/5913	D-11
29.44	mm	61.5		61.5	ASTM E399	MPa ^{1/2}				1.00	675		MPa	NUREG/CR/5913	D-11
27.40	mm	63.8		63.8	ASTM E399	MPa ^{1/2}				1.00	621		MPa	NUREG/CR/5913	D-11
26.59	mm	54.5		54.5	ASTM E399	MPa ^{1/2}				1.00	646		MPa	NUREG/CR/5913	D-11
26.94	mm	71.8	A,B			MPa ^{1/2}				1.00	646		MPa	NUREG/CR/5913	D-11
27.20	mm	141.2				MPa ^{1/2}				1.32	621		MPa	NUREG/CR/5913	D-11
52.73	mm	43.2		43.2	ASTM E399	MPa ^{1/2}				1.09	675		MPa	NUREG/CR/5913	D-12

Architecture

Table 38. Partia

TAG	EXP ID	PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORU	SPEC ID	SPEC TYPE	FLUENCE	FI RATE	DPA	TEMP IRR	TEST TEMP	TEMP UN
HSST-5				WHSS73	W	TL	73W123	1TCT					-80	C
HSST-5				WHSS73	W	TL	73W121	1TCT					-80	C
HSST-5				WHSS73	W	TL	73W159	1TCT					-80	C
HSST-5				WHSS73	W	TL	73W143	1TCT					-80	C
HSST-5				WHSS73	W	TL	73W161	1TCT					-80	C
HSST-5				WHSS73	W	TL	73W122	1TCT					-80	C
HSST-5				WHSS73	W	TL	73W175	1TCT					-80	C
HSST-5				WHSS73	W	TL	73W172	1TCT					-50	C
HSST-5				WHSS73	W	TL	73W181	1TCT					-50	C
HSST-5				WHSS73	W	TL	73W59	2TCT					-80	C
HSST-5				WHSS73	W	TL	73W73	2TCT					-80	C
HSST-5				WHSS73	W	TL	73W66	2TCT					-80	C
HSST-5				WHSS73	W	TL	73W54	2TCT					-80	C
HSST-5				WHSS73	W	TL	73W88	2TCT					-50	C
HSST-5				WHSS73	W	TL	73W72	2TCT					-50	C
HSST-5				WHSS73	W	TL	73W80	2TCT					-50	C
HSST-5				WHSS73	W	TL	73W87	2TCT					-30	C
HSST-5				WHSS73	W	TL	73W81	2TCT					-30	C
HSST-5				WHSS73	W	TL	73W67	2TCT					-30	C
HSST-5				WHSS73	W	TL	73W86	2TCT					-15	C
HSST-5				WHSS73	W	TL	73W20	4TCT					-50	C
HSST-5				WHSS73	W	TL	73W24	4TCT					-50	C
HSST-5				WHSS73	W	TL	73W10	4TCT					-30	C
HSST-5				WHSS73	W	TL	73W29	4TCT					-30	C
HSST-5				WHSS73	W	TL	73W28	4TCT					-30	C
HSST-5				WHSS73	W	TL	73W17	4TCT					-30	C
HSST-5				WHSS73	W	TL	73W25	4TCT					-15	C
HSST-5				WHSS73	W	TL	73W27	4TCT					-15	C
HSST-5				WHSS73	W	TL	73W26	4TCT					-15	C
HSST-5				WHSS73	W	TL	73W23	4TCT					-15	C
HSST-5				WHSS73	W	TL	73W005	6TCT					-5	C
HSST-5				WHSS73	W	TL	73W004	8TCT					-5	C
HSST-5				WHSS73	W	TL	73W003	8TCT					-5	C
HSST-5				WHSS73	W	TL	73W001	8TCT					-5	C
HSST-5				WHSS73	W	TL	73W002	8TCT					-5	C
HSST-5	ORR	6		WHSS72	W	TL	72W137	1TCT	1.540E+19		3.240E-02	298	-75	C
HSST-5	ORR	6		WHSS72	W	TL	72W141	1TCT	1.550E+19		3.310E-02	299	-25	C
HSST-5	ORR	6		WHSS72	W	TL	72W104	1TCT	1.600E+19		3.420E-02	297	-25	C
HSST-5	ORR	6		WHSS72	W	TL	72W125	1TCT	1.550E+19		3.310E-02	300	-25	C
HSST-5	ORR	6		WHSS72	W	TL	72W124	1TCT	1.460E+19		3.080E-02	300	25	C
HSST-5	ORR	6		WHSS72	W	TL	72W100	1TCT	1.550E+19		3.310E-02	292	29	C
HSST-5	ORR	6		WHSS72	W	TL	72W115	1TCT	1.670E+19		3.570E-02	297	29	C
HSST-5	ORR	6		WHSS72	W	TL	72W134	1TCT	1.710E+19		3.670E-02	294	50	C
HSST-5	ORR	6		WHSS72	W	TL	72W152	1TCT	1.650E+19		3.510E-02	294	50	C
HSST-5	ORR	8		WHSS72	W	TL	72W58	2TCT	1.410E+19		3.230E-02	288	0	C
HSST-5	ORR	8		WHSS72	W	TL	72W65	2TCT	1.760E+19		4.020E-02	289	25	C
HSST-5	ORR	8		WHSS72	W	TL	72W64	2TCT	1.360E+19		3.080E-02	288	25	C
HSST-5	ORR	8		WHSS72	W	TL	72W71	2TCT	1.400E+19		3.230E-02	288	50	C
HSST-5	ORR	8		WHSS72	W	TL	72W55	2TCT	1.810E+19		4.150E-02	288	95	C
HSST-5	ORR	11		WHSS72	W	TL	72W19	4TCT	1.670E+19		3.710E-02	286	50	C
HSST-5	ORR	12		WHSS72	W	TL	72W26	4TCT	1.710E+19		3.770E-02	286	50	C
HSST-5	ORR	11		WHSS72	W	TL	72W20	4TCT	1.620E+19		3.550E-02	286	75	C
HSST-5	ORR	12		WHSS72	W	TL	72W25	4TCT	1.760E+19		3.940E-02	287	75	C
HSST-5	ORR	4		WHSS72	W	TL	72W13	4TCT	1.790E+19		4.180E-02	286	85	C
HSST-5	ORR	5		WHSS73	W	TL	73W158	1TCT	1.530E+19		3.230E-02	299	-75	C
HSST-5	ORR	5		WHSS73	W	TL	73W160	1TCT	1.550E+19		3.290E-02	297	-25	C
HSST-5	ORR	5		WHSS73	W	TL	73W128	1TCT	1.600E+19		3.400E-02	294	-25	C
HSST-5	ORR	5		WHSS73	W	TL	73W156	1TCT	1.710E+19		3.670E-02	292	-25	C
HSST-5	ORR	5		WHSS73	W	TL	73W130	1TCT	1.460E+19		3.070E-02	301	25	C
HSST-5	ORR	5		WHSS73	W	TL	73W126	1TCT	1.650E+19		3.510E-02	291	29	C
HSST-5	ORR	5		WHSS73	W	TL	73W163	1TCT	1.660E+19		3.570E-02	294	29	C
HSST-5	ORR	5		WHSS73	W	TL	73W136	1TCT	1.430E+19		3.000E-02	298	125	C
HSST-5	ORR	7		WHSS73	W	TL	73W76	2TCT	1.400E+19		3.220E-02	288	-25	C

9. Partial listing of KJC.dbf

MP UNIT	JQ	J METHOD	JIC	JIC UNIT	KJC	KJC UNIT	T AVG	CRACK LENG	CRACK L F	CRACK UNIT	YLS	FLOW STRES	YLS UNIT	REF ID	PAGES
	61.3	SST/MJE/E-813 L	61.3	kJ/m ²			30	103.4	154.93	mm		612.2	MPa	NUREG/CR-3506	6-4,A-19
	52.4	SST/MJE/E-813 L	52.4	kJ/m ²			38	101.88	156.26	mm		612.2	MPa	NUREG/CR-3506	6-4,A-21
	97.4	SST/MJE/E-813 L	97.4	kJ/m ²			100	94.01	150.04	mm		486.5	MPa	NUREG/CR-3506	6-4,A-23
	128.1	SST/MJE/E-813 L	128.1	kJ/m ²			72	102.29	156.18	mm		486.5	MPa	NUREG/CR-3506	6-4,A-25
	63.6	SST/MJE/E-813 L	63.6	kJ/m ²			31	43.51	63.81	mm		612.2	MPa	NUREG/CR-3506	6-4,A-27
	83.0	SST/MJE/E-813 L	83.0	kJ/m ²			41	43.28	59.89	mm		621.9	MPa	NUREG/CR-3506	6-4,A-29
	57.7	SST/MJE/E-813 L	57.7	kJ/m ²			68	44.46	63.35	mm		475.7	MPa	NUREG/CR-3506	6-4,A-31
	78.3	SST/MJE/E-813 L	78.3	kJ/m ²			70	44.78	65.67	mm		486.5	MPa	NUREG/CR-3506	6-4,A-33
	103.1	SST/MJE/E-813 L	103.1	kJ/m ²			51	20.73	29.41	mm		621.9	MPa	NUREG/CR-3506	6-4,A-35
	46.4	SST/MJE/E-813 L	46.4	kJ/m ²			15	21.25	34.01	mm		601.9	MPa	NUREG/CR-3506	6-4,A-37
	69.5	SST/MJE/E-813 L	69.5	kJ/m ²			44	21.03	30.94	mm		612.2	MPa	NUREG/CR-3506	6-4,A-39
	123.9	SST/MJE/E-813 L	123.9	kJ/m ²			74	21.06	27.94	mm		504.3	MPa	NUREG/CR-3506	6-4,A-41
	89.5	SST/MJE/E-813 L	89.5	kJ/m ²			52	20.75	27.15	mm		486.5	MPa	NUREG/CR-3506	6-4,A-43
	142.3	SST/MJE/E-813 L	142.3	kJ/m ²			89	21.51	27.10	mm		519.2	MPa	NUREG/CR-3506	6-4,A-45
	66.1	SST/MJE/E-813 L	66.1	kJ/m ²			47	21.04	28.80	mm		475.7	MPa	NUREG/CR-3506	6-4,A-47
	76.4	SST/MJE/E-813 L	76.4	kJ/m ²			22	12.83	20.12	mm		621.9	MPa	NUREG/CR-3506	6-4,A-49
	44.6	SST/MJE/E-813 L	44.6	kJ/m ²			17	12.95	17.84	mm		601.9	MPa	NUREG/CR-3506	6-4,A-51
	89.1	SST/MJE/E-813 L	89.1	kJ/m ²			66	13.18	18.29	mm		486.5	MPa	NUREG/CR-3506	6-4,A-53
	96.4	SST/MJE/E-813 L	96.4	kJ/m ²			60	13.13	20.37	mm		612.2	MPa	NUREG/CR-3506	6-4,A-55
	143.4	SST/MJE/E-813 L	143.4	kJ/m ²			106	12.88	18.36	mm		519.2	MPa	NUREG/CR-3506	6-4,A-57
	130.6	SST/MJE/E-813 L	130.6	kJ/m ²			90	13.34	19.63	mm		504.3	MPa	NUREG/CR-3506	6-4,A-59
	75.0	SST/MJE/E-813 L	75.0	kJ/m ²			53	12.78	19.38	mm		475.7	MPa	NUREG/CR-3506	6-4,A-61
	76.5	SST/MJE/E-813 L	76.5	kJ/m ²			53	12.87	19.37	mm		475.7	MPa	NUREG/CR-3506	6-4,A-63
	90.0	SST/MJE/E-813 L	90.0	kJ/m ²			62	107.34	160.43	mm		596.4	MPa	NUREG/CR-3506	6-5,B-21
	145.5	SST/MJE/E-813 L	145.5	kJ/m ²			140	107.08	138.75	mm		466.8	MPa	NUREG/CR-3506	6-5,B-23
	107.6	SST/MJE/E-813 L	107.6	kJ/m ²			154	106.96	109.52	mm		472.3	MPa	NUREG/CR-3506	6-5,B-25
	87.3	SST/MJE/E-813 L	87.3	kJ/m ²			112	112.05	119.40	mm		446.8	MPa	NUREG/CR-3506	6-5,B-27
	105.9	SST/MJE/E-813 L	105.9	kJ/m ²			62	106.25	158.98	mm		606.0	MPa	NUREG/CR-3506	6-5,B-29
	154.4	SST/MJE/E-813 L	154.4	kJ/m ²			117	38.34	60.27	mm		466.8	MPa	NUREG/CR-3506	6-5,B-31
	114.5	SST/MJE/E-813 L	114.5	kJ/m ²			124	43.02	58.95	mm		480.9	MPa	NUREG/CR-3506	6-5,B-33
	128.7	SST/MJE/E-813 L	128.7	kJ/m ²			133	42.26	63.50	mm		466.8	MPa	NUREG/CR-3506	6-5,B-35
	101.0	SST/MJE/E-813 L	101.0	kJ/m ²			118	40.49	61.84	mm		446.8	MPa	NUREG/CR-3506	6-5,B-37
	85.0	SST/MJE/E-813 L	85.0	kJ/m ²			52	42.22	56.25	mm		596.4	MPa	NUREG/CR-3506	6-5,B-39
	118.3	SST/MJE/E-813 L	118.3	kJ/m ²			60	42.37	62.32	mm		609.5	MPa	NUREG/CR-3506	6-5,B-41
	118.7	SST/MJE/E-813 L	118.7	kJ/m ²			91	21.03	26.39	mm		609.5	MPa	NUREG/CR-3506	6-5,B-43
	115.9	SST/MJE/E-813 L	115.9	kJ/m ²			69	21.06	28.17	mm		596.4	MPa	NUREG/CR-3506	6-5,B-45
	127.4	SST/MJE/E-813 L	127.4	kJ/m ²			45	21.26	30.76	mm		606.0	MPa	NUREG/CR-3506	6-5,B-47
	60.9	SST/MJE/E-813 L	60.9	kJ/m ²			24	22.17	33.30	mm		575.7	MPa	NUREG/CR-3506	6-5,B-49
	150.1	SST/MJE/E-813 L	150.1	kJ/m ²			139	21.36	24.82	mm		480.9	MPa	NUREG/CR-3506	6-5,B-51
	160.3	SST/MJE/E-813 L	160.3	kJ/m ²			115	21.26	25.60	mm		472.3	MPa	NUREG/CR-3506	6-5,B-53
	150.8	SST/MJE/E-813 L	150.8	kJ/m ²			99	21.18	26.34	mm		466.8	MPa	NUREG/CR-3506	6-5,B-55
	93.8	SST/MJE/E-813 L	93.8	kJ/m ²			59	21.14	31.06	mm		446.8	MPa	NUREG/CR-3506	6-5,B-57
	94.1	SST/MJE/E-813 L	94.1	kJ/m ²			50	12.99	16.78	mm		606.0	MPa	NUREG/CR-3506	6-5,B-59
	95.9	SST/MJE/E-813 L	95.9	kJ/m ²			34	13.23	19.91	mm		606.0	MPa	NUREG/CR-3506	6-5,B-61
	96.2	SST/MJE/E-813 L	96.2	kJ/m ²			32	13.03	19.84	mm		609.5	MPa	NUREG/CR-3506	6-5,B-63
	61.9	SST/MJE/E-813 L	61.9	kJ/m ²			24	13.64	18.52	mm		575.7	MPa	NUREG/CR-3506	6-5,B-65
	63.3	SST/MJE/E-813 L	63.3	kJ/m ²			29	12.95	19.43	mm		596.4	MPa	NUREG/CR-3506	6-5,B-67
	78.4	SST/MJE/E-813 L	78.4	kJ/m ²			83	13.84	19.71	mm		466.8	MPa	NUREG/CR-3506	6-5,B-69
	91.4	SST/MJE/E-813 L	91.4	kJ/m ²			99	13.82	19.10	mm		480.9	MPa	NUREG/CR-3506	6-5,B-71
	83.6	SST/MJE/E-813 L	83.6	kJ/m ²			59	13.48	19.41	mm		446.8	MPa	NUREG/CR-3506	6-5,B-73
	121.7	SST/MJE/E-813 L	121.7	kJ/m ²			119	13.64	18.16	mm		508.8	MPa	NUREG/CR-3506	6-5,B-75
	101.0	SST/MJE/E-813 L	101.0	kJ/m ²			94	13.77	19.43	mm		472.3	MPa	NUREG/CR-3506	6-5,B-77
	85.0	SST/MJE/E-813 L	85.0	kJ/m ²			84	13.16	19.51	mm		446.8	MPa	NUREG/CR-3506	6-5,B-79
	113.8	SST/MJE/E-813 L	113.8	kJ/m ²			87	12.83	19.25	mm		466.8	MPa	NUREG/CR-3506	6-5,B-81
	77.7	SST/MJE/E-813 L	77.7	kJ/m ²			113	104.07	154.07	mm		479.2	MPa	NUREG/CR-3506	6-6,C-19
	148.4	SST/MJE/E-813 L	148.4	kJ/m ²			100	108.81	146.41	mm		484.7	MPa	NUREG/CR-3506	6-6,C-21
	72.7	SST/MJE/E-813 L	72.7	kJ/m ²			16	106.60	160.16	mm		609.5	MPa	NUREG/CR-3506	6-6,C-23
	88.4	SST/MJE/E-813 L	88.4	kJ/m ²			62	103.23	158.34	mm		467.5	MPa	NUREG/CR-3506	6-6,C-25
	79.2	SST/MJE/E-813 L	79.2	kJ/m ²			49	41.98	61.87	mm		615.7	MPa	NUREG/CR-3506	6-6,C-27
	62.2	SST/MJE/E-813 L	62.2	kJ/m ²			29	41.66	62.79	mm		609.5	MPa	NUREG/CR-3506	6-6,C-29
	79.6	SST/MJE/E-813 L	79.6	kJ/m ²			94	41.91	63.91	mm		479.2	MPa	NUREG/CR-3506	6-6,C-31
	118.0	SST/MJE/E-813 L	118.0	kJ/m ²			120	42.95	61.62	mm		505.4	MPa	NUREG/CR-3506	6-6,C-33
	103.5	SST/MJE/E-813 L	103.5	kJ/m ²			97	41.86	62.15	mm		484.7	MPa	NUREG/CR-3506	6-6,C-35

Table

EXP ID	PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	SPEC ID	SPEC TYPE	GROOVE	TEST LAB	FLUENCE	TEMP IRR	TEST TEMP	T
MEA-JR	BSR	A2	WHSS61	W	TL	61W-20	4TCT	20	NRL/MEA	1.400E+19	288	200	C
MEA-JR	BSR	A2	WHSS61	W	TL	61W-21	4TCT	20	NRL/MEA	1.100E+19	288	200	C
MEA-JR			WHSS61	W	TL	61W-23	4TCT	20	NRL/MEA			200	C
MEA-JR			WHSS61	W	TL	61W-24	4TCT	20	NRL/MEA			200	C
MEA-JR	BSR	A2	WHSS61	W	TL	61W-30	1.6TCT	20	NRL/MEA	1.200E+19	288	200	C
MEA-JR	BSR	A2	WHSS61	W	TL	61W-31	1.6TCT	20	NRL/MEA	1.300E+19	288	121	C
MEA-JR			WHSS61	W	TL	61W-32	1.6TCT	20	NRL/MEA			288	C
MEA-JR			WHSS61	W	TL	61W-33	1.6TCT	20	NRL/MEA			200	C
MEA-JR	BSR	A2	WHSS61	W	TL	61W-40	0.8TCT	10	NRL/MEA	1.100E+19	288	121	C
MEA-JR	BSR	A2	WHSS61	W	TL	61W-41	0.8TCT	10	NRL/MEA	1.100E+19	288	288	C
MEA-JR	BSR	A2	WHSS61	W	TL	61W-42	0.8TCT	10	NRL/MEA	1.200E+19	288	200	C
MEA-JR			WHSS61	W	TL	61W-44	0.8TCT	20	NRL/MEA			121	C
MEA-JR			WHSS61	W	TL	61W-45	0.8TCT	20	NRL/MEA			200	C
MEA-JR			WHSS61	W	TL	61W-46	0.8TCT	20	NRL/MEA			75	C
MEA-JR			WHSS61	W	TL	61W-47	0.8TCT	20	NRL/MEA			288	C
MEA-JR	BSR	A2	WHSS61	W	TL	61W-100	0.5TCT	20	NRL/MEA	1.600E+19	288	121	C
MEA-JR	BSR	A2	WHSS61	W	TL	61W-102	0.5TCT	20	NRL/MEA	1.400E+19	288	288	C
MEA-JR			WHSS61	W	TL	61W-121	0.5TCT	20	NRL/MEA			200	C
MEA-JR	BSR	A2	WHSS61	W	TL	61W-129	0.5TCT	10	NRL/MEA	1.000E+19	288	200	C
MEA-JR			WHSS61	W	TL	61W-142	0.5TCT	20	NRL/MEA			75	C
MEA-JR			WHSS61	W	TL	61W-143	0.5TCT	20	NRL/MEA			121	C
MEA-JR			WHSS61	W	TL	61W-144	0.5TCT	20	NRL/MEA			288	C
MEA-JR			WHSS61	W	TL	61W-145	0.5TCT	20	NRL/MEA			288	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-20	4TCT	20	NRL/MEA	1.500E+19	288	200	C
MEA-JR			WHSS62	W	TL	62W-21	4TCT	20	NRL/MEA			200	C
MEA-JR			WHSS62	W	TL	62W-22	4TCT	20	NRL/MEA			177	C
MEA-JR			WHSS62	W	TL	62W-23	4TCT	20	NRL/MEA			288	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-25	4TCT	20	NRL/MEA	1.400E+19	288	177	C
MEA-JR			WHSS62	W	TL	62W-30	1.6TCT	20	NRL/MEA			200	C
MEA-JR			WHSS62	W	TL	62W-31	1.6TCT	20	NRL/MEA			149	C
MEA-JR			WHSS62	W	TL	62W-32	1.6TCT	20	NRL/MEA			200	C
MEA-JR			WHSS62	W	TL	62W-33	1.6TCT	20	NRL/MEA			288	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-34	1.6TCT	20	NRL/MEA	1.600E+19	288	200	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-35	1.6TCT	20	NRL/MEA	1.400E+19	288	149	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-41	0.8TCT	10	NRL/MEA	1.300E+19	288	149	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-42	0.8TCT	10	NRL/MEA	1.300E+19	288	200	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-43	0.8TCT	20	NRL/MEA	1.500E+19	288	177	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-44	0.8TCT	20	NRL/MEA	1.500E+19	288	288	C
MEA-JR			WHSS62	W	TL	62W-45	0.8TCT	20	NRL/MEA			149	C
MEA-JR			WHSS62	W	TL	62W-46	0.8TCT	20	NRL/MEA			177	C
MEA-JR			WHSS62	W	TL	62W-47	0.8TCT	20	NRL/MEA			200	C
MEA-JR			WHSS62	W	TL	62W-50	0.8TCT	20	NRL/MEA			288	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-100	0.5TCT	10	NRL/MEA	1.300E+19	288	176	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-102	0.5TCT	20	NRL/MEA	0.800E+19	288	177	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-114	0.5TCT	20	NRL/MEA	1.600E+19	288	149	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-116	0.5TCT	20	NRL/MEA	1.500E+19	288	288	C
MEA-JR	BSR	B2	WHSS62	W	TL	62W-118	0.5TCT	20	NRL/MEA	1.000E+19	288	200	C
MEA-JR			WHSS62	W	TL	62W-135	0.5TCT	20	NRL/MEA			200	C
MEA-JR			WHSS62	W	TL	62W-136	0.5TCT	20	NRL/MEA			149	C
MEA-JR			WHSS62	W	TL	62W-137	0.5TCT	20	NRL/MEA			288	C
MEA-JR			WHSS62	W	TL	62W-138	0.5TCT	20	NRL/MEA			75	C
MEA-JR			WHSS62	W	TL	62W-141	0.5TCT	20	NRL/MEA			177	C
MEA-JR			WHSS62	W	TL	62W-157	0.5TCT	20	NRL/MEA			288	C
MEA-JR			WHSS62	W	TL	62W-160	0.5TCT	20	NRL/MEA			200	C
MEA-JR			WHSS63	W	TL	63W-20	4TCT	20	NRL/MEA			200	C
MEA-JR			WHSS63	W	TL	63W-21	4TCT	20	NRL/MEA			171	C
MEA-JR	BSR	C2	WHSS63	W	TL	63W-23	4TCT	20	NRL/MEA	1.250E+19	288	200	C
MEA-JR			WHSS63	W	TL	63W-24	4TCT	20	NRL/MEA			288	C
MEA-JR	BSR	C2	WHSS63	W	TL	63W-30	1.6TCT	20	NRL/MEA	1.300E+19	288	171	C
MEA-JR	BSR	C2	WHSS63	W	TL	63W-31	1.6TCT	20	NRL/MEA	1.400E+19	288	200	C
MEA-JR			WHSS63	W	TL	63W-32	1.6TCT	20	NRL/MEA			200	C
MEA-JR			WHSS63	W	TL	63W-33	1.6TCT	20	NRL/MEA			100	C
MEA-JR			WHSS63	W	TL	63W-34	1.6TCT	20	NRL/MEA			171	C

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Q	VALIDIT	K METHOD	KID	KID UNIT	PQ	TIME PQ	P MAX	LOAD RATE	LOAD R U	COD	YLS	YLS DYN	LTS	REF ID	PAGES
4.73		ASTM E399-74	34.73	MPass ¹ (1/2)				3.63E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-15
5.27	B	ASTM E399-74		MPass ¹ (1/2)				4.07E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-15
12.20		ASTM E399-74	42.20	MPass ¹ (1/2)				5.38E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-15
11.65		ASTM E399-74	41.65	MPass ¹ (1/2)				5.27E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-15
59.01		ASTM E399-74	59.01	MPass ¹ (1/2)				5.82E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-15
15.05	A	ASTM E399-74		MPass ¹ (1/2)				3.52E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-15
54.84	A	ASTM E399-74		MPass ¹ (1/2)				3.63E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-15
70.66	A	ASTM E399-74		MPass ¹ (1/2)				6.37E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-15
36.92		ASTM E399-74	36.92	MPass ¹ (1/2)				5.20E+04	MPass ¹ (1/2)/s					EPRI NP-933	1-15
36.48		ASTM E399-74	36.48	MPass ¹ (1/2)				4.80E+04	MPass ¹ (1/2)/s					EPRI NP-933	1-15
67.80		ASTM E399-74	67.80	MPass ¹ (1/2)				1.40E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-15
50.77		ASTM E399-74	50.77	MPass ¹ (1/2)				1.10E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-15
94.94		ASTM E399-74	94.94	MPass ¹ (1/2)				1.90E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-15
84.73		ASTM E399-74	84.73	MPass ¹ (1/2)				1.50E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-15
108.13		ASTM E399-74	108.13	MPass ¹ (1/2)				2.00E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-15
118.68		ASTM E399-74	118.68	MPass ¹ (1/2)				2.20E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-15
104.94		ASTM E399-74	104.94	MPass ¹ (1/2)				3.74E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-16
109.23		ASTM E399-74	109.23	MPass ¹ (1/2)				3.74E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-16
44.29		ASTM E399-74	44.29	MPass ¹ (1/2)				5.38E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-23
47.47		ASTM E399-74	47.47	MPass ¹ (1/2)				5.93E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-23
72.86	A	ASTM E399-74		MPass ¹ (1/2)				5.82E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-23
71.65	A	ASTM E399-74		MPass ¹ (1/2)				6.04E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-23
76.26	A	ASTM E399-74		MPass ¹ (1/2)				5.60E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-23
56.70		ASTM E399-74	56.70	MPass ¹ (1/2)				5.38E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-31
142.86	F	ASTM E399-74		MPass ¹ (1/2)				1.32E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-31
53.74		ASTM E399-74	53.74	MPass ¹ (1/2)				5.27E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-38
101.10	A	ASTM E399-74		MPass ¹ (1/2)				5.05E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-38
145.05	AF	ASTM E399-74		MPass ¹ (1/2)				1.43E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-38
54.18		ASTM E399-74	54.18	MPass ¹ (1/2)				3.19E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-66
50.99		ASTM E399-74	50.99	MPass ¹ (1/2)				6.04E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-66
58.57	A	ASTM E399-74		MPass ¹ (1/2)				5.82E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-66
52.64		ASTM E399-74	52.64	MPass ¹ (1/2)				5.38E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-66
72.75	A	ASTM E399-74		MPass ¹ (1/2)				5.27E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-66
54.26		ASTM E399-74	54.26	MPass ¹ (1/2)				2.31E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-46
40.55		ASTM E399-74	40.55	MPass ¹ (1/2)				2.75E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-53
92.09		ASTM E399-74	92.09	MPass ¹ (1/2)				2.42E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-53
33.74		ASTM E399-74		MPass ¹ (1/2)				2.86E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-60
71.65	A	ASTM E399-74		MPass ¹ (1/2)				2.86E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-60
80.22		ASTM E399-74	80.22	MPass ¹ (1/2)				2.53E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-60
54.18		ASTM E399-74	54.18	MPass ¹ (1/2)				6.37E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-67
89.23		ASTM E399-74	89.23	MPass ¹ (1/2)				2.20E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-68
33.30		ASTM E399-74	33.30	MPass ¹ (1/2)				6.20E+04	MPass ¹ (1/2)/s					EPRI NP-933	1-75
63.19		ASTM E399-74	63.19	MPass ¹ (1/2)				1.30E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-75
102.09		ASTM E399-74	102.09	MPass ¹ (1/2)				1.70E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-75
82.09		ASTM E399-74	82.09	MPass ¹ (1/2)				2.42E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-75
47.14		ASTM E399-74	47.14	MPass ¹ (1/2)				8.90E+04	MPass ¹ (1/2)/s					EPRI NP-933	1-82
33.30	B	ASTM E399-74		MPass ¹ (1/2)				5.80E+04	MPass ¹ (1/2)/s					EPRI NP-933	1-82
62.31		ASTM E399-74	62.31	MPass ¹ (1/2)				6.20E+04	MPass ¹ (1/2)/s					EPRI NP-933	1-82
104.29		ASTM E399-74	104.29	MPass ¹ (1/2)				2.20E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-82
64.94		ASTM E399-74	64.94	MPass ¹ (1/2)				1.32E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-82
46.59		ASTM E399-74	46.59	MPass ¹ (1/2)				7.80E+04	MPass ¹ (1/2)/s					EPRI NP-933	1-89
37.14		ASTM E399-74		MPass ¹ (1/2)				4.70E+04	MPass ¹ (1/2)/s					EPRI NP-933	1-89
95.49		ASTM E399-74	95.49	MPass ¹ (1/2)				1.20E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-89
106.37		ASTM E399-74	106.37	MPass ¹ (1/2)				1.80E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-89
87.58		ASTM E399-74	87.58	MPass ¹ (1/2)				1.10E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-89
33.63		ASTM E399-74	33.63	MPass ¹ (1/2)				6.30E+04	MPass ¹ (1/2)/s					EPRI NP-933	1-99
61.65		ASTM E399-74	61.65	MPass ¹ (1/2)				1.30E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-99
104.94		ASTM E399-74	104.94	MPass ¹ (1/2)				1.90E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-99
47.36		ASTM E399-74	47.36	MPass ¹ (1/2)				8.80E+04	MPass ¹ (1/2)/s					EPRI NP-933	1-99
80.00		ASTM E399-74	80.00	MPass ¹ (1/2)				1.50E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-99
108.57		ASTM E399-74	108.57	MPass ¹ (1/2)				2.10E+05	MPass ¹ (1/2)/s					EPRI NP-933	1-99
75.49		ASTM E399-74	75.49	MPass ¹ (1/2)				2.97E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-99
75.93		ASTM E399-74	75.93	MPass ¹ (1/2)				2.42E+03	MPass ¹ (1/2)/s					EPRI NP-933	1-99

Table 40. Partial

EXP ID	PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	SPEC ID	SPEC POS	SPEC TYPE	TEST LAB	FLUENCE	TEMP IRR	TEST TEMP	TEMP UNIT	CRACK LEN
FRA EP			SHSS02	SRM	TL	6		1TCT	B&W			-101	C	
FRA EP			SHSS02	SRM	TL	1		1TCT	B&W			-101	C	
FRA EP			SHSS02	SRM	TL	19		1TCT	CE CHA			-62	C	
FRA EP			SHSS02	SRM	TL	20		1TCT	CE CHA			-62	C	
FRA EP			SHSS02	SRM	TL	18		1TCT	CE CHA			-29	C	
FRA EP			SHSS02	SRM	TL	9		1TCT	B&W			-29	C	
FRA EP			SHSS02	SRM	TL	2		1TCT	B&W			-29	C	
FRA EP			SHSS02	SRM	TL	23		1TCT	CE CHA			-29	C	
FRA EP			SHSS02	SRM	TL	2		1TB	ETI			-77	C	
FRA EP			SHSS02	SRM	TL	3		1TB	ETI			-77	C	
FRA EP			SHSS02	SRM	TL	4		1TB	ETI			-29	C	
FRA EP			SHSS02	SRM	TL	5		1TB	ETI			-29	C	
FRA EP			SHSS02	SRM	TL	6		1TB	ETI			4	C	
FRA EP			SHSS02	SRM	TL	8		1TB	ETI			4	C	
FRA EP			SHSS02	SRM	TL	9		1TB	ETI			38	C	
FRA EP			SHSS02	SRM	TL	10		1TB	ETI			38	C	
FRA EP			SHSS02	SRM	TL	1		3TCT	B&W			4	C	
FRA EP			SHSS02	SRM	TL	1A		3TCT	B&W			4	C	
FRA EP			PEP101	P	TL	6		1TCT	CE CHA			-62	C	
FRA EP			PEP101	P	TL	4		1TCT	CE CHA			-62	C	
FRA EP			PEP101	P	TL	26		1TCT	CE CHA			-23	C	
FRA EP			PEP101	P	TL	11		1TCT	CE CHA			-23	C	
FRA EP			PEP101	P	TL	10		1TCT	CE CHA			-23	C	
FRA EP			HEP101	HAZ	LT	25		1TCT	CE CHA			-107	C	
FRA EP			HEP101	HAZ	LT	1		4TCT	B&W			-40	C	
FRA EP			HEP102	HAZ	LT	16		1TCT	CE CHA			-104	C	
FRA EP			HEP102	HAZ	LT	24		1TCT	CE CHA			-40	C	
FRA EP			HEP102	HAZ	LT	1		4TCT	B&W			-23	C	
FRA EP			PEP102	P	TL	4		1TCT	CE CHA			-62	C	
FRA EP			PEP102	P	TL	12		1TCT	CE CHA			-46	C	
FRA EP			PEP102	P	TL	11		1TCT	CE CHA			-46	C	
FRA EP			PEP102	P	TL	10		1TCT	CE CHA			-46	C	
FRA EP			PEP102	P	TL	19		1TCT	CE CHA			-23	C	
FRA EP			PEP102	P	TL	1		4TCT	B&W			-29	C	
FRA EP			PEP103	P	TL	9		1TCT	CE CHA			-62	C	
FRA EP			PEP103	P	TL	1		4TCT	B&W			4	C	
FRA EP			PEP104	P	TL	1		1TCT	CE CHA			-62	C	
FRA EP			PEP104	P	TL	3		1TCT	CE CHA			-18	C	
FRA EP			PEP104	P	TL	1		4TCT	B&W			-1	C	
FRA EP			PEP105	P	TL	22		1TCT	CE CHA			-84	C	
FRA EP			PEP105	P	TL	1		4TCT	B&W			-29	C	
FRA EP			PEP106	P	TL	3		1TB	ETI			-84	C	
FRA EP			PEP106	P	TL	2		1TB	ETI			-29	C	
FRA EP			PEP106	P	TL	1		1TB	ETI			4	C	
FRA EP			PEP106	P	TL	1		4TCT	B&W			-29	C	
FRA EP			PEP107	P	TL	5		1TB	ETI			-84	C	
FRA EP			PEP107	P	TL	3		1TB	ETI			-84	C	
FRA EP			PEP107	P	TL	2		1TB	ETI			-23	C	
FRA EP			PEP107	P	TL	1		1TB	ETI			10	C	
FRA EP			PEP107	P	TL	1		4TCT	ETI			-23	C	
FRA EP			PEP108	P	TL	2		1TB	ETI			-84	C	
FRA EP			PEP108	P	TL	4		1TB	ETI			-84	C	
FRA EP			PEP108	P	TL	6		1TB	ETI			-18	C	
FRA EP			PEP108	P	TL	5		1TB	ETI			16	C	
FRA EP			PEP108	P	TL	1		4TCT	B&W			-18	C	
FRA EP			PEP109	P	LT	3		1TB	ETI			-101	C	
FRA EP			PEP109	P	LT	1		1TB	ETI			-18	C	
FRA EP			PEP109	P	LT	2		1TB	ETI			16	C	
FRA EP			PEP109	P	TL	2		1TB	ETI			-101	C	
FRA EP			PEP109	P	TL	3		1TB	ETI			-18	C	
FRA EP			PEP109	P	TL	4		1TB	ETI			17	C	
FRA EP			PEP109	P	TL	1		3TCT	B&W			-18	C	
FRA EP			PEP109	P	LT	1		4TCT	B&W			-18	C	

Partial listing of KJD.dbf

LOC	J METHOD	FRACT TAG	VALIDIT	JID	KJD	KID JID	KID UNIT	T AVG	CRACK LENG	CRACK L F	LOAD RATE	LOAD R U	YLS	UTS	REF ID	PAGES
	MCJ	A			115.71		MPass ¹ (1/2)				7.82E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-15
	MCJ	A			121.09		MPass ¹ (1/2)				6.71E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-15
	MCJ	A			98.75		MPass ¹ (1/2)				4.38E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-15
	MCJ	A			166.12		MPass ¹ (1/2)				4.50E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-15
	MCJ	A			219.78		MPass ¹ (1/2)				2.08E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-15
	MCJ	A			199.46		MPass ¹ (1/2)				6.00E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-15
	MCJ	A			105.95		MPass ¹ (1/2)				4.71E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-15
	MCJ	A			210.00		MPass ¹ (1/2)				6.90E+04	MPass ¹ (1/2)/s			EPRI NP-933	1-15
	MCJ	A			108.67		MPass ¹ (1/2)				6.47E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-23
	MCJ	A			121.45		MPass ¹ (1/2)				6.25E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-23
	MCJ	A			130.74		MPass ¹ (1/2)				6.38E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-23
	MCJ	A			156.42		MPass ¹ (1/2)				6.41E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-31
	MCJ	A			201.35		MPass ¹ (1/2)				5.49E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-31
	MCJ	A			190.78		MPass ¹ (1/2)				6.61E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-38
	MCJ	A			91.01		MPass ¹ (1/2)				6.50E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-46
	MCJ	A			112.56		MPass ¹ (1/2)				6.49E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-46
	MCJ	A			111.20		MPass ¹ (1/2)				5.40E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-46
	MCJ	A			91.90		MPass ¹ (1/2)				3.25E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-53
	MCJ	A			157.74		MPass ¹ (1/2)				3.70E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-53
	MCJ	A			164.60		MPass ¹ (1/2)				3.59E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-60
	MCJ	A			186.56		MPass ¹ (1/2)				3.61E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-60
	MCJ	A			125.06		MPass ¹ (1/2)				6.43E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-67
	MCJ	A			196.17		MPass ¹ (1/2)				7.12E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-67
	MCJ	A			263.74		MPass ¹ (1/2)				2.50E+05	MPass ¹ (1/2)/s			EPRI NP-933	1-141
	MCJ	A			213.47		MPass ¹ (1/2)				3.35E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-148
	MCJ	A			116.28		MPass ¹ (1/2)				6.64E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-163
	MCJ	A			210.03		MPass ¹ (1/2)				6.34E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-163
	MCJ	A			163.75		MPass ¹ (1/2)				6.13E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-170
	MCJ	A			212.32		MPass ¹ (1/2)				2.62E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-199
	MCJ	A			190.76		MPass ¹ (1/2)				3.34E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-199
	MCJ	A			174.06		MPass ¹ (1/2)				5.72E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-199
	MCJ	A			192.31		MPass ¹ (1/2)				3.10E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-206
	MCJ	A			137.37		MPass ¹ (1/2)				3.87E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-213
	MCJ	A			119.78		MPass ¹ (1/2)				3.47E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-213
	MCJ	A			189.35		MPass ¹ (1/2)				5.53E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-213
	MCJ	A			173.13		MPass ¹ (1/2)				5.57E+03	MPass ¹ (1/2)/s			EPRI NP-933	1-213
	MCJ	A			108.43		MPass ¹ (1/2)				3.63E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-6
	MCJ	A			191.27		MPass ¹ (1/2)				3.60E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-6
	MCJ	A			108.33		MPass ¹ (1/2)				3.65E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-21
	MCJ	A			116.48		MPass ¹ (1/2)				3.89E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-21
	MCJ	A			105.90		MPass ¹ (1/2)				3.84E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-36
	MCJ	A			93.05		MPass ¹ (1/2)				3.74E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-51
	MCJ	A			153.15		MPass ¹ (1/2)				3.67E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-51
	MCJ	A			182.35		MPass ¹ (1/2)				3.70E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-46
	MCJ	A			133.98		MPass ¹ (1/2)				3.88E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-48
	MCJ	A			136.70		MPass ¹ (1/2)				3.88E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-48
	MCJ	A			157.83		MPass ¹ (1/2)				3.84E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-48
	MCJ	A			85.97		MPass ¹ (1/2)				6.68E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-95
	MCJ	A			129.84		MPass ¹ (1/2)				6.81E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-95
	MCJ	A			127.54		MPass ¹ (1/2)				6.31E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-102
	MCJ	A			181.65		MPass ¹ (1/2)				6.97E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-109
	MCJ	A			131.87		MPass ¹ (1/2)				7.41E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-123
	MCJ	A			103.89		MPass ¹ (1/2)				6.41E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-130
	MCJ	A			136.57		MPass ¹ (1/2)				7.64E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-130
	MCJ	A	F		139.74		MPass ¹ (1/2)				2.67E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-130
	MCJ	A			140.10		MPass ¹ (1/2)				3.88E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-137
	MCJ	A			96.34		MPass ¹ (1/2)				3.98E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-144
	MCJ	A			142.96		MPass ¹ (1/2)				3.52E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-144
	MCJ	A			149.54		MPass ¹ (1/2)				2.89E+03	MPass ¹ (1/2)/s			EPRI NP-933	5-6
	MCJ	A			235.16		MPass ¹ (1/2)				1.40E+05	MPass ¹ (1/2)/s			EPRI NP-933	6-6
	MCJ	A			105.89		MPass ¹ (1/2)				6.60E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-116
	MCJ	A			146.38		MPass ¹ (1/2)				7.38E+03	MPass ¹ (1/2)/s			EPRI NP-933	2-116

Table 41

EXP ID	PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	SPEC ID	SPEC TYPE	GROOVE	TEST LAB	FLUENCE	TEMP IRR	TEST TEMP	TEMP UNIT
FRA EP			SHSS02	SRM	TL	22	1TCT		CE CHA			4.4	C
FRA EP			SHSS02	SRM	TL	11	1TCT		CE CHA			4.4	C
FRA EP			SHSS02	SRM	TL	4	1TCT		B&W			4.4	C
FRA EP			SHSS02	SRM	TL	6	1TCT		B&W			4.4	C
FRA EP			SHSS02	SRM	TL	11	1TCT		FCC			29.4	C
FRA EP			SHSS02	SRM	TL	7	1TCT		CE CHA			37.8	C
FRA EP			SHSS02	SRM	TL	10	1TCT		B&W			37.8	C
FRA EP			SHSS02	SRM	TL	20	1TB		ETI			22.2	C
FRA EP			PEP101	P	TL	18	1TCT		CE CHA			10.0	C
FRA EP			PEP101	P	TL	19	1TCT		CE CHA			10.0	C
FRA EP			PEP101	P	TL	16	1TCT		CE CHA			10.0	C
FRA EP			HEP101	HAZ	LT	16	1TCT		CE CHA			-56.7	C
FRA EP			HEP101	HAZ	LT	12	1TCT		CE CHA			-23.3	C
FRA EP			HEP102	HAZ	LT	9	1TCT		CE CHA			-6.7	C
FRA EP			PEP102	P	TL	18	1TCT		CE CHA			-23.3	C
FRA EP			PEP102	P	TL	16	1TCT		CE CHA			-23.3	C
FRA EP			PEP102	P	TL	27	1TCT		CE CHA			-12.2	C
FRA EP			PEP103	P	TL	6	1TCT		CE CHA			-12.2	C
FRA EP			PEP103	P	TL	12	1TCT		CE CHA			21.2	C
FRA EP			PEP104	P	TL	19	1TCT		CE CHA			15.6	C
FRA EP			PEP104	P	TL	18	1TCT		CE CHA			48.9	C
FRA EP			PEP105	P	TL	9	1TCT		CE CHA			-28.9	C
FRA EP			PEP105	P	TL	15	1TCT		CE CHA			4.4	C
FRA EP			HEP104	HAZ	LT	6	1TB		ETI			26.7	C
FRA EP			WEP101	W	TL	18	1TCT		CE CHA			-23.3	C
FRA EP			WEP103	W	TL	7	1TCT		CE CHA			-51.1	C
FRA EP			WEP103	W	TL	22	1TCT		CE CHA			-17.8	C
FRA EP			WEP104	W	TL	1	1TCT		CE CHA			-28.9	C
FRA EP			WEP108	W	TL	22	1TCT		CE CHA			-40.0	C
FRA EP			WEP108	W	TL	26	1TCT		CE CHA			-23.3	C
FRA EP			WEP108	W	TL	19	1TCT		CE CHA			-6.7	C
FRA EP			WEP109	W	TL	25	1TCT		CE CHA			-23.3	C
FRA EP			WEP110	W	TL	23	1TCT		CE CHA			-23.3	C
FRA EP			WEP110	W	TL	21	1TCT		CE CHA			-23.3	C
FRA EP			WEP110	W	TL	20	1TCT		CE CHA			-6.7	C
FRA EP			WEP110	W	TL	19	1TCT		CE CHA			10.0	C
FRA EP			FEP201	F	TL	8	1TCT		B&W			-6.7	C
FRA EP			FEP201	F	TL	7	1TCT		B&W			26.7	C
FRA EP			FEP202	F	TL	10	1TCT		B&W			-6.7	C
FRA EP			FEP202	F	TL	11	1TCT		B&W			26.7	C
FRA EP			FEP203	F	TL	10	1TCT		B&W			-1.1	C
FRA EP			FEP204	F	TL	9	1TCT		B&W			4.4	C
FRA EP			FEP204	F	TL	1	4TCT		B&W			4.4	C
FRA EP			FEP205	F	TL	8	1TCT		B&W			26.7	C
FRA EP			WEP202	W	TL	10	1TCT		B&W			-6.7	C
FRA EP			WEP202	W	TL	6	1TCT		B&W			26.7	C
FRA EP			WEP202	W	TL	2	1TCT		B&W			60.0	C
FRA EP			WEP203	W	TL	2	1TCT		B&W			-62.2	C
FRA EP			WEP203	W	TL	5	1TCT		B&W			-28.9	C
FRA EP			WEP204	W	TL	7	1TCT		B&W			-34.5	C
FRA EP			WEP205	W	TL	9	1TCT		B&W			-62.2	C
FRA EP			WEP207	W	TL	6	1TCT		B&W			-28.9	C
FRA EP			WEP208	W	TL	7	1TCT		B&W			-51.1	C
FRA EP			WEP208	W	TL	10	1TCT		B&W			-17.8	C
FRA EP			WEP208	W	TL	1	4TCT		B&W			-51.1	C
FRA EP			WEP209	W	TL	7	1TCT		B&W			-17.8	C
FRA EP			WEP210	W	TL	7	1TCT		B&W			-45.6	C
FRA EP			WEP210	W	TL	6	1TCT		B&W			-12.2	C
FRA EP			FEP501	F	TL	2	1TCT		CE CHA			-62.2	C
FRA EP			PEP601	P	TL	3	1TB		ETI			-12.2	C
FRA EP			WEP206	W	TL	9	1TCT		B&W			-34.5	C
FRA EP			WEP206	W	TL	3	1TCT		B&W			-1.1	C

ing of KIA.dbf

LIDIT	KA METHOD	KIA	KO	KIA UNIT	CRACK LENG	CRACK L F	CRACK A1	CRACK A2	CRACK A3	YLS	UTS	YLS UNIT	REF ID	PAGE
	ASTM E1221-88	97	199	MPa ^m (1/4)	43.67	94.67	93.99	96.06	93.34	514	645	MPa	NUREG/CR/5584	56
	ASTM E1221-88	93	205	MPa ^m (1/4)	43.67	98.67	98.35	99.46	97.77	506	630	MPa	NUREG/CR/5584	56
	ASTM E1221-88		214	MPa ^m (1/4)	44.18	84.18	84.27	84.42	84.24	513	643	MPa	NUREG/CR/5584	56
	ASTM E1221-88	94	209	MPa ^m (1/4)	43.67	98.67	99.16	101.31	95.74	513	644	MPa	NUREG/CR/5584	56
	ASTM E1221-88	107	191	MPa ^m (1/4)	44.12	88.12	90.27	90.87	84.43	524	659	MPa	NUREG/CR/5584	56
	ASTM E1221-88	103	201	MPa ^m (1/4)	43.74	92.74	92.25	92.20	92.50	513	644	MPa	NUREG/CR/5584	56
	ASTM E1221-88	104	195	MPa ^m (1/4)	45.05	92.05	91.15	92.37	92.20	524	659	MPa	NUREG/CR/5584	56
	ASTM E1221-88	114	215	MPa ^m (1/4)	43.59	93.59	93.90	92.70	93.15	506	630	MPa	NUREG/CR/5584	56
	ASTM E1221-88	94	180	MPa ^m (1/4)	44.21	93.21	93.92	90.68	93.47	513	644	MPa	NUREG/CR/5584	56
	ASTM E1221-88	67	124	MPa ^m (1/4)	43.71	87.71	87.84	91.60	84.49	540	677	MPa	NUREG/CR/5584	56
	ASTM E1221-88	61	168	MPa ^m (1/4)	20.58	52.58	52.84	53.05	53.07	524	659	MPa	NUREG/CR/5584	56
	ASTM E1221-88		192	MPa ^m (1/4)	20.47	50.47	51.02	51.67	48.92	524	659	MPa	NUREG/CR/5584	56
	ASTM E1221-88	60	168	MPa ^m (1/4)	20.68	53.68	53.59	52.87	53.96	524	659	MPa	NUREG/CR/5584	56
E	ASTM E1221-88		234	MPa ^m (1/4)	20.63	49.63	50.14	49.94	47.62	513	644	MPa	NUREG/CR/5584	56
	ASTM E1221-88	73	168	MPa ^m (1/4)	21.15	49.15	48.77	49.85	47.59	538	675	MPa	NUREG/CR/5584	56
	ASTM E1221-88	53	132	MPa ^m (1/4)	20.73	51.73	51.42	50.38	51.30	555	692	MPa	NUREG/CR/5584	56
	ASTM E1221-88	71	164	MPa ^m (1/4)	21.01	50.01	49.83	48.66	51.68	504	593	MPa	NUREG/CR/5584	56
	ASTM E1221-88	66	147	MPa ^m (1/4)	20.87	48.87	49.19	48.92	49.24	556	694	MPa	NUREG/CR/5584	56
	ASTM E1221-88	57	146	MPa ^m (1/4)	20.96	51.96	51.81	51.72	52.31	554	691	MPa	NUREG/CR/5584	56
	ASTM E1221-88		145	MPa ^m (1/4)	43.45	112.45	113.00	112.41	113.08	555	692	MPa	NUREG/CR/5584	56
	ASTM E1221-88		261	MPa ^m (1/4)	44.58	101.58	101.97	99.58	102.99	506	630	MPa	NUREG/CR/5584	56
	ASTM E1221-88	74	149	MPa ^m (1/4)	43.27	93.27	91.93	92.62	93.69	538	675	MPa	NUREG/CR/5584	56
	ASTM E1221-88	92	190	MPa ^m (1/4)	43.33	94.33	93.49	95.72	92.77	526	661	MPa	NUREG/CR/5584	56
	ASTM E1221-88	76	151	MPa ^m (1/4)	43.40	93.40	92.69	92.66	93.53	555	692	MPa	NUREG/CR/5584	56
	ASTM E1221-88	76	141	MPa ^m (1/4)	43.81	88.81	88.63	87.99	90.08	538	675	MPa	NUREG/CR/5584	56
	ASTM E1221-88	92	154	MPa ^m (1/4)	43.40	81.40	80.40	78.11	84.65	538	675	MPa	NUREG/CR/5584	56
	ASTM E1221-88	91	186	MPa ^m (1/4)	43.43	93.43	93.44	88.42	97.28	524	659	MPa	NUREG/CR/5584	56
	ASTM E1221-88	98	194	MPa ^m (1/4)	43.26	92.26	92.21	91.59	93.74	524	659	MPa	NUREG/CR/5584	56
D	ASTM E1221-88		216	MPa ^m (1/4)	42.94	55.94	72.66	72.30	70.45	501	612	MPa	NUREG/CR/5584	56
C	ASTM E1221-88		267	MPa ^m (1/4)	42.67	73.67	89.84	89.58	90.14	503	621	MPa	NUREG/CR/5584	57
	ASTM E1221-88	125	232	MPa ^m (1/4)	42.42	70.42	87.09	86.36	85.53	506	631	MPa	NUREG/CR/5584	57
	ASTM E1221-88	108	217	MPa ^m (1/4)	42.54	73.54	89.54	91.30	87.39	506	629	MPa	NUREG/CR/5584	57
	ASTM E1221-88	125	256	MPa ^m (1/4)	42.82	75.82	92.62	92.60	88.80	505	626	MPa	NUREG/CR/5584	57
	ASTM E1221-88	103	229	MPa ^m (1/4)	42.48	79.48	95.65	94.32	96.38	507	632	MPa	NUREG/CR/5584	57
	ASTM E1221-88	115	229	MPa ^m (1/4)	43.16	75.16	91.89	91.48	88.76	504	626	MPa	NUREG/CR/5584	57
	ASTM E1221-88	91	237	MPa ^m (1/4)	42.92	87.92	103.82	104.88	101.33	513	643	MPa	NUREG/CR/5584	57
D	ASTM E1221-88		230	MPa ^m (1/4)	46.06	67.06	78.89	76.62	83.24	504	626	MPa	NUREG/CR/5584	57
	ASTM E1221-88	85	146	MPa ^m (1/4)	60.56	110.56	110.13	108.90	113.44	524	659	MPa	NUREG/CR/5584	57
	ASTM E1221-88	107	178	MPa ^m (1/4)	60.68	112.68	115.74	114.05	108.99	506	630	MPa	NUREG/CR/5584	57
	ASTM E1221-88	95	195	MPa ^m (1/4)	75.57	134.57	135.70	128.79	140.41	513	644	MPa	NUREG/CR/5584	57
D	ASTM E1221-88		182	MPa ^m (1/4)	44.42	59.42	60.94	59.59	58.71	593	683	MPa	NUREG/CR/5584	59
	ASTM E1221-88	120	176	MPa ^m (1/4)	45.00	79.00	80.70	81.45	74.18	593	683	MPa	NUREG/CR/5584	59
	ASTM E1221-88	101	155	MPa ^m (1/4)	43.75	77.75	77.68	77.05	78.55	597	689	MPa	NUREG/CR/5584	59
	ASTM E1221-88	133	163	MPa ^m (1/4)	44.28	66.28	66.61	66.79	64.54	597	689	MPa	NUREG/CR/5584	59
	ASTM E1221-88	81	130	MPa ^m (1/4)	43.70	81.70	81.77	80.17	82.25	603	697	MPa	NUREG/CR/5584	59
	ASTM E1221-88	144	177	MPa ^m (1/4)	43.81	65.81	67.83	58.49	70.18	590	679	MPa	NUREG/CR/5584	59
	ASTM E1221-88	114	177	MPa ^m (1/4)	43.86	79.86	80.82	77.32	81.03	597	689	MPa	NUREG/CR/5584	59
	ASTM E1221-88	102	138	MPa ^m (1/4)	44.28	72.28	72.22	69.11	74.71	597	689	MPa	NUREG/CR/5584	59
	ASTM E1221-88	118	168	MPa ^m (1/4)	43.90	72.90	76.05	67.54	76.03	590	679	MPa	NUREG/CR/5584	59
	ASTM E1221-88	132	185	MPa ^m (1/4)	43.79	69.79	74.78	60.10	74.94	593	683	MPa	NUREG/CR/5584	59
	ASTM E1221-88	53	98	MPa ^m (1/4)	20.53	43.53	43.33	43.20	44.68	617	714	MPa	NUREG/CR/5584	59
	ASTM E1221-88		229	MPa ^m (1/4)	20.73	56.73	56.98	56.52	56.25	603	697	MPa	NUREG/CR/5584	59
	ASTM E1221-88		129	MPa ^m (1/4)	20.64	41.64	41.78	41.44	41.32	603	697	MPa	NUREG/CR/5584	59
	ASTM E1221-88	38	81	MPa ^m (1/4)	20.60	48.60	47.85	49.23	48.39	655	753	MPa	NUREG/CR/5584	59
	ASTM E1221-88	61	121	MPa ^m (1/4)	20.62	45.62	45.35	43.88	46.18	618	714	MPa	NUREG/CR/5584	59
	ASTM E1221-88	70	129	MPa ^m (1/4)	20.67	42.67	43.48	41.82	43.77	603	697	MPa	NUREG/CR/5584	59
	ASTM E1221-88	43	97	MPa ^m (1/4)	20.63	48.63	47.66	48.39	48.21	655	753	MPa	NUREG/CR/5584	59
	ASTM E1221-88		105	MPa ^m (1/4)	20.70	38.70	38.92	38.91	38.72	616	712	MPa	NUREG/CR/5584	59
	ASTM E1221-88	52	151	MPa ^m (1/4)	20.82	53.82	53.36	52.63	54.03	535	669	MPa	NUREG/CR/5584	57
	ASTM E1221-88	75	172	MPa ^m (1/4)	20.66	49.66	49.18	50.39	47.66	535	669	MPa	NUREG/CR/5584	57
	ASTM E1221-88		203	MPa ^m (1/4)	20.68	55.68	55.72	55.59	55.40	535	669	MPa	NUREG/CR/5584	57
	ASTM E1221-88	67	181	MPa ^m (1/4)	20.93	52.93	53.25	54.61	52.18	521	653	MPa	NUREG/CR/5584	57
	ASTM E1221-88		204	MPa ^m (1/4)	20.60	55.60	55.32	53.38	56.07	521	653	MPa	NUREG/CR/5584	57

Table 42. Partial I

EXP ID	PLANT ID	CAPSULE	HEAT ID	PROD ID	ORI	SPEC ID	OROOVE	SPEC TYPE	CRACK TYPE	FLUENCE	DPA	TEMP IRR	TEST TEMP	UNIT	KA
HSSI-6			WHSS72	W	TL	A72W01	24	1TWOL 6T	WE				-16	C	97
HSSI-6			WHSS72	W	TL	A72W02	25	1.3TWOL 6T	WE				0	C	93
HSSI-6			WHSS72	W	TL	A72W03	30	1TWOL 6T	WE				-14	C	128
HSSI-6			WHSS72	W	TL	A72W04	25	1.3TWOL 6T	WE				-15	C	94
HSSI-6			WHSS72	W	TL	A72W05	30	1TWOL 6T	WE				-30	C	107
HSSI-6			WHSS72	W	TL	A72W07	24	1.3TWOL 6T	WE				-15	C	103
HSSI-6			WHSS72	W	TL	A72W08	29	1TWOL 6T	WE				-30	C	104
HSSI-6			WHSS72	W	TL	A72W12	24	1.3TWOL 6T	WE				0	C	114
HSSI-6			WHSS72	W	TL	A72W19	24	1.3TWOL 6T	WE				-15	C	94
HSSI-6			WHSS72	W	TL	A72W20	28	1TWOL 6T	WE				-47	C	67
HSSI-6			WHSS72	W	TL	A72W24	25	1TWOL 3T	WE				-30	C	61
HSSI-6			WHSS72	W	TL	A72W25	24	1TWOL 3T	WE				-30	C	79
HSSI-6			WHSS72	W	TL	A72W28	24	1TWOL 3T	WE				-30	C	60
HSSI-6			WHSS72	W	TL	A72W31	24	1TWOL 3T	WE				-15	C	108
HSSI-6			WHSS72	W	TL	A72W34	25	1TWOL 3T	WE				-45	C	73
HSSI-6			WHSS72	W	TL	A72W35	25	1TWOL 3T	WE				-60	C	53
HSSI-6			WHSS72	W	TL	A72W36	25	1TWOL 3T	WE				47	C	71
HSSI-6			WHSS72	W	TL	A72W37	25	1TWOL 3T	WE				-61	C	66
HSSI-6			WHSS72	W	TL	A72W38	25	1TWOL 3T	WE				-59	C	57
HSSI-6			WHSS72	W	TL	A72W39	25	1TWOL 6T	WE				-60	C	45
HSSI-6			WHSS72	W	TL	A72W40	25	1.3TWOL 6T	WE				0	C	114
HSSI-6			WHSS72	W	TL	A72W41	25	1TWOL 6T	WE				-45	C	74
HSSI-6			WHSS72	W	TL	A72W43	25	1TWOL 6T	WE				-32	C	92
HSSI-6			WHSS72	W	TL	A72W44	25	1TWOL 6T	WE				-60	C	76
HSSI-6			WHSS72	W	TL	A72W45	25	1.3TWOL 6T	WE				-45	C	76
HSSI-6			WHSS72	W	TL	A72W46	26	1TWOL 6T	WE				-45	C	92
HSSI-6			WHSS72	W	TL	A72W47	25	1.3TWOL 6T	WE				-30	C	91
HSSI-6			WHSS72	W	TL	A72W48	26	1TWOL 6T	WE				-30	C	98
HSSI-6			WHSS72	W	TL	A72W57	25	1.3TWOL 6T	DX				21	C	146
HSSI-6			WHSS72	W	TL	A72W62	25	1.3TWOL 6T	DX				10	C	136
HSSI-6			WHSS72	W	TL	A72W63	25	1.3TWOL 6T	DX				-1	C	125
HSSI-6			WHSS72	W	TL	A72W64	25	1.3TWOL 6T	DX				1	C	108
HSSI-6			WHSS72	W	TL	A72W65	25	1.3TWOL 6T	DX				4	C	125
HSSI-6			WHSS72	W	TL	A72W66	25	1.3TWOL 6T	DX				-2	C	103
HSSI-6			WHSS72	W	TL	A72W68	25	1.3TWOL 6T	DX				5	C	115
HSSI-6			WHSS72	W	TL	A72W71	25	1.3TWOL 6T	DX				-14	C	91
HSSI-6			WHSS72	W	TL	A72W73	25	1.3TWOL 6T	DX				5	C	142
HSSI-6			WHSS72	W	TL	A72W83	8	2TWOL	WE				-30	C	85
HSSI-6			WHSS72	W	TL	A72W84	8	2TWOL	WE				0	C	107
HSSI-6			WHSS72	W	TL	A72W85	25	2TWOL	WE				-15	C	95
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W06	30	1TWOL 6T	WE	1.6500E+19	0.0413	289	90	C	160
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W09	25	1.3TWOL 6T	WE	1.6700E+19	0.0418	289	90	C	120
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W10	29	1TWOL 6T	WE	1.6400E+19	0.0410	289	75	C	101
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W11	30	1TWOL 6T	WE	1.5200E+19	0.0376	286	75	C	133
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W13	30	1TWOL 6T	WE	1.6840E+19	0.0415	287	60	C	81
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W14	24	1.3TWOL 6T	WE	1.8520E+19	0.0462	289	100	C	144
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W15	30	1TWOL 6T	WE	1.5400E+19	0.0379	289	75	C	114
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W16	30	1TWOL 6T	WE	1.5300E+19	0.0377	289	76	C	102
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W17	25	1.3TWOL 6T	WE	1.8500E+19	0.0463	289	100	C	118
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W18	29	1TWOL 6T	WE	1.4200E+19	0.0345	287	90	C	132
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W21	25	1TWOL 3T	WE	2.3400E+19	0.0538	281	30	C	51
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W22	25	1TWOL 3T	WE	2.0300E+19	0.0475	284	60	C	62
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W23	25	1TWOL 3T	WE	2.3200E+19	0.0532	282	60	C	74
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W26	25	1TWOL 3T	WE	2.0100E+19	0.0470	285	-25	C	38
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W27	25	1TWOL 3T	WE	2.0600E+19	0.0483	283	29	C	61
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W29	25	1TWOL 3T	WE	2.3300E+19	0.0536	286	60	C	70
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W30	25	1TWOL 3T	WE	2.0400E+19	0.0478	283	-25	C	43
HSSI-6	ORR	6-1	WHSS72	W	TL	A72W32	25	1TWOL 3T	WE	2.3100E+19	0.0530	285	32	C	66
HSSI-6			WHSS73	W	TL	A73W01	25	1TWOL 3T	WE				-45	C	52
HSSI-6			WHSS73	W	TL	A73W02	25	1TWOL 3T	WE				-45	C	75
HSSI-6			WHSS73	W	TL	A73W03	25	1TWOL 3T	WE				-45	C	64
HSSI-6			WHSS73	W	TL	A73W04	25	1TWOL 3T	WE				-30	C	67
HSSI-6			WHSS73	W	TL	A73W05	25	1TWOL 3T	WE				-30	C	70

Table 43. Partial listing of DW_NDT.dbf

PLANT ID	CAPSULE	HEAT ID	HEAT NO	MAT ID	PROD ID	QRI	ABOON	URT_NDT	T_NDT	UNIT	CU	P	NI	REF ID	PAGES	NOTES
AD1		FAD101	ANH161	A5082	F		LOWER SHELL FORGING		50.0	F	0.040	0.012	0.740	WCAP-8957	1-1; 3-1; 4-15; A-2	
AD1		HAD101	ANH161	A5082	HAZ		CORE REGION WELD HEAT-AFFECTED-ZONE		-40.0	F	0.030		0.700	WCAP-8957	1-1; 3-1; 4-15	
AD1		WAD101	82912	A5082	W		REPRESENTATIVE WELD		-70.0	F	0.030	0.005	0.560	WCAP-8957	3-1; 4-15; A-1; A-2	
AL2		HAL201	C0545-2	A533B1	HAZ		WELD HEAT-AFFECTED-ZONE METAL		-40.0	F	0.030		0.700	WCAP-9228	2-1; 3-2	
AL2		PAL201	C0545-2	A533B1	P		INTERMEDIATE SHELL		-10.0	F	0.060	0.009	0.560	WCAP-9228	2-1; 3-2; A-1; A-2	
AL2		WAL201	83642	A533B1	W		REPRESENTATIVE WELD CORE REGION		-40.0	F	0.050	0.004	0.040	WCAP-9228	2-1; 3-2; A-1; A-2	
AS1		HAS101	C2333-1	A533B1	HAZ		HEAT AFFECTED ZONE OF WELD	-50.0	-60.0	F	0.030		0.700	WCAP-9308	2-1; 3-2; A-1; A-2	
AS1		PAS101	C2333-1	A533B1	P		CORE REGION LOWER SHELL PLATE	18.0	-30.0	F	0.040	0.008	0.560	WCAP-9308	2-1; 3-2; A-1; A-2	
AS1		WAS101	83650	A533B1	W		REPRESENTATIVE WELD	-50.0	-50.0	F	0.040	0.011	0.270	WCAP-9308	2-1; 3-2; A-1; A-2	
AS2		HAS201	C4191-2	A533B1	HAZ		HEAT AFFECTED ZONE OF WELD	-40.0	-40.0	F	0.030		0.700	WCAP-9330	2-1; 3-2; A-1; A-2	
AS2		PAS201	C4191-2	A533B1	P		CORE REGION	40.0	-50.0	F	0.050	0.007	0.610	WCAP-9330	2-1; 3-2; A-1; A-2	
AS2		WAS201	4P6052	A533B1	W		REPRESENTATIVE WELD	-60.0	-60.0	F	0.020	0.005	0.050	WCAP-9330	2-1; 3-2; A-1; A-2	
BV1		FBV120	ZV3758	A5082	F	LT	CLOSURE HEAD FLANGE	60.0	60.0	F	0.080	0.007	0.650	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		FBV121	ZV3661	A5082	F	LT	VESSEL FLANGE	60.0	60.0	F	0.120	0.010	0.710	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		FBV122	9-5443	A5082	F	LT	INLET NOZZLE	60.0	60.0	F	0.100	0.008	0.840	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		FBV123	9-5460	A5082	F	LT	INLET NOZZLE	60.0	60.0	F	0.100	0.010	0.830	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		FBV124	9-5712	A5082	F	LT	INLET NOZZLE	60.0	60.0	F	0.080	0.007	0.800	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		FBV125	9-5415	A5082	F	LT	OUTLET NOZZLE	60.0	60.0	F	0.030	0.008	0.790	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		FBV126	9-5415	A5082	F	LT	OUTLET NOZZLE	60.0	60.0	F	0.030	0.007	0.790	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		FBV127	9-5444	A5082	F	LT	OUTLET NOZZLE	60.0	60.0	F	0.090	0.007	0.780	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		FBV128	123V339	A5082	F	LT	UPPER SHELL	40.0	40.0	F	0.030	0.010	0.670	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		FBV129	123V223	A5082	F	LT	TRANS. RING	30.0	30.0	F	0.030		0.700	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		HBV101		A533B1	HAZ	TL	WELD HAZ	-40.0	-40.0	F	0.030		0.700	WCAP-9860	; A-5	CODE B6607-1
BV1	V	PBV101	C6317-1	A533B1	P		CORE REGION	27.0	-50.0	F	0.200	0.010	0.540	WCAP-9860	; 4-3; A-8, A-9	WCAP10867
BV1		PBV102	C4381-1	A533B1	P	LT	INTERMEDIATE SHELL	43.0	-10.0	F	0.140	0.015	0.620	WCAP-9860	; A-5	WCAP10867
BV1		PBV103	C4381-2	A533B1	P	LT	INTERMEDIATE SHELL	73.0	-10.0	F	0.140	0.015	0.620	WCAP-9860	; A-5	WCAP10867
BV1		PBV120	C6293-2	A533B1	P	LT	LOWER SHELL	20.0	-20.0	F	0.140	0.015	0.570	WCAP-9860	; A-5	WCAP10867
BV1		PBV121	C6213-1B	A533B1	P	LT	CLOSURE HEAD DOME	0.0	-40.0	F	0.150	0.010	0.540	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		PBV122	A5518-2	A533B1	P	LT	CLOSURE HEAD SEGMENT	-20.0	-20.0	F	0.140	0.015	0.600	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		PBV123	C4423-3	A533B1	P	LT	BOTTOM HEAD SEGMENT	-29.0	-30.0	F	0.130	0.008	0.550	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1		PBV124	C4482-1	A533B1	P	LT	BOTTOM HEAD DOME	-33.0	-50.0	F	0.130	0.015	0.550	WCAP-9860	; A-5	RTNDT PER MTEB 5-2, WCAP10867
BV1	U	WBV121	305424	A533B1	W		INTER. SHELL LONG. WELD	0.0	0.0	F	0.290	0.015	0.630	WCAP-10867	; A-7, 3-1	50-412
BV1	U	WBV123	90136	A533B1	W		INTER. TO LOWER SHELL GIRTH WELD	0.0	0.0	F	0.310	0.015	0.070	WCAP-10867	; A-7, 3-1	50-412
BV1	U	WBV124	305414	A533B1	W		LOWER SHELL LONG. WELD	0.0	0.0	F	0.330	0.013	0.610	WCAP-10867	; A-7, 3-1	50-412
BV2		PBV201		A533B1	P	LT	INTERMEDIATE SHELL	40.0	-10.0	F	0.070		0.590	WCAP-12406	; A-13	B9004-2
BV2	U	PBV220		A533B1	P	LT	INTERMEDIATE SHELL PLATE	60.0	0.0	F	0.070		0.530	WCAP-12406	; A-7; A-13	B9004-1
BV2		PBV222		A533B1	P	LT	LOWER SHELL	28.0	-50.0	F	0.080		0.590	WCAP-12406	; A-13	B9005-1
BV2		PBV223		A533B1	P	LT	LOWER SHELL	33.0	-40.0	F	0.070		0.580	WCAP-12406	; A-13	B9005-2
BV2		PBV224		A533B1	P	LT	CLOSURE HEAD DOME	-10.0	-20.0	F	0.130		0.510	WCAP-12406	; A-13	B9008-1
BV2		PBV225		A533B1	P	LT	CLOSURE HEAD FLANGE	-10.0	-10.0	F	0.030		0.740	WCAP-12406	; A-13	B9002-1
BV2		PBV226		A533B1	P	LT	VESSEL FLANGE	0.0	0.0	F	0.030		0.730	WCAP-12406	; A-13	B9001-1
BV2		PBV227		A533B1	P	LT	INLET NOZZLE	0.0	0.0	F	0.030		0.880	WCAP-12406	; A-13	B9011-1
BV2		PBV228		A533B1	P	LT	INLET NOZZLE	10.0	10.0	F	0.030		0.880	WCAP-12406	; A-13	B9011-2
BV2		PBV229		A533B1	P	LT	INLET NOZZLE	20.0	20.0	F	0.030		0.840	WCAP-12406	; A-13	B9011-3
BV2		PBV230		A533B1	P	LT	OUTLET NOZZLE	-10.0	-10.0	F	0.030		0.710	WCAP-12406	; A-13	B9012-1
BV2		PBV231		A533B1	P	LT	OUTLET NOZZLE	-10.0	-10.0	F	0.030		0.740	WCAP-12406	; A-13	B9012-2
BV2		PBV232		A533B1	P	LT	OUTLET NOZZLE	-10.0	-10.0	F	0.030		0.680	WCAP-12406	; A-13	B9012-3
BV2		PBV233		A533B1	P	LT	NOZZLE SHELL	50.0	-10.0	F	0.130		0.610	WCAP-12406	; A-13	B9003-1
BV2		PBV234		A533B1	P	LT	NOZZLE SHELL	60.0	0.00	F	0.120		0.580	WCAP-12406	; A-13	B9003-2
BV2		PBV235		A533B1	P	LT	NOZZLE SHELL	50.0	-10.0	F	0.130		0.610	WCAP-12406	; A-13	B9003-3
BV2		PBV236		A533B1	P	LT	BOTTOM HEAD TORUS	-4.00	-30.0	F	0.150		0.490	WCAP-12406	; A-13	B9010-1
BV2		PBV237		A533B1	P	LT	BOTTOM HEAD DOME	-25.0	-30.0	F	0.140		0.530	WCAP-12406	; A-13	B9009-1
BV2		WBV220	83642	A533B1	W	LT	INTERMEDIATE TO LOWER GIRTH SEAM	-30.0	-30.0	F	0.080		0.070	WCAP-12406	; A-13	50-412
BV2		WBV221	83642	A533B1	W	LT	INTERMEDIATE VERTICAL SEAM	-30.0	-30.0	F	0.080		0.070	WCAP-12406	; A-13	50-412
BV2		WBV222	83642	A533B1	W	LT	INTERMEDIATE VERTICAL SEAM	-30.0	-30.0	F	0.080		0.070	WCAP-12406	; A-13	50-412
BV2		WBV223	83642	A533B1	W	LT	LOWER VERTICAL SEAM	-30.0	-30.0	F	0.080		0.070	WCAP-12406	; A-13	50-412
BV2		WBV224	83642	A533B1	W	LT	LOWER VERTICAL SEAM	-30.0	-30.0	F	0.080		0.070	WCAP-12406	; A-13	50-412
BW1		PBW122	C4500	A533B1	P		LOWER SHELL COURSE	10.0	F	0.150	0.012	0.540	NEDO-24161	8, 9; 13; 14	USE CHANGE - 20%	

listing of REAC.dbf

TAG	F1 RATE	CAP_FPI	FPI TO F1	FPI UNC	CAP_PBS	F1 TO PBS	CAP_DPA	DPA TO F1	REF ID	PAGES	NOTES
	1.400E+09						4.090E-04		ASTM STP 1046/5	21	COMBINATION 3-4, 3-9
	1.050E+09						7.010E-04		ASTM STP 1046/5	21	COMBINATION 3-3, 3-5, 3-8
	9.590E+12						3.390E-05		ORNL/TM-10444	131; 141; 201	DPA FROM ASTM STP 1046, P.21
	9.590E+12						3.390E-05		ORNL/TM-10444	131; 141; 201	DPA FROM ASTM STP 1046, P.21
	9.590E+12						3.390E-05		ORNL/TM-10444	131; 141; 201	DPA FROM ASTM STP 1046, P.21
	9.590E+12						3.390E-05		ORNL/TM-10444	131; 142	COMBINATION HFC-2 AND HFC-3
	9.590E+12						3.390E-05		ORNL/TM-10444	131; 141; 201	COMBINATION HFC-2 AND HFC-4
	9.590E+12						3.390E-05		ORNL/TM-10444	131; 141; 201	COMBINATION HFC-3 AND HFC-4
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL/TM-10444	159; 161; 162	AB/PS CORE POS.
									ORNL-4871		HSST-1 IRL RANGE OF FLU..TP.
	1.560E+12								NUREG/CR-0505	9, 27	FLUENCE RATE AT CAPSULE CENTE
	1.820E+12								NUREG/CR-0505	9, 27	FLUENCE RATE AT CAPSULE CENTE
	1.600E+12								NUREG/CR-0505	9, 27	FLUENCE RATE AT CAPSULE CENTE
									NUREG/CR-0505	ADDENDUM, TABLE 1	FLUENCE AT CAPSULE CENTER
									NUREG/CR-0505	ADDENDUM, TABLE 1	FLUENCE AT CAPSULE CENTER
									NUREG/CR-0505	ADDENDUM, TABLE 1	FLUENCE AT CAPSULE CENTER
	9.440E+19		7.3				4.220E-02		NUREG/CR-3333	24, 25	FLUENCE AT IT-CT SPECIMEN #50
	6.650E+19		7.3				3.010E-02		NUREG/CR-3333	24, 27	FLUENCE AT IT-CT SPECIMEN #50
	8.690E+19		7.3				3.910E-02		NUREG/CR-3333	24, 29	FLUENCE AT IT-CT SPECIMEN #50
	3.500E+12						1.530E-02		ASTM STP 782/433	435 - 437	F1 RATE BETWEEN 3.0 AND 4.0E12
	3.500E+12						1.530E-02		ASTM STP 782/433	435 - 437	F1 RATE BETWEEN 3.0 AND 4.0E12
	3.500E+12						1.504E-02		ASTM STP 782/433	435 - 437	F1 RATE BETWEEN 3.0 AND 4.0E12
	3.500E+12						1.517E-02		ASTM STP 782/433	435 - 437	F1 RATE BETWEEN 3.0 AND 4.0E12
	3.500E+12						1.386E-02		ASTM STP 782/433	435 - 437	F1 RATE BETWEEN 3.0 AND 4.0E12
	3.500E+12						1.367E-02		ASTM STP 782/433	435 - 437	F1 RATE BETWEEN 3.0 AND 4.0E12
	3.500E+12						1.392E-02		ASTM STP 782/433	435 - 437	F1 RATE BETWEEN 3.0 AND 4.0E12
	3.500E+12						1.528E-02		ASTM STP 782/433	435 - 437	COMBINATION OF D1-1 AND D10-4
	3.500E+12						1.398E-02		ASTM STP 782/433	435 - 437	F1 RATE BETWEEN 3.0 AND 4.0E12
	3.500E+12						1.325E-02		ASTM STP 782/433	435 - 437	F1 RATE BETWEEN 3.0 AND 4.0E12
	2.000E+13							2.050E-21	IAEA TRS 265	25; 78	NEAR CORE POSITION
							4.620E-02		ASTM STP 909/70	76	
							1.248E-01		ASTM STP 909/70	76	
	1.000E+13								IAEA TRS 265	23	
	1.700E+13								IAEA TRS 265	23	
	8.000E+11							1.900E-21	IAEA TRS 265	23	F1 RATE BETWEEN 0.4 AND 3.0E13
	3.000E+12							1.600E-21	IAEA TRS 265	25; 78	SURVEILLANCE POSITION
	3.600E+12							1.450E-21	IAEA TRS 265	25; 78	NEAR CORE POSITION
	1.600E+13								IAEA TRS 265	23	
	2.000E+12								IAEA TRS 265	23	
	3.000E+13								IAEA TRS 265	23	
		2.91				1.22			NUREG/CR-2487	2; 6; 7	
		2.91				1.22			NUREG/CR-2487	2; 6; 7	
		2.91				1.22			NUREG/CR-2487	2; 6; 7	
		2.91				1.22			NUREG/CR-2487	2; 6; 7	
									NUREG/CR-5357/152	155 - 156	FISS F1 IS PRELIM. EST.
									NUREG/CR-5357/152	155 - 156	CORE POSITION
									NUREG/CR-5357/152	155 - 156	CORE POSITION
	4.400E+11	2.225E+19							ASTM STP 484/74	76 - 81; 84	SURVEILLANCE EXPERIMENT
	2.100E+10	1.775E+19							ASTM STP 484/74	76 - 81; 84	SURVEILLANCE EXPERIMENT
	4.400E+11	4.700E+19							ASTM STP 484/74	76 - 81; 84	SURVEILLANCE EXPERIMENT
	4.400E+11								ASTM STP 484/74	87 - 89	REFERENCE EXPERIMENT
									JUL-SPEZ-406	44 - 46	
									PACHUR 1988	FILE NO. 216	
									PACHUR 1988	FILE NO. 217	
									PACHUR 1988	FILE NO. 218	
									PACHUR 1988	FILE NO. 215	
									PACHUR 1988	FILE NO. 219	
									PACHUR 1988	FILE NO. 504	
									PACHUR 1988	FILE NO. 220	
									PACHUR 1988	FILE NO. 221	

Architecture

Table 44. Partial

TAG	EO ID	PLANT ID	CAPRULE	START DATE	STOP DATE	CONFID	EXP TIME	TIME U	CAP T MIN	CAP T MAX	CAP T NOM	TEMP RANGE	TEMP U	TEMP TAG	CAP P1	PL UNC	PL
B	HFIR	HFIR	D-X2	11/08/1965	02/14/1974		6.45	Y	120	129			F	1	2.840E+17		A
B	HFIR	HFIR	D-X3	11/08/1965	11/15/1966		15.01	Y	120	129			F	1	4.880E+17		A
B	HFIR	ORR	HFC-2				70.0	H		123			F	6	2.430E+18	4.2	A
B	HFIR	ORR	HFC-3				70.0	H		123			F	6	2.430E+18	4.2	A
B	HFIR	ORR	HFC-4				70.0	H		123			F	6	2.430E+18	4.2	A
B	HFIR	ORR	HFC-P1				70.0	H		123			F	6	2.430E+18	4.2	A
B	HFIR	ORR	HFC-W1				70.0	H		123			F	6	2.430E+18	4.2	A
B	HFIR	ORR	HFC-W2				70.0	H		123			F	6	2.430E+18	4.2	A
B	HFIR	ORR	HFT-1				0.29	H	110	122			F	1	1.300E+16		A
B	HFIR	ORR	HFT-10				38.0	H	110				F	5	1.700E+18		A
B	HFIR	ORR	HFT-11				170.0	H	110				F	5	7.700E+18		A
B	HFIR	ORR	HFT-2				3.45	H	110	122			F	1	1.700E+17		A
B	HFIR	ORR	HFT-3				16.0	H	110	122			F	1	7.300E+17		A
B	HFIR	ORR	HFT-4				38.0	H	110	122			F	1	1.700E+18		A
B	HFIR	ORR	HFT-5				72.0	H	110	122			F	1	3.300E+18		A
B	HFIR	ORR	HFT-6				170.0	H	110	122			F	1	7.700E+18		A
B	HFIR	ORR	HFT-7				384.0	H	110	122			F	1	1.700E+19		A
B	HFIR	ORR	HFT-8				0.33	H	110				F	5	1.500E+16		A
B	HFIR	ORR	HFT-9				3.3	H	110				F	5	1.500E+17		A
B	HSST-1	ORR	XX														
B	HSST-2	BSR	A2	10/15/1976	05/23/1977		8.620E+06	S			550		F	T		30	A
B	HSST-2	BSR	B2	10/15/1976	05/23/1977		8.620E+06	S			550		F	T		30	A
B	HSST-2	BSR	C2	10/15/1976	05/23/1977		8.620E+06	S			550		F	T		30	A
B	HSST-3	BSR	A3	12/19/1977	02/17/1978		3.640E+06	S			550		F	T	7.280E+18	30	A
B	HSST-3	BSR	B3	12/19/1977	02/17/1978		3.640E+06	S			550		F	T	7.110E+18	30	A
B	HSST-3	BSR	C3	12/19/1977	02/28/1978		3.640E+06	S			550		F	T	9.830E+18	30	A
B	HSST-4	BSR	A4	12/18/1979	10/17/1980		1.667E+07	S			550		F	T	2.630E+19	5.9	A
B	HSST-4	BSR	B4	06/26/1980	05/18/1981		1.59E+07	S			550		F	T	1.870E+19	5.9	A
B	HSST-4	BSR	C4	04/01/1981	01/17/1982		1.667E+07	S			550		F	T	2.430E+19	5.9	A
B	IASAB	HERALD	A3-3								290		C	T	1.014E+19	14	A
B	IASAB	HERALD	A3-6								290		C	T	1.020E+19	14	A
B	IASAB	HERALD	A3-8								290		C	T	9.970E+18	14	A
B	IASAB	HERALD	A3-9								290		C	T	1.011E+19	13	A
B	IASAB	HERALD	D1-1								290		C	T	9.270E+18	9.2	A
B	IASAB	HERALD	D1-5								250		C	T	9.120E+18	10	A
B	IASAB	HERALD	D1/D10								290		C	T	9.300E+18	16	A
B	IASAB	HERALD	D10-2								250		C	T	1.021E+19	13	A
B	IASAB	HERALD	D10-4								290		C	T	9.320E+18	16	A
B	IASAB	HERALD	D10-7								290		C	T	8.890E+18	12	A
B	IASAC	WWRS	XX											T			A
B	IASAF	TRITON	FT945								287		C		2.990E+19		
B	IASAF	TRITON	FT946								287		C		8.100E+19		
B	IASAF	TRITON	XX								288		C	T			A
B	IASAG	FRO-2	XX											T			A
B	IASAG	EKS	XX								282		C	2	2.000E+19		A
B	IASAG	VAK	XX														A
B	IASAI	CIRUS	XX								288		C	M			A
B	IASAI	/MTR	XX								288		C	T			A
B	IASAK	FRJ-1	XX								288		C	T			A
B	IASAK	FRJ-2	XX								288		C	T			A
B	IASAU	UBR	UB-23								550		F	T	2.100E+19		S
B	IASAU	UBR	UB-24								550		F	T	2.300E+19		S
B	IASAU	UBR	UB-29								550		F	T	2.000E+19		S
B	IASAU	UBR	UB-30								550		F	T	1.900E+19		S
B	IASAU	UBR	UB-80A								288		C	T	2.300E+19		A
B	IASAU	UBR	UB-80B								288		C	T	2.700E+19		A
B	JPDR	JPDR	1	/ /1963	06/ /1966						260		C	2	1.245E+19		A
B	JPDR	JPDR	2	/ /1963	04/ /1967						260		C	2	2.275E+19		A
B	JPDR	JPDR	3	/ /1963	06/ /1969						260		C	2	2.625E+19		A
B	JPDR	JPDR	4								260		C	2	3.000E+18		S
B	KFA	FRJ-1	BE24						150	180	160		C	T	2.500E+19		A
B	KFA	FRJ-1	X00115				12	H			150		C	T	1.500E+18		
B	KFA	FRJ-1	X00215				30	H			150		C	T	3.500E+18		
B	KFA	FRJ-1	X00715				60	H			150		C	T	7.000E+18		
B	KFA	FRJ-1	X01015				200	D			150		C	T	1.000E+19		
B	KFA	FRJ-1	X01515				120	H			150		C	T	1.500E+19		
B	KFA	FRJ-1	X01829								288		C	T	1.800E+19		
B	KFA	FRJ-1	X03015				600	H			150		C	T	3.000E+19		
B	KFA	FRJ-1	X07015				1200	H			150		C	T	7.000E+19		

6. Partial listing of REAC_LST.dbf

	PLANT DES	ARCH ENG	VESSEL MFG
A.	Westinghouse/EBE	Gibbs & Hill/Promon Engenhann, S.A.	Babcock & Wilcox
idad, S.A.	Westinghouse	Empresarios Agrupados/Gibbs & Hill Espanola	Combustion Engineering
pany	Babcock & Wilcox	Bechtel	Babcock & Wilcox
pany	Combustion Engineering	Bechtel Corp.	Combustion Engineering
A, S.A.	Westinghouse	Bechtel Corp./Empresa Nacional de Ingenieros Tech	Combustion Engineering
A, S.A.	Westinghouse	Bechtel Corp./Empresa Nacional de Ingenieros Tech	Combustion Engineering
ny	Westinghouse	Sargent & Lundy Engineers	
ny	Westinghouse	Sargent & Lundy Engineers	
	General Electric	Tennessee Valley Authority	Babcock & Wilcox/THI
	General Electric	Bechtel Corp.	Combustion Engineering
	Westinghouse	Stone & Webster Engineering Corp.	Combustion Engineering
	Westinghouse	Duquesne Light Co./Stone & Webster Engineering	
pany	General Electric	United Engineers and Constructors, Inc.	Chicago Bridge and Iron
pany	General Electric	United Engineers and Constructors, Inc.	Chicago Bridge and Iron
ny	Westinghouse	Sargent & Lundy Engineers	
ny	Westinghouse	Sargent & Lundy Engineers	
werke AG (NOI)	Westinghouse	Gibbs & Hill (US)/Brown Boveri et Cie (Switzerland)	Societe des Forges et Ateliers du Creusot
werke AG (NOI)	Westinghouse	Gibbs & Hill (US)/Brown Boveri et Cie (Switzerland)	Societe des Forges et Ateliers du Creusot
	Westinghouse	Gibbs & Hill	Combustion Engineering
	Westinghouse	Duke Power Company	Rotterdamse Droogdok Maatschappij (Netherlands)
	Westinghouse	Duke Power Company	
pany	Combustion Engineering	Bechtel Corp.	Combustion Engineering
pany	Combustion Engineering	Bechtel Corp.	Combustion Engineering
pany	Westinghouse	American Electric Power Service Corporation	Combustion Engineering
pany	Westinghouse	American Electric Power Service Corporation	Chicago Bridge and Iron
	Westinghouse	Bechtel Corp.	Combustion Engineering
pany	Westinghouse Corporation	Gibbs & Hill, Inc.	
ct	General Electric	Burns & Roe, Inc.	Combustion Engineering
	Babcock & Wilcox	Gilbert Associates, Inc.	Babcock & Wilcox
Power Company	Westinghouse	Stone & Webster Engineering Corp.	Combustion Engineering
r Company	General Electric	Commonwealth Associates	Chicago Bridge and Iron
	Babcock & Wilcox	Bechtel	Babcock & Wilcox
ny	Westinghouse	Pacific Gas & Electric Company/Bechtel	Combustion Engineering
ny	Westinghouse	Pacific Gas & Electric Company/Bechtel	Combustion Engineering
ny	General Electric	Bechtel Corp.	New York Ship Building
ny	General Electric	Sargent & Lundy Engineers	Babcock and Wilcox
ny	General Electric	Sargent & Lundy Engineers	Babcock and Wilcox
ny	General Electric	Sargent & Lundy Engineers	Pacific Coast Engineering
ociation	Albia-Chalmers	Sargent & Lundy Engineers	
	Westinghouse	Southern Company Services, Inc./Bechtel Corp.	Combustion Engineering
	Westinghouse	Southern Company Services, Inc./Bechtel Corp.	Combustion Engineering
	Combustion Engineering	Gibbs, Hill, Durham & Richardson, Inc.	Combustion Engineering
of New York	General Electric	Stone & Webster Engineering Corp.	Combustion Engineering
Electrica, Italy	General Electric	Ebasco Services, Inc.	Terni
poration	Westinghouse	Gilbert Associates, Inc.	Babcock & Wilcox
	General Electric	Southern Company Services, Inc./Bechtel Corp.	Combustion Engineering
pany	Westinghouse	Ebasco Services, Inc.	Combustion Engineering
ny	General Electric	Bechtel Corp.	Combustion Engineering
y of New York, Inc.	Westinghouse	United Engineers and Constructors, Inc.	Combustion Engineering
of New York	Westinghouse	United Engineers and Constructors, Inc.	Combustion Engineering
ny, Ltd.	Westinghouse	Gilbert Associates, Inc.	Babcock & Wilcox
poration	Westinghouse	Fluor Pioneer, Inc.	Combustion Engineering
	Albia-Chalmers	Sargent & Lundy Engineers	Combustion Engineering
	Westinghouse	Iberduero, S.A./Bechtel Corp./Sener, S.A./INITEC	Babcock & Wilcox
	Westinghouse	Duke Power Company	Combustion Engineering
	Westinghouse	Duke Power Company	Rotterdamse Droogdok Maatschappij (Netherlands)
	Babcock & Wilcox	Bechtel	Babcock & Wilcox
	Babcock & Wilcox	Bechtel	Babcock & Wilcox
pany	General Electric	Ebasco Services, Inc.	Combustion Engineering
pany	Combustion Engineering	Bechtel Corp.	Combustion Engineering
pany	Westinghouse	Stone & Webster Engineering Corp.	Combustion Engineering
ny	General Electric	Bechtel Corp.	Chicago Bridge and Iron
Company	Combustion Engineering	Stone & Webster Engineering Corp.	Combustion Engineering
pany	Westinghouse	Stone & Webster Engineering Corp.	Rotterdamse Droogdok Maatschappij (Netherlands)

Table 4

TAO	PLANT ID	REAC TYPE	REAC NAME	LOCATION	PLANT OP
W	AD1	PWR	Angre Dos Reis Unit 1	Itorna, RdJ, Brazil	Furnas-Centra Electrica, S
W	AL2	PWR	Almaraz Unit 2	Almaraz, Caceres, Spain	Compania Sevillana de Elect
B	AN1	PWR	Arkansas Nuclear One, Unit 1	Russellville, Arkansas	Arkansas Power & Light Co
C	AN2	PWR	Arkansas Nuclear One, Unit 2	Russellville, Arkansas	Arkansas Power & Light Co
W	AS1	PWR	Asco Unit 1	Asco, Tarragona, Spain	Fuerzas Electricas de Catalu
W	AS2	PWR	Asco Unit 2	Asco, Tarragona, Spain	Fuerzas Electricas de Catalu
W	BD1	PWR	Braidwood Unit 1	Braidwood, Illinois	Commonwealth Edison Com
W	BD2	PWR	Braidwood Unit 2	Braidwood, Illinois	Commonwealth Edison Com
G	BF3	BWR	Browns Ferry Unit 3	Decatur, Alabama	Tennessee Valley Authority
G	BR	BWR	Big Rock Point Reactor	Charlevoix, Michigan	Consumers Power Company
W	BV1	PWR	Beaver Valley Unit 1	Shippingport, Pennsylvania	Duquesne Light Company
W	BV2	PWR	Beaver Valley Unit 2	Shippingport, Pennsylvania	Duquesne Light Company
G	BW1	BWR	Brunswick Unit 1	Southport, North Carolina	Carolina Power & Light Co
G	BW2	BWR	Brunswick Unit 2	Southport, South Carolina	Carolina Power & Light Co
W	BY1	PWR	Byron Unit 1	Byron, Illinois	Commonwealth Edison Com
W	BY2	PWR	Byron Unit 2	Byron, Illinois	Commonwealth Edison Com
W	BZ1	PWR	Beznau Unit 1	Doettingen, Switzerland	Nordostschweizerische Kraft
W	BZ2	PWR	Beznau Unit 2	Doettingen, Switzerland	Nordostschweizerische Kraft
W	CAB	PWR	Jose Cabrera-Zorita Reactor	Madrid, Spain	Union Electrica, S.A.
W	CB1	PWR	Catawba Unit 1	Clover, South Carolina	Duke Power Company
W	CB2	PWR	Catawba Unit 2	Clover, South Carolina	Duke Power Company
C	CC1	PWR	Calvert Cliffs Unit 1	Lusby, Maryland	Baltimore Gas & Electric Co
C	CC2	PWR	Calvert Cliffs Unit 2	Lusby, Maryland	Baltimore Gas & Electric Co
W	CK1	PWR	Donald C. Cook Unit 1	Bridgman, Michigan	Indiana-Michigan Power Co
W	CK2	PWR	Donald C. Cook Unit 2	Bridgman, Michigan	Indiana-Michigan Power Co
W	CL1	PWR	Callaway Unit 1	Fulton, Missouri	Union Electric Company
W	CP2	PWR	Comanche Peak Unit 2	Glen Rose, Texas	Texas Utilities Generating Co
G	CPR	BWR	Cooper	Brownville, Nebraska	Nebraska Public Power Distr
B	CR3	PWR	Crystal River Unit 3	Rod Level, Florida	Florida Power Corporation
W	CTY	PWR	Haddam Neck	Haddam Neck, Connecticut	Connecticut Yankee Atomic
G	DAC	BWR	Duane Arnold Energy Center Unit 1	Palo, Iowa	Iowa Electric Light and Powe
B	DB1	PWR	Davis-Besse Nuclear Power Station Unit 1	Oak Harbor, Ohio	Toledo Edison Company
W	DC1	PWR	Diablo Canyon Unit 1	Avila Beach, California	Pacific Gas & Electric Comp
W	DC2	PWR	Diablo Canyon Unit 2	Avila Beach, California	Pacific Gas & Electric Comp
G	DR1	BWR	Dresden Nuclear Plant Station Unit 1	Morris, Illinois	Commonwealth Edison Com
G	DR2	BWR	Dresden Nuclear Plant Station Unit 2	Morris, Illinois	Commonwealth Edison Com
G	DR3	BWR	Dresden Nuclear Plant Station Unit 3	Morris, Illinois	Commonwealth Edison Com
A	ERR	BWR	Elk River	Elk River, Minnesota	Rural Co-operative Power A
W	FA1	PWR	Joseph M. Farley Unit 1	Dothan, Alabama	Alabama Power Company
W	FA2	PWR	Joseph M. Farley Unit 2	Dothan, Alabama	Alabama Power Company
C	FC1	PWR	Fort Calhoun Station Unit 1	Fort Calhoun, Nebraska	Omaha Public Power District
G	FTZ	BWR	James A. FitzPatrick	Orwego, New York	Power Authority of the State
G	GAR	BWR	Garigliano	Scusa Aurunca, Italy	Ente Nazionale per l'Energia
W	GIN	PWR	Robert E. Ginna Nuclear Plant Unit 1	Ontario, New York	Rochester Gas & Electric Co
G	HA1	BWR	Edwin I. Hatch Unit 1	Baxley, Georgia	Georgia Power Company
W	HB2	PWR	H. B. Robinson Unit 2	Hartsville, South Carolina	Carolina Power & Light Co
G	HM3	BWR	Humboldt Bay Power Plant Unit 3	Eureka, California	Pacific Gas & Electric Comp
W	IP2	PWR	Indian Point Unit 2	Indian Point, New York	Consolidated Edison Compan
W	IP3	PWR	Indian Point Unit 3	Indian Point, New York	Power Authority of the State
W	KO1	PWR	Korea Nuclear Unit 1	Ko-Ri, Korea	Korea Electric Power Compe
W	KWE	PWR	Kewaunee Nuclear Power Plant	Carbon, Wisconsin	Wisconsin Public Service Co
A	LAC	BWR	Lacrosse Boiling Water Reactor (Genoa-2)	Genoa, Wisconsin	Dairyland Power Cooperative
W	LM2	PWR	Lemoniz Unit 2	Lemoniz, Vizcaya, Spain	Iberduero, S. A.
W	MC1	PWR	W. B. McGuire Unit 1	Cornelius, North Carolina	Duke Power Company
W	MC2	PWR	W. B. McGuire Unit 2	Cornelius, North Carolina	Duke Power Company
B	MD1	PWR	Midland Unit 1	Midland, Michigan	Consumers Power Company
B	MD2	PWR	Midland Unit 2	Midland, Michigan	Consumers Power Company
G	ML1	BWR	Millstone Nuclear Power Station Unit 1	Waterford, Connecticut	Northeast Utilities Service Co
C	ML2	PWR	Millstone Nuclear Power Station Unit 2	Waterford, Connecticut	Northeast Utilities Service Co
W	ML3	PWR	Millstone Nuclear Power Station Unit 3	Waterford, Connecticut	Northeast Utilities Service Co
G	MON	BWR	Monticello Nuclear Generating Plant	Monticello, Minnesota	Northern States Power Comp
C	MY	PWR	Maine Yankee Nuclear Plant	Wiscasset, Maine	Maine Yankee Atomic Power
W	NA1	PWR	North Anna Unit 1	Mineral, Virginia	Virginia Electric & Power Co

Table 46. Partial listing of REAC_GEO.dbf

PLANT ID	REAC TYPE	PV THICK	PV ID	PV IR	PV OR	CORE HEIGHT	CORE DIAM	PV UNIT	NO FUEL	FUEL GEO	CORE P DEN	U P DEN	LOOP	D PRESS	O PRESS	P UNIT	REF ID	PAGES
AD1	PWR	6.692		66.00	72.69										2235	PSIG	SWRI-06-8976	53; 59
AL2	PWR	7.9															NEI 30(372)	62
AN1	PWR	8.500	171.0	85.50	94.1	144	128.9	IN.	177	15X15	76	kW/l	L-LOOP	2500	2205	PSIG	BAW-2075/R1	8-5
AN2	PWR	7.9	171.0	85.50		150	123	IN.	177	16X16	96.6	kW/l	2-LOOP	2485	2235	PSIG	NUREG/CR-5640	5-2; 5-48
BD1	PWR	8.5	173.0	86.7	95.3	143.7	132.7	IN.	193	17X17	104.5	kW/l	4-loop	2485	2247	PSIG	WCAP-12685	6-19
BD2	PWR	8.5	173.0	86.50		143.7	132.7	IN.	193	17X17	104.5	kW/l	4-loop	2485	2247	PSIG	NUREG/CR-5640	4-58; 4-63
BF3	BWR	6.313	251.0	125.5				IN.						1250	1024	PSIG	NUREG/CR-5640	10-5
BR	BWR	6.000	106.0	53.00		79	77.5	IN.	172	12X12	46	kW/l	BWR/1	1700	1336	PSIG	MATSURV DATABAS	
BV1	PWR	7.875	157.0	78.5	86.4	143.7	119.5	IN.	157	17X17	100.0	kW/l	3-loop	2485	2250	PSIG	DOCKET 50-334/1	8
BV2	PWR	7.875	157.0	78.7	86.6	143.7	119.5	IN.	157	17X17	100.0	kW/l	3-loop	2485	2250	PSIG	DOCKET 50-412	7
BW1	BWR	5.5	218.0	109.0		150	160.2	IN.	560	8X8	50.5	kW/l	BWR/4	1250	1030	PSIG	NUREG/CR-5640	10-5
BW2	BWR	5.5	218.0	109.0		150	187.1	IN.	764	8X8	50	kW/l	BWR/4	1250	1030	PSIG	NUREG/CR-5640	10-5
BY1	PWR	8.5	173.0	86.50		143.7	132.7	IN.	193	17X17	104.5	kW/l	4-loop	2485	2247	PSIG	NUREG/CR-5640	4-58; 4-63
BY2	PWR	8.5	173.0	86.7	95.3	143.7	132.7	IN.	193	17X17	104.5	kW/l	4-loop	2485	2247	PSIG	WCAP-12431	6-17
BZ1	PWR	6.5															NEI 30(372)	58
BZ2	PWR	6.5															NEI 30(372)	58
CAB	PWR	5.8															NEI 30(372)	58
CB1	PWR	8.6	173.0	86.5	95.2	143.7	132.7	IN.	193	17X17	103.5	kW/l	4-loop	2485	2235	PSIG	WCAP-11527	6-25
CB2	PWR	8.625	173.0	86.7	95.3	143.7	132.7	IN.	193	17X17	103.5	kW/l	4-loop	2485	2235	PSIG	WCAP-11941	6-17; A-8
CC1	PWR	8.630	172.0	86.00		136.7	136	IN.	217	14X14	78.5	kW/l	2-LOOP	2485	2250	PSIG	BMI-1280	84; 88
CC2	PWR	8.6	172.0	86.97	95.59	136.7	136	IN.	217	14X14	78.5	kW/l	2-LOOP	2485	2235	PSIG	SWRI-7524	44
CK1	PWR	8.500	173.0	86.50	95.34	143.7	132.7	IN.	193	17X17	98.0	kW/l	4-loop	2485	2235	PSIG	SWRI-7244-001/1	33; 41
CK2	PWR	8.500	173.0	86.50	95.20	143.7	132.7	IN.	193	17X17	98.0	kW/l	4-loop	2485	2235	PSIG	SWRI-06-8888	47; 55
CL1	PWR	8.630	173.0	86.5	95.2	143.7	132.7	IN.	193	17X17	109.2	kW/l	4-loop	2485	2247	PSIG	WCAP-11374/R1	6-16; A-8
CP2	PWR	8.630	167.0	83.50		143.7	132.7	IN.	193	17X17	103.3	kW/l	4-loop	2485	2317	PSIG	DOCKET 50-446/1	TABLE 5.3-5
CPR	BWR	8.380	218.0	109.0		150	187.1	IN.	764	8X8	50	kW/l	BWR/4	1250	1021	PSIG	MATSURV DATABAS	
CR3	PWR	8.4	171.0	85.5	94.1	144	128.9	IN.	177	15X15	79.6	kW/l	L-LOOP	2500	2205	PSIG	BAW-2049	6-9
CTY	PWR	10.78	154.0	77.0	87.8	121.8	119.6	IN.	157	15X15	82.0	kW/l	4-loop	2485	1991	PSIG	DOCKET 50-213	
DAC	BWR	5.000	183.0	91.50		144	129.9	IN.	368	8X8	50.9	kW/l	BWR/4	1250	1040	PSIG	MATSURV DATABAS	
DB1	PWR	8.500	171.0	85.6	94.0	144	128.9	IN.	177	15X15	90.6	kW/l	L-LOOP	2500	2190	PSIG	BAW-1882	6-7; 8-4
DC1	PWR	8.625	173.0	86.7	95.3	143.7	132.7	IN.	193	17X17	102.3	kW/l	4-loop	2485	2233	PSIG	WCAP-11567	6-26; A-8
DC2	PWR	8.5	173.0	86.7	95.6	143.7	132.7	IN.	193	17X17	102.3	kW/l	4-loop	2485	2233	PSIG	WCAP-11851	6-13; 6-25
DR1	BWR	6.000	146.0	73.00				IN.					BWR/1	1250	1000	PSIG	MATSURV DATABAS	
DR2	BWR	6.250	251.0	125.5	131.8	144	182.2	IN.	724	8X8	41.1	kW/l	BWR/3	1250	1030	PSIG	SWRI-06-7484-00	28
DR3	BWR	6.1	251.0	125.5	131.8	144	182.2	IN.	724	8X8	41.1	kW/l	BWR/3	1250	1030	PSIG	SWRI-06-7484-00	28
ERR	PWR	3.0	84.00	42.00				IN.						1	936	PSIG	NEI 30(372)	48
FA1	PWR	7.875	157.0	78.5	86.4	144.0	119.5	IN.	157	17X17	101.0	kW/l	3-loop	2485	2247	PSIG	WCAP-10474	6-26
FA2	PWR	7.875	157.0	78.5	86.4	144.0	119.5	IN.	157	17X17	101.0	kW/l	3-loop	2485	2247	PSIG	WCAP-10425	6-24
FC1	PWR	7.130	140.0	70.7	77.4	128	106.45	IN.	133	14X14	80.4	kW/l	2-LOOP	2250	2085	PSIG	MATSURV DATABAS	
FTZ	BWR	6.7	218.0	109.0		150	160.2	IN.	560	8X8	50.1	kW/l	BWR/4	1250	1004	PSIG	NUREG/CR-5640	10-5
GAR	BWR	4.7															NEI 30(372)	48
GIN	PWR	6.500	132.0	66.0	72.5	144.0	96.5	IN.	121	14X14	89.0	kW/l	2-loop	2485	2237	PSIG	WCAP-10086	6-17
HA1	BWR	5.5	218.0	109.0		150	160.2	IN.	560	8X8	49.2	kW/l	BWR/4	1250	1006	PSIG	NUREG/CR-5640	10-5
HB2	PWR	9.312	156.0	77.97	87.28	144.0	119.5	IN.	157	15X15	82.6	kW/l	3-loop	2485	2250	PSIG	SWRI-02-4397	47
HM3	BWR	5.0	121.0	60.50				IN.					BWR/1				NUREG/CR-5640	8-16
IP2	PWR	8.500	173.0	86.50	95.28	144.0	132.7	IN.	193	15X15	85.0	kW/l	4-loop	2485	2235	PSIG	SWRI-02-5212	35; 43
IP3	PWR	8.6	173.0	86.7	95.6	144.0	132.7	IN.	193	15X15	92.7	kW/l	4-LOOP	2485	2250	PSIG	WCAP-11815	6-33
KO1	PWR	6.500		66.50	72.50										2250	PSIG	SWRI-17-5759-20	35; 41
KWE	PWR	6.5	132.0	66.2	72.8	144.0	96.5	IN.	121	14X14	94.9	kW/l	2-loop	2485	2233	PSIG	WCAP-12020	6-15
LAC	PWR	4.0	99.00	49.50				IN.						1	1285	PSIG	NE&D 8	95
LM2	PWR	7.9															NEI 30(372)	66

47. Partial listing of LEAD.dbf

	PLUX QT	PLUX QT	PLU CAP	PLU ID	PLU QT	PLU QT	BOL ID	BOL QT	BOL QT	BOL YEARS	REF ID	PAGES
0	3.170E+10	9.342E+09	4.576E+18	1.520E+18	9.830E+17	2.680E+17	4.960E+19	3.201E+19	8.738E+18	32.0	SWRI-06-8976	1, 6, 39, 40
	7.900E+09	1.800E+09	7.770E+17	4.140E+17	2.400E+17	5.400E+16	1.100E+19	6.300E+18	1.400E+18	32.0	BAW-1836	6-3, 6-7
			9.750E+18								BAW-1836	6-3, 6-7
			1.030E+19								BAW-1836	6-3, 6-6, 6-7
0	7.900E+09	1.800E+09	7.770E+17	4.140E+17	2.400E+17	5.400E+16	1.270E+19	7.100E+18	1.000E+18	32.0	BAW-1698	6-2, 6-3, 6-4
0	9.400E+09	2.100E+09	3.530E+18	5.299E+17		6.785E+16					BAW-1698	6-2, 6-3, 6-4
			4.280E+18								BAW-1698	6-2, 6-3, 6-4
0	7.900E+09	1.800E+09	7.770E+17	4.100E+17	2.400E+17	5.000E+16	9.750E+18	5.450E+18	1.340E+18	32.0	BAW-2075/R1	6-5, 6-7, 6-8, 6-9
			1.380E+19								BAW-2075/R1	6-5, 6-9
			1.480E+19								BAW-2075/R1	6-5
0	7.716E+09		7.270E+17	4.140E+17	2.300E+17		5.000E+18	2.800E+18	6.600E+17	10.0	BAW-1440	6-2, 6-4, 6-7
0	2.626E+10	7.505E+09	3.400E+18	2.300E+18	1.400E+18	4.000E+17	5.400E+19	3.400E+19	1.000E+19	40.0	BMI-0584	1, 2, 24, 25, 26
0			3.790E+18	9.500E+17			3.030E+19	1.660E+19	3.570E+18	32.0	WCAP-12685	1-2, 6-24, -28, -30
0			3.910E+18	9.800E+17			1.510E+19	8.240E+18	1.780E+18	16.0	WCAP-12845	6-2, 6-24, 28, 29, 7-1
			6.540E+18								WCAP-10867	6-20, 6-29, 6-33, 6-34
0	3.540E+10	7.888E+09	2.530E+18	1.800E+18	1.140E+18	2.540E+17	5.840E+19	3.980E+19	7.970E+18	32.0	WCAP-9808, 10867	1-1, 6-12, -16, -18, -20
0			9.490E+18	8.627E+18			4.070E+19	2.300E+19	5.250E+18	32.0	WCAP-12005	6-12, 6-25, 6-30, 7-1
0			5.990E+18	2.037E+18			6.330E+19	3.600E+19	8.230E+18	32.0	WCAP-12406	6-2, 6-24, 6-29, 7-1
0	1.730E+10	3.270E+09	3.500E+18	1.143E+18		1.187E+17	2.530E+19	1.390E+19	2.630E+18	32.0	WCAP-11651	1-16, 17, -18, -20, -28
0			3.900E+18	9.900E+17			3.030E+19	1.660E+19	3.570E+18	32.0	WCAP-12431	1-2, 4-7, 6-24, 7-1
0			3.680E+19	2.430E+18			1.060E+19	7.310E+18	2.610E+18	32.0	WCAP-10185	6-2, -13, -14, -24
0	1.730E+10	3.270E+09	3.080E+18	8.080E+17	4.440E+17	8.390E+16	3.170E+19	1.730E+19	3.300E+18	32.0	WCAP-11527	6-13, -14, -15, -21
0			3.360E+18	8.296E+17			3.050E+19	1.670E+19	3.680E+18	32.0	WCAP-11941	4-5, 6-24, 6-29, 7-1
0	2.600E+10	6.100E+09	6.200E+18	4.400E+18	2.400E+18	5.600E+17	4.700E+19	2.600E+19	6.100E+18	32.0	BMI-1280	1, 22, 28, 31
0	2.290E+10	5.660E+09	8.080E+18	5.444E+18		8.173E+17	3.800E+19	2.300E+19	5.700E+18	32.0	SWRI-7524	18-20, 23, 39, 41
0			1.800E+18	6.923E+17			1.740E+19			32.0	SWRI-02-4770	1, 8, 18, 41, 42, 43
0			1.880E+19	5.481E+18			1.410E+19	8.520E+18	3.110E+18	32.0	WCAP-12483	1-2, 6-13, 18, 7-1, All
0			9.224E+18	2.300E+18			2.100E+19	1.300E+19	3.200E+18	32.0	SWRI-02-6159	1, 8, 16, 19, 20, 22, 40
0			1.300E+19	3.600E+18			2.300E+19	1.400E+19	3.500E+18	32.0	SWRI-7244-081/1	1, 7, 16, 18, 19, 21, 36
0			2.670E+18	6.700E+17			2.000E+19	1.200E+19	3.000E+18	32.0	SWRI-02-5928	1, 8, 16, 18, 19, 36
0	1.121E+10	2.142E+09	1.002E+19	3.406E+18	1.865E+18	3.562E+17	2.067E+19	1.132E+19	2.161E+18	32.0	SWRI-06-8888	1, 7, 23, 35
0			5.307E+18	1.880E+18			1.600E+19	9.800E+18	2.500E+18	32.0	SWRI-7244-082/1	1, 7, 17, 18, 34
0	1.750E+10	4.330E+09	4.017E+18	8.470E+17	4.730E+17	1.170E+17	2.580E+19	1.440E+19	3.550E+18	32.0	WCAP-11374/R1	6-18, -20, -22, -31
0			1.290E+19	3.440E+18			2.390E+19	1.310E+19	2.820E+18	32.0	WCAP-12946	1-1, 3-4, 5, 6-23, 29
0	1.207E+09		2.300E+17	3.593E+17				1.200E+18		32.0	MODE-103-0886	2-1, 2-2, 2-3, 4-2
0	6.443E+09	1.611E+09	1.830E+18	2.830E+17		3.620E+16	1.300E+19			32.0	BAW-1679/R1	6-2, 6-4, 6-7
0	6.443E+09	1.611E+09	1.830E+18	2.830E+17		3.620E+16	1.300E+19			32.0	BAW-1718	4-2, 4-4, 4-5
0	7.100E+09	1.700E+09	6.500E+18	1.920E+18	1.070E+18	2.520E+17	9.640E+18	5.380E+18	1.270E+18	32.0	BAW-1898	6-3, 6-4, 6-5, 6-6
0	6.900E+09	1.600E+09	7.300E+18	1.870E+18	1.040E+18	2.480E+17	9.300E+18	5.280E+18	1.250E+18	32.0	BAW-1899	6-2, -3, -4, -5, -6
0	6.000E+09	1.300E+09	1.080E+19	1.720E+18	1.040E+18	2.430E+17	1.080E+19	6.000E+18	1.300E+18	32.0	BAW-2049	6-5, 6-6, 6-7, 6-8
0			2.340E+18	2.430E+18							WCAP-10236	6-15, -21, -38
0			2.070E+18	1.590E+18			2.510E+19			30.0	BMI-1070	1, 41, 52
0			2.480E+19	2.560E+19			5.900E+19	2.700E+19	3.800E+19	27.0	WCAP-10236	1-1, 1-2, 6-24, 6-38
0			5.280E+18	5.440E+18							WCAP-10236	6-15, 6-38
0			4.040E+18	3.100E+18			3.600E+19			30.0	BMI-0372-A	1, 36
0			1.790E+19	1.830E+19							WCAP-10236	6-15, 6-38
0			1.790E+19	1.140E+19			4.100E+19	2.200E+19	3.300E+18	27.0	WCAP-9339	1-1/4, 1/6-3, -13, -17
0	2.626E+09		4.930E+17	6.282E+17				3.600E+18		32	NEDC-31166/R1	3-1, 4-2, 3, 4-4-6
0	1.400E+10	3.400E+09	1.290E+19	2.130E+18	1.200E+18	2.800E+17	1.700E+19	9.400E+18	2.200E+18	32.0	BAW-1882	6-3, 6-4, 6-5, 6-7
0	1.100E+10	2.500E+09	1.152E+19	1.510E+18	8.400E+17	1.900E+17	1.600E+19	8.900E+18	2.000E+18	32.0	BAW-1834	6-3, 6-4, 6-5, 6-6
0	8.305E+09	1.950E+09	9.630E+18	2.440E+18	1.340E+18	3.350E+17	1.110E+19	6.200E+18	1.520E+18	32.0	BAW-2125	6-5, 6-7, 6-8, 6-9
0	8.800E+09	2.000E+09	1.980E+18	5.190E+17	2.800E+17	6.500E+16	2.000E+19	1.100E+19	2.300E+18	32.0	BAW-1701	6-3, 6-4, 6-5
0	9.020E+09	1.540E+09	2.980E+18	9.080E+17	4.740E+17	8.090E+16	2.190E+19	1.140E+19	1.950E+18	40.0	WCAP-11567	6-14, -16, -20, -22, 7-1
0	9.180E+09	1.860E+09	3.510E+18	6.950E+17	3.710E+17	7.510E+16	2.180E+19	1.180E+19	2.340E+18	40.0	WCAP-11851	6-10, 13, 14, 19, 21, 7-1
			1.280E+19								NEDC-12585	67
			1.200E+19								NEDC-12585	67
			1.000E+19								NEDC-12585	58, 67
			1.000E+19								NEDC-12585	58, 67
			1.000E+19								NEDC-12585	58, 67
			2.980E+19								BCL-585-3	22, 23
			2.230E+19								BCL-585-3	22, 23
			1.870E+19								BCL-585-3	22, 23
			19.330E+18								BCL-585-3	22, 23
			1.200E+16								NEDC-12585	63, 64, 67
			1.300E+16								NEDC-12585	63, 64, 67
			9.500E+18								NEDC-12585	63, 64, 67
			1.400E+19								NEDC-12585	63, 64, 67
			6.400E+18								NEDC-12585	63, 64, 67
			6.400E+18								NEDC-12585	63, 64, 67

Table

PLANT ID	CAPRUL	CONFID	AZIMUTH	CORE DIST	CORE DIST U	EFF TIME	EFF T U	LEAD ID	LEAD OF	LEAD BT	LEAD NOT	FLUX CAP	FLUX ID
ADI	V		13.0	42.375	IN.	359.0	D	3.00	4.66		17.07	1.477E+11	4.917E+11
ANI	A	1 OF 2	11.0	211.0	CM	345.0	D	1.76	3.03		13.46	2.440E+10	1.390E+11
ANI	A	2 OF 2	11.0	202.0	CM	943.0	D					1.300E+11	
ANI	A	TOTAL	11.0	211.0	CM	345.0	D	1.76	3.03		13.46	2.440E+10	1.390E+11
ANI	B	1 OF 2	11.0	211.0	CM	374.0	D	6.70	11.69		52.32	1.100E+11	1.640E+11
ANI	B	2 OF 2	11.0	202.0	CM								
ANI	B	TOTAL	11.0	211.0	CM	345.0	D	1.77	3.03	6.06	14.54	2.440E+10	1.390E+11
ANI	C	1 OF 2	11.0	211.0	CM	1.610E+08	D						
ANI	C	2 OF 2	11.0	202.0	CM								
ANI	C	TOTAL	11.0	211.0	CM	345.0	D	1.76	3.16		8.90	6.400E+10	4.315E+11
ANI	E		97.0			1.69	Y	1.48	2.43			1.090E+11	2.790E+11
ANI	W97		97.0			1.10	Y	4.00				1.080E+11	2.702E+11
BD1	U		58.5			1.15	Y	4.00				5.780E+10	
BD2	U		58.5			1.130E+08	S				10.04	7.910E+10	5.770E+11
BD2	U		25.0	191.2	CM	3.220E+07	S	1.37	2.34			5.110E+10	4.645E+11
BY1	U		15.0	191.2	CM	5.89	Y	1.10				1.530E+11	5.204E+11
BY1	V		25.0			1.24	Y	2.94				9.850E+10	3.150E+11
BY1	W		243.0			3.630E+07	S	3.06	5.57	12.33	29.49	1.090E+11	2.725E+11
BY2	U		58.5			1.15	Y	4.00				1.580E+11	1.051E+11
BY2	U		58.5			2.330E+08	S	15.05				1.300E+11	3.140E+11
BY2	U		22.75			0.793	Y	3.85	6.94	15.75	36.71	1.240E+11	3.061E+11
CAB	N		301.5	81.63	IN	0.86	Y	4.85			11.07	6.710E+10	4.700E+11
CB1	Z		301.5	81.63	IN	2.94	Y	1.43	2.58		9.86	5.500E+10	3.770E+11
CB2	Z		263.0			1.671E+03	D	1.48	2.44			4.500E+10	1.730E+11
CC1	W263		263.0	217.1	CM	461.94	D	2.80				6.300E+10	1.895E+11
CC2	W263		40.0			9.17	Y	3.43				6.700E+10	2.630E+11
CK1	T		40.0	211.4	CM	1.271E+03	D	3.19				6.400E+10	2.410E+11
CK1	U		220.0	211.9	CM	1.805E+03	D	3.61			28.12	6.019E+10	2.040E+11
CK1	X		320.0	211.9	CM	396.19	D	3.24				6.357E+10	1.900E+11
CK1	Y		40.0	211.9	CM	5.273	Y	2.94	5.37			9.849E+10	3.140E+11
CK2	T		220.0	211.41	CM	3.24	Y	3.57			27.95	8.890E+10	2.371E+11
CK2	X		320.0	211.9	CM	3.24	Y	3.85	6.91	10.46		1.030E+09	1.641E+11
CK2	Y		58.5	81.63	IN	3.320E+07	S	3.77				1.030E+09	1.220E+11
CL1	U		241.0			4.80	Y	0.64	0.87		29	4.510E+10	1.220E+11
CL1	Y		30.0			2.140E+08	S	3.71	7		29	4.510E+10	1.220E+11
CPR	I		26.9	201.84	CM	268.8	D	3.71	7			5.120E+10	1.280E+11
CR3	B		26.9	201.84	CM	268.8	D	3.42	6.13	12.31	26.03	4.900E+10	1.240E+11
CR3	B		11.0	202.0	CM	1.462E+03	D	4.81	7.21	14.45	30.49	4.900E+10	1.000E+11
CR3	C		27.0	202.0	CM	1.733E+03	D	4.28	10.38	21.56	44.63	3.980E+10	4.097E+11
CR3	D		11.0	202.0	CM	1.876E+03	D	8.97				3.490E+10	2.680E+11
CR3	F		43.5	184.1	CM	5.930E+07	S	1.30				7.480E+10	7.710E+11
CTY	A					1.640E+04	H	0.97				6.390E+10	6.577E+11
CTY	A					3.320E+08	S	0.97				4.927E+10	3.780E+11
CTY	D		43.5			8.270E+07	S	0.97				7.490E+10	7.740E+11
CTY	F		43.5			2.6	Y	1.30				7.490E+10	4.394E+11
CTY	F					2.390E+08	S	0.97				6.900E+10	3.333E+11
CTY	H		43.5			2.594E+08	S	1.57				2.600E+09	3.333E+11
CTY	H		43.5			1.872E+08	S	1.78	99			1.230E+11	2.610E+11
DAC	I		11.0	202.0	CM	1.214E+03	D	4.88	10.75	21.86	46.07	7.266E+10	2.010E+11
DB1	A		27.0	202.0	CM	943.0	D	3.92	7.85	14.44	31.16	5.600E+10	1.490E+11
DB1	B		26.9	202.0	CM	374.0	D	3.94	7.87	13.96	28.72	6.080E+10	1.610E+11
DB1	D		27.0	202.0	CM	1.990E+03	D	3.78	7.80	14	30.15	6.080E+10	1.610E+11
DB1	F		320.0	83.23	IN	1.26	Y	3.28	6.29	18.12	36.84	7.510E+10	1.730E+11
DC1	S		56.0	81.62	IN	0.99	Y	5.85	9.46	26.53	46.74	1.120E+11	1.730E+11
DR1	2		206.0			3.871E+07	S					3.100E+11	
DR1	2		206.0			1.923E+08	S					5.300E+10	
DR1	4-1		82.0			1.923E+08	S					5.300E+10	
DR1	4-1		82.0			1.923E+08	S					4.110E+11	
DR1	4-1		82.0			839.0	D					3.070E+11	
DR1	4-1		0.0			839.0	D					2.570E+11	
DR2	2		0.0			839.0	D					1.290E+11	
DR2	2		0.0			839.0	D					6.000E+08	
DR2	2		0.0			839.0	D					6.200E+08	
DR2	2		35.0			2.057E+07	S					4.600E+11	
DR2	3		35.0			2.057E+07	S					6.800E+11	
DR2	3		90.0			2.057E+07	S					3.100E+11	
DR2	4		90.0			2.057E+07	S					3.100E+11	
DR2	4		90.0			2.057E+07	S					3.100E+11	
DR2	4		90.0			2.057E+07	S					3.100E+11	

of HEAT_LST.dbf

S	LENGTH U	SOURCE	MPC ID	MPC HEAT	REF ID	PAGES	NOTES
in		FABR			ORNL-4816/3	76; 78	
in		FABR			NUREG/CR-4092	1, 2, 17	
in		FABR			NUREG/CR-4092	1, 2, 17	
in		FABR			NUREG/CR-4092	1, 2, 17	
in		FABR			ORNL-4871	10	
in		FABR			ORNL-4871	42, 43	
in					ORNL-4871	1, 2, 3	FROM HSST 01, SECTION L
in					ORNL-4871	1, 2, 3, 15	PVRC #315, CODE CASE 1339
in		FABR			NUREG/CR-5696	9	FABR. BY B&W FOR WESTINGHOUSE
in		CUTOUT			NUREG/CR-5696	9	TWO FILLER WIRES USED
in		CUTOUT	E23	62N	NUREG/CR-5696	9	FILLER WIRE A
in		CUTOUT	E23	62N	NUREG/CR-5696	9	FILLER WIRE B
in		CUTOUT			NUREG/CR-5696	9	
in		CUTOUT			NUREG/CR-5696	9	
in		CUTOUT			NUREG/CR-5696	9	
in		CUTOUT			NUREG/CR-5696	9	
in		CUTOUT			NUREG/CR-5696	9	
in		FABR			NUREG/CR-3978	1, 2	
in					NUREG/CR-3978	1, 2	MADE FOR EPRI
in					NUREG/CR-3978	1, 2	MADE FOR EPRI
in					NUREG/CR-3978	1, 2	
in					NUREG/CR-3978	1, 2	
mm		CUTOUT	E32	FG2C13	IAEA TRS 265	5	OTHER MPC ID = F41, F42, F43
mm		CUTOUT			IAEA TRS 265	5	PARENT FORGING OF WFRA12
mm		SCR	E32	JP212	IAEA TRS 265	5	
					IAEA TRS 265	5; 97	SEE ASTM STP 1046
					IAEA TRS 265	5; 94; 103	HAZ OF WJAP12
mm			E32	F63449	IAEA TRS 265	5	
mm			E32	JP107	IAEA TRS 265	5	
in		FABR			IAEA TRS 265	5	
in		FABR			IAEA TRS 265	5; 99	RISO ANALYSIS PHASE 1
mm			E32	F61-F64	IAEA TRS 265	5	
mm			E32	FRG	IAEA TRS 265	5	
mm			E32	JW502	IAEA TRS 265	5	
in		FABR			IAEA TRS 265	5; 100	
in		FABR			IAEA TRS 265	5; 100	BLOCK MX
mm					IAEA TRS 265	5; 103	3/4 T LOCATION OF WJAP12
in		FABR			IAEA TRS 265	5; 99	
mm					IAEA TRS 265	5; 88	BLOCK 14
mm					IAEA TRS 265	5; 88	
in		FABR			IAEA TRS 265	5; 99	
in		FABR			IAEA TRS 265	5; 99	
in		FABR			IAEA TRS 265	5; 99	
in		FABR			IAEA TRS 265	5; 107; 108	GKSS ANALYSIS
in		FABR			IAEA TRS 265	5; 99	GKSS ANALYSIS PHASE 2
mm					IAEA TRS 265	5; 95	3/4 T LOCATION OF PFRA11
in		FABR			IAEA TRS 265	5; 100	COMBINATION OF SECT. GG AND LZ
in		FABR			IAEA TRS 265	5; 100	
mm		CUTOUT			IAEA TRS 265	5; 95	0 T LOCATION OF FFRA11
mm		CUTOUT			IAEA TRS 265	5; 95	1/2 T LOCATION OF FFRA11
mm		CUTOUT			IAEA TRS 265	5; 95	3/4 T LOCATION OF FFRA11
mm		SCR			IAEA TRS 265	5; 90	0 T LOCATION OF FIAP11
mm		SCR			IAEA TRS 265	5; 90	1/2 T LOCATION OF FIAP11
mm		SCR			IAEA TRS 265	5; 90	3/4 T LOCATION OF FIAP11
mm					IAEA TRS 265	5; 94	0 T LOCATION OF PFRA11
mm					IAEA TRS 265	5; 87	1/2 T LOCATION OF PFRA11
mm					IAEA TRS 265	5; 90	0 T LOCATION OF PIAP11
mm					IAEA TRS 265	5; 90	1 T LOCATION OF PIAP11
mm					IAEA TRS 265	5; 90	1/2 T LOCATION OF PIAP11
mm					IAEA TRS 265	5; 90	3/4 T LOCATION OF PIAP11
mm					NUREG/CR-2487	3	PARENT PLATE OF WJAP12
mm					IAEA TRS 265	5; 93	0T LOCATION OF PIAP12
in		FABR			IAEA TRS 265	5; 98	MIXTURE OF 1/4 T AND 3/4 T

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Table 48, Partial listing

TAG	EXP ID	HEAT ID	RPT ID	HEAT NO	PROD ID	MAT ID	SUPPLIER	THICKNESS
E	HSST-0	SHSS03J	HSST03, SECTION J	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	HSST-0	SHSS03LF	HSST03, SECTION LF	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	HSST-0	SHSS03LS	HSST03, SECTION LS	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	HSST-0	SHSS03PL	HSST03, SECTION PL	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	HSST-1	SHSS01B 14	HSST01, SEC. B, 1/4T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0
E	HSST-1	SHSS02FB13	HSST02, SECT.FB, 1/3T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0
E	HSST-1	WHSS51B	HSST NO. 51, SECT.B9		W	A533B1		11.75
E	HSST-1	WHSS53E	HSST NO. 53, SECT.E2		W	A302B		6.375
E	HSST-2	WHSS61	61W, ALSO CODE W, W1		W	A533B1	B&W	9.75
E	HSST-2	WHSS62	62W		W	A5082	B&W	12.0
E	HSST-2	WHSS62A	62WA (ALSO: 62N(2))		W	A5082	B&E	12.0
E	HSST-2	WHSS62B	26WB (ALSO: 62N(1))		W	A5082	B&W	12.0
E	HSST-2	WHSS63	63W (ALSO: 63N)		W	A5082	B&W	12.0
E	HSST-3	WHSS64	64W		W	A5082	B&W	12.0
E	HSST-3	WHSS65	65W		W	A5082	B&W	12.0
E	HSST-3	WHSS66	66W		W	A5082	B&W	12.0
E	HSST-3	WHSS67	67W		W	A5082	B&W	12.0
E	HSST-4	SHSS02GA	HSST02, SECTION GA	A1195-1	SRM	A533B1	LUKENS STEEL	12.0
E	HSST-4	WHSS68	68W, CODE CGS		W	A533B1	COMBUSTION ENG.	0.178
E	HSST-4	WHSS69	69W, CODE CHS		W	A533B1	COMBUSTION ENG.	0.300
E	HSST-4	WHSS70	70W, CODE MK-W-124		W	A533B1	B&W	0.175
E	HSST-4	WHSS71	71W, CODE MK-W-80		W	A533B1	B&W	0.175
E	IAEA	FFRAI1	CODE FF, F4		F	A5083	FRAMATOME	230.0
E	IAEA	FFRAI2	CODE FM		F	A5083	FRAMATOME	220.0
E	IAEA	FJAPI1	CODE JF (212, 213)		F	A5083	JAPAN STEEL	302.0
E	IAEA	HFRAI2	CODE FH; FROM WFRAI2		HAZ	A5083		
E	IAEA	HJAPI2	HAZ OF JW		HAZ	A533B1		
E	IAEA	PFRAI1	CODE FP, F3		P	A533B1	MARREL	310.0
E	IAEA	PIAPI1	CODE JP (107)		P	A533B1	NIPPON STEEL	251.0
E	IAEA	SHSS03	HSST03, UNSPEC.SECT.	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEA	SHSS03LK	HSST03, SECTION LK	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEA	WFRAI2	CODE FW		W	A5083	FRAMATOME	220.0
E	IAEA	WFRGI1	CODE GW		W	A533B2	THYSSEN	250.0
E	IAEA	WJAPI2	CODE JW (1/4 T)		W	A533B1	MITSUBISHI	248.0
E	IAEAB	SHSS03MN	HSST03, SECTION MN	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEAB	SHSS03MX	HSST03, SECTION MX	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEAB	WJAPI23/4T	CODE JW, 3/4 T		W	A533B1	MITSUBISHI	248.0
E	IAEAC	SHSS03LJ	HSST03, SECTION LJ	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEAD	WFRAI2 0T	CODE FW, 0T LOCATION		W	A5083	FRAMATOME	220.0
E	IAEAD	WFRAI23/4T	CODE FW, 3/4 T		W	A5083	FRAMATOME	220.0
E	IAEAF	SHSS03LQ	HSST03, SECTION LQ	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEAF	SHSS03LU	HSST03, SECTION LU	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEAG	SHSS03MD	HSST03, SECTION MD	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEAG	SHSS03NR	HSST03, SECTION NR	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEAG	SHSS03PC	HSST03, SECTION PC	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEAI	PFRAI13/4T	CODE FP, 3/4 T		P	A533B1	MARREL	310.0
E	IAEAI	SHSS03GGLZ	HSST03, SECT. CG/LZ	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEAK	SHSS03MQ	HSST03, SECTION MQ	C2702	SRM	A533B1	LUKENS STEEL	12.0
E	IAEAM	FFRAI1 0T	CODE FF, 0T LOCATION		F	A5083	FRAMATOME	230.0
E	IAEAM	FFRAI11/2T	CODE FF, 1/2 T		F	A5083	FRAMATOME	230.0
E	IAEAM	FFRAI13/4T	CODE FF, 3/4 T		F	A5083	FRAMATOME	230.0
E	IAEAM	FJAPI1 0T	CODE JF, 0T LOCATION		F	A5083	JAPAN STEEL	302.0
E	IAEAM	FJAPI11/2T	CODE JF, 1/2 TF		F	A5083	JAPAN STEEL	302.0
E	IAEAM	FJAPI13/4T	CODE JF, 3/4 T		F	A5083	JAPAN STEEL	302.0
E	IAEAM	PFRAI1 0T	CODE FP, 0T LOCATION		P	A533B1	MARREL	310.0
E	IAEAM	PFRAI11/2T	CODE FP, 1/2 T		P	A533B1	MARREL	310.0
E	IAEAM	PIAPI1 0T	CODE JP		P	A533B1	NIPPON STEEL	251.0
E	IAEAM	PIAPI1 1T	CODE JP		P	A533B1	NIPPON STEEL	251.0
E	IAEAM	PIAPI11/2T	CODE JP		P	A533B1	NIPPON STEEL	251.0
E	IAEAM	PIAPI13/4T	CODE JP		P	A533B1	NIPPON STEEL	251.0
E	IAEAM	PIAPI2	CODE LG (PM OF JW)		P	A533B1	JAPAN STEEL	248.0
E	IAEAM	PIAPI2 0T	PM OF JW		P	A533B1	MITSUBISHI	248.0
E	IAEAM	SHSS03A	HSST03, SECTION A	C2702	SRM	A533B1	LUKENS STEEL	12.0

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Partial listing of CHEM.dbf

U	V	B	TI	CO	N	O	SB	AS	ZR	AL	PB	W	SN	ZN	TA	NB	REF ID	PAGES
030	0.010			0.008						0.026					0.005		ASTM STP 782/433	435
046	0.002		0.003	0.008	0.009		0.001	0.006		0.022			0.006				ASTM STP 782/433	435
046	0.002			0.008	0.009		0.001	0.006		0.023			0.006				IAEA TRS 265	11; 86
046	0.002		0.003	0.009	0.009		0.001	0.005		0.013			0.004				ASTM STP 782/433	435
028	0.002			0.022	0.010		0.006	0.004		0.013			0.004				IAEA TRS 265	11; 87
037	0.002			0.022	0.010		0.006	0.004					0.004				IAEA TRS 265	11; 87
028	0.002		0.016	0.022	0.010		0.006	0.004					0.004				ASTM STP 782/433	435
037	0.002		0.016	0.024	0.010		0.005	0.004					0.004				ASTM STP 782/433	435
037	0.002		0.016	0.024	0.010		0.005	0.004					0.004				ASTM STP 782/433	435
037	0.002		0.016	0.024	0.010		0.005	0.004					0.010				IAEA TRS 265	11; 87
037	0.002			0.024	0.010		0.005	0.004		0.017							IAEA TRS 265	11; 88
0.05	<0.01			>0.03													IAEA TRS 265	7; 88
0.05	<0.01			>0.03													IAEA TRS 265	11; 88
0.03	0.008						0.010	0.022		0.031			0.008				IAEA TRS 265	11; 88
0.03	0.008						0.010	0.022		0.031			0.008				IAEA TRS 265	11; 86
0.03	0.008			0.165			0.001	0.008		0.024			0.007				IAEA TRS 265	11; 86
0.00	<0.05			0.930			0.010	0.008		0.024			0.007				IAEA TRS 265	11; 87
0.00	0.002						0.005	0.019		0.028			0.005				IAEA TRS 265	11; 87
0.00	0.002						0.005	0.019		0.028			0.005				IAEA TRS 265	11; 86
0.00	0.002				0.118		0.009	0.007		0.020			0.003				IAEA TRS 265	11; 86
0.021	<0.05				0.106		0.001	0.007		0.020			0.003				IAEA TRS 265	11; 88
0.00	0.008						0.005	0.057		0.010			0.007				IAEA TRS 265	11; 89
0.00	0.003						0.006	0.010		0.020			0.005				IAEA TRS 265	11; 89
0.00	<0.05				0.113		0.006	0.010		0.015			0.006				IAEA TRS 265	11; 87
0.045	0.004						0.043	0.010		0.015			0.006				IAEA TRS 265	11; 87
0.045	<0.05				0.131		0.043	0.010		0.015			0.006				IAEA TRS 265	11; 88
0.067										0.023							GRSS-1	TABLE 1; TABLE 2
0.060	0.010									0.013							GRSS-1	TABLE 1; TABLE 2
0.030	0.010									0.010							JUL-SPEZ-406	41; 53
0.035																	IAEA TRS 265	6; 88
0.080	0.010			0.020													IAEA TRS 265	6; 88
0.070	<0.01			0.020													IAEA TRS 265	6; 88
0.070	<0.01			0.020													IAEA TRS 265	5; 7
0.070	<0.01																IAEA TRS 265	6; 86
0.040	<0.01			0.008						0.031							IAEA TRS 265	6; 86
0.040	<0.01			0.008						0.023							IAEA TRS 265	6; 86
0.040	<0.01			0.008						0.023							IAEA TRS 265	6; 86
0.030	<0.01			0.008						0.026							IAEA TRS 265	6; 87
0.030							0.021	0.022		0.020			0.004				IAEA TRS 265	6; 87
0.030							0.022	0.020		0.020			0.004				IAEA TRS 265	6; 87
0.030							0.021	0.020		0.023			0.004				IAEA TRS 265	6; 87
0.030							0.021	0.023		0.023			0.004				IAEA TRS 265	6; 87
0.030							0.021	0.020		0.023			0.005				IAEA TRS 265	6; 87
0.030							0.020	0.023		0.023			0.004				IAEA TRS 265	6; 86
0.010																0.005	IAEA TRS 265	6; 86
0.010	0.002				0.008		0.008	0.003		0.020							IAEA TRS 265	11; 88
0.040	0.008				0.153		0.005	0.057		0.010			0.007				IAEA TRS 265	7; 88
0.050	0.010				0.023												IAEA TRS 265	7; 88
0.070	<0.01																IAEA TRS 265	7; 88
0.056	0.011			0.022													IAEA TRS 265	7; 89
0.030	<0.01			<0.01	0.010	0.029				0.013						<0.01	IAEA TRS 265	7; 89
0.040	<0.01			<0.01	0.010	0.027				0.014						<0.01	IAEA TRS 265	7; 89
0.030	<0.01			<0.01	0.011	0.027				0.015						<0.01	IAEA TRS 265	7; 89
0.040	<0.01			<0.01	0.011	0.030				0.015						<0.01	IAEA TRS 265	7; 89
0.040	0.009			0.028	0.010		0.003	0.005		0.010			0.012				IAEA TRS 265	6; 87
0.010	0.002				0.008		0.008	0.003		0.020						0.005	IAEA TRS 265	6; 87
0.040	0.007				0.028	0.011	0.003	0.005		0.008			0.007				IAEA TRS 265	6; 87
0.040	0.011				0.027	0.011	0.003	0.005		0.007			0.011				IAEA TRS 265	6; 87
0.150	0.010																NUREG/CR-5357	45
0.140	0.002									0.014							NUREG/CR-5357	45
0.010	0.100									0.021							NUREG/CR-5357	45
0.010	0.100									0.016							NUREG/CR-5357	45
0.100	0.100									0.013							NUREG/CR-5357	3; 4
0.040										0.011							NUREG/CR-5357	45
0.260	0.002																ASTM STP 484/74	87; 88
0.220																	ASTM STP 484/74	87; 88
										0.031							ASTM STP 484/74	87; 88

NUREG/CR-6506

Table 49. P

EXP ID	HEAT ID	PROD ID	MAT ID	CHEM LAB	SPEC ID	C	MN	P	S	SI	NI	CR	MO	CO
IAEAB	FJAPI	F	A5083	AERE	HEAT	0.180	1.310	0.007	0.005	0.280	0.740	0.110	0.480	0.000
IAEAB	FJAPI	F	A5083	AERE	JF1	0.188	1.365	0.008	0.004	0.280	0.775	0.125	0.495	0.000
IAEAB	FJAPI	F	A5083	AERE	BL 230	0.188	1.370	0.007	0.004	0.280	0.770	0.125	0.490	0.000
IAEAB	FJAPI	F	A5083	AERE	JF2	0.175	1.340	0.007	0.004	0.280	0.770	0.130	0.490	0.000
IAEAB	WJAP2	W	A53381	AERE	HEAT	0.118	1.330	0.008	0.004	0.280	0.990	0.100	0.520	0.000
IAEAB	WJAP2	W	A53381	AERE	HEAT	0.083	1.240	0.008	0.004	0.280	0.860	0.070	0.520	0.000
IAEAB	WJAP2	W	A53381		JW513	0.117	1.330	0.009	0.005	0.285	0.790	0.100	0.530	0.000
IAEAB	WJAP2	W	A53381		JW513	0.083	1.235	0.009	0.005	0.305	0.865	0.070	0.525	0.000
IAEAB	WJAP2	W	A53381		JW512	0.080	1.235	0.009	0.005	0.310	0.875	0.070	0.520	0.000
IAEAB	WJAP2	W	A53381		JW512	0.082	1.230	0.009	0.005	0.305	0.875	0.070	0.520	0.000
IAEAB	WJAP23/4T	W	A53381	AERE	HEAT	0.080	1.230	0.008	0.004	0.300	0.870	0.070	0.520	0.000
IAEAD	WFRAD 0T	W	A5083	RISO	HEAT	0.052	1.520	0.007	0.007	0.390	0.800	<.005	0.620	0.000
IAEAD	WFRAD23/4T	W	A5083	RISO	HEAT	0.062	1.480	0.007	0.008	0.350	0.780	0.100	0.620	0.000
IAEAF	FFRAJ1	F	A5083	SEN	BL 23	0.130	1.340	0.009	0.009	0.240	0.680	0.240	0.460	0.000
IAEAF	FFRAJ1	F	A5083	SEN	BL 34	0.161	1.320	0.009	0.006	0.260	0.715	0.235	0.490	0.000
IAEAF	FJAPI	F	A5083	SEN	BL 227	0.171	1.280	0.009	0.003	0.275	0.740	0.120	0.450	0.000
IAEAF	FJAPI	F	A5083	SEN	BL 227	0.180	1.340	0.009	0.005	0.280	0.780	0.110	0.500	0.000
IAEAF	FFRAJ1	P	A53381	SEN	BL 17	0.230	1.480	0.008	0.002	0.230	0.660	0.030	0.510	0.000
IAEAF	FFRAJ1	P	A53381	SEN	BL 17	0.228	1.430	0.008	0.002	0.215	0.640	0.045	0.495	0.000
IAEAF	PIAPI	P	A53381	SEN	BL 110	0.180	1.480	0.009	0.004	0.220	0.660	0.200	0.570	0.000
IAEAF	PIAPI	P	A53381	SEN	BL 110	0.175	1.400	0.009	0.004	0.215	0.630	0.170	0.540	0.000
IAEAF	WFRAD	W	A5083	SEN	HEAT	0.060	1.500	0.012	0.008	0.370	0.790	0.070	0.620	0.000
IAEAF	WFRG11	W	A53382	SEN	BL E	0.075	1.480	0.015	0.009	0.160	0.930	0.020	0.620	0.000
IAEAF	WFRG11	W	A53382	SEN	BL E	0.072	1.440	0.015	0.005	0.200	0.930	0.025	0.600	0.000
IAEAF	WJAP2	W	A53381	SEN	HEAT	0.080	1.170	0.011	0.008	0.370	0.730	0.070	0.470	0.000
IAEAF	WJAP2	W	A53381	SEN	HEAT	0.067	1.170	0.011	0.003	0.315	0.900	0.060	0.495	0.000
IAEAG	FFRAJ1	F	A5083	GKSS	BL 36			0.009	0.008		0.690			0.000
IAEAG	FJAPI	F	A5083	GKSS	HEAT	0.180	1.330	0.009	0.005	0.270	0.760	0.120	0.500	0.000
IAEAG	WFRG11	W	A53382		HEAT	0.075	1.480	0.015	0.009	0.160	0.930	0.020	0.620	0.000
IAEAK	WFRG11	W	A53382		HEAT	0.080	1.430	0.013	0.005	0.165	0.930	0.020	0.610	0.000
IAEAM	FFRAJ1	F	A5083	FRAMATOME	LADLE	0.130	1.300	0.010	0.005	0.280	0.720	0.240	0.500	0.000
IAEAM	FFRAJ1	F	A5083	FRAMATOME	HEAT	0.130	1.370	0.009	0.008	0.250	0.690	0.240	0.470	0.000
IAEAM	FFRAJ1	F	A5083	FRAMATOME	HEAT	0.130	1.330	0.008	0.007	0.240	0.670	0.240	0.490	0.000
IAEAM	FFRAD	F	A5083	FRAMATOME	HEAT	0.130	1.370	0.009	0.008	0.250	0.680	0.240	0.480	0.000
IAEAM	FJAPI	F	A5083	JAPAN STEEL	LADLE	0.180	1.380	0.007	0.007	0.240	0.750	0.110	0.490	0.000
IAEAM	FJAPI	F	A5083	JAPAN STEEL	BL D	0.180	1.330	0.007	0.005	0.270	0.780	0.130	0.510	0.000
IAEAM	FJAPI	F	A5083	JAPAN STEEL	BL E	0.180	1.340	0.007	0.005	0.260	0.780	0.110	0.490	0.000
IAEAM	FJAPI	F	A5083	JAPAN STEEL	BL F	0.180	1.310	0.007	0.005	0.260	0.740	0.110	0.480	0.000
IAEAM	FFRAJ1	P	A53381	FRAMATOME	LADLE	0.230	1.470	0.008	0.003	0.220	0.650	0.040	0.520	0.000
IAEAM	FFRAJ1	P	A53381	FRAMATOME	BL A	0.230	1.440	0.007	0.002	0.230	0.650	0.030	0.510	0.000
IAEAM	FFRAJ1	P	A53381	FRAMATOME	BL Z	0.230	1.430	0.007	0.002	0.230	0.650	0.030	0.500	0.000
IAEAM	FFRAJ1 0T	P	A53381	FRAMATOME	HEAT	0.225	1.480	0.007	0.002	0.230	0.660	0.030	0.520	0.000
IAEAM	FFRAJ1 0T	P	A53381	FRAMATOME	HEAT	0.230	1.450	0.007	0.002	0.230	0.650	0.030	0.510	0.000
IAEAM	FFRAJ1 1/2T	P	A53381	FRAMATOME	TETE	0.240	1.530	0.007	0.003	0.240	0.680	0.030	0.530	0.000
IAEAM	FFRAJ1 1/2T	P	A53381	FRAMATOME	PIED	0.225	1.430	0.006	0.002	0.230	0.650	0.030	0.500	0.000
IAEAM	PIAPI	P	A53381	NIPPON STEEL	LADLE	0.180	1.400	0.007	0.004	0.220	0.660	0.200	0.580	0.000
IAEAM	PIAPI	P	A53381	NIPPON STEEL	HEAT	0.180	1.480	0.007	0.007	0.220	0.660	0.200	0.570	0.000
IAEAM	WFRAD	W	A5083	SEN	HEAT	0.073	1.660	0.012	0.007	0.410	0.715	0.035	0.525	0.000
IAEAM	WFRAD	W	A5083	FRAMATOME	HEAT	0.056	1.370	0.015	0.011	0.540	0.580	0.045	0.520	0.000
IAEAM	WFRAD	W	A5083	FRAMATOME	HEAT	0.150	1.360	0.009	0.008	0.230	0.680	0.240	0.480	0.000
IAEAM	WFRAD	W	A5083	FRAMATOME	HEAT	0.075	1.600	0.011	0.008	0.375	0.730	0.085	0.530	0.000
IAEAM	WFRG11	W	A53382	THYSSEN AG	HEAT	0.075	1.480	0.011	0.009	0.160	0.930	0.020	0.620	0.000
IAEAM	WFRG11	W	A53382	THYSSEN AG	HEAT	0.079	1.450	0.013	0.005	0.160	0.930	0.020	0.620	0.000
IAEAM	WFRG11	W	A53382	THYSSEN AG	HEAT	0.089	1.460	0.013	0.006	0.170	0.930	0.020	0.610	0.000
IAEAM	WFRG11	W	A53382	THYSSEN AG	HEAT	0.087	1.420	0.014	0.006	0.170	0.930	0.020	0.600	0.000
IAEAM	WJAP2	W	A53381	mitsubishi	HEAT	0.084	1.240	0.009	0.007	0.360	0.710	0.070	0.480	0.000
IAEAM	WJAP2	W	A53381	mitsubishi	HEAT	0.180	1.480	0.007	0.007	0.220	0.660	0.200	0.570	0.000
IAEAM	WJAP2 0T	W	A53381	mitsubishi	HEAT	0.074	1.140	0.010	0.008	0.350	0.780	0.060	0.500	0.000
IAEAM	WJAP21/2T	W	A53381	mitsubishi	HEAT	0.080	1.140	0.011	0.008	0.410	0.730	0.070	0.480	0.000
IAEAU	FJAP2	F	A5083		HEAT	0.180	1.400	0.014	0.003	0.250	0.790	0.250	0.490	0.000
IAEAU	PIAP4	P	A53381		HEAT	0.180	1.420	0.018	0.004	0.240	0.830	0.120	0.510	0.000
IAEAU	PIAP5	P			HEAT	0.180	1.450	0.007	0.002	0.270	0.810	0.150	0.540	0.000
IAEAU	PIAP6	P			HEAT	0.180	1.420	0.017	0.001	0.260	0.830	0.150	0.540	0.000
IAEAU	PIAP7	P			HEAT	0.180	1.450	0.017	0.001	0.270	0.820	0.150	0.530	0.000
IAEAU	WJAP2	W	A53381		HEAT	0.070	1.200	0.008	0.003	0.320	0.890	0.060	0.500	0.000
IAEAU	WJAP3	W			HEAT	0.090	1.290	0.026	0.005	0.300	1.100	0.040	0.480	0.000
JPDR	PIAP3	P	A5421		HEAT	0.150	0.580	0.014	0.006	0.310		2.100	1.060	0.000
JPDR	PIAP4	P	A53381		HEAT	0.190	1.340	0.014	0.008	0.270	0.630	0.120	0.500	0.000
JPDR	PIAP5	P	2.25Cr-1Mo		HEAT	0.180	0.500	0.012	0.013	0.210	0.050	2.250	0.940	0.000

Listing of HEAT.dbf

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Architecture

Table 50. Partial list

EXP. ID	RELAT. ID	PROD. ID	SUPPLIER	RELAT. TREAT	RELAT. NO.	SUPPL. ID	MINTEMP. 1	MAXTEMP. 1	MINTEMP. 2	RANGE 1	BOULES 1	QCIM 1	ID 1	MINTEMP. 2	MAXTEMP. 2	MINTEMP. 3
CLA	WFLAS	W	FLAMATONE			NO. 15				530	6.00		R			600
IAEAM	WFLAS	W				FW				617	8.00	PC	R			600
FESE-E	WFLAS	W				SERIES 1				570	52.00					600
FESE-E	WFLAS	W				SERIES 2				560	40.00					600
FESE-E	WFLAS	W				SERIES 3										
FESE-E	WFLAS	W				SERIES 4				550	8.00					600
FESE-E	WFLAS	W				SERIES 5				550	50.00					600
FESE-E	WFLAS	W				SERIES 6				550	30.00					600
FESE-E	WFLAS	W				SERIES 7				500	30.00					600
FESE-E	WFLAS	W				SERIES 8				400	11.00					600
FESE-E	WFLAS	W				SERIES 9				550	25.00					600
FESE-E	WFLAS	W				SERIES 10				550	20.00					600
FESE-E	WFLAS	W				SERIES 11										
FESE-E	WFLAS	W				SERIES 12				550	52.00					600
FESE-E	WFLAS	W				SERIES 13				550	40.00					600
FESE-E	WFLAS	W				SERIES 14				550	40.00					600
FESE-E	WFLAS	W				SERIES 15				550	20.00					600
FESE-E	WFLAS	W				SERIES 16				550	40.00					600
FESE-E	WFLAS	W				SERIES 17				550	8.00					600
FESE-E	WFLAS	W				SERIES 18				550	50.00					600
FESE-E	WFLAS	W				SERIES 19				550	40.00					600
IAEAM	WFLAS	W	TYSON			OW				600	20.00	PC	R			600
IEFE	WFLAS	W	ALLS CHALLENGER			OC1A				500	17.00		R			600
IEFE	WFLAS	W	OWFL			P5000				500	17.00		R			600
PI-408	WFLAS	W	COMBUSTION ENG.							1150	20.00		R			600
VDE	WFLAS	W	MANHESMANN AG	MANHESMANN AG	CYRE					400	9.25	AC	R			600
NRL-3	WFLAS	W	COMBUSTION ENG.			EST 30				1150	12.00	PC	R			600
EST-1	WFLAS	W				EST 51				1150	12.00	PC	R			600
EST-1	WFLAS	W				EST 52				1700	6.00	WQ	A			1025
NRL-3	WFLAS	W	WESTBOURNE			GW	1100	1150			24.00	PC	R	1100	1150	
EST-2	WFLAS	W	BAW			GW	1100	1150			6.00		R			
EST-2	WFLAS	W	BAW			GW	1100	1150			40.00		R			
EST-3	WFLAS	W	BAW			GW	1100	1150			40.00		R			
EST-3	WFLAS	W	BAW			GW	1100	1150			80.00		R			
EST-3	WFLAS	W	BAW			GW	1100	1150			40.00		R			
EST-4	WFLAS	W	COMBUSTION ENG.			GW, CDS				601	25.00		R			
EST-4	WFLAS	W	COMBUSTION ENG.			GW, CDS				601	25.00		R			
EST-4	WFLAS	W	BAW			GW				607	40.00		R			
EST-4	WFLAS	W	BAW			GW				607	40.00		R			
IFDR	WFLAS	W				2.25C-B4				600	20.00	PC	R			
IAEAM	WFLAS	W	MITCHELL			FW				605	20.00	PC	R			
IAEAM	WFLAS	W				FWQ				600	40.00		R			
LAC	WFLAS	W	ALLS CHALLENGER				1100	1175								
NRL-1	WFLAS	W	LUEDS							1125	20.00	PC	R			
NRL-1	WFLAS	W	LUEDS			SP607				1150	8.00	PC	R			
MEA-AH	WFLAS	W	LUEDS	COMBUSTION ENG.		SP608	WBA			621	24.00		R			
MEA-AH	WFLAS	W	LUEDS	COMBUSTION ENG.		SP609	WBA			621	24.00		R			
MEA-AH	WFLAS	W	LUEDS	COMBUSTION ENG.		SP609	WBA			621	24.00		R			
MEA-AH	WFLAS	W	COMBUSTION ENG.			WBA				607	20.00		R			
MEA-AH	WFLAS	W	COMBUSTION ENG.			WBA				621	24.00		R			
MOLES	WFLAS	W	BAW			W1				1150	31.00		R			
MOLES	WFLAS	W	BAW			W2				1150	31.00		R			
MOLES	WFLAS	W	BAW			W3				1150	31.00		R			
NRL-3	WFLAS	W	COMBUSTION ENG.	COMBUSTION ENG.		WELD 1	1100	1150					R			1150
NRL-3	WFLAS	W	COMBUSTION ENG.	COMBUSTION ENG.		WELD 2	1100	1150					R			1150
NRL-3	WFLAS	W	COMBUSTION ENG.	COMBUSTION ENG.		WELD 3	1100	1150					R			1150
NRL-3	WFLAS	W	COMBUSTION ENG.	COMBUSTION ENG.		WELD 4	1100	1150					R			1150
NRL-3	WFLAS	W	COMBUSTION ENG.	COMBUSTION ENG.		WELD 5	1100	1150					R			1150
SM-3	WFLAS	W				EXP. 104	1125	1150			30.00	PC	R			
SM-3	WFLAS	W				EXP. 106	1125	1150			30.00	PC	R			
SM-3	WFLAS	W				EXP. 108	1125	1150			30.00	PC	R			
SM-3	WFLAS	W				EXP. 108	1125	1150			30.00	PC	R			
SM-4	WFLAS	W					1050	1075			60.00	PC	R	1075	1080	
SM-4	WFLAS	W					1050	1075			60.00	PC	R	1075	1080	
ERA	WFLAS	W	ERAA	ERAA		WQ1				1112	12.00		R			1200
ERA	WFLAS	W	ERAA	ERAA		WQ2				1112	12.00		R			1200
ERA	WFLAS	W	ERAA	ERAA		WQ3				1112	12.00		R			1200
ERA	WFLAS	W	ERAA	ERAA		WQ4				1112	40.00		R			1200
ERA	WFLAS	W	ERAA	ERAA		WQ1				1112	12.00		R			1200
ERA	WFLAS	W	ERAA	ERAA		WQ2				1112	12.00		R			1200
ERA	WFLAS	W	ERAA	ERAA		WQ3				1112	9.00		R			1200
ORPST	WFLAS	W	ERAA			R				900	6.00	WQ	H			600
ERA	WFLAS	W	BARCOCK POWER			UCW				900	6.00	WQ	H			600
VDE	WFLAS	W	OBERRAISEN RUWE	OBERRAISEN RUWE						530	30.00	PC	R			600
VDE	WFLAS	W	PROENTX KREINZ	PROENTX KREINZ						400	3.00	PC	R			600
VDE	WFLAS	W	KLOEDER WERKE	KLOEDER WERKE						530	30.00	PC	R			600
NRL-1	WFLAS	W	VEIDOR							1150	40.00	PC	R			
NRL-1	WFLAS	W	VEIDOR							1150	40.00	PC	R			
NRL-1	WFLAS	W	WESTINGHOUSE							1150	8.00	PC	R			1150
IFDR	WFLAS	W				2.25C-B4				900	1.00	AC	R			600
IFDR	WFLAS	W				2.25C-B4				900	1.00	AC	R			600
EST-2	WFLAS	W	BAW			GW	1100	1150			25.00		R			

Table 51. Partial listing of WELD.dbf

TAG	EXP ID	HEAT ID	WLD TYPE	WLD CODE	HEAT 1	HEAT 2	WELD SUPPLY	WIRE TYPE	WIRE HEAT	FLUX TYPE	FLUX LOT	RFP ID
E	KWU-PR	WGER12						NiCrMo1		LW 320		KWU-0186
E	KWU-PR	WGER13						NiCrMo1		GRAU LO		KWU-0186
E	KWU-PR	WGER14						NiCrMo1		LW 320		KWU-0186
E	LAC	WLAC01	SAW		PLAC02	PLAC03	ALLIS CHALMERS					NE&D 8/95
E	MEA-AN	WMEA8A	SAW	W8A	PLUK03		LUKENS	MnMoNi	3P8393	L80	0418	NUREG/CR-3228/V1/73
E	MEA-AN	WMEA8B	SAW	W8B			LUKENS	MnMoNi	3P8393	L80	0418	NUREG/CR-3228/V1/73
E	MEA-AN	WMEA9A	SAW	W9A	PLUK03		LUKENS	MnMoNi	3P8393	L0091	0204	NUREG/CR-3228/V1/73
E	MEA-AN	WMEA94	SAW	WW4			COMBUSTION ENG.	MnMoNi		L124		NUREG/CR-5469
E	MEA-AN	WMEA97	SAW	WW7	PLUK04		COMBUSTION ENG.	MnMo	5P2320	L80		NUREG/CR-5469
E	MOLBR3	WMOL01	SAW	W1			B&W	L44		L80		MEA-2218
E	MOLBR3	WMOL02	SAW	W2			B&W	L44		L80		MEA-2218
E	MOLBR3	WMOL03	SAW	W3			B&W	L44		L80		MEA-2218
E	MOLBR3	WMOL04	SAW	W4R			RR&A			L80		MEA-2218
E	MOLBR3	WMOL0D	SAW	WD			B&W			L80		MEA-2218
E	MOLBR3	WMOL0E	SAW	WE			EPRI			L80		MEA-2218
E	NRL-1	WB&W19	ESW		PB&W19		B&W					NRL 6772
E	NRL-1	WLUK18	SAW		PLUK18		LUKENS					NRL 6772
E	NRL-1	WVEN20	SAW		PVEN20		VENDOR					NRL 7011
E	NRL-1	WVEN21	MAW		PVEN21		VENDOR					NRL 7011
E	NRL-2	WHSS50	SAW	50	SHSS01AA	SHSS01AB	COMBUSTION ENG.	B-4 MOD		L1092		NE&D 17/116
E	NRL-3	WME53A	SAW		PME53A		LUKENS	MnMoNi	RACOIP3607	L0091		WJRS 7-72/369
E	NRL-3	WNRL01	SAW		PNRL01		COMBUSTION ENG.	Mn-Mo-Ni		L0091		TIS 4191
E	NRL-3	WNRL02	TSA		PNRL02		COMBUSTION ENG.	Mn-Mo		L0091		TIS 4191
E	NRL-3	WNRL03	TSA		PNRL03		COMBUSTION ENG.	Mn-Mo		L0091		TIS 4191
E	NRL-3	WNRL04	SAW		PNRL04		COMBUSTION ENG.	Mn-Mo		L0091		TIS 4191
E	NRL-3	WNRL06	SMA		PNRL06		COMBUSTION ENG.					ASTM STP 683/235
E	NRL-4	WMY 01	SAW	MY	PMY 11	PMY 13	COMBUSTION ENG.	B-4 MOD	IP3571	L1092	3958	NRL 8357
E	NRL-AN	WB&W86	SAW	V86						L80		ASTM STP 683/278
E	NRL-AN	WCE 84	SAW	V84						L1092		ASTM STP 683/278
E	NRL-EP	WEPR04	SAW	E4						L124		EPRI NP-2782
E	PR-EDB	WHM301			PHM301	PHM301	COMBUSTION ENG.					ASTM STP 481
E	RRA	WRAA01	SAW	WQ1			RR&A	BABCOCK10B		UM 709-5		ASTM STP 782/343
E	RRA	WRAA02	SAW	WQ2			RR&A	BABCOCK #3		BOC 80		ASTM STP 782/343
E	RRA	WRAA03	SAW	WQ3	PRRA05	PRRA05	RR&A	BABCOCK10B		UM 709-5		ASTM STP 782/343
E	RRA	WRAA11	SAW	WS1			RR&A	BABCOCK10B		UM 709-5		ASTM STP 782/343
E	RRA	WRAA12	SAW	WS2			RR&A	BABCOCK #3		BOC 80		ASTM STP 782/343
E	RRA	WRAA13	MMA	WS3	PRRA05	WRAA03	RR&A	BABCOCK H1				ASTM STP 782/343
E	SM-2	WNRL08	MMA	1934	SASTMD							NA 6/27
E	SM-2	WNRL09	MMA	1936	SASTMD							NA 6/27
E	SM-2	WNRL10	MMA	1938	SASTMD							NA 6/27
E	SM-2	WNRL11	MMA	1948	SASTMD							NA 6/27
E	SM-2	WNRL12	SAW							L1092		NA 6/27
E	SM-2	WNRL13	SAW							L1092		NA 6/27
E	VDE	WHSS03	SAW		SHSS03		LUKENS	MnMoNi	RACOIP3607	L0091		ORN14816/76
E	VDE	WHSS03	UP		SHSS03	SHSS03	MANNESMANN AG	EML5S2NiMo				BERICHT SUMMARY
E	VDE	WVDE0B	UP		PVDE0B	PVDE0B	OBERHAUSEN HUWK	S3MoNi 1,5				BERICHT SUMMARY
E	VDE	WVDE0C	UP		PVDE0C	PVDE0C	PHOENIX RHEINR.	MoNi 1		Grau LO		BERICHT SUMMARY
E	VDE	WVDE0D	UP		PVDE0D	PVDE0D	KLOCKNER-WERKE	S4 CrMo		Grau LO		BERICHT SUMMARY
E	IAEAM	WFRG11	SAW	GW			Thyssen AG					IAEA TRS 265
E	NRL-1	WW 16	SAW		PW 16	PW 17	Westinghouse					NRL 6772

Table 52. Partial listing of HAZ.dbf

TAG	EXP ID	PLANT ID	HEAT ID	HEAT B	HEAT W	REF ID	PAGES	NOTES
W	PR-AD1	AD1	HAD101	FAD101	WAD101	WCAP-8957	3-1	W-HAZ OF ANH161
W	PR-AL2	AL2	HAL201	PAL201	WAL201	WCAP-9228	2-1	FROM W-HAZ OF PLATE B9405-1
B	PR-AN1	AN1	HAN101	PAN101		BAW-1440	3-2	FROM PLATE C-5114-1 LONG.
B	PR-AN1	AN1	HAN102	PAN102		BAW-1698	3-2	FROM PLATE C-5114-2 LONG.
C	PR-AN2	AN2	HAN201	PAN201	WAN202	CE-A-MCM-106	3	FROM C8009-3 AND C8009-2
W	PR-AS1	AS1	HAS101	PAS101	WAS101	WCAP-9308	2-1	FROM W-HAZ OF PLATE B9605-2
W	PR-AS2	AS2	HAS201	PAS201	WAS201	WCAP-9330	2-1	FROM W-HAZ OF PLATE R408-1
W	PR-BD1	BD1	HBD101	FBD101	WBD101	WCAP-12685	4-1	WITHIN HAZ 49D867-1/49C813-1
W	PR-BD2	BD2	HBD201	FBD201	WBD201	WCAP-12845	4-1	WITHIN HAZ 50D102-1/50C97-1
G	PR-BR	BR	HBR 01	PBR 01	WBR 01	GEGR-4442	4	MADE FROM TEST WELD MATERIAL
W	PR-BV1	BV1	HBV101	PBV102	WBV101	WCAP-8457	2-1	FROM WITHIN HAZ OF PL. B6607-1
W	PR-BV2	BV2	HBV201	PBV201	WBV201	WCAP-12406	4-1	FROM W-HAZ OF B9004-2
W	PR-BY1	BY1	HBV101	PBY101	WBY101	WCAP-11651	4-1	FROM W-HAZ OF 5P-5933
W	PR-BY2	BY2	HBV201	PBY201	WBY201	WCAP-12431	4-1	FROM W-HAZ OF FORGING MK24-3
W	PR-BZ1	BZ1	HBZ101	PBZ102		WCAP-7214	3	FROM W-HAZ OF FORGING D
W	PR-CAB	CAB	HCAB02	PCAB02	WCAB01	WCAP-10185	4-1	FROM W-HAZ OF B1105-2
W	PR-CB1	CB1	HCB101	FCB101	WCB101	WCAP-9734	2-1	FROM W-HAZ OF FORGING 05
W	PR-CB2	CB2	HCB201	PCB201		WCAP-11941	4-1	FROM HAZ OF PLATE B8605-1
C	PR-CC1	CC1	HCC101	PCC103	WCC102	BMI-1280	7	FROM D7206-3 SIDE OF WELD
C	PR-CC2	CC2	HCC201	PCC202	WCC202	TR-ESS-001	III-1, B-8	FROM D8907-2 AND D8907-3
W	PR-CK1	CK1	HCK101	PCK101	WCK101	SWRI-02-4770	7	FROM B4406-3 SIDE OF WELD
W	PR-CK2	CK2	HCK201	PCK201	WCK201	WCAP-8512	2-1	FROM W-HAZ OF C5521-2
W	PR-CL1	CL1	HCL101	PCL101	WCL101	WCAP-9842	2-1	FROM W-HAZ OF R2708-1
W	PR-CP2	CP2	HCP201	PCP201	WCP201	WCAP-10684	2-1	FROM W-HAZ OF R3807-2
G	PR-CPR	CPR	HCPR01		WCPR01	MDE-103-0986	3-6	FROM G2802-1 AND G2802-2
B	PR-CR3	CR3	HCR301	PCR301		BAW-1898	3-2	FROM C4344-1, HEAT NN
B	PR-CR3	CR3	HCR302	PCR302		BAW-1898	3-2	FROM C4344-2, HEAT PP
W	PR-CTY	CTY	HCTY04		WCTY01	WCAP-7036	5	FROM W9807-1 AND W9807-8
G	PR-DAC	DAC	HDAC01	PDAC01	WDAC01	NEDC-31166/R1	3-3	FROM PLATE 1-21
B	PR-DB1	DB1	HDB101	FDB101		BAW-1882	3-2	FROM HEAT AKJ233
B	PR-DB1	DB1	HDB102	FDB102		BAW-1882	3-2	FROM HEAT BCC241
W	PR-DC1	DC1	HDC101	PDC103	WDC101	WCAP-8465	2-1	FROM WITHIN HAZ OF B4106-3
W	PR-DC2	DC2	HDC201	PDC201	WDC201	WCAP-8783	2-1	FROM W-HAZ OF B5454-1
G	PR-DR1	DR1	HDR101	PDR101	WDR101	DOCKET 50-10	4, 6	SAW HAZ

_TITL.dbf

FILE	PUB DATE
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bruary 1982.	02/ /1982
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Laboratory, Oak Ridge, TN, May 1983.	05/ /1983
nce of Nickel and Copper Content to Radiation Sensitivity and	11/ /1982
ation Heat Treatment Recovery of Reactor Vessel Steels, NUREG/CR-2948,	11/ /1982
06, Materials Engineering Associates, Inc., Lanham, MD, November 1982.	11/ /1982
ent of Postirradiation Heat Treatment for Alleviation of	04/ /1983
o-Induced Embrittlement, Structural Integrity of Water Reactor Pressure	04/ /1983
y Components, Annual Report for 1982, NUREG/CR-3228, MEA-2012, Vol. 1, p.	04/ /1983
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nce of Postirradiation Heat Treatment Temperature and Duration to Notch	04/ /1983
Recovery, Structural Integrity of Water Reactor Pressure Boundary	04/ /1983
ents, Annual Report for 1982, NUREG/CR-3228, MEA-2148, Vol. 1, p. 81-83,	04/ /1983
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on of Nickel and Copper Content in Radiation Sensitivity, Structural	04/ /1983
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y, Structural Integrity of Water Reactor Pressure Boundary Components,	04/ /1983
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/CR-3228, MEA-2051, Vol. 2, F.J. Loss, ed., p. 101-104, Materials	09/ /1984
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ical Properties Determination for PSF Simulated Surveillance and	09/ /1984
Wall Specimen Capsules, Structural Integrity of Water Reactor Pressure	09/ /1984
y Components, Annual Report for 1983, NUREG/CR-3228, MEA-2051, Vol. 2,	09/ /1984
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ent of Postirradiation Heat Treatment as a Method for Alleviating	09/ /1984
o-Induced Embrittlement, Structural Integrity of Water Reactor Pressure	09/ /1984
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y in Reactor Vessel Welds, Structural Integrity of Water Reactor Pressure	06/ /1985
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Table 53. Partial listing of REF

TAG	EXP ID	REF ID	ALT REF	CONT	AUTHOR 1	AUTHOR 2	REF TI
	I/AEU	NUREG/CR-2447		1	Hawthorne, J. R.		Evaluati
		NUREG/CR-2447		2			Embriol
		NUREG/CR-2447		3			Laborato
	SM-4	NUREG/CR-2511		1	Hawthorne, J. R.		Status of
		NUREG/CR-2511		2			Steele, N
		NUREG/CR-2511		3			DC, Feb
	HSST-4	NUREG/CR-2751/V4		1	Whitman, G. D.	Pugh, C. E.	Heavy-S
		NUREG/CR-2751/V4		2	Bryan, R. H.		October
		NUREG/CR-2751/V4		3			National
	SM-4	NUREG/CR-2948	MEA-2006	1	Hawthorne, J. R.		Signific
		NUREG/CR-2948		2			Postirra
		NUREG/CR-2948		3			MEA-20
	MEA-AN	NUREG/CR-3228/V1/73	MEA-2012	1	Hawthorne, J. R.		Assessm
		NUREG/CR-3228/V1/73		2			Radiatio
		NUREG/CR-3228/V1/73		3			Boundar
		NUREG/CR-3228/V1/73		4			73-80, 1
	MEA-AN	NUREG/CR-3228/V1/81	MEA-2012	1	Hawthorne, J. R.		Signific
		NUREG/CR-3228/V1/81		2			Ductility
		NUREG/CR-3228/V1/81		3			Compos
		NUREG/CR-3228/V1/81		4			Material
	SM-4	NUREG/CR-3228/V1/84	MEA-2012	1	Hawthorne, J. R.		Interact
		NUREG/CR-3228/V1/84		2			Integrit
		NUREG/CR-3228/V1/84		3			NUREG
		NUREG/CR-3228/V1/84		4			Inc., La
	MEA-AN	NUREG/CR-3228/V1/87	MEA-2012	1	Hawthorne, J. R.		Impuriti
		NUREG/CR-3228/V1/87		2			Sensitiv
		NUREG/CR-3228/V1/87		3			Annual
		NUREG/CR-3228/V1/87		4			Enginoo
	MEA-RT	NUREG/CR-3228/V1/92	MEA-2012	1	Hawthorne, J. R.		Studies
		NUREG/CR-3228/V1/92		2			Integrit
		NUREG/CR-3228/V1/92		3			NUREG
		NUREG/CR-3228/V1/92		4			Inc., La
	MEA-RT	NUREG/CR-3228/V2/101	MEA-2051	1	Hawthorne, J. R.		Studies
		NUREG/CR-3228/V2/101		2			Integrit
		NUREG/CR-3228/V2/101		3			NUREG
		NUREG/CR-3228/V2/101		4			Enginoo
	ORRPSF	NUREG/CR-3228/V2/105	MEA-2051	1	Hawthorne, J. R.	Menke, B. H.	Mechan
		NUREG/CR-3228/V2/105		2	Hiser, A. L.		Throug
		NUREG/CR-3228/V2/105		3			Bounda
		NUREG/CR-3228/V2/105		4			F.J. Lo
		NUREG/CR-3228/V2/105		5			Septem
	MEA-AN	NUREG/CR-3228/V2/81	MEA-2051	1	Hawthorne, J. R.		Assessm
		NUREG/CR-3228/V2/81		2			Radiatio
		NUREG/CR-3228/V2/81		3			Bounda
		NUREG/CR-3228/V2/81		4			F.J. Lo
		NUREG/CR-3228/V2/81		5			Septem
	SM-5	NUREG/CR-3228/V2/90	MEA-2051	1	Hawthorne, J. R.		Impuriti
		NUREG/CR-3228/V2/90		2			Sensitiv
		NUREG/CR-3228/V2/90		3			Annual
		NUREG/CR-3228/V2/90		4			90-101
	MEA-AN	NUREG/CR-3228/V3/114	MEA-2051	1	Hawthorne, J. R.		Effect o
		NUREG/CR-3228/V3/114		2			Recove
		NUREG/CR-3228/V3/114		3			Bounda
		NUREG/CR-3228/V3/114		4			F.J. Lo
		NUREG/CR-3228/V3/114		5			June 19
	SM-5	NUREG/CR-3228/V3/124	MEA-2051	1	Hawthorne, J. R.		Influen
		NUREG/CR-3228/V3/124		2			Treatm
		NUREG/CR-3228/V3/124		3			Compo
		NUREG/CR-3228/V3/124		4			ed., p.
	MEA-AN	NUREG/CR-3228/V3/131	MEA-2051	1	Hawthorne, J. R.		Mechan
		NUREG/CR-3228/V3/131		2			Integrit
		NUREG/CR-3228/V3/131		3			NUREG
		NUREG/CR-3228/V3/131		4			Enginoo

Table 54. Partial listing of REF_LST.dbf

TAG	EXP_ID	REF_ID	MPC_ID
	BET-AN	WAPD-TM-1095	
	BWREXP	NEDO-10115	
	BWREXP	NEDO-21708	E16
	CEA	ASTM STP 725/20	E29
	CEA	ASTM STP 782/392	E29
	CEA	ASTM STP 819/29	
	CEA	ASTM STP 819/64	E27
	CEA	ASTM STP 909/70	
	EPR-AN	EPRI NP-2712/V2	E30
	FKS-G	ASTM STP 1011/115	
	FKS-G	ASTM STP 909/34	
	FKS-G	GKSS-1	
	FKS-K	ASTM STP 782/412	
	FKS-K	ASTM STP 782/520	
	HAW-AN	NRL 8287	E18
	HFIR	ASTM STP 1046/5	
	HFIR	ORNL/TM-10444	
	HSST-0	NUREG/CR-4092	
	HSST-0	ORNL-4313	
	HSST-0	ORNL-4313-2	
	HSST-0	ORNL-4816/3	
	HSST-0	ORNL-TM-3193	
	HSST-1	ORNL-4871	E10
	HSST-2	BAW-1975	
	HSST-2	NUREG/CR-0106	
	HSST-2	NUREG/CR-0505	
	HSST-2	NUREG/CR-1158	
	HSST-2	NUREG/CR-1941	
	HSST-2	NUREG/CR-3506	
	HSST-2	NUREG/CR-5696	
	HSST-2	ORNL/NUREG/TM-120	
	HSST-2	WCAP-7414	
	HSST-3	BAW-1975	
	HSST-3	NUREG/CR-1627	
	HSST-3	NUREG/CR-1806	
	HSST-3	NUREG/CR-5696	
	HSST-4	ASTM STP 870/1094	E36
	HSST-4	NE&D 89/181	
	HSST-4	NUREG/CR-2141/V1	
	HSST-4	NUREG/CR-2751/V4	
	HSST-4	NUREG/CR-3333	
	HSST-4	NUREG/CR-3744/V1	
	HSST-4	NUREG/CR-3978	
	HSST-4	NUREG/CR-4219/V3/N2	
	HSST-4	NUREG/CR-4880/V1	
	IAEA	IAEA TRS 265	
	IAEAB	ASTM STP 782/433	
	IAEAB	IAEA TRS 265	
	IAEAC	IAEA TRS 265	

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APPENDIX A PRELIMINARY SOFTWARE AND PROCESSING

A.1 Introduction

The software described in this appendix is the current implementation of a system that provides Embrittlement Data Base (EDB) users with the necessary tools to process the data and to create a variety of tables, fits, and graphs for reports and verification of irradiation embrittlement predictions. The present version is far from complete; many important tasks remain that are not yet part of this software package and that must be performed through dBASE or compatible software. In particular, any direct editing of data and the elimination of duplicate records can currently be done only through calls to dBASE. Also, combining data from several different files by means of key identifiers must be done through dBASE. Software to facilitate these tasks will be part of later updates.

The current version of the EDB-Utilities software package is written in the Clipper language, which allows compilation of dBASE procedures and has facilities for menu and help screens so that users can usually run the program without additional instructions. The program package provides the means for a number of file-manipulation tasks, including displaying data on the computer screen and printing a hardcopy of the data. The dBASE and related software, such as Clipper, lack the facility for extensive mathematics/statistics calculations and scientific graphs. Some plotting and fitting programs are written in FORTRAN using the IMSL and GRAFMATIC libraries and require ASCII files as input. The ASCII files for the plotting program can be created through the EDB-Utilities file-manipulation feature. Another ASCII file that is needed for input to the fitting of raw Charpy data, CHARPY.dat, was created from the file CHARPY.dbf and is part of the EDB diskettes. Also included is the ASCII file CV_RS.dat, which contains the results of the Monte Carlo uncertainty analysis and can be used as input for the multiple fitting program.

The primary output device for graphic presentations by the EDB-Utilities is the monitor screen in EGA, VGA or SVGA format. Utilities are available (e.g., GRAFPLUS) to transfer the screen picture to the printer (Sect. A.7 "Installation and Execution"). Creating output for plotting devices (e.g., HP plotters) is not part of the current version of the EDB-Utilities but is being considered for future releases.

A.2 Edb-Utilities Software Package

The EDB-Utilities package was designed to provide EDB users with convenient means to manipulate, view, plot, and fit the data that are given in dBASE format. Four major options can be selected from the first menu (Fig. A.1).

EDB PROGRAM

Fig. A.1. Major options available from first menu.

- (1) File-manipulation Procedures. This option is not restricted to EDB files; any file in dBASE format can be processed. Specifically, the following operations can be performed:

Retrieve a file for manipulation.

Add or delete fields.

Use numerical data for calculations and place results in user defined fields.

Add or delete records.

Reorder records.

Display or export data .

Save working file.

A detailed explanation of the different operations is given in Sect. A.3, "File Manipulation Procedure."

- (2) Plot data exported from EDB files. Numerical data from dBASE files can be exported to ASCII files (described in Sect. A.3.7, "Display and Export") and can be represented in scatter plots with automatic scaling and labeling. Specific curves can be added to the graph as an option. Details are given in Sect. A.4, "Plotting Program."
- (3) Fit and plot charpy data. Once in ASCII format, raw Charpy impact data from the file CHARPY.dbf, can be fitted to a hyperbolic tangent curve and the results plotted. A Monte Carlo uncertainty analysis program is included that determines the uncertainties in the fitting

parameters given the uncertainties in impact energy and test temperature of the original data. The following options are provided:

- (a) single-curve fitting and plotting,
- (b) multiple-curve fitting and plotting,
- (c) monte Carlo uncertainty analysis,
- (d) extraction of selected Charpy sets.

Details are given in Sect. A.5, "Charpy Fitting and Plotting."

- (4) Call dBASE IV. This option allows the user to run dBASE without exiting EDB-Utilities, provided dBASE IV has been properly installed. The user can, in this manner, easily switch between different options and edit or perform other tasks in dBASE for which no provisions are given in the EDB-Utilities package. Note that all fields in the EDB files are character fields and that any numerical manipulation of data must first use the VAL(...) function to obtain numbers and then convert the results back to character strings using STR(...).

A.3 File-Manipulation Procedures

File-manipulation procedures are shown schematically in Fig. A.2.

A.3.1 General Considerations

EDB consists of a number of data files in dBASE format. Each file can be considered as a table of data; the columns of the table are called Data Fields and the rows, Records. Each data field has a given length FIELD_LEN, a unique identifier FIELD_NAME, and a FIELD_TYPE, which declares the data as either "character," "numeric," or a "date," and this information is coded in a special manner at the head of the dBASE files.

All data fields in EDB are character fields; this allows one to use blanks for missing data and to introduce scientific notation, for which dBASE IV has no provisions. However, the actual data types must be provided to processing codes in some way to perform calculations, comparisons, and orderings. For this reason, a "structure file" is assigned to each data file that has the same name but the extension .str instead of .dbf (e.g., REAC.dbf has the structure file REAC.str). A structure file has the same first five fields as a dBASE structure file but also has a field F_T for the actual field type, which can be C for character, N for numeric, S for scientific notation, and D for date. A structure file also has a field DESC, which contains a detailed description of the data field plus the type of units used in brackets [...]. This information is displayed in menu screens concerning data fields and is used to label the axes in the plots that are generated in the plotting option of EDB-Utilities.

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File-manipulation procedures, such as changing data fields or records, reordering, and displaying are never performed on the original data file; the input file is first copied to a "working file" WORK.dbf, and the associated structure file, to STRUCT.dbf. A dBASE-type structure file, TMPS.dbf, is also needed for some file-manipulation procedures. After performing the desired procedures, the working files may be saved to new files or the old files may be overwritten. The working files remain in the directory and can be accessed again by EDB-Utilities, even after the program has been temporarily terminated. The original files remain as they are unless overwritten by the user.

Fig. A.2. EDB-Utilities file-manipulation procedures.

A.3.2 Retrieval of Files for Manipulation

Any dBASE file can be processed by the manipulation option of EDB, including the structure files. The input files need not be EDB files (i.e., containing only character fields), but the working file WORK.dbf has this property. A new structure file is created if an associated structure file is not present or is incompatible with the input file. Field names used in EDB files are listed in STR_ALL.dbf, and this file is used to put information in the new structure file for such field names. Other information must be entered by the user, who can also change the information from STR_ALL.dbf if necessary. The new structure file is saved if none was previously available, but old files are not overwritten, even if they are incompatible. The working file WORK.dbf has no associated index file. However, an index file can be used with the input file to ensure the proper order in the working file.

A.3.3 Addition and Deletion of Fields

Fields can be added to the working file for storing the results of calculations, and only these fields can be used for this purpose. However, fields added in a previous run to a file that was subsequently saved can still be used for results after later retrieval of the file. Any field can also be deleted, including fields added in a previous run. Both additions and deletions become final only after the modification command is given; tentative additions and deletions can be aborted if necessary.

A.3.4 Addition and Deletion of Records

Records can be deleted from the working file according to conditions entered by the user. This step is done using the option "Select Records From Working File." Note that the deletion of records in dBASE is a two-step procedure; records to be deleted are marked, and then the marked records are eliminated. Marked records can be restored as long as the final elimination step has not been executed. Consequently, there are two options in the selection procedure, (1) deletion (marking) of records and (2) restoring (unmarking). All records can be deleted if the restoration option is entered before deleting any records. Both procedures are completed for records that satisfy conditions entered by the user in the menu screens provided. Using suitable sequences of deletions and restorations, practically all selection criteria can be satisfied (see Sect. A.6, "Examples"). After the selection procedure is completed, all deleted (i.e., marked) records are removed (eliminated) and can no longer be restored. Selections can also be aborted in case of an error.

Records can be added to the working file by appending them from another dBASE file. This file need not be an EDB file or a saved working file and may have numerical or date fields. All data are again converted into character fields before appending. Data are appended according to the field names, which must be the same in the working file and the added file.

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A.3.5 Calculations

A variety of numerical operations can be performed on fields of numerical- or scientific-type data, with the results entered into user-defined scientific fields. Only one operation at a time can be performed, namely, addition, subtraction, multiplication, division, exponentiation plus exponential function, and logarithm. More complicated formulas can be calculated in a properly chosen sequence of operations using, perhaps, some auxiliary fields for temporary storage. A warning is given for improper operations, such as division by zero, and a blank record is given as a result. A blank is also given if one of the operations has a blank record, indicating missing data.

A.3.6 Reordering

No index files are associated with the working file, but records can be sorted in any manner by entering the ordering criteria in the menu screen provided. The chosen arrangement can be saved in an output file if desired.

A.3.7 Display and Export

Data in the working file can be displayed on the screen or printed. A menu is provided that allows the selection of fields to be displayed or printed in any desired order. For printing, the user must supply the number of characters per line and the number of lines per page. The fields are distributed over several pages if the width of the output exceeds the number of lines permitted and if there are more records than the number of lines per page. The data can also be saved in an output file that is formatted in a manner suitable for subsequent plotting with the EDB-Utilities plotting program. Another ASCII file can be created as input for the Charpy fitting programs from a raw Charpy data file, such as CHARPY.dbf, or another file with the same structure. An empty file, RAW_C_DT.dbf, must be present to receive the data from the input file after the necessary unit conversions. An optional structure file CHARPY.str can be used to ensure that the input file has the proper data structure.

A.3.8 Save Working File

The working file and the associated structure file can be saved by copying them under a user-specified name. A warning will be given if a file under this name already exists, but overwriting an existing file is permitted, destroying the old file in the process.

A.4 **Plotting Program**

Data input for the plotting program (Fig. A.3) is prepared by the file-manipulation procedures and is exported to special plot files as described in the Sect. A.2, "DDB-Utilities Software Package." Data from up to ten different files can be put in the same plot with different symbols assigned to each data set. Once the plotting program has been called from the main menu, the following information must be input:

Fig. A.3. Flowchart for the EDB-Utilities plotting program.

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1. Name of the structure file associated with the working file from which the data set was prepared. The sole purpose of this file is to provide information about which data fields should be used for the x- and y-coordinates, respectively. Thus, any structure file may be used that has the corresponding numerical data fields in it, even if another working file was used to create the plot input. The field names used for coordinates must be common to all plot files for the same plot.
2. Plot title. The title appears in large letters on top of the plot.
3. Data fields for the coordinates. The user selects these fields from an input screen that shows the numerical fields in the structure file. The descriptions and units given in the structure file will be used for labeling the coordinate axes.
4. Names of the plot files and associated descriptions. The data descriptions are used for (optional) legends that can be placed at any desired location in the plot and appear in the same sequence as they are entered in the screen. Blanks as descriptions are ignored in the legend.
5. Curves. Certain types of curves can be placed on the plots in addition to the data points. The user selects the desired type of curves from the menu screen and may also enter legends for these curves.
6. Choice of a preset coordinate system. The default version of this option is a coordinate system that is automatically scaled to accommodate all data and curves in the smallest range possible. However, the user can select a predetermined range of coordinate values. The option also includes the choice of a logarithmic coordinate system in either or both coordinates. Points and curves that fall outside the range are eliminated.
7. Symbols and colors. An option is provided for selecting symbols and colors (for color monitors and printers) for different data sets and curves. Dashes of different densities can be selected for the curves.

Once the input is completed, the plot appear on the screen. Scaling and labeling of the axes are automatic, using the information from the input data and structure files. The user is asked to place the legend at some location in the plot where it does not interfere with the data points and curves. The plot may then be sent to the printer if the necessary connections are in place.

All input data for the plot, including information about curves, symbols, and colors, are saved and can be used with subsequent plots. The user can use the same plot data again with a possible change in curves, symbols, colors, and placement of the legend. The input information may also be changed selectively or completely erased (this applies only to the information generated during the plotting procedure, such as the names of input files, title, and legends, not to the data files, which remain intact).

A.5 CHARPY FITTING AND PLOTTING

Procedures for fitting and plotting raw Charpy data are shown in Fig. A.4.

Fig. A.4. Procedures for fitting and plotting raw Charpy data.

A.5.1 General Considerations

EDB-Utilities allows the creation of fits and plots for any given set of raw Charpy data using the hyperbolic tangent function. Each set of raw Charpy data is uniquely identified by the keys EXP_ID + PLANT_ID + CAPSULE + HEAT_ID + SPEC_ORI, and all data points having the same combination of these four identifiers are combined into the same set, unless the sequence of data records is interrupted by a record that contains different key identifiers. The program requires an input file in ASCII format, CHARPY.dat, that was created from the EDB file CHARPY.dbf. All data are converted to English units, the unit fields are removed, and a one-character field is added in front

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of SPEC_ID. If this field contains an asterisk, the record is excluded from processing; this feature is useful for removing outliers. No outliers are tagged in this way in the attached files, but examples are given in Figs. A.7 and A.8. The modified file is then converted to ASCII format using the dBASE command "Copy to CHARPY.dat SDF."

The fitting procedure is completely automated. Upper- and lower-shelf values are restricted by adding a penalty proportional to the deviation from initial estimates to avoid unphysical fits. A first inspection of the points is made to obtain a rough estimate for the initial values of the curve parameters. A nonlinear least-squares fitting program ZSSQ from the IMSL library is used to determine the best fit, which is then plotted and appears on the screen, including data points with automatic scaling and labeling of the axes in both English and the International System (SI) units. The plots can be sent to the printer, including a summary of transition temperatures and upper-shelf data (in SI units). All internal calculations are done in SI units, centigrade and joule. Currently, no options are available to fit and plot lateral expansion or fracture appearance vs test temperature data. A detailed report of the fitting and uncertainty analysis will be available in the near future. As stated in Sect. A.2, Item 3, there are four options for this part of the program.

A.5.2 Single-Curve Fitting and Plotting

In this option, selected data sets are fitted and plotted, one at a time, with optional printing of the results. Titles and subtitles for the plots can be given either individually or at the start of the procedure, with the key identifiers serving as subtitles. The user has the option to skip any data set and to terminate the procedure without reading the whole input file.

A.5.3 Multiple-Curve Fitting and Plotting

With this option, up to ten different fits can be placed into one plot, which is useful for comparing data before and after irradiation. The user enters the overall title and legends for the individual fits. Default legends can be used that contain the name of the capsule and the total fluence (>1.0 MeV). Legends can be placed by the user at a suitable free spot in the plot. An auxiliary file generated as a dBASE output file from the Monte Carlo fitting procedure can be used to bypass the fitting procedure in favor of predetermined fitting parameters. The file CV_RS.dat is distributed with EDB for this purpose. (See Sect. A.5.4, "Monte Carlo Uncertainty Analysis.")

A.5.4 Monte Carlo Uncertainty Analysis

Uncertainties for the fitting parameters are needed to determine the accuracy and credibility of the transition temperature and upper-shelf data. A covariance matrix of the fitting parameters is part of any least-squares procedure, but these covariances are not used for uncertainty analysis in the EDB-Utilities. The unavoidable linearization used for determining the covariances disregards second-order effects, and there is no possibility to account for uncertainties in test temperature. A more reliable procedure is the use of random variations of the input data (Monte Carlo procedure); such variations can be applied to both impact energy and test temperature, and the results reflect more accurately the

influences of nonlinearities. The necessary computing time is, of course, increased by a large factor but remains manageable for today's computers. Because this option is completely automated, including printing the plots, a fairly large amount of data sets can be processed overnight or over a weekend. Nonphysical results and results that deviate substantially from the mean are eliminated from the sampling, which has the added advantage that fits can be obtained even after some tries have failed initially.

The user enters the (one-standard deviation) uncertainties for the impact energy and test temperature and the number of iterations. Unsuccessful iterations (i.e., the ones rejected by the program as nonphysical or inconsistent with the rest) are not counted; however, the total number of tries may not exceed five times the specified iteration number. Also needed is the number of sets to be skipped at the beginning of the input data file and the number to be processed. Processing is done one set at a time, in sequence, starting after the specified number of sets have been skipped. A more specific selection can be obtained by using, as the input data file, the set created by the selection procedure (Sect. A.5.5, "Extraction of Selected Charpy Sets"). Continuous plotting and printing can be chosen as an option, with the user providing the common title and the key identifiers as a subtitle.

Three output files are created by the procedure, the names of which are either entered by the user or assigned by default. The "Summary Output File" (default name FORT15; the 15 in FORT15 is the unit number of the FORTRAN output file) is a list that contains the set number, key identifiers, fluence, irradiation temperature, transition temperature at 41 J and 68 J (30 ft-lb and 50 ft-lb), upper- and lower-shelf energy (all in SI units), number of specimens in the set, and number of successful iterations for each processed set. The "Covariance Output File" (default name FORT16) contains mean values, standard deviations, and correlations for all fitting parameters that include the transition temperature at the center of the curve and 1/slope, which is one-half of the impact energy range of the transition region. The "EDB_dBASE Output File" (default name FORT17) is intended for conversion to a dBASE file data for which are an alternative to the file SHFT_PR. This file can also be used as an "auxiliary" input file in the multiple-fitting option (Sect. 5.3, "Multiple-curve Fitting and Plotting"). Data are given in English units. A "status report" listing the results from all successful and unsuccessful iterations is placed on the screen during the procedure. The screen output can be redirected to a file as an option.

The complete file CHARPY.dat has been processed with this program, with 10 J and 4°C as input uncertainties for impact energy and test temperature, respectively, and 200 iterations. The summary and dBASE output files, CV_RS.sum and CV_RS.dat, respectively, are included in the data disks. The dBASE version of CV_RS.dat (CV_RS.dbf) is also included in the package. The covariance file, which is very large and of limited usefulness, is not included, but a sample printout is shown in Sect. A.6, "Examples."

A.5.5 Extracting Selected Charpy Sets

The raw data files for individual Charpy sets are quite large and thus require long search times in sequential access. It is, therefore, convenient and saves time to copy small subsets from a larger file,

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if such subsets are processed repeatedly. This is accomplished through the dat-selection option. The user specifies the selection criteria and may, in addition, skip certain sets and terminate the procedure without going through the rest of the input file. No processing is done during this option, but the user-specified output file (default FORT20) can now serve as an input file for any subsequent processing step.

A.5.6 Selection of Input Files and Data Sets

The four options for selecting input files and data sets require essentially the same input information that is requested in several input screens:

1. Names of input data files, primary and auxiliary. The primary input file is CHARPY.dat, which is included in the package and given as the default at the menu. The user may change this name to that of any other data file that contains raw Charpy data in the same format, for example, one obtained from the selection procedure described in Sect. A.5.5, "Extracting Selected Charpy Sets." The multiple-fitting option permits the use of an additional, "auxiliary" input file that contains the values of the fitting parameters as generated by the Monte Carlo uncertainty analysis as an EDB-dBASE output file. The file CV_RS.dat is included in the package and appears as the default. Its use is optional and allows the user to bypass the least-squares fitting, speeding up the process and avoiding problems with convergence. The data sets in the primary and auxiliary files need not be identical or in the same sequence.
2. Selection criteria. Reactors and materials can be selected for processing by entering the selection criteria in the appropriate menu screen. These criteria are not used in Monte Carlo uncertainty analysis. The Monte Carlo uncertainty analysis is designed to process a large number of data sets in sequence without user intervention. Consequently, only the starting number and the number of sets to be processed can be given. The number associated with each set can be found in the ASCII file RAW_CPY.SUM. These numbers are entered in the input screen as discussed in Sect. A.5.4, "Monte Carlo Uncertainty Analysis."
3. Choice of a preset coordinate system. The default version of this option is a coordinate system that is automatically scaled to accommodate all data and curves in the smallest range possible. However, the user can select a predetermined range of coordinate values, making it easy to compare the Charpy curves from different sets. Points and curves that fall outside the range are eliminated.
4. Selection of symbols and colors. This is essentially the same procedure as for plots in Sect. A.4, "Plotting Program," Item 6. Data points that are excluded from the fitting procedure can be plotted using different symbols. Such points can also be completely eliminated from the plot by using the empty symbol (zero symbol) for rejected data points.

A.6 Examples

The following examples are intended as exercises to guide EDB-Utilities users through the various options and to show typical applications of these processing steps. It is assumed that users will try to duplicate the sequence of processing steps listed in the following pages and verify the results. Readers of this report who are interested only in the capabilities of EDB-Utilities may have difficulty understanding the listing of processing steps without running the program and may safely skip these parts, concentrating instead on the general introductions and resulting tables and graphs. EDB-Utilities is started by typing EDB and then selecting from the various options that follow.

A.6.1 File-Manipulation Procedures with Plots

In the following example, the relation between shift in transition temperature and upper-shelf energy drop will be investigated. This example was chosen because it makes use of most of the file-manipulation features and needs only one EDB raw data file SHFT_CV.dbf. For more in-depth investigations, chemistry data need to be added, which would require additional processing with dBASE software. Also, the proposed manipulation of the data file could be done, perhaps faster, directly in dBASE by someone familiar with the software. However, the creation of the plot file and the actual plotting requires EDB-Utilities.

The following example compares the values given in DTT30 for the shift of transition temperature at 30 ft-lb with the relative upper-shelf drop given in DUSE_REL in percent for commercial power reactor surveillance data. However in many reports, these values are not listed directly and only the transition temperatures, UTT30 and ITT30, and upper-shelf energies, UUSE and IUSE, for unirradiated and irradiated conditions are given, from which the shift values can easily be calculated. Thus, two new fields are added to the input file, DTT and DUSE, which will contain either the reported value or the calculated value if the reported value is unavailable. The values for base material (plates, forgings, and standard reference materials) and welds are separated. Heat-affected-zone (HAZ) data are ignored.

Using the file-manipulation option, the following sequence of procedures will be performed:

```
Retrieve:          SHFT_CV.dbf
Power Reactor Data: A prompt message will allow the user to select power reactor data.
Delete records:   PROD_ID = HAZ
                  TEMP_U <> F*
                  USE_U <> FT-LB
                  (data with non-U.S. units are eliminated; conversion to U.S. units
                  is another possibility)
```

*The symbol <> (abbreviation for < or >) stands for "not equal." Symbols are listed as they appear on the menu screen (and dBASE commands).

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Add two user-defined fields: Name and description as follows

DTT	Shift in Transition Temperature @ 30 ft-lb [degree F]
DUSE	Upper Shelf Drop [Percent] (text in brackets [] are units for the plot)

Save working file: to a temporary file (e.g., TMP0)

Delete records: $DUSE_REL \leq 0$ (use reported USE_REL with positive drop only)

Calculate: $DUSE = DUSE_REL + 0$ (put DUSE_REL into DUSE)

Save working file: to another temporary file (e.g., TMP01)

Retrieve: TMP0.dbf

Delete records: $DUSE_REL > 0$ (retain records without DUSE_REL)
 $UUSE \leq 0$
 $IUSE \leq 0$ (eliminate missing UUSE and IUSE values)

Calculate: $DUSE = UUSE - IUSE$
 $DUSE = DUSE / UUSE$
 $DUSE = DUSE * 100$
(put calculated values $(UUSE - IUSE)/UUSE * 100$ to DUSE)

Delete records: $DUSE \leq 0$ (eliminate negative USE drop)

Add records: From TMP01.dbf

The working file now contains both reported and calculated relative drop values for USE with preference for reported values and negative drop values eliminated. A similar sequence can be performed for shift in transition temperature:

Save working file: to a temporary file (e.g., TMP1)

Delete records: $DTT30 \leq 0$

Calculate: $DTT = DTT30 + 0$ (puts DTT30 into DTT)

Save working file: to another temporary file (e.g., TMP11)

Retrieve: TMP1.dbf

Delete records: $DTT30 > 0$ (eliminate reported DTT30)

Calculate: $DTT = ITT30 - UTT30$ (put calculated shift into DTT)

Delete records: DTT $\leq$ 0 (eliminate negative shift)

Add records: From TMP11.dbf

The working file now contains the desired values for transition temperature shift and upper-shelf drop in the two newly created fields DTT and DUSE. These values are ready for printing and plotting. Through the processes of deleting and adding, the original sequence of records has been destroyed. It may be desirable to put the records in some new order before printing (the order of records is immaterial for plotting), for instance, through:

Reorder records: DTT - ASCENDING

By sending selected fields of the working file to the printer, one obtains the list in Table A.1. For plotting, it may be desirable to have different symbols for base materials and welds. This can be accomplished by selecting subsets of records from the file before exporting them to the plot files. First, the working file must be saved to a permanent file:

Save working file: to DTT_US.dbf

Delete records: PROD_ID = W (for base material)

Export to plot file: to BASE.dat

Retrieve: DTT_US.dbf

Delete records: PROD_ID $\neq$ W (for weld material)

Export to plot file: to WELD.dat

The data are now ready for plotting. After selecting the plotting option, the following input must be entered:

Title: Shift in Transition Temperature versus Upper Shelf Drop

Structure File: DTT_US (any of the temporary files will do also)

Coordinates: DTT for x-coordinate, DUSE for y-coordinate

Input files and legends: BASE.dat - Base Material
 WELD.dat - Weld Material

The present plot needs no additional curves, but suitable symbols and colors may be selected. Following that, the plot is created automatically. The last step is to put the legends in an appropriate place after prompting. The finished plot is shown in Fig. A.5. There seems to be a near linear relation between transition-temperature shift and upper-shelf drop for low shift values, although the USE drop appears to level off at high shift values. No obvious distinctions between base metal and welds can be seen. The data scatter is rather large and suggests further investigation of additional factors that may influence the relation between Charpy transition-temperature (CVT) shift and USE drop.

Appendix A

Table A.1. Transition-temperature shifts vs upper-shelf drop from Sect. A.6.1 example.
Data arranged according to increasing transition-temperature shift

PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	CSP FI	UTT30	ITT30	DTT30	DTT	UUSE	IUSE	DUSE REL	DUSE	TEMP U	USE U
DR2	S	WDR201	W	TL	1.300E+16	-10	-8	2	2.000E+00	101	96	5	5.000E+00	F	FT-LB
DB1	A	FDB101	F	TL	1.290E+19	-26	-24	2	2.000E+00	140	127		9.286E+00	F	FT-LB
TP3	S	FTP301	F	LT	1.410E+19	-46	-44	2	2.000E+00	145	128		1.172E+01	F	FT-LB
NA2	V	WNA201	W	TL	2.410E+18	-26	-24	2	2.000E+00	115	92		2.000E+01	F	FT-LB
DB1	D	FDB102	F	TL	9.620E+18	16	19	3	3.000E+00	122	117		4.098E+00	F	FT-LB
WF3	W97	PWF301	P	LT	6.470E+18	0	3	3	3.000E+00	170	154		9.412E+00	F	FT-LB
DR3	18	WDR301	W	TL	7.100E+16			4	4.000E+00	75	74		1.333E+00	F	FT-LB
CB1	Z	WCB101	W	TL	3.080E+18	-35	-30	5	5.000E+00	128	123		3.906E+00	F	FT-LB
GAR	216A	FGAR020D	F	TL		-8	-2	5	5.000E+00	89	79		1.124E+01	F	FT-LB
BD2	U	FBD201	F	TL	3.910E+18	-25	-20	5	5.000E+00	153	137		1.046E+01	F	FT-LB
OC3	A	FOC301	F	TL	7.390E+17	-5	1	6	6.000E+00	144	135		9.028E+00	F	FT-LB
SO2	W97	WSO201	W	LT	5.540E+18	-61	-54	7	7.000E+00	146	140	4	4.000E+00	F	FT-LB
NA2	V	FNA201	F	TL	2.410E+18	60	69	9	9.000E+00	75	62		1.733E+01	F	FT-LB
ST1	U	PST101	P	LT	2.930E+18	-35	-25	10	1.000E+01	137	132		3.650E+00	F	FT-LB
AN2	W97	WAN201	W	TL	3.340E+18	0	10	10	1.000E+01	154	147	5	5.000E+00	F	FT-LB
FA2	U	WFA201	W	TL	5.610E+18	-30	-20	10	1.000E+01	144	132		8.333E+00	F	FT-LB
AD1	V	WAD101	W	TL	4.580E+18	-80	-70	10	1.000E+01	171	155		9.357E+00	F	FT-LB
OC3	A	FOC301	F	LT	7.390E+17	-5	5	10	1.000E+01	180	155		1.389E+01	F	FT-LB
SB1	U	WSB101	W	TL	3.110E+18	-60	-50	10	1.000E+01	160	129	19	1.938E+01	F	FT-LB
OC2	E	FOC201	F	LT	1.210E+19	-24	-12	12	1.200E+01	152	136		1.053E+01	F	FT-LB
HB2	S	PHB203	P	LT	3.690E+18	27	40	13	1.300E+01	113	109		3.540E+00	F	FT-LB
TM1	C	PTM101	P	TL	8.660E+18	28	41	13	1.300E+01	98	79		1.939E+01	F	FT-LB
BR	121	WBR 01	W	TS		-70	-55	15	1.500E+01	95	92	3	3.158E+00	F	FT-LB
CL1	Y	PCL101	P	LT	1.290E+19	-5	10	15	1.500E+01	126	118		6.349E+00	F	FT-LB
BR	119	SHM3	SRM	LT	1.500E+18	0	15	15	1.500E+01	96	70	27	2.708E+01	F	FT-LB
HB2	S	PHB202	P	LT	3.690E+18	10	26	16	1.600E+01	90	88		2.222E+00	F	FT-LB
PH3	I	WPH301	W	LT	1.600E+17	2	18	16	1.600E+01	110	100	9	9.091E+00	F	FT-LB
PH3	I	PPH301	P	LT	1.600E+17	-14	2	16	1.600E+01	137	123	10	1.022E+01	F	FT-LB
AN1	E	PAN101	P	LT	7.270E+17	-21	-4	17	1.700E+01	132	118		1.061E+01	F	FT-LB
OC3	B	FOC302	F	TL	3.120E+18	-9	10	19	1.900E+01	112	100		1.786E+00	F	FT-LB
VY	30D	PVY 01	P	LT	4.300E+16	8	27	19	1.900E+01	148	128	14	1.351E+01	F	FT-LB
DR1	DRUM	PDR1010	P	TS	-3.000E+12	90	110	20	2.000E+01	80	79		1.250E+00	F	FT-LB
KWE	R	FKWE02	F	LT	2.070E+19	-50	-30	20	2.000E+01	157	153		2.548E+00	F	FT-LB
R12	X	WRI201	W				0	20	2.000E+01	124	120		3.226E+00	F	FT-LB
CB2	Z	PCB201	P	LT	3.360E+18	-15	5	20	2.000E+01	138	132		4.348E+00	F	FT-LB
WC1	U	WWC101	W	TL	3.390E+18	-50	-30	20	2.000E+01	100	92		8.000E+00	F	FT-LB
PB2	V	FPB201	F	LT	4.740E+18	-55	-35	20	2.000E+01	145	135		6.897E+00	F	FT-LB
PI1	P	FPI101	F	LT	1.250E+19	-25	-5	20	2.000E+01	158	142		1.013E+01	F	FT-LB
CR3	B	PCR301	P	TL	1.000E+18	16	37	21	2.100E+01	94	89		5.319E+00	F	FT-LB
SL2	W3	PSL201	P	TL	1.630E+18	40	61	21	2.100E+01	117	111		5.128E+00	F	FT-LB
NA1	V	FNA101	F	TL	2.490E+18	46	65	21	2.100E+01	85	75		1.176E+01	F	FT-LB
AN2	W97	PAN201	P	LT	3.410E+18	3	24	21	2.100E+01	159	140	12	1.195E+01	F	FT-LB
TRO	U	WTR001	W	TL	3.880E+18	2	24	22	2.200E+01	83	81		2.410E+00	F	FT-LB
FTZ	I	PFTZ01	P	LT	2.600E+17	-32	-9	23	2.300E+01	130	122	6	6.154E+00	F	FT-LB
TM1	E	PTM101	P	LT	1.070E+18	-13	11	24	2.400E+01	131	120		8.397E+00	F	FT-LB
SR1	U	WSR101	W	TL	5.520E+18	-35	-11	24	2.400E+01	94	82		1.277E+01	F	FT-LB
KWE	P	FKWE01	F	LT	2.890E+19	-25	0	25	2.500E+01	160	157		1.875E+00	F	FT-LB
ZN1	T	PZN101	P	TL	1.800E+18	25	50	25	2.500E+01	117	114		2.564E+00	F	FT-LB
BV2	U	WBV201	W	TL	5.990E+18	-35	-10	25	2.500E+01	139	134		3.597E+00	F	FT-LB
SQ2	T	FSQ201	F	TL	2.200E+18	0	25	25	2.500E+01	88	82		6.818E+00	F	FT-LB
AD1	V	FAD101	F	TL	4.580E+18	-22	3	25	2.500E+01	128	119		7.031E+00	F	FT-LB
SR1	V	WSR101	W	TL	1.320E+19	-35	-10	25	2.500E+01	92	81		1.196E+01	F	FT-LB
PL1	I	PPL101	P	LT	2.300E+17			25	2.500E+01			10	1.000E+01	F	FT-LB
AD1	V	FAD101	F	LT	4.580E+18	-25	0	25	2.500E+01	141	127		9.929E+00	F	FT-LB
GIN	V	FGIN01	F	LT	4.900E+18	-40	-15	25	2.500E+01	183	160		1.257E+01	F	FT-LB
SB1	U	FSB101	P	TL	3.110E+18	10	38	28	2.800E+01	79	72	9	8.861E+00	F	FT-LB
CR3	B	WCR301	W	TL	1.170E+18	36	64	28	2.800E+01	79	70		1.139E+01	F	FT-LB
DB1	A	FDB102	F	TL	1.290E+19	16	44	28	2.800E+01	127	118		7.087E+00	F	FT-LB
WC1	U	PWC101	P	LT	3.390E+18	-20	10	30	3.000E+01	148	145		2.027E+00	F	FT-LB
VS1	U	WVS101	W	TL	6.390E+18	-55	-25	30	3.000E+01	91	87		4.396E+00	F	FT-LB
ST1	U	PST101	P	TL	2.930E+18	-5	25	30	3.000E+01	113	105		7.080E+00	F	FT-LB
CL1	U	PCL101	P	TL	3.270E+18	-20	10	30	3.000E+01	104	93		1.058E+01	F	FT-LB
TM1	C	PTM101	P	LT	8.660E+18	-27	3	30	3.000E+01	131	114		1.298E+01	F	FT-LB
QC2	13	WQC201	W	TL	1.690E+16	-30	0	30	3.000E+01	125	107		1.440E+01	F	FT-LB
WC1	Y	PWC101	P	LT	1.330E+19	-20	10	30	3.000E+01	148	121		1.824E+01	F	FT-LB
GIN	T	FGIN01	F	LT	1.750E+19	-40	-10	30	3.000E+01	183	143		2.186E+01	F	FT-LB
OC3	D	FOC301	F	TL	1.450E+19	-9	22	31	3.100E+01	144	125		1.319E+01	F	FT-LB
SO3	W97	WSO301	W	TL	8.000E+18	-27	5	32	3.200E+01	82	70	15	1.463E+01	F	FT-LB
OC2	C	FOC201	F	LT	9.430E+17	-35	-3	32	3.200E+01	155	135		1.290E+01	F	FT-LB
OC3	B	FOC301	F	TL	3.120E+18	-9	12	32	3.200E+01	148	125		1.554E+01	F	FT-LB
OC1	A	POC102	P	TL	8.950E+18	5	39	34	3.400E+01	108	106		1.852E+00	F	FT-LB
HB2	S	PHB201	P	LT	3.690E+18	-18	16	34	3.400E+01	91	85		6.593E+00	F	FT-LB
ML3	U	PM1301	P	TL	4.320E+18	5	40	35	3.500E+01	111	108		2.703E+00	F	FT-LB

Table A.1. (continued).

PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	CSP FI	UTT30	ITT30	DTT30	DTT	UUSE	IUSE	DUSE REL	DUSE	TEMP U	USE U
PB2	R	FPB201	F	LT	2.010E+19	-45	-10	35	3.500E+01	145	140		3.448E+00	F	FT-LB
CTY	F	PCTY02	P	LT	4.040E+18	-30	5	35	3.500E+01	138	127		7.971E+00	F	FT-LB
CTY	A	PCTY02	P	LT	2.070E+18	-30	5	35	3.500E+01	138	124		1.014E+01	F	FT-LB
PI2	T	FP1201	F	TL	1.050E+19	0	35	35	3.500E+01	108	93		1.389E+01	F	FT-LB
SL2	W83	PSL201	P	LT	1.620E+18	3	38	35	3.500E+01	133	118		1.128E+01	F	FT-LB
DR1	WALL-1	PDR101	P	TS	0.520E+18	80	115	35	3.500E+01	82	62		2.439E+01	F	FT-LB
KO1	V	FKO101	F	LT	3.120E+18		35	35	3.500E+01	175	155	11	1.143E+01	F	FT-LB
AN1	B	PAN102	P	LT	4.280E+18	-13	22	35	3.500E+01	147	123		1.633E+01	F	FT-LB
KO1	T	FKO101	F	TL	9.800E+18			35	3.500E+01	168	139	17	1.726E+01	F	FT-LB
ML1	2	WML101	W	TS	3.300E+17	-45	-10	35	3.500E+01	112	75	33	3.304E+01	F	FT-LB
SB1	U	PSB101	P	LT	3.110E+18	-25	11	36	3.600E+01	125	118	6	5.600E+00	F	FT-LB
WF3	W97	WWF301	W		6.470E+18	-80	-44	36	3.600E+01	156	143		8.333E+00	F	FT-LB
WF3	W97	PWF301	P	TL	6.470E+18	-29	7	36	3.600E+01	141	123		1.277E+01	F	FT-LB
SR1	V	PSR101	P	TL	1.320E+19	65	102	37	3.700E+01	70	64		8.571E+00	F	FT-LB
PI1	P	FP1101	F	TL	1.250E+19	-27	10	37	3.700E+01	143	136		4.895E+00	F	FT-LB
ZN2	U	PZN201	P	LT	2.000E+18	37	75	38	3.800E+01	128	121		5.469E+00	F	FT-LB
AN1	C	PAN101	P	TL	1.460E+19	17	55	38	3.800E+01	96	80		1.667E+01	F	FT-LB
OC1	C	POC102	P	TL	9.860E+19	18	94	39	3.900E+01	108	96		1.111E+01	F	FT-LB
AN1	E	PAN101	P	TL	7.270E+17	7	46	39	3.900E+01	107	82		2.336E+01	F	FT-LB
NA1	V	FNA101	F	LT	2.490E+18	-6	33	39	3.900E+01	135	122		1.852E+01	F	FT-LB
OC3	B	SHSS02	SRM	LT	3.120E+18	56	95	39	3.900E+01	130	96		2.615E+01	F	FT-LB
DR2	4	PDR201	P	LT	9.500E+18	0	39	39	3.900E+01	153	117	24	2.353E+01	F	FT-LB
CK2	T	WCK201	W	TL	1.800E+18			40	4.000E+01			3	3.000E+00	F	FT-LB
VS1	U	PVS101	P	LT	6.390E+18	-20	20	40	4.000E+01	133	131		1.504E+00	F	FT-LB
ML3	U	WML301	W	LT	4.320E+18	-35	5	40	4.000E+01	143	135		5.594E+00	F	FT-LB
QC2	12	PQC201	P	LT	1.270E+19	-15	25	40	4.000E+01	135	123		8.889E+00	F	FT-LB
BR	127	SHM3	SRM	LT	7.100E+18	0	40	40	4.000E+01	96	82	15	1.458E+01	F	FT-LB
CL1	Y	WCL101	W	TL	1.290E+19	-55	-15	40	4.000E+01	112	97		1.339E+01	F	FT-LB
SR1	V	PSR101	P	LT	1.320E+19	60	101	41	4.100E+01	86	80		6.977E+00	F	FT-LB
TP4	S	FTP402	F	LT	1.250E+19	-12	29	41	4.100E+01	135	123		8.889E+00	F	FT-LB
DAC	I	PDAC01	P	LT	4.900E+17	-35	7	42	4.200E+01	164	160	3	2.439E+00	F	FT-LB
DR1	4-1	WDR101	W	TS	1.000E+19	0	43	43	4.300E+01	110	91	17	1.727E+01	F	FT-LB
QC2	18	WQC201	W	TL	6.600E+16			43	4.300E+01			27	2.700E+01	F	FT-LB
SR1	U	PSR101	P	TL	5.520E+18	65	110	45	4.500E+01	70	69		1.429E+00	F	FT-LB
VS1	V	WVS101	W	TL	1.470E+19	-60	-15	45	4.500E+01	91	85		6.593E+00	F	FT-LB
MC1	U	PMC101	P	LT	4.140E+18	5	50	45	4.500E+01	140	133		5.000E+00	F	FT-LB
MC1	X	PMC101	P	LT	1.380E+19	5	50	45	4.500E+01	140	133		5.000E+00	F	FT-LB
SU2	X	PSU201	P	TL	3.020E+18	5	50	45	4.500E+01	105	95		9.524E+00	F	FT-LB
CL1	Y	PCL101	P	TL	1.290E+19	-20	25	45	4.500E+01	104	91		1.250E+01	F	FT-LB
OC2	C	WOC201	W	TL	9.430E+17	4	49	45	4.500E+01	67	54		1.940E+01	F	FT-LB
OC3	D	FOC302	F	TL	1.450E+19	-9	36	45	4.500E+01	112	93		1.696E+01	F	FT-LB
SO2	W97	PSO201	P	TL	5.540E+18	21	65	45	4.500E+01	126	105	17	1.667E+01	F	FT-LB
TRO	V	WTRO01	W	TL	2.370E+19	2	47	45	4.500E+01	83	62		2.530E+01	F	FT-LB
AN1	A	SHSS02	SRM	LT	1.050E+19		94	46	4.600E+01	124	95		2.823E+01	F	FT-LB
OC1	E	POC102	P	TL	1.500E+18	6	53	47	4.700E+01	108	107		9.259E-01	F	FT-LB
PB2	S	FPB201	F	LT	3.470E+19	-45	2	47	4.700E+01	145	134		7.586E+00	F	FT-LB
TP3	S	FTP302	F	LT	1.410E+19	-63	-16	47	4.700E+01	154	122		2.078E+01	F	FT-LB
OC3	A	WOC301	W	TL	7.390E+17	45	93	48	4.800E+01	66	54		1.818E+01	F	FT-LB
AN1	A	PAN101	P	LT	1.030E+19	-31	17	48	4.800E+01	132	108		1.818E+01	F	FT-LB
MC1	U	PMC101	P	TL	4.140E+18	0	50	50	5.000E+01	101	100		9.901E-01	F	FT-LB
OC1	E	POC102	P	LT	1.500E+18	-10	40	50	5.000E+01	141	138		2.128E+00	F	FT-LB
CTY	F	PCTY07	P	LT	4.040E+18	-25	25	50	5.000E+01	126	121		3.968E+00	F	FT-LB
SU1	T	PSU101	P	LT	2.500E+18	-10	40	50	5.000E+01	125	120		4.000E+00	F	FT-LB
WC1	Y	WWC101	W	TL	1.330E+19	-50	0	50	5.000E+01	100	94		6.000E+00	F	FT-LB
CK2	Y	WCK201	W	TL	5.550E+18			50	5.000E+01			9	9.000E+00	F	FT-LB
SA2	T	PSA201	P	LT	2.560E+18	30	80	50	5.000E+01	122	115		5.738E+00	F	FT-LB
DR2	S	PDR201	P	LT	1.900E+19	0	50	50	5.000E+01	139	127	9	8.633E+00	F	FT-LB
ZN2	U	SHSS02	SRM	LT	2.000E+18	50	100	50	5.000E+01	124	111		1.048E+01	F	FT-LB
AN2	W97	PAN201	P	TL	3.330E+18	10	60	50	5.000E+01	134	120	10	1.045E+01	F	FT-LB
RI2	X	FRI201	F	LT			23	50	5.000E+01	139	124		1.079E+01	F	FT-LB
SO3	W97	PSO301	P	LT	8.000E+18	80	130	50	5.000E+01	92	70	24	2.391E+01	F	FT-LB
KO1	V	FKO101	F	TL	3.120E+18		50	50	5.000E+01	168	140	16	1.667E+01	F	FT-LB
AN1	B	SHSS02	SRM	LT	4.280E+18		98	50	5.000E+01	124	96		2.742E+01	F	FT-LB
SO2	W97	PSO201	P	LT	5.540E+18	15	66	51	5.100E+01	151	134	11	1.126E+01	F	FT-LB
OC3	A	FOC302	F	TL	7.390E+17	-2	50	52	5.200E+01	112	104		7.143E+00	F	FT-LB
CTY	H	PCTY07	P	LT	1.790E+19	-30	23	53	5.300E+01	120	117		2.500E+00	F	FT-LB
TRO	U	WTRO01	P	LT	3.880E+18			53	5.300E+01	116			5.172E+00	F	FT-LB
IP2	T	PIP201	P	LT	2.930E+18			54	5.400E+01	118	100	15	1.525E+01	F	FT-LB
SU2	X	PSU201	P	LT	3.020E+18	-5	50	55	5.500E+01	125	120		4.000E+00	F	FT-LB
BR	119	WBR 01	W	TS	1.500E+18	-70	-15	55	5.500E+01	95	80	16	1.579E+01	F	FT-LB
CK2	T	PCK201	P	LT	2.300E+18			55	5.500E+01			12	1.200E+01	F	FT-LB
QC2	3	PQC201	P	LT	4.140E+19	-15	40	55	5.500E+01	135	119	12	1.185E+01	F	FT-LB
SO3	W97	PSO301	P	TL	8.000E+18	50	105	55	5.500E+01	92	76	17	1.739E+01	F	FT-LB

Appendix A

Table A.1. (continued).

PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	CSP FI	UTT30	ITT30	DTT30	DTT	UUSE	IUSE	DUSE REL	DUSE	TEMP U	USE U
PI2	T	FPI201	F	LT	1.050E+19	-25	30	55	5.500E+01	150	133		1.133E+01	F	FT-LB
PL1	I	WPL101	W	TL	2.300E+17			55	5.500E+01			18	1.800E+01	F	FT-LB
CPR	I	WCPR01	W	TL	2.300E+17	-10	45	55	5.500E+01	112	85	24	2.411E+01	F	FT-LB
DR1	WALL-2	PDR101	P	TS	4.700E+18	80	135	55	5.500E+01	82	53		3.537E+01	F	FT-LB
CTY	H	PCTY02	P	LT	1.790E+19	-50	7	57	5.700E+01	135	130		3.704E+00	F	FT-LB
DR2	2	WDR202	W	TL	1.870E+19	-13	45	58	5.800E+01	71	70	1	1.408E+00	F	FT-LB
RS1	D	PRS101	P	TL	6.600E+18	4	62	58	5.800E+01	90	88		2.222E+00	F	FT-LB
HA1	I	PHA101	P	LT	2.400E+17	-70	-12	58	5.800E+01	139	131	6	5.755E+00	F	FT-LB
ML1	2	PML101	P	LT	3.300E+17	15	73	58	5.800E+01	106	88	17	1.698E+01	F	FT-LB
DR3	12	PDR301	P	LT	9.250E+18	-10	48	58	5.800E+01	135	115	15	1.481E+01	F	FT-LB
ML2	W104	WML201	W	TL	8.840E+18	-30	28	58	5.800E+01	132	108		1.818E+01	F	FT-LB
GAR	I13C	FGAR01ID	F	LT	2.470E+18	-53	7	59	5.900E+01	124	116		6.452E+00	F	FT-LB
GRN	R	FGIN01	F	LT	7.600E+18		11	59	5.900E+01	183	170		7.104E+00	F	FT-LB
CC1	W263	WCC101	W	TL	6.100E+18	-50	9	59	5.900E+01	160	119		2.563E+01	F	FT-LB
PI2	V	WPI201	W	TL	5.490E+18	-75	-15	60	6.000E+01	103	100		2.913E+00	F	FT-LB
OC1	A	POC102	P	LT	8.950E+18	-5	55	60	6.000E+01	141	137		2.837E+00	F	FT-LB
SA1	T	SHSS02	SRM	LT	2.560E+18	50	110	60	6.000E+01	123	115		6.504E+00	F	FT-LB
ZN1	T	PZN101	P	LT	1.800E+18	-5	55	60	6.000E+01	140	132		5.714E+00	F	FT-LB
BR	I27	PBR 01	P	TL	7.100E+18	-5	55	60	6.000E+01	82	73	11	1.098E+01	F	FT-LB
SU2	X	SHSS02	SRM	LT	3.020E+18	40	100	60	6.000E+01	125	115		8.000E+00	F	FT-LB
VSI	V	PVS101	P	LT	1.470E+19	-25	35	60	6.000E+01	132	122		7.576E+00	F	FT-LB
PI2	T	WPI201	W	TL	1.050E+19	-75	-15	60	6.000E+01	103	92		1.068E+01	F	FT-LB
ZN1	U	PZN101	P	TL	8.920E+18	25	85	60	6.000E+01	117	102		1.282E+01	F	FT-LB
SQ2	T	FSQ201	F	LT	2.200E+18	-70	-10	60	6.000E+01	134	118		1.194E+01	F	FT-LB
CK1	T	SHSS02	SRM	LT	1.800E+18	45	105	60	6.000E+01	120	102	15	1.500E+01	F	FT-LB
FC1	W225	PFC101	P	LT	4.500E+18	22	82	60	6.000E+01	141	122	13	1.348E+01	F	FT-LB
CK1	T	PCK101	P	LT	1.800E+18	5	65	60	6.000E+01	130	108	16	1.692E+01	F	FT-LB
CC1	W263	PCC103	P	LT	6.000E+18	8	68	60	6.000E+01	138	115		1.667E+01	F	FT-LB
DR3	14	PDR301	P	LT	1.020E+19	-10	50	60	6.000E+01	135	112		1.704E+01	F	FT-LB
SQ2	U	FSQ201	F	TL	6.430E+18	0	62	62	6.200E+01	88	80		9.091E+00	F	FT-LB
DR2	4	WDR202	W	TL	6.400E+18	-13	50	63	6.300E+01	71	51	28	2.817E+01	F	FT-LB
OC3	B	WOC301	W	TL	3.120E+18	45	109	64	6.400E+01	66	49		2.576E+01	F	FT-LB
AN1	C	PAN101	P	LT	1.460E+19	-31	33	64	6.400E+01	132	109		1.742E+01	F	FT-LB
DR1	WALL-2	PDR101	P	TS	4.700E+18	90	155	65	6.500E+01	80	70		1.250E+01	F	FT-LB
DC2	U	PDC201	P	LT	3.510E+18	5	70	65	6.500E+01	144	124	15	1.389E+01	F	FT-LB
MC2	V	FMC201	F	LT	3.060E+18	-75	-10	65	6.500E+01	156	134		1.410E+01	F	FT-LB
DR1	WALL-2	PDR101	P	LS	4.700E+18	60	125	65	6.500E+01	122	65		4.672E+01	F	FT-LB
DC1	S	SHSS02	SRM	LT	2.980E+18	46	112	66	6.600E+01	124	123		8.065E+01	F	FT-LB
AN1	A	PAN101	P	TL	1.030E+19	17	83	66	6.600E+01	96	83		1.146E+01	F	FT-LB
ZN1	T	SHSS02	SRM	LT	1.800E+18	42	108	66	6.600E+01	124	106		1.452E+01	F	FT-LB
CTY	H	PCTY04	P	LT	1.790E+19	-24	43	67	6.700E+01	126	122		3.175E+00	F	FT-LB
SL1	W104	PSL101	P	LT	7.160E+18	8	75	67	6.700E+01	139	116		1.655E+01	F	FT-LB
CAB	P	PCAB02	P	LT	1.430E+19	-24	44	68	6.800E+01	125	123		1.600E+00	F	FT-LB
RS1	F	PRS101	P	TL	1.420E+19	4	72	68	6.800E+01	90	79		1.222E+01	F	FT-LB
OC1	C	SHSS02	SRM	LT	9.860E+19		116	68	6.800E+01	124	101		2.339E+01	F	FT-LB
AN1	C	SHSS02	SRM	LT	1.460E+19		116	68	6.800E+01	124	99		2.500E+01	F	FT-LB
SL1	W97	PSL101	P	LT	5.400E+18	8	76	68	6.800E+01	139	107	23	2.302E+01	F	FT-LB
CC2	W263	WCC201	W	TL	7.970E+18	-50	19	69	6.900E+01	137	105	23	2.336E+01	F	FT-LB
SA2	T	PSA201	P	TL	2.560E+18	10	80	70	7.000E+01	97	89		8.247E+00	F	FT-LB
MC2	V	FMC201	F	TL	3.060E+18	-25	45	70	7.000E+01	94	85		9.574E+00	F	FT-LB
CK1	T	PCK101	P	TL	1.800E+18	20	90	70	7.000E+01	94	84	10	1.064E+01	F	FT-LB
SA2	U	PSA201	P	LT	5.700E+18	30	100	70	7.000E+01	122	112		8.197E+00	F	FT-LB
CK2	X	WCK201	W	TL	8.530E+18			70	7.000E+01			15	1.500E+01	F	FT-LB
CL1	U	WCL101	W	TL	3.270E+18	-55	15	70	7.000E+01	112	101		9.821E+00	F	FT-LB
SQ1	T	FSQ101	F	LT	2.740E+18	-35	35	70	7.000E+01	116	98		1.552E+01	F	FT-LB
SU1	T	SHSS02	SRM	LT	2.500E+18	45	115	70	7.000E+01	123	105		1.463E+01	F	FT-LB
BR	I22	PBR 01	P	TL	2.300E+19	-5	65	70	7.000E+01	82	62	24	2.439E+01	F	FT-LB
SL1	W97	PSL101	P	TL	5.400E+18	16	86	70	7.000E+01	103	78	24	2.427E+01	F	FT-LB
FC1	W265	PFC101	P	TL	9.000E+18	36	106	70	7.000E+01	120	93	23	2.250E+01	F	FT-LB
GAR	I13F	FGAR01OD	F	LT	3.640E+18	-69	1	70	7.000E+01	135	107		2.074E+01	F	FT-LB
ML2	W97	PML201	P	LT	3.750E+18	38	108	70	7.000E+01	131	94	28	2.824E+01	F	FT-LB
OC2	A	SHSS02	SRM	LT	3.370E+18		119	71	7.100E+01	124	103		2.177E+01	F	FT-LB
IP2	T	SASTM	SRM	LT	2.550E+18			72	7.200E+01	78	68	13	1.282E+01	F	FT-LB
DC2	U	PDC201	P	TL	3.510E+18	26	99	73	7.300E+01	95	94	1	1.053E+00	F	FT-LB
CR3	C	SHSS02	SRM	LT	6.560E+18		121	73	7.300E+01	124	103		2.177E+01	F	FT-LB
SL1	W104	WSL101	W	TL	7.160E+18	-53	20	73	7.300E+01	144	108		2.500E+01	F	FT-LB
CPR	I	PCPR01	P	LT	2.300E+17	-66	8	74	7.400E+01	129	112	13	1.318E+01	F	FT-LB
FC1	W265	PFC101	P	LT	9.000E+18	22	96	74	7.400E+01	141	109	23	2.270E+01	F	FT-LB
SL1	W97	WSL101	W	TL	5.300E+18	-53	21	74	7.400E+01	144	100	31	3.056E+01	F	FT-LB
NA1	U	WNA101	W	TL	8.280E+18	-26	49	75	7.500E+01	95	92		3.158E+00	F	FT-LB
SU2	V	PSU201	P	LT	1.880E+19	-5	70	75	7.500E+01	125	121		3.200E+00	F	FT-LB
DR1	4-1	SHM3 O	SRM	TS	1.000E+19	10	85	75	7.500E+01	67	58	13	1.343E+01	F	FT-LB
HB2	T	PHB203	P	LT	4.110E+19	30	105	75	7.500E+01	114	105		7.895E+00	F	FT-LB

Table A.1. (continued).

PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	CSP FI	UTT30	ITT30	DTT30	DTT	UUSE	IUSE	DUSE REL	DUSE	TEMP U	USE U
SU2	V	PSU201	P	TL	1.880E+19	5	80	75	7.500E+01	105	94		1.048E+01	F	FT-LB
SQ1	U	FSQ101	F	TL	1.080E+19	45	120	75	7.500E+01	72	58		1.944E+01	F	FT-LB
DR1	WALL-2	PDR101O	P	LS	4.700E+18	60	135	75	7.500E+01	112	92		1.786E+01	F	FT-LB
ZN2	T	PZN201	P	LT	8.700E+18			75	7.500E+01			19	1.900E+01	F	FT-LB
HB2	S	SASTM	SRM	TL	3.690E+18	65	141	76	7.600E+01	39	36		7.692E+00	F	FT-LB
PB2	S	FPB202	F	LT	3.470E+19	-80	-4	76	7.600E+01	180	163		9.444E+00	F	FT-LB
OC1	C	POC102	P	LT	9.860E+19	-5	34	76	7.600E+01	141	117		1.702E+01	F	FT-LB
ML2	W97	WML201	W	TL	3.770E+18	-30	46	76	7.600E+01	132	98	26	2.576E+01	F	FT-LB
TM1	C	SHSS02	SRM	LT	8.660E+18		125	77	7.700E+01	124	97		2.661E+01	F	FT-LB
NA1	V	WNA101	W	TL	2.490E+18	-26	52	78	7.800E+01	95	95		3.158E+00	F	FT-LB
CTY	D	PCTY04	P	LT	2.220E+19	-24	54	78	7.800E+01	126	110		1.270E+01	F	FT-LB
SA2	X	PSA201	P	LT	1.160E+19	30	110	80	8.000E+01	122	120		1.639E+00	F	FT-LB
SQ2	T	WSQ201	W	TL	2.200E+18	-75	5	80	8.000E+01	112	110		1.786E+00	F	FT-LB
CTY	F	PCTY04	P	LT	4.040E+18	-20	60	80	8.000E+01	130	126		3.077E+00	F	FT-LB
OC1	E	WOC101	W	TL	1.500E+18	-5	75	80	8.000E+01	64	55		1.406E+01	F	FT-LB
CK2	T	PCK201	P	TL	2.300E+18			80	8.000E+01			14	1.400E+01	F	FT-LB
HM3	4	SHM3	SRM	LT	3.000E+19	0	80	80	8.000E+01	94	81		1.383E+01	F	FT-LB
PI1	R	FPI101	F	LT	4.030E+19	-25	55	80	8.000E+01	158	145		8.228E+00	F	FT-LB
QC1	I	WQC101	W	TL	8.910E+18	10	90	80	8.000E+01	100	85	15	1.500E+01	F	FT-LB
DR1	CORE-1	PDR101O	P	TS	0.700E+19	90	170	80	8.000E+01	80	62		2.250E+01	F	FT-LB
FA1	Y	WFA101	W	TL	5.830E+18	-80	0	80	8.000E+01	149	130		1.275E+01	F	FT-LB
CK2	Y	PCK201	P	LT	7.010E+18			80	8.000E+01			19	1.900E+01	F	FT-LB
ZN1	X	PZN101	P	TL	1.500E+19			80	8.000E+01			21	2.100E+01	F	FT-LB
CK1	T	WCK101	W	TL	1.800E+18	-90	-10	80	8.000E+01	110	80	27	2.727E+01	F	FT-LB
SO1	A	WSO101	W	TL	1.200E+19			80	8.000E+01	100	67		3.300E+01	F	FT-LB
FA1	U	WFA101	W	TL	1.650E+19	-80	0	80	8.000E+01	149	108		2.752E+01	F	FT-LB
TP3	T	SASTM	SRM	LT	5.680E+18			82	8.200E+01	78	72		7.692E+00	F	FT-LB
CC2	W263	PCC202	P	LT	8.060E+18	9	93	84	8.400E+01	146	115	21	2.123E+01	F	FT-LB
PI2	R	FPI201	F	TL	4.420E+19	0	85	85	8.500E+01	108	98		9.259E+00	F	FT-LB
FA1	Y	PFA101	P	LT	5.830E+18	-30	55	85	8.500E+01	140	128		8.571E+00	F	FT-LB
ZN1	U	PZN101	P	LT	8.920E+18	-5	80	85	8.500E+01	140	120		1.429E+01	F	FT-LB
DR1	CORE-5	WDR101	W	TS	1.300E+20	-0	85	85	8.500E+01	110	69		3.727E+01	F	FT-LB
CK2	X	PCK201	P	LT	1.050E+19			85	8.500E+01			33	3.300E+01	F	FT-LB
IP2	V	PIP202	P	LT	4.570E+18	15	101	86	8.600E+01	117	111	5	5.128E+00	F	FT-LB
PI1	R	FPI101	F	TL	4.030E+19	-27	60	87	8.700E+01	143	129		9.790E+00	F	FT-LB
ZN2	Y	PZN201	P	LT	1.480E+19	37	125	88	8.800E+01	128	111		1.328E+01	F	FT-LB
CC1	W263	SHSS01	SRM	LT	5.900E+18	39	127	88	8.800E+01	135	109		1.926E+01	F	FT-LB
OC1	A	SHSS02	SRM	LT	8.950E+18		144	88	8.800E+01	124	97		2.661E+01	F	FT-LB
IP3	T	PIP301	P	LT	2.920E+18	-2	87	89	8.900E+01	132	119		9.848E+00	F	FT-LB
FA1	U	PFA101	P	TL	1.650E+19	15	105	90	9.000E+01	90	82		8.889E+00	F	FT-LB
DR1	CORE-1	PDR101I	P	TS	0.700E+19	80	170	90	9.000E+01	82	72		1.220E+01	F	FT-LB
TRO	V	PTR001	P	LT	2.370E+19	-15	75	90	9.000E+01	116	106		8.621E+00	F	FT-LB
GIN	V	SASTM	SRM	LT	4.900E+18	40	130	90	9.000E+01	78	65		1.667E+01	F	FT-LB
TRO	X	PTR001	P	LT	1.770E+19	-15	75	90	9.000E+01	84	102		1.667E+01	F	FT-LB
ZN2	T	PZN201	P	TL	1.100E+19			90	9.000E+01			15	1.500E+01	F	FT-LB
PB1	S	PPB101	P	LT	7.050E+18	-45	45	90	9.000E+01	107	92		1.402E+01	F	FT-LB
PB1	V	PPB101	P	LT	3.580E+18	-45	45	90	9.000E+01	109	91		1.651E+01	F	FT-LB
PB2	V	SHSS02	SRM	LT	4.740E+18	45	135	90	9.000E+01	125	95		2.400E+01	F	FT-LB
TP4	T	SHSS02	SRM	LT	6.050E+18			90	9.000E+01	123	92		2.520E+01	F	FT-LB
ZN1	X	PZN101	P	LT	1.200E+19			90	9.000E+01			23	2.300E+01	F	FT-LB
DR2	2	PDR201	P	LT	2.980E+19	0	90	90	9.000E+01	153	109	29	2.876E+01	F	FT-LB
ZN1	Y	PZN101	P	LT	1.560E+19	-5	87	92	9.200E+01	140	114		1.857E+01	F	FT-LB
MY	W263	PMY 01	P	TL	6.600E+18	15	108	93	9.300E+01	115	96		1.452E+01	F	FT-LB
SQ2	U	FSQ201	F	LT	6.430E+18	-70	23	93	9.300E+01	134	110		1.791E+01	F	FT-LB
ZN1	Y	PZN101	P	TL	1.560E+19	25	119	94	9.400E+01	117	96		1.795E+01	F	FT-LB
IP2	T	PIP202	P	LT	2.930E+18			94	9.400E+01	122	99		1.885E+01	F	FT-LB
TRO	X	PTR001	P	TL	1.770E+19	8	103	95	9.500E+01	84	76		9.524E+00	F	FT-LB
PB1	S	SASTM	SRM	LT	7.050E+18	40	135	95	9.500E+01	78	68		1.282E+01	F	FT-LB
SA2	U	PSA201	P	TL	5.700E+18	10	105	95	9.500E+01	97	84		1.340E+01	F	FT-LB
KEVE	V	SHSS02	SRM	LT	5.590E+18	45	140	95	9.500E+01	124	109		1.129E+01	F	FT-LB
DR1	CORE-1	PDR101I	P	LS	0.700E+19	60	155	95	9.500E+01	122	105		1.393E+01	F	FT-LB
SU2	X	WSU201	W	TL	3.020E+18	-20	75	95	9.500E+01	90	70		2.222E+01	F	FT-LB
NAJ	U	FNA101	F	LT	8.280E+18	-6	89	95	9.500E+01	135	110		1.852E+01	F	FT-LB
CTY	A	WCTY01	W	TL	2.070E+18	-50	45	95	9.500E+01	108	82		2.407E+01	F	FT-LB
OC2	E	SHSS02	SRM	LT	1.210E+19		143	95	9.500E+01	124	98		2.581E+01	F	FT-LB
QC2	12	WQC201	W	TL	1.250E+19	-30	65	95	9.500E+01	125	89		2.880E+01	F	FT-LB
IP2	V	SASTM	SRM	LT	4.570E+18			95	9.500E+01	118	70	41	4.068E+01	F	FT-LB
GIN	R	SASTM	SRM	LT	7.600E+18			96	9.600E+01	78	60		2.308E+01	F	FT-LB
ML2	W97	PML201	P	TL	3.670E+18	17	113	96	9.600E+01	108	79	27	2.685E+01	F	FT-LB
TRO	V	PTR001	P	TL	2.370E+19	8	105	97	9.700E+01	84	70		1.667E+01	F	FT-LB
CR3	D	PCR301	P	TL	7.500E+18	16	113	97	9.700E+01	94	72		2.340E+01	F	FT-LB
MY	W263	PMY 01	P	LT	6.600E+18	0	97	97	9.700E+01	140	113		1.929E+01	F	FT-LB
RS1	B	WRS101	W	TL	3.990E+18	-14	85	99	9.900E+01	68	51		2.500E+01	F	FT-LB

Appendix A

Table A.1. (continued).

PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	CSP FI	UTT30	ITT30	DTT30	DTT	UUSE	IUSE	DUSE REL	DUSE	TEMP U	USE U
ML2	W104	PML201	P	LT	8.840E+18	38	137	99	9.900E+01	131	94		2.824E+01	F	FT-LB
PB1	T	PPB101	P	LT	2.110E+19	-45	55	100	1.000E+02	107	95		1.121E+01	F	FT-LB
PI2	R	WPI201	W	TL	4.420E+19	-75	25	100	1.000E+02	103	91		1.165E+01	F	FT-LB
SA1	T	PSA102	P	LT	2.560E+18	-25	75	100	1.000E+02	116	103		1.121E+01	F	FT-LB
CK2	Y	PCK201	P	TL	7.010E+18			100	1.000E+02			20	2.000E+01	F	FT-LB
SA1	T	PSA101	P	LT	2.560E+18	-20	80	100	1.000E+02	108	89		1.759E+01	F	FT-LB
MC2	X	FMC201	F	LT	1.450E+19	-75	25	100	1.000E+02	156	136		1.282E+01	F	FT-LB
DR1	WALL-3	PDR101	P	TS	9.800E+18	80	180	100	1.000E+02	82	61		2.561E+01	F	FT-LB
DR1	CORE-1	PDR101O	P	LS	0.700E+19	60	160	100	1.000E+02	112	89		2.054E+01	F	FT-LB
PI2	R	FPI201	F	LT	4.420E+19	-25	75	100	1.000E+02	150	127		1.533E+01	F	FT-LB
CK1	X	PCK101	P	LT	7.700E+18	5	105	100	1.000E+02	102		22	2.200E+01	F	FT-LB
SO1	A	PSO103	P	LT	1.200E+19			100	1.000E+02	105	72		3.143E+01	F	FT-LB
FA1	X	WFA101	W	TL	2.800E+19	-80	20	100	1.000E+02	149	115		2.282E+01	F	FT-LB
ZN2	T	SHSS02	SRM	LT	1.000E+19			100	1.000E+02	124		29	2.900E+01	F	FT-LB
CK1	X	SHSS02	SRM	LT	6.900E+18			100	1.000E+02	124		34	3.400E+01	F	FT-LB
IP2	Z	SASTM	SRM	LT	9.620E+18			100	1.000E+02	78			7.692E+01	F	FT-LB
DR2	4	WDR201	W	TL	9.500E+18	-10	93	103	1.030E+02	101	80	21	2.079E+01	F	FT-LB
CK2	X	PCK201	P	TL	1.050E+19			103	1.030E+02			27	2.700E+01	F	FT-LB
FA2	U	PFA201	P	LT	5.610E+18	-23	80	103	1.030E+02	130	94		2.769E+01	F	FT-LB
PB1	R	PPB101	P	LT	2.220E+19	-45	60	105	1.050E+02	107	100		6.542E+00	F	FT-LB
FA1	X	PFA101	P	TL	2.800E+19	15	120	105	1.050E+02	90	80		1.111E+01	F	FT-LB
AN1	E	WAN101	W	TL	7.270E+17	5	110	105	1.050E+02	73	58		2.055E+01	F	FT-LB
PB2	T	SHSS02	SRM	LT	9.450E+18	49	154	105	1.050E+02	124	109		1.210E+01	F	FT-LB
MC2	X	FMC201	F	TL	1.450E+19	-25	80	105	1.050E+02	94	77		1.809E+01	F	FT-LB
HM3	4	WHM301	W	TS	3.000E+19	-25	80	105	1.050E+02	93	70		2.473E+01	F	FT-LB
CK1	Y	PCK101	P	LT	1.340E+19			105	1.050E+02			20	2.000E+01	F	FT-LB
DR3	4	PDR301	P	LT	2.060E+19	-10	95	105	1.050E+02	135	106	22	2.148E+01	F	FT-LB
HB2	V	SASTM	SRM	TL	4.510E+18			105	1.050E+02	69	38		4.493E+01	F	FT-LB
GAR	113D	SASTM S2	SRM	LT	7.370E+18	27	133	106	1.060E+02	78	59		2.436E+01	F	FT-LB
DB1	A	SHSS02	SRM	LT	1.290E+19		154	106	1.060E+02	124	95		2.823E+01	F	FT-LB
PB1	V	WPB101	W	TL	3.580E+18	-45	65	110	1.100E+02	65	58		1.077E+01	F	FT-LB
SU1	V	PSU101	P	LT	1.940E+19	-10	100	110	1.100E+02	125	116		7.200E+00	F	FT-LB
DC1	S	WDC101	W	TL	2.980E+18	-67	43	110	1.100E+02	98	87		1.122E+01	F	FT-LB
CAB	K	WCAB01	W	TL	1.400E+19	-20	90	110	1.100E+02	102	85		1.667E+01	F	FT-LB
CK1	X	PCK101	P	TL	6.200E+18			110	1.100E+02			18	1.800E+01	F	FT-LB
SA1	Y	PSA103	P	LT	8.910E+18	-50	60	110	1.100E+02	130	113		1.308E+01	F	FT-LB
CTY	D	WCTY01	W	TL	2.220E+19	-50	60	110	1.100E+02	105	83		2.095E+01	F	FT-LB
IP2	Z	PIP202	P	LT	1.200E+19	15	125	110	1.100E+02					F	FT-LB
PI1	V	SHSS02	SRM	LT	5.210E+18	49	159	110	1.100E+02	124	91		2.661E+01	F	FT-LB
CK1	Y	SHSS02	SRM	LT	1.200E+19			110	1.100E+02			28	2.800E+01	F	FT-LB
SO1	D	PSO102	P	LT	2.260E+19			110	1.100E+02	110	71		3.545E+01	F	FT-LB
SL1	W104	SHSS01	SRM	LT	7.160E+18	39	149	110	1.100E+02	134	87		3.507E+01	F	FT-LB
IP2	Z	PIP201	P	LT	1.200E+19	9	120	111	1.110E+02					F	FT-LB
ZN1	T	WZN101	W	TL	1.800E+18	4	116	112	1.120E+02	64	56		1.250E+01	F	FT-LB
OC2	A	WOC201	W	TL	3.370E+18	4	118	114	1.140E+02	67	48		2.836E+01	F	FT-LB
CK1	U	PCK101	P	TL	1.880E+19	15	130	115	1.150E+02	96	95		1.042E+00	F	FT-LB
CK1	U	PCK101	P	LT	1.880E+19	5	120	115	1.150E+02	130	113		1.308E+01	F	FT-LB
CK1	Y	PCK101	P	TL	1.060E+19			115	1.150E+02			19	1.900E+01	F	FT-LB
GAR	114B	SASTM S2	SRM	LT	2.210E+19	27	142	115	1.150E+02	78	59		2.436E+01	F	FT-LB
DR2	5	WDR201	W	TL	1.900E+19	-10	105	115	1.150E+02	101	76		2.475E+01	F	FT-LB
FA1	U	PFA101	P	LT	1.650E+19	-30	85	115	1.150E+02	140	110		2.143E+01	F	FT-LB
PI1	R	WPI101	W	TL	4.030E+19	-57	60	117	1.170E+02	79	75		5.063E+00	F	FT-LB
IP3	T	PIP304	P	TL	2.920E+18	60	178	118	1.180E+02	67	58		1.343E+01	F	FT-LB
CR3	D	WCR301	W	TL	7.500E+18	36	155	119	1.190E+02	79	68		1.392E+01	F	FT-LB
OC3	D	SHSS02	SRM	LT	1.450E+19		151	119	1.190E+02	124	94		2.903E+01	F	FT-LB
PB1	T	SASTM	SRM	LT	2.110E+19	40	160	120	1.200E+02	78	69		1.154E+01	F	FT-LB
CK1	U	SHSS02	SRM	LT	1.880E+19	45	165	120	1.200E+02	120	110		8.333E+00	F	FT-LB
DR3	12	WDR301	W	TL	8.640E+18	40	160	120	1.200E+02	70	60	14	1.429E+01	F	FT-LB
BR	125	PBR 01	P	TL	2.270E+19			120	1.200E+02	82			1.707E+01	F	FT-LB
DR2	2	WDR201	W	TL	2.230E+19	-10	110	120	1.200E+02	101	87		1.386E+01	F	FT-LB
CR3	F	WCR301	W	TL	1.080E+19	36	156	120	1.200E+02	79	64		1.899E+01	F	FT-LB
SQ1	X	FSQ101	F	TL	1.610E+19	45	165	120	1.200E+02	72	56	22	2.222E+01	F	FT-LB
CAB	P	PCAB01	P	LT	1.430E+19	-50	70	120	1.200E+02	103	85		1.748E+01	F	FT-LB
SU2	V	SHSS02	SRM	LT	1.880E+19	45	165	120	1.200E+02	125	102		1.840E+01	F	FT-LB
IP2	T	PIP203	P	LT	2.550E+18			120	1.200E+02	113	88	22	2.212E+01	F	FT-LB
SO1	F	PSO102	P	LT	5.140E+19	10	130	120	1.200E+02	97	71		2.680E+01	F	FT-LB
BV1	U	PBV101	P	LT	6.540E+18	-5	115	120	1.200E+02	134	99		2.612E+01	F	FT-LB
MY	W253	PMY 01	P	LT	1.250E+19	0	120	120	1.200E+02	140	105		2.500E+01	F	FT-LB
DR1	WALL-3	PDR101	P	LS	9.800E+18	60	180	120	1.200E+02	122	84		3.115E+01	F	FT-LB
ZN1	X	SHSS02	SRM	LT	1.400E+19			120	1.200E+02			32	3.200E+01	F	FT-LB
MY	A25	PMY 01	P	LT	1.300E+19	0	120	120	1.200E+02	140	96	31	3.143E+01	F	FT-LB
CR3	C	WCR301	W	TL	6.560E+18	36	158	122	1.220E+02	79	63		2.025E+01	F	FT-LB
GAR	113D	FGAR01ID	F	LT	6.760E+18	-53	70	122	1.220E+02	124	101		1.855E+01	F	FT-LB

Table A.1. (continued).

PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	CSP FI	UTT30	ITT30	DTT30	DTT	UUSE	IUSE	DUSE_REL	DUSE	TEMP U	USE U
GAR	WALL1	FGAR02ID	F	LT	2.640E+18	-47	75	122	1.220E+02	135	107		2.074E+01	F	FT-LB
TM1	E	WTM101	W	TL	1.070E+18	-56	68	124	1.240E+02	81	64		2.099E+01	F	FT-LB
FC1	W225	SHSS01	SRM	LT	4.800E+18	27	151	124	1.240E+02	128	102	21	2.031E+01	F	FT-LB
SA2	X	PSA201	P	TL	1.160E+19	10	135	125	1.250E+02	97	89		8.247E+00	F	FT-LB
DB1	B	WDB101	W	TL	5.920E+18	-11	114	125	1.250E+02	72	57		1.806E+01	F	FT-LB
TP3	V	SASTM	SRM	LT	1.229E+19	35	160	125	1.250E+02	76	60		2.105E+01	F	FT-LB
DR1	CORE-2	PDR1010	P	TS	1.500E+19	90	215	125	1.250E+02	80	61		2.375E+01	F	FT-LB
QC1	I	PQC101	P	LT	1.190E+19	-30	95	125	1.250E+02	105	85	19	1.905E+01	F	FT-LB
SA1	Y	SHSS02	SRM	LT	8.910E+18	50	175	125	1.250E+02	123	103		1.626E+01	F	FT-LB
PI2	V	SHSS02	SRM	LT	5.490E+18	45	170	125	1.250E+02	123	102		1.707E+01	F	FT-LB
SA1	Z	PSA103	P	LT	1.330E+19	-50	75	125	1.250E+02	130	108		1.692E+01	F	FT-LB
CR3	C	PCR301	P	TL	6.560E+18		142	126	1.260E+02	94	76		1.915E+01	F	FT-LB
GAR	113B	SASTM S2	SRM	LT	1.100E+19	27	153	126	1.260E+02	78	60		2.308E+01	F	FT-LB
DB1	F	WDB101	W	TL	2.290E+18	-11	116	127	1.270E+02	72	65		1.389E+01	F	FT-LB
DR1	2	PDR1010	P	TS	1.200E+19	85	212	127	1.270E+02	70	56	20	2.000E+01	F	FT-LB
CR3	C	PCR302	P	TL	6.560E+18		143	127	1.270E+02		77			F	FT-LB
GAR	216B	WGAR01	W	TL		-121	7	128	1.280E+02	103	84		1.845E+01	F	FT-LB
ZN2	U	WZN201	W	LT	2.000E+18	-10	118	128	1.280E+02	69	50		2.754E+01	F	FT-LB
CR3	F	PCR301	P	TL	1.080E+19	16	144	128	1.280E+02	94	71		2.447E+01	F	FT-LB
CC2	W263	SHSS01	SRM	LT	8.140E+18	25	153	128	1.280E+02	142	90	37	3.662E+01	F	FT-LB
ZN1	Y	SHSS02	SRM	LT	1.560E+19	42	171	129	1.290E+02	124	98		2.097E+01	F	FT-LB
SQ2	U	WSQ201	W	TL	6.430E+18	-75	55	130	1.300E+02	112	109		2.679E+00	F	FT-LB
DR3	4	WDR301	W	TL	1.780E+19	40	170	130	1.300E+02	70	59	16	1.571E+01	F	FT-LB
SO1	F	SASTM	SRM	LT	5.140E+19	40	170	130	1.300E+02	78	62		2.051E+01	F	FT-LB
BV1	V	PBV101	P	LT	2.550E+18	-5	125	130	1.300E+02	134	114		1.493E+01	F	FT-LB
SQ1	U	FSQ101	F	LT	1.080E+19	-35	95	130	1.300E+02	116	92		2.069E+01	F	FT-LB
DR1	CORE-7	PDR1011	P	LS	6.100E+19	60	190	130	1.300E+02	122	96		2.131E+01	F	FT-LB
SO1	D	PSO103	P	LT	2.260E+19			130	1.300E+02	105	73		3.048E+01	F	FT-LB
ZN1	U	SHSS02	SRM	LT	8.920E+18	42	172	130	1.300E+02	124	88		2.903E+01	F	FT-LB
FA2	U	PFA201	P	TL	5.610E+18	-13	120	133	1.330E+02	95	69		2.737E+01	F	FT-LB
DR1	2	PDR1010	P	LS	1.200E+19	60	194	134	1.340E+02	110	80	27	2.727E+01	F	FT-LB
BV1	U	PBV101	P	TL	6.540E+18	20	155	135	1.350E+02	80	78		2.500E+00	F	FT-LB
DB1	D1	WHSS66	W	TL	6.630E+18	45	180	135	1.350E+02	56	43		2.321E+01	F	FT-LB
ZN2	Y	SHSS02	SRM	LT	1.480E+19	50	185	135	1.350E+02	124	110		1.129E+01	F	FT-LB
BR	125	WBR 01	W	TS	2.270E+19			135	1.350E+02	95			2.211E+01	F	FT-LB
BR	127	WBR 01	W	TS	7.100E+18	-70	65	135	1.350E+02	95	70	26	2.632E+01	F	FT-LB
SA1	Z	SHSS02	SRM	LT	1.330E+19	50	185	135	1.350E+02	123	98		2.033E+01	F	FT-LB
FA1	X	PFA101	P	LT	2.800E+19	-30	105	135	1.350E+02	140	114		1.857E+01	F	FT-LB
DR1	CORE-6	WDR101	W	TS	2.300E+20	-0	135	135	1.350E+02	110	82		2.545E+01	F	FT-LB
IP3	T	PIP304	P	LT	2.920E+18	35	170	137	1.370E+02	105	96		8.571E+00	F	FT-LB
CAB	P	SASTM	SRM	LT	1.430E+19	40	178	138	1.380E+02	65	62		4.615E+00	F	FT-LB
BV1	V	PBV101	P	TL	2.550E+18	20	160	140	1.400E+02	80	75		6.250E+00	F	FT-LB
SQ1	X	FSQ101	F	LT	1.610E+19	-35	105	140	1.400E+02	116	107	8	7.759E+00	F	FT-LB
CAB	K	PCAB01	P	LT	1.400E+19	-50	90	140	1.400E+02	103	89		1.359E+01	F	FT-LB
CTY	D	SASTM	SRM	LT	2.220E+19	40	180	140	1.400E+02	78	61		2.179E+01	F	FT-LB
GIN	T	SASTM	SRM	LT	1.750E+19	40	180	140	1.400E+02	78	61		2.179E+01	F	FT-LB
GAR	113C	FGAR02ID	F	TL	2.510E+18	23	163	140	1.400E+02	83	59		2.892E+01	F	FT-LB
OC3	D	WOC301	W	LT	1.450E+19	45	185	140	1.400E+02	66	42		3.636E+01	F	FT-LB
IP3	Y	SHSS02	SRM	LT	8.050E+18	50	190	140	1.400E+02	123	98		2.033E+01	F	FT-LB
KWE	R	SHSS02	SRM	LT	2.070E+19	45	185	140	1.400E+02	123	95		2.276E+01	F	FT-LB
GIN	V	WGIN01	W	TL	4.900E+18	-25	115	140	1.400E+02	80	51		3.625E+01	F	FT-LB
SO1	D	PSO101	P	LT	2.260E+19			140	1.400E+02	95	63		3.368E+01	F	FT-LB
SQ1	T	WSQ101	W	TL	2.740E+18	-85	55	140	1.400E+02	111	78		2.973E+01	F	FT-LB
DR1	CORE-2	PDR1011	P	LS	1.500E+19	60	200	140	1.400E+02	122	84		3.115E+01	F	FT-LB
ML2	W104	SHSS01	SRM	LT	8.840E+18	24	165	141	1.410E+02	142	94		3.380E+01	F	FT-LB
DB1	D1	WHSS67	W	TL	1.030E+19	-39	103	142	1.420E+02	76	55		2.763E+01	F	FT-LB
IP3	T	WIP301	W	TL	2.920E+18	-55	88	143	1.430E+02	120	91		2.417E+01	F	FT-LB
GAR	WALL2	FGAR02ID	F	LT	3.100E+18	-47	97	144	1.440E+02	135	95		2.963E+01	F	FT-LB
SO1	F	WSO101	W	TL	5.140E+19	-20	125	145	1.450E+02	99	80		1.919E+01	F	FT-LB
SU1	V	SHSS02	SRM	LT	1.940E+19	45	190	145	1.450E+02	123	100		1.870E+01	F	FT-LB
DR1	CORE-3	PDR1011	P	TS	4.800E+19	80	225	145	1.450E+02	82	58		2.927E+01	F	FT-LB
DR1	CORE-3	PDR1010	P	TS	4.800E+19	90	235	145	1.450E+02	80	55		3.125E+01	F	FT-LB
SU2	V	WSU201	W	TL	1.880E+19	-20	125	145	1.450E+02	90	60		3.333E+01	F	FT-LB
IP2	Y	PIP203	P	LT	4.720E+18			145	1.450E+02			29	2.900E+01	F	FT-LB
PB2	S	SHSS02	SRM	LT	3.470E+19	49	194	145	1.450E+02	124	84		3.226E+01	F	FT-LB
CR3	C1	WHSS65	W	TL	5.100E+18	-27	121	148	1.480E+02	77	55		2.857E+01	F	FT-LB
HB2	T	SASTM	SRM	TL	4.110E+19	65	215	150	1.500E+02	40	37		7.500E+00	F	FT-LB
IP3	Y	PIP304	P	TL	8.050E+18	60	210	150	1.500E+02	67	57		1.493E+01	F	FT-LB
PB2	T	WPB201	W	TL	9.450E+18	0	150	150	1.500E+02	66	56		1.515E+01	F	FT-LB
BR	124	PBR 01	P	TL	1.070E+20	-5	145	150	1.500E+02	82	70	15	1.463E+01	F	FT-LB
DB1	D	WDB101	W	TL	9.620E+18	-11	139	150	1.500E+02	70	54		2.286E+01	F	FT-LB
BV1	W	PBV101	P	LT	9.490E+18	-5	145	150	1.500E+02	134	114		1.493E+01	F	FT-LB
IP3	Z	PIP303	P	LT	1.070E+19	-25	125	150	1.500E+02	130	108		1.692E+01	F	FT-LB

Appendix A

Table A.1. (continued).

PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	CSP FI	UTT30	ITT30	DTT30	DTT	UUSE	IUSE	DUSE REL	DUSE	TEMP U	USE U
BV1	V	WBV101	W	TL	2.550E+18	-60	90	150	1.500E+02	112	88		2.143E+01	F	FT-LB
GIN	T	WGIN01	W	TL	1.750E+19	-25	125	150	1.500E+02	80	55		3.125E+01	F	FT-LB
MY	A25	SHSS01	SRM	LT	1.300E+19	15	165	150	1.500E+02	130	100	23	2.308E+01	F	FT-LB
GAR	114C	SASTM S2	SRM	LT	5.470E+19	27	178	151	1.510E+02	78	52		3.333E+01	F	FT-LB
PB2	R	SHSS02	SRM	LT	2.010E+19	49	200	151	1.510E+02	124	98		2.097E+01	F	FT-LB
AN1	A	WAN101	W	TL	1.030E+19	5	156	151	1.510E+02	73	45		3.836E+01	F	FT-LB
RS1	D	WRS101	W	TL	6.600E+18	-14	138	152	1.520E+02	68	53		2.206E+01	F	FT-LB
DR3	14	WDR301	W	TL	7.710E+18	40	195	155	1.550E+02	70	64		8.571E+00	F	FT-LB
IP3	Z	PIP304	P	TL	1.070E+19	60	215	155	1.550E+02	67	56		1.642E+01	F	FT-LB
PAL	W290	PPAL01	P	TL	1.130E+19	25	180	155	1.550E+02	102	84		1.765E+01	F	FT-LB
DR1	CORE-5	SHM3 O	SRM	TS	1.300E+20	10	165	155	1.550E+02	70	51		2.714E+01	F	FT-LB
QC1	1	WQC102	W	TL	7.200E+18	-30	125	155	1.550E+02	72	52	28	2.778E+01	F	FT-LB
CAB	N	PCAB01	P	LT	3.680E+19	-50	105	155	1.550E+02	105	83		2.095E+01	F	FT-LB
KWE	P	SHSS02	SRM	LT	2.890E+19	45	200	155	1.550E+02	123	101		1.789E+01	F	FT-LB
CAB	N	SASTM	SRM	LT	3.680E+19	40	195	155	1.550E+02	78	55		2.949E+01	F	FT-LB
BV1	U	WBV101	W	TL	6.540E+18	-60	95	155	1.550E+02	112	83		2.589E+01	F	FT-LB
SA2	T	WSA201	W	TL	2.560E+18	-30	125	155	1.550E+02	111	79		2.883E+01	F	FT-LB
DR1	CORE-3	PDR101O	P	LS	4.800E+19	60	215	155	1.550E+02	112	75		3.304E+01	F	FT-LB
DR1	CORE-3	PDR101I	P	LS	4.800E+19	60	215	155	1.550E+02	122	77		3.689E+01	F	FT-LB
PI1	P	SHSS02	SRM	LT	1.250E+19	49	205	156	1.560E+02	124	85		3.145E+01	F	FT-LB
CR3	C1	WHSSCR	W		6.090E+18	13	173	160	1.600E+02	72	57		2.083E+01	F	FT-LB
SQ1	X	WSQ101	W	TL	1.610E+19	-85	75	160	1.600E+02	111	88	21	2.072E+01	F	FT-LB
SQ1	U	WSQ101	W	TL	1.080E+19	-85	75	160	1.600E+02	111	82		2.613E+01	F	FT-LB
MY	W253	SHSS01	SRM	LT	1.250E+19	15	175	160	1.600E+02	130	96		2.615E+01	F	FT-LB
PI2	T	SHSS02	SRM	LT	1.050E+19	45	205	160	1.600E+02	123	88		2.846E+01	F	FT-LB
MC1	U	WMC101	W	TL	4.140E+18	-5	155	160	1.600E+02	112	75		3.304E+01	F	FT-LB
GAR	114B	FGAR01ID	F	LT	2.210E+19	-53	109	162	1.620E+02	124	99		2.016E+01	F	FT-LB
TP3	T	WTP301	W	TL	5.680E+18	12	176	164	1.640E+02	66	62		6.061E+00	F	FT-LB
PB1	S	WPB101	W	TL	7.050E+18	-45	120	165	1.650E+02	65	52		2.000E+01	F	FT-LB
PB1	R	WPB101	W	TL	2.220E+19	-45	120	165	1.650E+02	65	51		2.154E+01	F	FT-LB
SA1	Z	PSA102	P	LT	1.330E+19	-25	140	165	1.650E+02	116	102		1.207E+01	F	FT-LB
SU1	T	WSU101	W	TL	2.500E+18	-15	150	165	1.650E+02	70	53		2.429E+01	F	FT-LB
FA2	W	PFA201	P	TL	1.540E+19	-13	152	165	1.650E+02	95	76		2.000E+01	F	FT-LB
PB2	V	WPB201	W	TL	4.740E+18	0	165	165	1.650E+02	65	42		3.538E+01	F	FT-LB
FA2	W	PFA201	P	LT	1.540E+19	-23	142	165	1.650E+02	130	102		2.154E+01	F	FT-LB
GIN	R	WGIN01	W	TL	7.600E+18	-25	140	165	1.650E+02	80	51		3.625E+01	F	FT-LB
MC1	X	WMC101	W	TL	1.380E+19	-5	160	165	1.650E+02	112	83		2.589E+01	F	FT-LB
SA1	Y	WSA101	W	TL	8.910E+18	-135	30	165	1.650E+02	104	75		2.788E+01	F	FT-LB
CK1	X	WCK101	W	TL	6.200E+18			165	1.650E+02			34	3.400E+01	F	FT-LB
RS1	F	WRS101	W	TL	1.420E+19	-14	152	166	1.660E+02	68	48		2.941E+01	F	FT-LB
GAR	114A	SASTM S2	SRM	LT	4.650E+19	27	194	167	1.670E+02	78	62		2.051E+01	F	FT-LB
SA1	Z	PSA101	P	LT	1.330E+19	-20	150	170	1.700E+02	108	90		1.667E+01	F	FT-LB
IP3	Z	PIP304	P	LT	1.070E+19	33	203	170	1.700E+02	105	82		2.190E+01	F	FT-LB
QC2	3	WQC201	W	TL	3.820E+19	-30	140	170	1.700E+02	125	80	36	3.600E+01	F	FT-LB
GAR	113F	FGAR02OD	F	TL	3.640E+18	-8	165	173	1.730E+02	89	78		1.236E+01	F	FT-LB
DC2	U	WDC201	W	TL	3.510E+18	-13	160	174	1.740E+02	121	85	30	2.975E+01	F	FT-LB
DB1	A	WDB101	W	TL	1.290E+19	-11	164	175	1.750E+02	72	62		1.111E+01	F	FT-LB
QC1	3	WQC101	W	TL	3.560E+19	10	185	175	1.750E+02	100	75		2.500E+01	F	FT-LB
ZN2	T	WZN201	W	LT	1.100E+19			175	1.750E+02			36	3.600E+01	F	FT-LB
PAL	W290	PPAL01	P	LT	1.100E+19	0	175	175	1.750E+02	155	112		2.774E+01	F	FT-LB
KWE	V	WKWE01	W	TL	5.590E+18	-50	125	175	1.750E+02	126	82		3.492E+01	F	FT-LB
GAR	113B	FGAR01OD	F	LT	9.200E+18	-69	109	178	1.780E+02	135	97		2.815E+01	F	FT-LB
OC2	E	WOC201	W	TL	1.210E+19	4	183	179	1.790E+02	67	44		3.433E+01	F	FT-LB
PB1	T	WPB101	W	TL	2.110E+19	-45	135	180	1.800E+02	65	55		1.538E+01	F	FT-LB
TP3	V	WTP301	W	TL	1.229E+19	10	190	180	1.800E+02	65	48		2.615E+01	F	FT-LB
QC1	3	PQC101	P	LT	4.040E+19	-30	150	180	1.800E+02	106	73		3.113E+01	F	FT-LB
FA2	X	PFA201	P	LT	3.110E+19	-23	157	180	1.800E+02	130	94		2.769E+01	F	FT-LB
QC2	12	WQC202	W	TL	8.970E+18	15	195	180	1.800E+02	90	51		4.333E+01	F	FT-LB
PI2	R	SHSS02	SRM	LT	4.420E+19	45	225	180	1.800E+02	123	77		3.740E+01	F	FT-LB
IP3	Y	WIP301	W	TL	8.050E+18	-55	125	180	1.800E+02	120	68		4.333E+01	F	FT-LB
IP2	Z	PIP203	P	LT	9.620E+18	16	199	183	1.830E+02					F	FT-LB
OC1	C	WOC101	W	TL	9.860E+19	-5	180	185	1.850E+02	64	52		1.875E+01	F	FT-LB
GAR	WALL3	FGAR02ID	F	TL	2.960E+18	-15	171	185	1.850E+02	71	52		2.676E+01	F	FT-LB
BV1	W	WBV101	P	TL	9.490E+18	20	205	185	1.850E+02	80	59		2.625E+01	F	FT-LB
AN1	C	WAN101	W	TL	1.460E+19	5	190	185	1.850E+02	73	47		3.562E+01	F	FT-LB
BV1	W	WBV101	W	TL	9.490E+18	-60	125	185	1.850E+02	112	78		3.056E+01	F	FT-LB
MY	A35	PMY 01	P	LT	8.390E+19	0	185	185	1.850E+02	140	85		3.929E+01	F	FT-LB
PI1	R	SHSS02	SRM	LT	4.030E+19	49	235	186	1.860E+02	124	86		3.065E+01	F	FT-LB
FA2	X	PFA201	P	TL	3.110E+19	-13	177	190	1.900E+02	95	69		2.737E+01	F	FT-LB
DR1	CORE-4	PDR101O	P	TS	17.500E+19	90	280	190	1.900E+02	80	48		4.000E+01	F	FT-LB
SA2	U	WSA201	W	TL	5.700E+18	-30	160	190	1.900E+02	111	74		3.333E+01	F	FT-LB
BR	122	WBR 01	W	TS	2.300E+19	-70	120	190	1.900E+02	95	57	40	4.000E+01	F	FT-LB
OC1	A	WOC101	W	TL	8.950E+18	-5	186	191	1.910E+02	64	52		1.875E+01	F	FT-LB

Table A.1. (continued).

PLANT ID	CAPSULE	HEAT ID	PROD ID	SPEC ORI	CSP F1	UTT30	ITT30	DTT30	DTT	UUSE	IUSE	DUSE REL	DUSE	TEMP U	USE U
KO1	V	WKO101	W	TL	3.950E+18		195	195	1.950E+02	66	48	27	2.727E+01	F	FT-LB
KO1	T	WKO101	W	TL	9.800E+18			195	1.950E+02	66	47	29	2.879E+01	F	FT-LB
ZN1	X	WZN101	W	TL	1.500E+19			195	1.950E+02	64		31	3.100E+01	F	FT-LB
SA2	X	WSA201	W	TL	1.160E+19	-30	165	195	1.950E+02	111	86		2.252E+01	F	FT-LB
MY	A35	PMY 01	P	TL	8.520E+19	15	210	195	1.950E+02	115	71		3.826E+01	F	FT-LB
IP2	Y	WIP201	W	TL	5.890E+18			195	1.950E+02			42	4.200E+01	F	FT-LB
IP2	V	WIP201	W	TL	5.590E+18	-65	132	197	1.970E+02	118	75	36	3.644E+01		FT-LB
ZN1	U	WZN101	W	TL	8.920E+18		203	199	1.990E+02	64	52		1.875E+01	F	FT-LB
DR1	CORE-4	PDR1011	P	TS	17.500E+19	80	280	200	2.000E+02	82	52		3.659E+01	F	FT-LB
GAR	113D	FGAR02ID	F	TL	6.760E+18	23	223	200	2.000E+02	83	51		3.855E+01	F	FT-LB
CK1	Y	WCK101	W		1.060E+19			200	2.000E+02			36	3.600E+01	F	FT-LB
TM1	C	WTM101	W	TL	8.660E+18	-56	147	203	2.050E+02	81	50		3.827E+01	F	FT-LB
DB1	D1	WHSSDB	W		8.210E+18	-52	152	204	2.040E+02	79	50		3.671E+01	F	FT-LB
CK1	U	WCK101	W		1.880E+19	-90	115	205	2.050E+02	110	94		1.455E+01	F	FT-LB
DR3	14	WDR302	W	TL	6.150E+18	-45	160	205	2.050E+02	65	45		3.077E+01	F	FT-LB
ZN1	Y	WZN101	W	TL	1.560E+19	4	209	205	2.050E+02	64	44		3.125E+01	F	FT-LB
PAL	A240	PPAL01	P	TL	4.400E+19	25	230	205	2.050E+02	102	68		3.333E+01	F	FT-LB
QC2	3	WQC202	W	TL	2.430E+19	15	220	205	2.050E+02	87	41	53	5.287E+01	F	FT-LB
PAL	A240	PPAL01	P	LT	4.500E+19	0	205	205	2.050E+02	155	92		4.065E+01	F	FT-LB
DR2	5	WDR202	W	TL	4.650E+19	-13	195	208	2.080E+02	71	52	27	2.676E+01	F	FT-LB
DR3	12	WDR302	W	TL	2.060E+19	-45	163	208	2.080E+02	65	42	35	3.538E+01	F	FT-LB
DR1	CORE-6	SHM3 O	SRM	TS	2.300E+20	10	220	210	2.100E+02	70	48		3.143E+01	F	FT-LB
HB2	V	WHB201	W	TL	4.510E+18	-87	124	211	2.110E+02	112	70		3.750E+01	F	FT-LB
CR3	C1	WHSS63	W		7.790E+18	-20	194	214	2.140E+02	73	48		3.425E+01	F	FT-LB
ZN2	Y	WZN201	W	LT	1.480E+19	-10	210	220	2.200E+02	69	51		2.609E+01	F	FT-LB
CAB	N	WCAB01	W	TL	3.680E+19	-20	200	220	2.200E+02	102	62		3.922E+01	F	FT-LB
IP3	Z	WIP301	W	TL	1.070E+19	-55	165	220	2.200E+02	120	76		3.667E+01	F	FT-LB
DR1	CORE-4	PDR1011	P	LS	17.500E+19	60	280	220	2.200E+02	122	60		5.082E+01	F	FT-LB
FC1	W265	WFC101	W	TL	9.000E+18	-28	193	221	2.210E+02	104	59	43	4.327E+01	F	FT-LB
MY	W263	WMY 01	W	TL	6.800E+18	-30	192	222	2.220E+02	105	59		4.381E+01	F	FT-LB
TP4	T	WTP401	W		6.050E+18	0	225	225	2.250E+02	66	44		3.333E+01	F	FT-LB
YR	08	SASTM SI	SRM		5.000E+19	15	240	225	2.250E+02	87	46		4.713E+01	F	FT-LB
DR1	CORE-4	PDR1010	P	LS	17.500E+19	60	285	225	2.250E+02	112	66		4.107E+01	F	FT-LB
BR	124	WBR 01	W	TS	1.070E+20	-70	160	230	2.300E+02	95	65	32	3.158E+01	F	FT-LB
KWE	P	WKWE01	W	TL	2.890E+19	-50	180	230	2.300E+02	126	76		3.968E+01	F	FT-LB
PB2	S	WPB201	W	TL	3.470E+19	0	231	231	2.310E+02	66	44		3.333E+01	F	FT-LB
PB2	R	WPB201	W	TL	2.010E+19	0	235	235	2.350E+02	66	48		2.727E+01	F	FT-LB
KWE	R	WKWE01	W	TL	2.070E+19	-50	185	235	2.350E+02	126	78		3.810E+01	F	FT-LB
FC1	W225	WFC101	W	TL	4.200E+18	-28	210	238	2.380E+02	104	65	37	3.750E+01	F	FT-LB
SU1	V	WSU101	W	TL	1.940E+19	-15	225	240	2.400E+02	70	50		3.000E+01	F	FT-LB
GAR	CORE1	FGAR02ID	F	LT	3.570E+19	-47	199	247	2.470E+02	135	80		4.074E+01	F	FT-LB
DR3	4	WDR302	W	TL	1.200E+19	-45	205	250	2.500E+02	65	41	37	3.692E+01	F	FT-LB
MY	W253	WMY 01	W	TL	1.250E+19	-30	230	260	2.600E+02	105	66		3.714E+01	F	FT-LB
YR	06	SASTM SI	SRM		7.000E+19	15	275	260	2.600E+02	87	44		4.943E+01	F	FT-LB
GAR	114B	FGAR02ID	F	TL	2.430E+19	23	284	261	2.610E+02	83	55		3.373E+01	F	FT-LB
QC1	3	WQC102	W	TL	2.370E+19	-30	235	265	2.650E+02	72	49		3.194E+01	F	FT-LB
GAR	113B	FGAR02OD	F	TL	1.000E+19	-8	257	265	2.650E+02	89	57		3.596E+01	F	FT-LB
GAR	CORE2	FGAR02OD	F	LT	3.650E+19	-44	225	268	2.680E+02	152	86		4.342E+01	F	FT-LB
GAR	114C	FGAR01ID	F	LT	6.640E+19	-53	217	270	2.700E+02	124	117		5.645E+00	F	FT-LB
MY	A25	WMY 01	W	TL	1.300E+19	-30	240	270	2.700E+02	105	57	45	4.571E+01	F	FT-LB
GAR	114A	FGAR01ID	F	LT	4.480E+19	-53	225	277	2.770E+02	124	93		2.500E+01	F	FT-LB
HB2	T	WHB201	W	TL	4.110E+19	-60	225	285	2.850E+02	117	67		4.274E+01	F	FT-LB
PAL	W290	WPAL01	W	TL	1.030E+19	-85	205	290	2.900E+02	118	64		4.576E+01	F	FT-LB
GAR	114B	WGAR01	W	TL	2.300E+19	-121	180	301	3.010E+02	103	60		4.175E+01	F	FT-LB
GAR	113B	WGAR01	W	TL	1.140E+19	-121	187	308	3.080E+02	103	74		2.816E+01	F	FT-LB
YR	01	SASTM SI	SRM		9.000E+19	15	325	310	3.100E+02	87	42		5.172E+01	F	FT-LB
YR	02	SASTM SI	SRM		9.000E+19	15	325	310	3.100E+02	87	42		5.172E+01	F	FT-LB
YR	08	PYR 01	P	LT	5.000E+19	10	330	320	3.200E+02	76	46		3.947E+01	F	FT-LB
GAR	114A	FGAR02ID	F	TL	4.650E+19	23	352	329	3.290E+02	83	51		3.855E+01	F	FT-LB
GAR	114C	FGAR02ID	F	TL	6.120E+19	23	363	340	3.400E+02	83	45		4.578E+01	F	FT-LB
MY	A35	WMY 01	W	TL	8.690E+19	-30	315	345	3.450E+02	105	50		5.238E+01	F	FT-LB
PAL	A240	WPAL01	W	TL	4.600E+19	-85	265	350	3.500E+02	118	52		5.593E+01	F	FT-LB
GAR	113F	WGAR01	W	TL	3.640E+18	-121	230	351	3.510E+02	103	80		2.233E+01	F	FT-LB
YR	06	PYR 01	P	LT	7.000E+19	10	370	360	3.600E+02	76	45		4.079E+01	F	FT-LB
GAR	114A	WGAR01	W	TL	4.220E+19	-121	264	385	3.850E+02	103	67		3.495E+01	F	FT-LB
YR	01	PYR 01	P	LT	9.000E+19	10	410	400	4.000E+02	76	45		4.079E+01	F	FT-LB
YR	02	PYR 01	P	LT	9.000E+19	10	410	400	4.000E+02	76	45		4.079E+01	F	FT-LB
GAR	114C	WGAR01	W	TL	5.470E+19	-121	282	403	4.030E+02	103	51		5.049E+01	F	FT-LB

Appendix A

Fig. A.5. Transition-temperature shift vs upper-shelf drop from Sect. A.6.1 example.

A.6.2 Charpy Fitting and Plotting

In this example, the Charpy fitting and plotting procedures will be applied to the weld data for the Zion Unit 2 reactor. The corresponding raw Charpy data are at the end of the file CHARPY.dat, resulting in long waiting times when these sets are processed. For this reason, and to demonstrate this feature, these sets are first copied to a file ZN2.dat with the aid of the option "Extracting Selected Charpy Sets." After choosing this option, the output file name ZN2.dat is entered, followed by entering, in the menu screen for selecting sets, the key ZN2 for PLANT_ID and the letter W for PROD_ID (or HEAT_ID). During the run of the program, the three sets baseline (CAPSULE is blank) and capsules T and U appear on the screen for confirmation. The output file (with a modification, see the following) is listed in Table A.2.

Table A.2. File ZN2.dat obtained from CHARPY.dat. (Note the added asterisk at the front of specimen W40, tagging it as an outlier.)

WZN2		WZN201	W	LT	-100.0	10.0	17	7		
WZN2		WZN201	W	LT	-100.0	11.0	13	8		
WZN2		WZN201	W	LT	-60.0	17.0	23	14		
WZN2		WZN201	W	LT	-60.0	20.0	33	16		
WZN2		WZN201	W	LT	-60.0	14.0	23	12		
WZN2		WZN201	W	LT	-25.0	35.0	58	32		
WZN2		WZN201	W	LT	-25.0	25.0	47	23		
WZN2		WZN201	W	LT	-25.0	32.0	42	27		
WZN2		WZN201	W	LT	10.0	37.0	55	33		
WZN2		WZN201	W	LT	10.0	40.0	61	38		
WZN2		WZN201	W	LT	10.0	41.0	71	40		
WZN2		WZN201	W	LT	40.0	47.0	65	43		
WZN2		WZN201	W	LT	40.0	51.0	71	48		
WZN2		WZN201	W	LT	40.0	76.0	100	63		
WZN2		WZN201	W	LT	40.0	43.5	57	40		
WZN2		WZN201	W	LT	75.0	60.0	95	58		
WZN2		WZN201	W	LT	75.0	62.0	97	57		
WZN2		WZN201	W	LT	75.0	56.5	97	53		
WZN2		WZN201	W	LT	210.0	69.0	100	69		
WZN2		WZN201	W	LT	210.0	69.5	100	70		
WZN2		WZN201	W	LT	210.0	62.0	100	61		
WZN2		WZN201	W	LT	300.0	68.0	100	65		
WZN2		WZN201	W	LT	300.0	72.0	100	68		
WZN2		WZN201	W	LT	300.0	70.0	100	61		
WZN2	T	WZN201	W	LT	W34	71.0	12.5	15	13	1.100E+19 579
WZN2	T	WZN201	W	LT	W33	135.0	22.0	35	18	1.100E+19 579
WZN2	T	WZN201	W	LT	*W40	180.0	88.0	100	76	1.100E+19 579
WZN2	T	WZN201	W	LT	W35	185.0	40.0	80	38	1.100E+19 579
WZN2	T	WZN201	W	LT	W39	235.0	36.5	80	34	1.100E+19 579
WZN2	T	WZN201	W	LT	W38	300.0	43.5	100	43	1.100E+19 579
WZN2	T	WZN201	W	LT	W37	350.0	44.5	100	47	1.100E+19 579
WZN2	T	WZN201	W	LT	W36	400.0	42.5	100	45	1.100E+19 579
WZN2	U	WZN201	W	LT	W45	50.0	16.5	10	13	2.800E+18 550
WZN2	U	WZN201	W	LT	W47	73.0	20.5	20	21	2.800E+18 550
WZN2	U	WZN201	W	LT	W42	125.0	31.0	65	30	2.800E+18 550
WZN2	U	WZN201	W	LT	W41	200.0	45.0	99	42	2.800E+18 550
WZN2	U	WZN201	W	LT	W44	285.0	48.0	100	51	2.800E+18 550
WZN2	U	WZN201	W	LT	W43	345.0	50.0	100	49	2.800E+18 550
WZN2	U	WZN201	W	LT	W46	350.0	46.5	100	71	2.800E+18 550
WZN2	U	WZN201	W	LT	W48	400.0	50.0	100	53	2.800E+18 550

Appendix A

The user can now test the other three options using the newly created file as an input file instead of the default CHARPY.dat. Figures A.6, A.7, and A.8 show the resulting plots for the three sets, with appropriate titles and subtitles entered by the user on prompts from the screen. Note that the fit for capsule T is very poor; inspection shows an outlier of 88-ft-lb impact energy at 180°F, which is inconsistent with the rest of the data. This point can be eliminated from the fitting by placing an asterisk in front of the specimen identifier W40, as shown in Table A.2. This can be done with any editor that works on ASCII files (e.g., EDLIN, if no better is available). Figure A.9 shows the resulting fit after this change. Note that the excluded point appears as a black square at the top of the graph.

Fig. A.6. Charpy fit for Zion Unit 2 weld material - baseline.

Fig. A.7. Charpy fit for Zion Unit 2 weld material - Capsule T. (Poor fit because of an outlier.)

Fig. A.8. Charpy fit for Zion Unit 2 weld material - Capsule U.

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Fig. A.9. Data from Fig. A.7 after the outlier at the top of the graph is eliminated.

The modified input file can now be used for the two other options. On the input screens for the Monte Carlo uncertainty analysis, several default options are already provided including the input file, title, input uncertainties, number of iterations, and output files. To process all the sets, the number of skipped sets must, of course, be 0 and the number of processed sets 3. Make sure that the correct input file ZN2.dat is chosen. During the run of the program, a summary of each single fit appears on the screen including a parameter "INFO", which indicates whether the fit was successful or not and the reason for failing. A list explaining the different INFO values is given in Table A.3. Sample screen outputs are shown in Tables A.4 and A.5. The first output at the start for the set in capsule T shows the failure to determine CVT at 50 ft-lb. Such data are first rejected for 20% of the prescribed iterations; once it is established that this is caused by the low upper shelf, CVT at 50 ft-lb is ignored, as shown in the subsequent screen output; there is still a high failure rate from other causes, as indicated in Table A.5. The three output files are listed in Tables A.6, A.7, and A.8. The EDB-dBASE file may be used as an auxiliary file for the multiple-curve fitting and plotting procedure. Users may choose to obtain a plot for each processed set. A sample is shown in Fig. A.10.

**Table A.3. Key to information tag INFO in screen output
for Monte Carlo uncertainty analysis**

INFO > 0 : Regular Output

- = 0 : Fitting did not converge
 - = -1 : Inconsistent with previous values, skipped
 - = -2 : Inconsistent with first value, first value ignored
 - = -3 : CVT @ 30 ft-lb or 50 ft-lb could not be determined
(ignored after failure in 20% of the iterations)
 - = -4 : Failure to find initial value for fitting, fitting aborted
 - = -5 : Fit not physically possible, rejected
-

Table A.4. Sample screen output from Monte Carlo uncertainty analysis-start.
(First 20 fits are rejected because of failure to obtain transition temperature
at 68 J (50 ft-lb), INFO = -3.)

ZN2 T WZN201 W LT: Fluence = 1.100E+19 , Irr. Temp. = 304.

LSE= 3., USE= 59., SLOPE= 0.0211, TMID= 52., CVT41= 70., CVT68=*****	-3
LSE= 3., USE= 59., SLOPE= 0.0209, TMID= 52., CVT41= 70., CVT68=*****	-3
LSE= 3., USE= 59., SLOPE= 0.0209, TMID= 52., CVT41= 70., CVT68=*****	-3
LSE= 3., USE= 69., SLOPE= 0.0177, TMID= 75., CVT41= 83., CVT68= 184.	2
LSE= 3., USE= 64., SLOPE= 0.0211, TMID= 84., CVT41= 96., CVT68=*****	-3
LSE= 3., USE= 59., SLOPE= 0.0577, TMID= 69., CVT41= 76., CVT68=*****	-3
LSE= 3., USE= 60., SLOPE= 0.0125, TMID= 36., CVT41= 63., CVT68=*****	-3
LSE= 3., USE= 68., SLOPE= 0.0177, TMID= 53., CVT41= 62., CVT68= 218.	-3
LSE= 3., USE= 68., SLOPE= 0.0162, TMID= 68., CVT41= 79., CVT68=*****	-3
LSE= 3., USE= 74., SLOPE= 0.0093, TMID= 90., CVT41= 98., CVT68= 217.	2
LSE= 3., USE= 62., SLOPE= 0.0668, TMID= 71., CVT41= 76., CVT68=*****	-3
LSE= 3., USE= 58., SLOPE= 0.0968, TMID= 64., CVT41= 68., CVT68=*****	-3
LSE= 3., USE= 60., SLOPE= 0.0570, TMID= 41., CVT41= 47., CVT68=*****	-3
LSE= 3., USE= 61., SLOPE= 0.0117, TMID= 48., CVT41= 76., CVT68=*****	-3
LSE= 3., USE= 59., SLOPE= 0.0391, TMID= 63., CVT41= 72., CVT68=*****	-3
LSE= 3., USE= 60., SLOPE= 0.2339, TMID= 52., CVT41= 53., CVT68=*****	-5

ZN2 T WZN201 W LT : Iteration number 0 out of 100

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Table A.5. Sample screen output from Monte Carlo uncertainty analysis-continuation.
(Failure to obtain transition temperatures at 68 J (50 ft-lb) is now ignored.)

LSE= 3., USE= 65., SLOPE= 0.0233, TMID= 62., CVT41= 72., CVT68=*****	2
LSE= 3., USE= 59., SLOPE= 0.0152, TMID= 55., CVT41= 80., CVT68=*****	2
LSE= 3., USE= 52., SLOPE= 0.0180, TMID= 43., CVT41= 77., CVT68=*****	2
LSE= 3., USE= 52., SLOPE= 0.0245, TMID= 32., CVT41= 77., CVT68=*****	0
LSE= 3., USE= 59., SLOPE= 0.0126, TMID= 42., CVT41= 73., CVT68=*****	2
LSE= 3., USE= 66., SLOPE= 0.0138, TMID= 40., CVT41= 55., CVT68=*****	2
LSE= 3., USE= 60., SLOPE= 0.0197, TMID= 68., CVT41= 85., CVT68=*****	2
LSE= 3., USE= 56., SLOPE= 0.0259, TMID= 36., CVT41= 54., CVT68=*****	2
LSE= 3., USE= 72., SLOPE= 0.0220, TMID= 59., CVT41= 64., CVT68= 121.	2
LSE= 3., USE= 52., SLOPE= 0.0358, TMID= 47., CVT41= 65., CVT68=*****	2
LSE= 3., USE= 77., SLOPE= 0.0128, TMID= 70., CVT41= 73., CVT68= 148.	2
LSE= 3., USE= 68., SLOPE= 0.0110, TMID= 63., CVT41= 80., CVT68=*****	2
LSE= 3., USE= 58., SLOPE= 0.0309, TMID= 53., CVT41= 66., CVT68=*****	2
LSE= 3., USE= 72., SLOPE= 0.0126, TMID= 78., CVT41= 86., CVT68= 188.	2
LSE= 3., USE= 61., SLOPE= 0.0177, TMID= 47., CVT41= 64., CVT68=*****	2
LSE= 3., USE= 99., SLOPE= 0.0061, TMID= 125., CVT41= 91., CVT68= 187.	-1
LSE= 3., USE= 67., SLOPE= 0.3619, TMID= 58., CVT41= 59., CVT68=*****	-5
LSE= 3., USE= 48., SLOPE= 0.0304, TMID= 33., CVT41= 61., CVT68=*****	2
LSE= 3., USE= 79., SLOPE= 0.0060, TMID= 124., CVT41= 125., CVT68= 275.	-1
LSE= 3., USE= 53., SLOPE= 0.0303, TMID= 26., CVT41= 46., CVT68=*****	2
LSE= 3., USE= 56., SLOPE= 0.0198, TMID= 62., CVT41= 85., CVT68=*****	2

ZN2 T WZN201 W LT : Iteration number 28 out of 100

Table A.6. Sample output of summary file

EDB - Hyperbolic Tangent Fits of Raw Charpy Data

Impact Energy Uncertainty = 10.0 J

Test Temperature Uncertainty = 4.0 Degree C

Number of Successful Iterations = 10, Maximum = 50

Set	Reactor Caps	Material	Fluence	Irr.Temp.	CVT(41J)	CVT(68J)	USE	LSE	Spec.	Iter
No.		ID	Type Or.	Deg.C	Deg.C	Deg.C	Joule	Joule	No.	No.
1	ZN2	WZN201	W LT	0.000E-01	0.	-30.6±4.1	1.3±4.4	93.0±4.1	3.0±0.0	24 100
2	ZN2	T	WZN201	W LT	1.100E+19	304.	71.2±14.1	0.0±1.0	61.4±6.6	3.0±0.0 7 100
3	ZN2	U	WZN201	W LT	2.800E+18	288.	49.0±13.1	0.0±1.0	70.0±6.8	3.0±0.0 8 100

Table A.7. Sample output of covariance file

EDB - Hyperbolic Tangent Fits of Raw Charpy Data

Impact Energy Uncertainty = 10.0 J

Test Temperature Uncertainty = 4.0 Degree C

Number of Successful Iterations = 100, Maximum = 500

ZN2 WZN201 W LT: Fluence = 0.000E-01, Irr. Temp. = 0. C
 No. of Specimen = 24, No. of Iterations = 100

Parameter	Mean	Std.Dev.	Correlation Coefficients				
Lower Shelf Energy	3.0	0.0					
Upper Shelf Energy	93.0	4.1	-0.186				
CVT at Midpoint	-22.7	4.2	-0.084	0.521			
1/slope (degree C)	50.1	8.3	-0.270	0.479	0.074		
CVT at 41 Joule	-30.6	4.1	0.092	-0.092	0.764	-0.482	
CVT at 68 Joule	1.3	4.4	-0.136	-0.005	0.543	0.511	0.403

ZN2 T WZN201 W LT: Fluence = 1.100E+19, Irr. Temp. = 304. C
 No. of Specimen = 7, No. of Iterations = 100

Parameter	Mean	Std.Dev.	Correlation Coefficients					
Lower Shelf Energy	3.0	0.0						
Upper Shelf Energy	61.4	6.6	-0.025					
CVT at Midpoint	52.5	15.2	0.073	0.580				
1/slope (degree C)	57.7	21.7	-0.112	0.334	0.082			
CVT at 41 Joule	71.2	14.1	0.050	0.022	0.652	0.390		
CVT at 68 Joule	0.0	-1.0	0.000	0.000	0.000	0.000	0.000	0.000

ZN2 U WZN201 W LT: Fluence = 2.800E+18, Irr. Temp. = 288. C
 No. of Specimen = 8, No. of Iterations = 100

Parameter	Mean	Std.Dev.	Correlation Coefficients					
Lower Shelf Energy	3.0	0.0						
Upper Shelf Energy	70.0	6.8	0.012					
CVT at Midpoint	39.4	16.3	-0.014	0.645				
1/slope (degree C)	76.0	27.9	-0.236	0.538	0.312			
CVT at 41 Joule	49.0	13.1	-0.097	0.211	0.851	0.270		
CVT at 68 Joule	0.0	-1.0	0.000	0.000	0.000	0.000	0.000	0.000

Table A.8. Sample output of EDB-dBASE file

```

ZN2  WZN201 W LT 0.000E-01  0 -22 7 34 8 69 3 2. -9.0.0111 24 100
ZN2 T  WZN201 W LT 1.100E+19 579 160 25  0 -1 45 5 2. 127.0.0096 7 100
ZN2 U  WZN201 W LT 2.800E+18 550 120 24  0 -1 52 5 2. 103.0.0073 8 100

```

Fig. A.10. Same data as in Fig. A.7, using the Monte Carlo procedure. (Note slight difference in the fitting curve.)

All three fitting curves and the corresponding data points can be combined in one plot with the multiple fitting and plotting procedure. Figure A.11 shows a sample output for appropriately chosen text in title and legends. No auxiliary input file was used for this example.

ZN2		VZN201	W	LT: Fluence = 0.000E+01 , Irr. Temp. = 0. C CVT(41J) = -29. C, CVT(68J) = 0. C, USE = 93. J
ZN2	T	VZN201	W	LT: Fluence = 1.100E+19 , Irr. Temp. = 304. C CVT(41J) = 70. C, CVT(68J) = ***** C, USE = 58. J
ZN2	U	VZN201	W	LT: Fluence = 2.800E+18 , Irr. Temp. = 288. C CVT(41J) = 48. C, CVT(68J) = ***** C, USE = 66. J

Fig. A.11. Combination graph of Zion Unit 2 weld material, baseline plus Capsules T and U.

Appendix A

A.7 Installation and Execution

Running EDB-Utilities with data files requires an IBM-compatible PC, preferably with an 80286 (AT) or better processor, and a hard disk. At least 512 kb of RAM is recommended. A matching coprocessor 80287/80387 is also required. The graphics programs are written for an EGA screen with 640×350 pixel resolution, or a VGA with 640×480 pixel resolution (selection is automatic, depending on the active video card). For a hardcopy of the graphics, a screen capture utility is needed that is activated by the Shift-PrtScr command. This command is part of the software and does not need be given externally.

The EDB software is being distributed on diskettes in compressed form. A directory with at least 10 Mb of free space must be prepared on the hard disk to receive the files. Place the distribution disk into the appropriate diskette drive "D" (D usually being drive A or B), and from the hard-disk directory give the command D:EDB. This command will unpack the files and copy them to the hard disk. After copying the files to a selected directory, the program is activated by typing "EDB" (executing the file EDB.bat). After a title screen, the menus appear from which users select the various option by means of the arrow keys and the "Enter" button. The options are self-explanatory. No changes are made in the original input files, unless the overwrite option is explicitly chosen by the user. Thus, some experimentation or user errors will not result in destruction of the original files. All anticipated user errors will be displayed on the screen with suggestions for corrective action. However, in rare cases, programs may be aborted, usually because of system problems such as lack of memory. To retain the error message in these cases, the executable file *.exe should be called directly, not the EDB.bat file. That is, type the name of the aborted file, in most cases PLNK, not EDB, to run the aborted program and obtain the error message.

APPENDIX B LIST OF EXP_IDs WITH DESCRIPTIONS OF EXPERIMENTS

B.1 Introduction

This appendix contains detailed descriptions of the EXP_ID used in EDB. The detailed contents of EXP_IDs for commercial power reactor surveillance programs are listed in Section B.2, "EXP_ID for Power Reactor Surveillance Programs."

BET-AN

Annealing Experiments Performed by Westinghouse at the Bettis Laboratory

Specimen from two steel plates coded S and U (EDB codes PBET0S and PBET0U) were irradiated to fluences in the range of 1.0 to $3.0 \text{ E}+19 \text{ n/cm}^2$ ($E > 1.0 \text{ MeV}$) at the Engineering Test Reactor (ETR). The fluences received were determined by dosimetry for some of the specimens (identified by an * at the SPEC_ID); the reported fluences for others are estimates. The irradiated Charpy specimens were tested, and the broken halves were reconstituted at both ends and were annealed for different lengths of time at different temperatures. Arbitrarily assigned SPEC_IDs were given to the irradiated Charpy set; additional extensions _A and _B were added to the SPEC_IDs of the irradiated Charpy set for the reconstituted Charpy specimens. (The identifications are not given in the original report (WAPD-TM-1095) but can be inferred from the fluence data.)

BWREXP

Irradiation Experiments Performed by GE with a Variety of Boiling Water Reactor Pressure Vessel (BWR-PV) Materials

The irradiation experiments were done at three different fluences— $2.0\text{E}17$, $1.5\text{E}18$, and $3.7\text{E}18 \text{ n/cm}^2$ ($E > 1.0 \text{ MeV}$)—in the Humboldt Bay reactor (HM3). All materials were from or were similar to materials used in existing BWRs.

CEA

Experiments in French Reactors Sponsored by Commissariat à l'Energie Atomique (CEA)

Experiments performed in support of French power reactors sponsored by CEA with the participation of different companies, mainly Framatome and EDF. Some of the experiments were run as research programs coordinated with the International Atomic Energy Agency (IAEA) (see EXP_ID = IAEAF). All experiments were performed at the CEA test reactors Triton, Siloe, Melusine, and Osiris. A large variety of steels of the type used in French PWRs were investigated.

EPR-AN

Annealing Experiments Sponsored by the Electric Power Research Institute (EPRI)

EPR-AN is a large-scale annealing experiment sponsored by EPRI. Three welds, coded WEPR19, WEPR23, and WEPR24, were irradiated in the University of Virginia Reactor (UVAR) and were subsequently annealed. Some of the material was reirradiated and reannealed. Specifically, material in CAPSULE EXP1 was irradiated to a fluence of about

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7.5E18 n/cm² (E > 1.0 MeV) and was annealed at a variety of temperatures and durations. The contents of CAPSULE EXP2 were also irradiated in a first run to approximately the same fluence, followed by a variety of annealing procedures repeated again by a second irradiation and anneal run. The contents of CAPSULE EXP3 were irradiated to twice the fluence without intermediate annealing for comparison with EXP2.

FKS-G

Irradiation Program at Geesthacht To Verify Safety Margins for German Licensing Rules

The German nuclear safety standard Kerntechnischer Ausschuss (KTA) 3203 predicts radiation embrittlement of PV material similar to the NRC Reg. Guide 1.99. To verify and validate these rules, selected forgings, plates, and welds were irradiated in the Geesthacht reactor FRG-2, and the results were compared with the KTA predictions. This investigation is part of research program "Integrity of Components" to verify safety margins for German licensing rules. Another participant is the Kraftwerkunion (KWU), see EXP_ID = FKS-K.

FKS-K

Irradiation Program by KWU to Verify Safety Margins for German Licensing Rules

The German nuclear safety standard KTA (Kerntechnischer Ausschuss) 3203 predicts radiation embrittlement of PV material similar to the NRC Reg. Guide 1.99. To verify and validate these rules, selected forgings, plates, and welds were irradiated in the Testing Nuclear Power Plant VAK, Kahl, Germany, and the results were compared with the KTA predictions. This investigation is part of the research program "Integrity of Components" to verify safety margins for German licensing rules. Another participant is the GKSS, Geesthacht, Germany, see EXP_ID = FKS-G.

FRA-EP

Nuclear Pressure Vessel Steel Data Base Assembly by EPRI

The report of this EPRI database, "Nuclear Pressure Vessel Steel Data Base, NP-933," was published in December 1978. This EPRI-funded project surveys the data that exist in the EPRI data base for unirradiated mechanical properties, chemistry, etc., for sixty-five heats (or conditions) of pressure vessel steels and weldments. The original EPRI data base was finalized at the end of 1975, and the results were printed in three reports, two from EPRI (NP-120 and NP-121) and one from Effects Technology report (TR-75-34R). At the time the data were generated (1974 - 1975), techniques for analyzing elastic-plastic fracture mechanics were not fully developed, and the maximum load was used as a fracture initiation point. Also, procedures for dynamic servo hydraulic machine testing and instrumented testing were developed and tested, although the American Society for Testing and Materials (ASTM) had not yet established ASTM guidelines. Three laboratories, Combustion Engineering, Babcock & Wilcox, and Effects Technology, were involved in the data generation effort.

HAW-AN**Compilation of Results from Annealing Experiments by J. R. Hawthorne**

This group of data is a compilation of results from annealing experiments performed at the Naval Research Laboratory (NRL) by J. R. Hawthorne. Most of the data that are contained in the associated report (NRL 8287) could be traced to the original reports and are listed under the original reference. Additional information was obtained from data sheets for the Material Property Council (MPC) data base.

HFIR**High Flux Isotope Reactor (HFIR) Surveillance Program and Related Experiments at Oak Ridge National Laboratory (ORNL)**

This group of data was collected in connection with the surveillance program for the HFIR at ORNL. The HFIR surveillance specimen showed an unexpectedly large shift in transition temperature for rather low fluences. (The shifts were determined at 15 ft-lb instead of the more common 30 or 50 ft-lb and are therefore listed in the file SHFTX_CV.dbf; no test data at higher impact energies are available.) This shift is still unexplained. For comparison purposes, additional specimens from the same or similar materials were irradiated in the Oak Ridge Research Reactor (ORR) at ORNL to a higher fluence of 2.3×10^{18} n/cm² ($E > 1.0$ MeV). The surveillance specimens were distributed in small batches over many different capsules; specimens that received similar fluences were combined to determine Charpy shifts. The same applies to some of the ORR irradiations. The raw data for separate and combined sets can be found in CHARPY.dbf and RAW_FT_CV.dbf, respectively.

HSST-0**Heavy Section Steel Technology (HSST) Program, Initial Characterization**

Three A533B1, 12-in.-thick steel plates were fabricated by Lukens for the HSST program at ORNL. Specimens from these plates are used as correlation monitor (standard reference) material in surveillance capsules of commercial power reactors whose pressure vessels were fabricated from A533B steel. Specimens from the first plate, SHSS01, were used in Combustion Engineering reactors; specimens from the second plate, SHSS02, were used in other U.S. reactors. (Specimens of the other correlation material, the 6-in. A302B plate SASTM, were used in older power reactors.) The third plate, SHSS03, was used in the German Verein Deutscher Eisenhüttenleute (VDE) experiment, the IAEA Joint Programme, and the ORR PSF benchmark experiment. The purpose of collecting the data under the EXP_ID HSST-0 was to determine the variability of the material properties at different locations and different thickness layers, for each plate, which is substantial. No irradiations were performed in this experiment.

HSST-1**Heavy Section Steel Irradiation (HSSI) Experiments, Series 1, at ORNL**

This was the first of a series of experiments performed at ORNL as part of the HSST irradiation program. Specimens from the two HSST plates, SHSS01 and SHSS02, and two

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welds that were fabricated from these plates, WHSS51B and WHSS53E, were irradiated in the ORR. Fluences and irradiation temperatures differed widely between specimens and are reported for each individual specimen. Charpy transition temperature shifts and upper-shelf energies were determined for groups of specimens from the same material that are sufficiently similar in irradiation conditions. Raw data are provided for every test and can be used for independent evaluations.

HSST-2

HSSI Experiments, Series 2, at ORNL

Three welds, WHSS61 to WHSS63, were investigated. The irradiation rig consisted of three identical capsules, each containing two 4T CT specimens and a variety of smaller CT, Charpy, and tensile specimens, plus dosimeters. The capsules were rotated during irradiation to obtain uniform exposure of the large CT specimens; the smaller specimens received widely varying fluences and irradiation temperatures, which are reported individually. Charpy transition temperatures and upper-shelf energies were determined by pooling together specimens that were exposed to similar irradiation conditions and by making corrections to account for differences in fluence and irradiation temperature. Raw data for individual Charpy tests are available for independent evaluations.

HSST-3

HSSI Experiments, Series 3, at ORNL

The third experiment in the HSSI series investigated four welds, WHSS64 to WHSS67. It used the same irradiation rig as HSST-2 with comparable results and problems.

HSST-4

HSSI Experiments, Series 4, at ORNL

The fourth experiment in the HSSI series investigated specimens of the HSST-2 plate, Section A, SHSS02A, and four welds, WHSS68 to WHSS71. The irradiation was performed in three capsules at the Bulk Shielding Reactor (BSR) facility at ORNL, but the rigs were different and more tightly controlled in fluence and irradiation temperature.

HSST-5

HSSI Experiments, Series 5, at ORNL

The fifth series investigated the effects of irradiation on the K_{IC} . It was designed to irradiate and test two different submerged arc welds, WHSS72 and WHSS73, to allow for verification of the irradiated ASME KIC curve to as high KIC level as practicable. The irradiation was performed in twelve capsules at the poolside facility of the ORR.

HSSI-6

HSSI Experiments, Series 6, at ORNL

The sixth series investigated the effect of irradiation on K_{Ia} , plain-strain crack-arrest fracture toughness. The objective of the six series was to determine the effect of neutron irradiation on the shift and shape of the K_{Ia} vs $(T - RT_{NDT})$ curve, where T is the temperature. Two capsules, each containing 30 compact crack-arrest specimens of the WHSS72 and WHSS73,

were irradiated in the ORR.

IAEA

IAEA Co-ordinated Research Program for Irradiation of Advanced RPV Steels

This is a program co-ordinated by IAEA for the investigation of reactor pressure vessel steels provided by vendors and laboratories of several countries. Each participating laboratory irradiated some or all of a set of forgings, plates, and welds provided and evaluated the results. A summary of the results is contained in IAEA TRS 265, but many participants published more detailed data in separate reports. Different EXP_IDs have been assigned to the different laboratories as follows:

EXP_ID	Laboratory	Country
IAEAB	AERE	United Kingdom
IAEAC	Skoda Nat. Corp.	Czechoslovakia
IAEAD	Riso Nat. Laboratories	Denmark
IAEAF	CEN	France
IAEAG	GKSS	Germany
IAEAI	Bhabha At. Center	India
IAEAJ	Japan At. Res. Inst.	Japan
IAEAK	KFA	Germany
IAEAM	Manufacturer's data	Country of origin
IAEAU	NRL	U.S.A.

IAEAB

IAEA Co-ordinated Research Program: AERE Contribution

The investigation was conducted by the U.K. Atomic Energy Authority with participation of Rolls Royce and Associates. Detailed results are published in ASTM STP 782/433. Some of the data in IAEA TRS 265 differ slightly from the ASTM STP report.

IAEAC

IAEA Co-ordinated Research Program: Skoda Contribution

All data listed are from IAEA TRS 265.

IAEAD

IAEA Co-ordinated Research Program: Riso Contribution

The Riso contribution to IAEA TRS 265 contains only chemistry data.

IAEAF

IAEA Co-ordinated Research Program: CEN Contribution

Detailed reports that contain other investigations with French test reactors are published in several ASTM STP reports (see EXP_ID = CEA).

IAEAG

IAEA Co-ordinated Research Program: GKSS Contribution

Additional data can be found in GKSS-1.

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IAEAI

IAEA Co-ordinated Research Program: Bhabha Contribution

All listed data are from IAEA TRS 265.

IAEAJ

IAEA Co-ordinated Research Program: Japan At. Res. Inst. Contribution

All data listed are from IAEA TRS 265.

IAEAK

IAEA Co-ordinated Research Program: KFA Contribution

These data are the contributions of D. Pachur from irradiations at the FRJ-1 and FRJ-2 reactors at the Kernforschungsanstalt in Jülich, Germany. D. Pachur has supplied data on diskettes in addition to beyond those published in IAEA TRS 265.

IAEAM

IAEA Co-ordinated Research Program: Steel Manufacturer's Contribution

These data are the baseline values for the preirradiation properties of the IAEA-supplied materials as provided by the manufacturers and listed in IAEA TRS 265.

IAEAU

IAEA Co-ordinated Research Program: NRL Contribution

The U.S. contribution to the IAEA Co-ordinated Research Program consisted of irradiations in the University Buffalo Reactor (UBR) reactor with evaluations by J. R. Hawthorne in NRL. In addition to the material investigated in IAEA TRS 265, other IAEA-supplied Japanese steels were investigated in NUREG/CR-5357.

JPDR

Japan Power Demonstration Reactor (JPDR) Surveillance Program

The report in ASTM stp 484/74 contains the results of the surveillance program for the JPDR, including supplemental experiments.

KFA

Miscellaneous Irradiation Experiment Performed at KFA

Most of the data are unpublished supplements to the VDE and IAEA experiments that were supplied by D. Pachur on diskettes. The transition temperatures were obtained from Pachur's two-stage impact-energy-versus-test-temperature model. These data are referenced as "Pachur 1988."

KRB

Experiments Concerning the Decommissioned Reactor KRB-A, Gundremmingen

Parts of the pressure vessel of the decommissioned reactor in Gundremmingen, Germany, are being tested at MEA and compared with archived material from the same PV after irradiation in the UBR to comparable fluences.

KWU-PR

Compilation of German Irradiated RPV Data for Transfer to NRC

This compilation contains surveillance data from pressure vessels of German power reactors from the Kraftwerkunion. The steel samples were obtained from ring forgings and associated

weld and HAZ material. The data were collected per request by the U.S. NRC and Materials Engineering Associates, Inc. (MEA).

LAC

Test Reactor Irradiations in Support of the LaCrosse Reactor

Several steel samples from the Lacrosse reactor were irradiated in the Low-Intensity Test Reactor (LITR) and Union Carbide Research Reactor (UCRR) as supplements to the surveillance program. The principal investigator was C. Z. Serpan, Jr.

MCD-AN

Compilation of Results from Annealing Experiments by B. McDonald

This compilation was collected by B. McDonald in support of his annealing model. All data could be traced to the original reports and are referenced accordingly.

MEA-AN

Post-irradiation Annealing Experiments at MEA.

Four welds, coded W8A (WMEA8A), W9A (WMEA9A), WW4 (WMEAW4), and WW7 (WMEAW7) were investigated at various states of irradiation, annealing, and reirradiation.

MEA-JR

J-R Curve Characterization of Irradiation Low Upper-Shelf Welds

This investigation provides a data base of J-R curve trends from irradiated A508 and A533B weld metals exhibiting low upper-shelf Charpy-V energy. Compact toughness specimens of four different sizes (0.5T to 4T-CT) were characterized. Irradiation of the specimens was conducted by ORNL under the Second and Third Irradiation Series at the BSR. The target fast neutron fluence was $\sim 1.0\text{E}+19$ n/cm² at a nominal irradiation temperature of 288°C.

MEA-RT

Study of the Influence of Fluence Rates on Irradiation Embrittlement at MEA

The influence of fluence rates was studied by exposing A302B (SASTM F23) and A533B (PNRLG23) material at reflector and in-core positions in the UBR and irradiating them to the same total fluences. The weld W8A (WMEA8A) from the MEA-AN experiment was also included in the study.

MOLBR3

Irradiation Experiments in Support of the BR3 Reactor at Mol, Belgium

In order to investigate possible benefits of annealing for the BR3 reactor vessel, several welds were irradiated in the UBR and subsequently annealed. The results are published in MEA 2218 and several CEN/SCK reports. The principal investigators were A. Fabry and J. R. Hawthorne. An independent evaluation was performed by D. Pachur.

MRI-1

Test of Hydrogen Influence in Steels performed at Materials Research, Idaho

The influence of hydrogen on radiation embrittlement is studied in this report.

NRL-1

Exploratory Irradiation Studies of A533, A543, and A302 Steels at NRL

This study combines the results of several exploratory irradiation experiments to determine

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the radiation embrittlement of commonly used pressure vessel materials.

NRL-2

Irradiation Experiments with HSST Material at the NRL

This study describes the results of irradiation experiments on the two HSST plates, HSST-1 (SHSS01) and HSST-2 (SHSS02), and a weld fabricated by Combustion Engineering. One objective of this experiment was to compare dynamic tear tests to regular Charpy tests.

NRL-3

Test of Irradiation Sensitivity for Commercial and Improved Steels at the NRL

This is a joint NRC - Combustion Engineering program that was carried out at the NRL. The main objective was to determine the influence of copper; in particular, newer improved low-alloy steels were compared with older commercial steel samples.

NRL-4

Notch Ductility Degradation of Low-Alloy Steels with Low-to-Intermediate Fluence

This is another NRC-sponsored study of the radiation sensitivity of a variety of commercially produced steel plates and welds with varying copper content. Fluences range between $1.0E18$ to $2.0E19$ n/cm² ($E > 1.0$ MeV).

NRL-AN

Investigation of Cyclic Irradiation and Annealing Effects in A533-B Welds

This investigation involved an annealing study of two commercially produced high-copper welds (Babcock & Wilcox and Combustion Engineering) with up to two cycles of irradiation-annealing-reirradiation and two different annealing temperatures (650°F and 750°F, respectively).

NRL-EP

NRL-EPRI Research Program (RP886-2)

This is a joint effort by EPRI and NRL to investigate the radiation embrittlement of typical reactor pressure vessel material. Plates (A533B and A302B), forgings (A5082) and associated welds were used in this program.

ORRPSF

Surveillance Dosimetry Improvement Program, Oak Ridge Research Reactore Poolside Facility (ORR-PSF) Metallurgical Irradiation

An essential part of the Pressure Vessel Surveillance Program was the PSF Benchmark Field which simulated the surveillance-capsule-pressure-vessel configuration in the ORR-PSF. Six different materials consisting of two plates (SASTM F23 and SHSS03 PSF), two forgings (FKFA01 and FMOL01), and two welds (WEPR23 and WRRP_PSF), were each irradiated in two simulated surveillance capsules and three "block" capsules corresponding to the inner surface, 1/4 T and 1/2 T positions of a pressure vessel in power reactors. Because the fluence spectra and relative fluence rates in these capsules were similar to the ones in power reactors, they provided some opportunity to validate surveillance programs.

PR-EDB

Experiments in Support of U.S. Power Reactor Surveillance

Data listed under this EXP_ID were obtained for power reactor surveillance materials that

were irradiated in test reactors.

RRA

Series of Experiments Performed at Rolls Royce Associates, UK

The current data in the TR-EDB are taken from ASTM STP 782/343 which are from a joint study of Rolls Royce, Associates and the Atomic Energy Research Establishment in Harwell, England.

SM-1

Experiments with Demonstration Melt A533 Plates

This is the first of a number of "Split Melt" experiments performed by J. R. Hawthorne at NRL and, later, at MEA, in which one melt was divided into several parts, each of which received a different amount of alloys (such as copper, phosphorus, and nickel) to determine the change of radiation sensitivity resulting from the alloying materials. In this experiment a 30-ton A533 heat was split four ways with two different copper contents (0.13% and 0.03%), each of which received two different heat treatments corresponding to Class 1 and Class 2 designation. Several irradiation experiments, including annealing, were performed with these materials.

SM-2

Experiments with Split-Melts To Study the Influence of Residual Elements in A302-B Steels

The study consisted of three 300-lb melts, each split three ways (PME38A to PME40C), and two 400-lb melts, split four ways (PMEV61, PME V63 to PME V67, PME V71 to PME V77). The melts differ in copper and phosphorus content. Each was fabricated into 0.5-in. plates and heat treated in the usual way. The A302B reference plate was also included in the study for comparison. Some of the PME Vxx samples were annealed after irradiation.

SM-3

Experiments with Split-Melts To Study the Influence of Residual Elements in A543 Steels

SM-3 was similar to SM-2. Two 300-lb melts were split three ways but were from A543 heats with aluminum and nitrogen added in various amounts (PMEY2A to PMEY3C). Associated welds were also included in the study.

SM-4

Experiments with Split-Melts to Study Nickel-Copper Interactions

This study involves two 400-lb A302B melts split four ways (PME05A to PME06D) with varying amounts of copper and nickel added. The irradiation experiments included annealing.

SM-5

Experiments with Split-Melts to Study Copper-Phosphorus Interaction

This study involves seven melts, each split four ways, resulting in 28 materials of type A302B and A533B (PME66A to PME72D), with varying amounts of copper, phosphorus, and nickel. Some of the materials were used in the annealing study MEA-AN.

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SRM

Irradiation of Standard Reference Materials in Power and Test Reactors

This study involves four steel plates provided by U.S. Steel to ASTM as reference correlation monitor materials (standard reference material, SRM). One of these plates, the A302B reference material, has been used extensively in surveillance programs of older power reactors. Samples of the four plates were sent to different organizations and irradiated in many different reactors to a variety of fluences and irradiation temperatures. The results have been collected and published by J. R. Hawthorne in ASTM DS54. Only changes between un-irradiated and irradiated data (shift values) were reported, not the baseline values themselves. Some of the baseline values were included in the MPC data base and have been transferred to the EDB. There appears to be a large variation in baseline values for different sections of the plates, but these are not given, nor are the locations of the samples clearly identified. The HEAT_ID code reflects, wherever possible, the location of the sample (such as, SASTM S1). The plain code SASTM is reserved for surveillance material. SASTM X stands for material whose location could not be identified. The other plates are coded SASTMA, SASTMB, and SASTMC. SASTMD and further codes are used for other materials that were identified as "reference material" in the reports.

VDE

Steel Irradiation Program Sponsored by VDE

This is an extensive irradiation program sponsored by the VDE. Four different steels, coded A, B, C, and D, and associated welds with HAZ were irradiated in the FRJ-2 reactor, KFA, Jülich, to target fluences of $1.0E19$, $5.0E19$, and $1.0E20$ ($E > 1.0$ MeV) at irradiation temperatures of 300 and 400°C. The code A material is part of the HSST-2 plate (SHSS02A, the associated weld, and HAZ were fabricated from a piece of HSST-3). The others are MnNiCrMoV and NiCrMo alloys (PVDE0B, PVDE0C, and FVDE0D). Irradiations were performed in small batches, and detailed information is provided for each run (listed in REAC.dbf, CV_REF.dbf, and CHARPY.dbf as individual physical capsules). Specimens from different capsules were then combined to determine the Charpy shift values for the target fluences and irradiation temperatures (the combined specimen sets are listed in RAW_FT_CV.dbf and CV_RF_FT.dbf). All details are published in 24 "Berichten," plus a summary (Abschlussbericht).

YR

Investigations in Support of the Yankee Rowe Reactor

The PV steel samples of the Yankee Rowe Reactor that were irradiated in surveillance capsules 1, 2, and 6 were not immediately tested but were annealed for 168 hours, each capsule at a different temperature. The results of this program are reported in NRL 6616 and are included in the file SHFTA_CV.dbf of the EDB.

B.2 Exp_ids for Power Reactor Surveillance Programs

The following list is composed of the EXP_IDS for commercial power reactor surveillance programs and the surveillance reports that provided the data for EDB. Updated fluence values of Westinghouse data are from "Westinghouse Surveillance Capsule Neutron Reevaluation," WCAP-14044.

PR-AD1

Angra Dos Reis Unit 1

J. A. Davidson and S. E. Yanichko, "Furnas-Centraís Electricas S.A. Angra Dos Reis Unit No. 1 Reactor Vessel Radiation Surveillance Program," WCAP-8957, Westinghouse Electric Corporation, Pittsburgh, PA, May 1977.

P. K. Nair and M. L. Williams, "Reactor Vessel Material Surveillance Program for Angra Dos Reis Unit No. 1: Analysis of Capsule V," SwRI Project 06-8976, Southwest Research Institute, San Antonio, TX, October 1987.

PR-AL2

Almaraz Unit 2

P. J. Fields, J. A. Davidson, and S. E. Yanichko, "Central Nuclear de Almaraz Almaraz Unit No. 2 Reactor Vessel Radiation Surveillance Program," WCAP-9228, Westinghouse Electric Corporation, Pittsburgh, PA, December 1977.

PR-AN1

Arkansas Nuclear One, Unit 1

J. D. Aadland, "Babcock & Wilcox Owner's Group 177-Fuel Assembly Reactor Vessel and Surveillance Program Materials Information," BAW-1820, Babcock & Wilcox, Lynchburg, VA, December 1984.

A. S. Heller and A. L. Lowe, Jr., "Correlations for Predicting the Effects of Neutron Radiation on Linde 80 Submerged-Arc Welds," BAW-1803, Babcock & Wilcox, Lynchburg, VA, January 1984.

A. L. Lowe, Jr., et al., "Analysis of Capsule ANI-E from Arkansas Power & Light Company Arkansas Nuclear One-Unit 1, Reactor Vessel Materials Surveillance Program," BAW-1440, Babcock & Wilcox, Lynchburg, VA, April 1977.

A. L. Lowe, Jr., et al., "Analysis of Capsule ANI-B from Arkansas Power & Light Company's Arkansas Nuclear One, Unit 1, Reactor Vessel Materials Surveillance Program," BAW-1698, Babcock & Wilcox, Lynchburg, VA, November 1981.

A. L. Lowe, Jr., et al., "Analyses of Capsule AN1-A Arkansas Power & Light Company, Arkansas Nuclear One, Unit 1, Reactor Vessel Material Surveillance Program," BAW-1836, Babcock & Wilcox, Lynchburg, VA, July 1984.

A. L. Lowe, Jr., et al., "Analysis of Capsule AN1-C Arkansas Power & Light Company Arkansas Nuclear One, Unit 1, Reactor Vessel Material Surveillance Program," BAW-2075, Rev. 1, Babcock

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& Wilcox, Lynchburg, VA, October 1989.

W. N. McElroy, ed., "LWR Pressure Vessel Surveillance Dosimetry Improvement Program: LWR Power Reactor Surveillance Physics-Dosimetry Data Base Compendium," NUREG/CR-3319, HEDL-TME 85-3, U.S. Nuclear Regulatory Commission, Washington, DC, August 1985.

PR-AN2

Arkansas Nuclear One, Unit 2

L. M. Lowry et al., "Summary Report on Examination, Testing, and Evaluation of Irradiated Pressure Vessel Surveillance Specimens from the Arkansas Nuclear One Unit 2 Generating Plant," Battelle Memorial Institute, Columbus, OH, May 1984.

A. Ragl, "Arkansas Power & Light Arkansas Nuclear One - Unit 2 Evaluation of Baseline Specimens Reactor Vessel Materials Irradiation Surveillance Program," TR-MCD-002, Combustion Engineering, Inc., Windsor, CT, February 1976.

PR-AS1

Asco Unit 1

P. J. Fields, J. A. Davidson, and S. E. Yanichko, "Fuerzas Electricas de Cataluna ASCO Unit No. 1 Reactor Vessel Radiation Surveillance Program," WCAP-9308, Westinghouse Electric Corporation, Pittsburgh, PA, July 1978.

PR-AS2

Asco Unit 2

P. J. Fields, J. A. Davidson, and S. E. Yanichko, "Fuerzas Electricas de Cataluna ASCO Unit No. 2 Reactor Vessel Radiation Surveillance Program," WCAP-9330, Westinghouse Electric Corporation, Pittsburgh, PA, August 1978.

PR-BD1

Braidwood Unit 1

E. Terek, S. L. Anderson, and L. Albertin, "Analysis of Capsule U from the Commonwealth Edison Company Braidwood Unit 1 Reactor Vessel Radiation Surveillance Program," WCAP-12685, Westinghouse Electric Corporation, Pittsburgh, PA, August 1990.

PR-BD2

Braidwood Unit 2

E. Terek, S. L. Anderson, and L. Albertin, "Analysis of Capsule U from the Commonwealth Edison Company Braidwood Unit 2 Reactor Vessel Radiation Surveillance Program," WCAP-12845, Westinghouse Electric Corporation, Pittsburgh, PA, March 1991.

PR-BR

Big Rock Point Reactor

F. A. Brandt, "Reactor Pressure Vessel Material Surveillance Program at the Consumers Power Company Big Rock Point Nuclear Plant," GECR-4442, General Electric, San Jose, CA, December 1963.

P. McConnell et al., "Irradiated Nuclear Pressure Vessel Steel Data Base," EPRI NP-2428, Electric Power Research Institute, Palo Alto, CA, June 1982.

C. Z. Serpan, Jr. and H. E. Watson, "Mechanical Property and Neutron Spectral Analyses of the Big Rock Point Reactor Pressure Vessel," Naval Research Laboratory, Washington, DC, Nucl. Eng. & Design 11(3), pp. 393-415, April 1970.

S. E. Yanichko, S. L. Anderson, R. P. Shogan, and R. G. Lott, "Analysis of Capsule 125 from the Consumers Power Company Big Rock Point Nuclear Plant Reactor Vessel Radiation Surveillance Program," WCAP-9794, Westinghouse Electric Corporation, Pittsburgh, PA, September 1980.

PR-BV1

Beaver Valley Unit 1

R. S. Boggs, S. L. Anderson, and W. T. Kaiser, "Analysis of Capsule U from the Duquesne Light Company Beaver Valley Unit 1 Reactor Vessel Radiation Surveillance Program," WCAP-10867, Westinghouse Electric Corporation, Pittsburgh, PA, September 1985.

J. A. Davidson, J. H. Phillips, and S. E. Yanichko, "Duquesne Light Company Beaver Valley Unit No. 1 Reactor Vessel Radiation Surveillance Program," Westinghouse Electric Corporation, Pittsburgh, PA, October 1974.

C. N. Dunn, "Response to NRC inquiries regarding Beaver Valley Power Station, Unit No. 1, Docket 50-334, Reactor Vessel Material Surveillance Program," Duquesne Light, Pittsburgh, PA, July 21, 1977.

S. E. Yanichko et al., "Analysis of Capsule V from the Duquesne Light Company Beaver Valley Unit No. 1 Reactor Vessel Radiation Surveillance Program," WCAP-9860, Westinghouse Electric Corporation, Pittsburgh, PA, January 1981.

S. E. Yanichko et al., "Analysis of Capsule W from the Duquesne Light Company Beaver Valley Unit 1 Reactor Vessel Radiation Surveillance Program," WCAP-12005, Westinghouse Electric Corporation, Pittsburgh, PA, November 1988.

PR-BV2

Beaver Valley Unit 2

S. E. Yanichko et al., "Analysis of Capsule U from the Duquesne Light Company Beaver Valley Unit 2 Reactor Vessel Radiation Surveillance Program," WCAP-12406, Westinghouse Electric Corporation, Pittsburgh, PA, September 1989.

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PR-BW1

Brunswick Unit 1

"Brunswick Steam Electric Plant Unit 1, Information on Reactor Vessel Material Surveillance Program," NEDO-24161, General Electric Company, San Jose, CA, November 1978.

PR-BW2

Brunswick Unit 2

"Brunswick Steam Electric Plant Unit 2, Information on Reactor Vessel Material Surveillance Program," NEDO-24157, Rev. 1, General Electric Corporation, San Jose, CA, December 1978.

PR-BY1

Byron Unit 1

S. E. Yanichko, E. P. Lippincott, and L. Albertin, "Analysis of Capsule U from the Commonwealth Edison Co. Byron Unit Reactor Vessel Radiation Surveillance Program," WCAP-11651, Westinghouse Electric Corporation, Pittsburgh, PA, November 1987.

PR-BY2

Byron Unit 2

E. Terek et al., "Analysis of Capsule U from the Commonwealth Edison Company Byron Unit 2 Reactor Vessel Radiation Surveillance Program," WCAP-12431, Westinghouse Electric Corporation, Pittsburgh, PA, October 1989.

PR-BZ1

Beznau Unit 1

G. Ullrich, B. Burgisser, "Nachbestrahlungsuntersuchungen an Reaktordruckgefassmaterial Beznau I/Kapsel V. Ermittlung der Neutronenfluens sowie Lateral-Expansion und Root-Notch-Contraction," PB-ME-75/02, Addendum zu PB-ME-73/9, Eidg. Institut für Reaktorforschung, November 1975.

G. Ullrich and B. Burgisser, "Nachbestrahlungsuntersuchungen an NOK-Reaktordruckgefassmaterial der Kernkraftwerke Beznau I/2 - Kapsel R," PB-ME-75/03, Eidg. Institut für Reaktorforschung, November 1975.

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S. E. Yanichko, "NOK Reactor Vessel, Radiation Surveillance Program," WCAP-7214, Westinghouse Electric Corp., Pittsburgh, PA, June 1968.

PR-CAB

Jose Cabrera-Zorita Reactor

T. R. Mager, R. Shogan, and S. Anderson, "Analysis of Capsules P and K from Union Electrica, S.A., Jose Cabrera Reactor Vessel Radiation Surveillance Program," WENX/76/64, Westinghouse Nuclear Europe, Brussels, August 1976.

S. E. Yanichko, "Union Electrica Madrilena Zorita Reactor Vessel Ration Surveillance Program," WCAP-7691-1, Westinghouse Electric Corporation, Pittsburgh, PA, May 1971.

S. E. Yanichko, K. C. Tran, R. P. Shogan, and R. G. Lott, "Analysis of Capsule N from the Union Electrica, S.A., Jose Cabrera Reactor Vessel Radiation Surveillance Program," WCAP-10185, Westinghouse Electric Corporation, Pittsburgh, PA, October 1982.

PR-CB1

Catawba Unit 1

S. E. Yanichko, "Duke Power Company Catawba Unit No. 1 Reactor Vessel Radiation Surveillance Program," WCAP-9734, Westinghouse Electric Corporation, Pittsburgh, PA, July 1980.

S. E. Yanichko and S. L. Anderson, "Analysis of Capsule Z from the Duke Power Company Catawba Unit 1 Reactor Vessel Radiation Surveillance Program," WCAP-11527, Westinghouse Electric Corporation, Pittsburgh, PA, June 1987.

PR-CB2

Catawba Unit 2

E. Terek, S. L. Zawalick, A. Madeyski, and P. A. Peter, "Analysis of Capsule X from the Duke Power Company Catawba Unit 2 Reactor Vessel Radiation Surveillance Program," WCAP-13875, Westinghouse Electric Corporation, Pittsburgh, PA.

S. E. Yanichko et al., "Analysis of Capsule Z from the Duke Power Company Catawba Unit 2 Reactor Vessel Radiation Surveillance Program," WCAP-11941, Westinghouse Electric Corporation, Pittsburgh, PA, September 1988.

PR-CC1

Calvert Cliffs Unit 1

S. T. Byrne, E. C. Biemiller, and A. Ragl, "Testing and Evaluation of Calvert Cliffs, Units 1 and 2 Reactor Vessel Materials Irradiation Surveillance Program Baseline Samples," TR-ESS-001, Combustion Engineering, Inc., Windsor, CT, January 31, 1975.

A. E. Jundvall, Jr., "Response to NRC inquiries regarding Calvert Cliffs Nuclear Power Plant Unit No. 1 and 2, Docket No. 50-317 and 50-318 Reactor Vessel Material Surveillance Program," Baltimore Gas and Electric Company, Baltimore, MD, December 29, 1977.

J. S. Perrin et al., "Final Report on Calvert Cliffs Unit No. 1 Nuclear Plant Reactor Pressure Vessel Surveillance Program: Capsule 263," Battelle Columbus Laboratories, Columbus, OH, Dec. 15, 1980.

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Calvert Cliffs Unit 2

A. E. Jundvall, Jr., "Response to NRC inquiries regarding Calvert Cliffs Nuclear Power Plant Unit No. 1 and 2, Docket No. 50-317 and 50-318 Reactor Vessel Material Surveillance Program," Baltimore Gas and Electric Company, Baltimore, MD, December 29, 1977.

E. B. Norris, "Reactor Vessel Material Surveillance Program for Calvert Cliffs Unit 2 Analysis of 263-Deg. Capsule," SWRI-7524, Southwest Research Institute, San Antonio, TX, September 1985.

PR-CK1

Donald C. Cook Unit 1

E. B. Norris, "Reactor Vessel Material Surveillance Program for Donald C. Cook Unit No. 1, Analysis of Capsule T," SwRI Project 02-4770, Southwest Research Institute, San Antonio, TX, December 1977.

E. B. Norris, "Reactor Vessel Material Surveillance Program for Donald C. Cook Unit No. 1 Analysis of Capsule X," SwRI Project No. 02-6159, Southwest Research Institute, San Antonio, TX, June 22, 1981.

E. B. Norris, "Reactor Vessel Material Surveillance Program for Donald C. Cook, Unit No. 1, Analysis of Capsule Y," SwRI-7244-001/1, Southwest Research Institute, San Antonio, TX, January 1984.

E. Terek et al., "Analysis of Capsule U from the American Electric Power Company D. C. Cook Unit 1 Reactor Vessel Radiation Surveillance Program," WCAP-12483, Westinghouse Electric Corporation, Pittsburgh, PA, January 1990.

S. E. Yanichko and D. J. Lege, "American Electric Power Service Corporation Donald C. Cook Unit No. 1 Reactor Vessel Radiation Surveillance Program," WCAP-8047, Westinghouse Electric Corporation, Pittsburgh, PA, March 1973.

PR-CK2

Donald C. Cook Unit 2

J.M. Chicots, S.L. Anderson, A. Madeyski, "Analysis of Capsule U from the Indiana Michigan Power Company D. C. Cook Unit 2 Reactor Vessel Radiation Surveillance Program," February 1993.

J. A. Davidson, S. E. Yanichko, and J. H. Phillips, "American Electric Power Company Donald C. Cook Unit No. 2 Reactor Vessel Radiation Surveillance Program," WCAP-8512, Westinghouse Electric Corporation, Pittsburgh, PA, November 1975.

P. K. Nair and M. L. Williams, "Reactor Vessel Material Surveillance Program for Donald C. Cook Unit No. 2: Analysis of Capsule X," SwRI Project 06-8888, Southwest Research Institute, San Antonio, TX, May 1987.

E. B. Norris, "Reactor Vessel Material Surveillance Program for Donald C. Cook Unit 2 Analysis of Capsule T," SwRI Project No. 02-5928, Southwest Research Institute, San Antonio, TX, September 16, 1981.

E. B. Norris, "Reactor Vessel Material Surveillance Program for Donald C. Cook, Unit No. 2, Analysis of Capsule Y," SwRI-7244-002/1, Southwest Research Institute, San Antonio, TX, February 1984.

PR-CL1

Callaway Unit 1

R. G. Lott et al., "Analysis of Capsule U from the Union Electric Company Callaway Unit 1 Reactor Vessel Radiation Surveillance Program," WCAP-11374, Rev. 1, Westinghouse Electric Corporation, Pittsburgh, PA, June 1987.

L. R. Singer, "Union Electric Company Callaway Unit No. 1 Reactor Vessel Radiation Surveillance Program," WCAP-9842, Westinghouse Electric Corporation, Pittsburgh, PA, May 1981.

E. Terek, S. L. Anderson, and A. Madeyski, "Analysis of Capsule Y from the Union Electric Company Callaway Unit 1 Reactor Vessel Radiation Surveillance Program," WCAP-12946, Westinghouse Electric Corporation, Pittsburgh, PA, June 1991.

PR-CP2

Comanche Peak Unit 2

L. R. Singer, "Texas Utilities Generating Company Comanche Peak Unit No. 2 Reactor Vessel Radiation Surveillance Program," WCAP-10684, Westinghouse Electric Corporation, Pittsburgh, PA, October 1984.

PR-CPR

Cooper

Combustion Engineering, Inc., Metallurgical Research and Development Department Materials Certification Report, Contract No. 21366, Job No. T-51483-003 (CPR).

T. A. Caine, "Cooper Nuclear Station Reactor Vessel Surveillance Materials Testing and Fracture Toughness Analysis," MDE-103-0986, General Electric Company, San Jose, CA, May 1987.

T.A. Caine, "Cooper Nuclear Station Vessel Surveillance Materials Testing and Fracture Toughness Analysis," February 1993.

M. T. Wang, "Fracture Toughness of Reactor Pressure Vessel Steel Welds," NEDC-30299, General Electric Company, October 1983.

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PR-CR3

Crystal River Unit 3

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A. L. Lowe, Jr., et al., "Analyses of Capsule CR3-B, Florida Power Corporation, Crystal River Unit 3, Reactor Vessel Materials Surveillance Program", BAW-1679, Rev. 1, Babcock & Wilcox, Lynchburg, VA, June 1982.

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PR-VO2

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PR-VS1

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J.M. Chicots, T.M. Lloyd, L. Albertin, "Analysis of Capsule X from the South Carolina Electric and Gas Company Virgil C Summer Unit 1 Reactor Vessel Radiation Surveillance Program," March 1991

D. J. Colburn et al., "Analysis of Capsule V from the South Carolina Electric and Gas Company Virgil C. Summer Unit 1 Reactor Vessel Radiation Surveillance Program," WCAP-11726, Westinghouse Electric Corporation, Pittsburgh, PA, January 1988.

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PR-VY

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PR-WB1

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J. A. Davidson, "Tennessee Valley Authority Watts Bar Unit No. 1 Reactor Vessel Radiation Surveillance Program," WCAP-9298, Westinghouse Electric Corporation, Pittsburgh, PA, July 1978.

PR-WC1

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J. M. Chicots et al., "Analysis of Capsule Y from the Wolf Creek Nuclear Operating Corporation Wolf Creek Reactor Vessel Radiation Surveillance Program," WCAP-13365, Westinghouse Electric Corporation, Pittsburgh, PA, June 1992.

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S. E. Yanichko, E. P. Lippincott, L. Albertin, and J. C. Schmertz, "Analysis of Capsule U from the Wolf Creek Nuclear Operating Corporation Wolf Creek Reactor Vessel Radiation Surveillance Program," WCAP-11553, Westinghouse Electric Corporation, Pittsburgh, PA, August 1987.

PR-WF3

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C. Z. Serpan, Jr. and J. R. Hawthorne, "Yankee Reactor Pressure Vessel Surveillance: Notch Ductility Performance of Vessel Steel and Maximum Service Fluence Determined from Exposure During Cores II, III, and IV," J. Basic Eng., pp. 897-910, December 1967.

R. W. Smith, "Evaluation of the Fracture Toughness Properties of the Yankee Rowe Reactor Vessel," YAE-1089, Yankee Atomic Electric Company, Westborough, MA, September 1975.

PR-ZN1

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A. L. Lowe, Jr. et al., "Analysis of Capsule Y Commonwealth Edison Company Zion Nuclear Plant Unit 1 Reactor Vessel Material Surveillance Program," BAW-2082, Babcock & Wilcox, Lynchburg, VA, March 1990.

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J. S. Perrin, D. R. Farmelo, R. G. Jung, and E. O. Fromm, "Final Report on Zion Nuclear Plant Reactor Pressure Vessel Surveillance Program: Unit No. 1 Capsule T and Unit No. 2 Capsule U," BCL-585-4, Battelle Columbus Laboratories, Columbus, OH, March 1978.

S. E. Yanichko and D. J. Lege, "Commonwealth Edison Co., Zion Unit No. 1 Reactor Vessel Radiation Surveillance Program," WCAP-8064, Westinghouse Electric Corporation, Pittsburgh, PA, March 1973.

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PR-ZN2

Zion Nuclear Plant Reactor Unit 2

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E. B. Norris, "Reactor Vessel Material Surveillance Program for Zion Unit No. 2 Analysis of Capsule T," SwRI Project 06-6901-001, Southwest Research Institute, San Antonio, TX, July 1983.

E. Terek et al., "Analysis of Capsule Y from the Commonwealth Edison Company Zion Unit 2 Reactor Vessel Radiation Surveillance Program," WCAP-12396, Westinghouse Electric Corporation, Pittsburgh, PA, September 1989.

S. E. Yanichko and D. J. Lege, "Commonwealth Edison Co., Zion Unit No. 2 Reactor Vessel Radiation Surveillance Program," WCAP-8132, Westinghouse Electric Corporation, Pittsburgh, PA, May 1973.

APPENDIX C. EDB DATA ACQUISITION SHEETS

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB)
OF REACTOR PRESSURE VESSEL MATERIALS

General Information

Component:

Contributor:

Name:	Country:	State:
City:	Street & No:	Postcode:
Contact person: Title:	Name:	Fax/Tel:

Remark contributor:

Modification: Yes ☐

Steelmaker:

Name:	Country:	State:
City:	Street & No:	Postcode:

Remark steelmaker:

Component manufacture:

Name:	Country:	State:
City:	Street & No:	Postcode:

Remark component manufacture:

Reactor:

Name:	Country:	State:
City:	Street & No:	Postcode:
Unit type:	Output (MWt):	Utility:
Designer:	Architect:	RPV:
RPV thickness(mm):	RPV ID(cm):	
Operation date	year: month: day:	Operation temp. (°C):

Remark reactor:

Experiment Identification:

Laboratory:	Authors:
Publication date:	Ref. title:

Appendix C

Completion Instructions (General Information)

- Component: name and identification of tested component (research heat, RPV ring, RPV nozzle, RPV weld, RPV clad, main steam pipe, steam generator pipe, etc.).
- Contributor: the organization, institution, or utility who supplied data to NRC/ORNL EDB with the permission of the data owner (e.g., Kurchatov Institute, any utility).
- Contact person: representative of the contributor who is responsible for answering questions and giving further information at the request of NRC/ORNL EDB.
- Remark contributor: remarks about the contributing organization if any.
- Modification: place an X in box if you use this sheet to modify previously reported data.
- Steelmaker: foundry that produced the actual material (optional).
- Remark steelmaker: remarks about the steel maker if any.
- Component manufacturer: company that produced the actual component or the main contractor (optional).
- Remark component manufacturer: remarks about the component manufacturer if any.
- Reactor: reactor information.
- Unit type: type of unit (PWR, BWR, MTR etc.)
- Output: thermal output of reactor (MW).
- Utility: plant operator.
- Designer: reactor designer or vendor.
- Architect: reactor architect/engineer.
- RPV: reactor pressure vessel manufacturer.
- RPV thickness: thickness of the reactor pressure vessel.
- RPV ID: inner diameter of the reactor pressure vessel.
- Operation date: start date for commercial electricity production.
- Operation temp.: average coolant inlet temperature (°C).
- Remark reactor: remarks about the reactor if any.
- Laboratory: laboratory responsible for experiment and evaluation.
- Authors: principal investigators.
- Ref. title: bibliographic reference.

**NRC/ORNL EMBRITTLEMENT DATA BASE (EDB)
OF REACTOR PRESSURE VESSEL MATERIALS**

Material Data Sheet

Component:

Standard name:	Material type:
Source:	Material name:
Production date: year: month: day:	Supplier:
Heat No:	Report No:
Material thickness (mm):	Quality documentation:

Remark material:
Modification: Yes ☐

Material production reference:

Page: Date: year: month: day:

Heat treatment:

No. of treatment	Heat treatment type	Temperature $\pm$ range ($^{\circ}\text{C}$)	Time (h)	Cooling method

Remark heat treatment:

Modification: Yes ☐

Heat treatment reference:

Page: Date: year: month: day:

Appendix C

Completion Instructions (Material Data)

- . Component: the name of the tested component (research heat, RPV ring, RPV nozzle, RPV weld, RPV clad, etc.).
- . Standard name: standard material designation (e.g., SA 533 Grade B) used to identify product type.
- . Material type: forging, plate, weldment, casting, pipe, etc.
- . Source: source of material: FABR_icated, SCR_ap, SIM_ulated weld, or CUTOUT.
- . Material name: steel producer name for material, weld, etc. (e.g., "HSST01" if any).
- . Supplier: supplier of material.
- . Heat No: heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Report No.: material identifier used in surveillance report.
- . Material thickness: thickness of component (mm).
- . Quality documentation: identification code and number of quality assurance document of tested material.
- . Remark material: any remarks.
- . Modification: put an X in box if data are modifications of earlier, mistakenly reported data.
- . No. of heat treatment: 1, 2, 3, 4, etc.
- . Heat treatment type: type of heat treatment (e.g., normalization, austenizing, tempering, stress relief).
- . Temperature $\pm$ range: nominal temperature and its range during heat treatment ($^{\circ}\text{C}$).
- . Time: duration of stay at nominal temperature in (h).
- . Cooling method: type of cooling (e.g., in furnace, air, water, oil).
- . Modification: put an X in box if you use this sheet to modify previously reported data.
- . Remark heat treatment: remarks about heat treatment.
- . Heat treatment reference: original documentation that includes all data about heat treatment of specific component. (e.g., technology prescriptions, manufacturer documentation).

**NRC/ORNL EMBRITTLEMENT DATA BASE (EDB)
OF REACTOR PRESSURE VESSEL MATERIALS**

Weld Material Data Sheet

Component:

Base material 1:

Base material 2:

	Root weld	Filling weld
Welding technology:		
Thickness (mm):		
Weld supplier:		
Weld code:		
Wire type:		
Wire heat No.:		
Flux type:		
Flux lot:		
Preheat (°C):		
PWHT temp. (°C):		
Time (h):		
Cooling method:		
Welding company:		

Remark weld:

Modification: Yes ☐

Welding reference:

Page:

Date: year:

month:

day:

Appendix C

Completion Instruction (Weld Material)

- Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, RPV clad, etc.).
- Base material 1: standard designation of base material for welding.
- Base material 2: use only in case of dissimilar material welding.
- Welding technology: welding method used (e.g., manual arc weld).
- Thickness: material thickness at location of the weld (mm).
- Weld supplier: supplier of weld material.
- Weld code: identification code used by weld manufacturer.
- Wire type: factory or standard name of welding wire.
- Wire heat No: heat number or quality assurance document number of welding wire.
- Flux type: type or specification of flux used in welding process.
- Flux lot: heat number or batch identifier designating flux material used in combination with a particular weld wire heat.
- Preheat: average preheating temperature before and during the welding (°C).
- PWHT temp: postweld heat treatment temperature (°C).
- Time: the duration of PWHT (h).
- Cooling method: type of cooling (e.g., in furnace, air, water, oil).
- Welding company: name of company who made welding.
- Welding reference: documentation that includes original welding information.

**NRC/ORNL EMBRITTLEMENT DATA BASE (EDB)
OF REACTOR PRESSURE VESSEL MATERIALS**

HAZ Material Data Sheet

Component:

	Base material	Weld material
Heat No:		
Standard name:		
Material type:		

Remark HAZ:

Modification: Yes ☐

Reference:

Page:

Date: year:

month:

day:

Appendix C

Completion Instructions (HAZ Material)

- . Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, RPV clad, etc.).
- . Base material: base material used in HAZ.
- . Weld material: Weld material connected with HAZ.
- . Heat No: heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Standard name: standard material designation (e.g., SA 533 Grade B) used to identify the product type.
- . Material type: forging, plate, weldment, casting, pipe, etc.
- . Remark HAZ: remarks on HAZ.
- . Modification: put an X in box if data are modifications of earlier reported data.
- . Reference: title of original documentation.
- . Page: page of original documentation where present data are located.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Chemistry Data Sheet

Component:

Standard name:	Material type:
Heat No.:	Chemistry lab.:
Analysis method:	Specimen ID:

C:	Mn:	P:	S:	Si:	Ni:
Cr:	Mo:	Cu:	V:	B:	Cs:
Ti:	Co:	N:	O:	Sb:	As:
Zr:	Al:	Pb:	W:	Sn:	Zn:
Ta:	H:	Nb:	Other:		

Remark chemistry:

Modification: Yes ☐

Chemistry reference:

Page:

Date: year:

month:

day:

Appendix C

Completion Instruction (Chemistry)

- . Component: name of tested component.
- . Standard name: Standard material designation(e.g., SA533 Grade B).
- . Material type: forging, plate, weldment, casting, pipe, etc.
- . Heat No: heat number of plate, forging, or weld meta; unique identifier of a quantity of material produced together in the foundry.
- . Chemistry Lab.: Chemistry Analysis Laboratory.
- . Analysis method: type of chemical analysis (wet, spectrography, mass spectrography, activation analysis, etc.)
- . Specimen ID: specimen identifier used to identify source of chemistry data; for example, the manufacturer's chemistry is identified as "HEAT"; for the chemistry from the broken specimen, the specimen identifier is used as specimen ID.
- . C: carbon content in weight percent (%)
- . Mn: manganese content in weight percent (%)
- . P: phosphorus content in weight percent (%)
- . S: sulphur content in weight percent (%)
- . Si: silicon content in weight percent(%)
- . Ni: nickel content in weight percent (%)
- . Cr: chromium content in weight percent (%)
- . Mo: molybdenum content in weight percent (%)
- . Cu: copper content in weight percent (%)
- . V: vanadium content in weight percent (%)
- . B: boron content in weight percent (%)
- . Cs: cesium content in weight percent (%)
- . Ti: titanium content in weight percent (%)
- . Co: cobalt content in weight percent (%)
- . N: nitrogen content in weight percent (%)
- . O: oxygen content in weight percent (%)
- . Sb: antimony content in weight percent (%)
- . As: arsenic content in weight percent (%)
- . Zr: zirconium content in weight percent (%)
- . Al: aluminum content in weight percent (%)
- . Pb: lead content in weight percent (%)
- . W: tungsten content in weight percent (%)
- . Sn: tin content in weight percent (%)
- . Zn: zinc content in weight percent (%)
- . Ta: tantalum content in weight percent (%)
- . H: hydrogen content in weight percent (%)
- . Nb: niobium content in weight percent (%)
- . Other: element chemical symbol
- . Empty field: element specified at Other content in weight percent (%)
- . Remark chemistry: remarks about the chemical analysis if any.
- . Modification: put an X in box if you use this sheet to modify previously reported data.
- . Chemistry reference: documentation on chemical analysis.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Irradiated Capsule Data Sheet

Reactor:	Capsule:
Start date: year: month: day:	Stop date: year: month: day:
Configuration:	EFP time (s):
Capsule nominal temp:	Temp. range:
Capsule maximum temp.:	Temp. tag:
Temp. control method:	
Fluence, E > 1 MeV:	Uncertainty of fluence, E > 1 MeV:
Fluence, E > 0.5 MeV:	Uncertainty of fluence, E > 0.5 MeV:
Fluence, E > 0.1 MeV:	Uncertainty of fluence, E > 0.1 MeV:
Fluence, E < 0.414 eV:	Uncertainty of fluence, E < 0.414 eV:
Flux, E > 1 MeV	Fluence tag:
C/E ratio:	Dpa:
Dpa energy tag (MeV):	Uncertainty of dpa:
Neutron detection:	
Transport code:	Adjustment code:
Responsible engineer:	

Remark capsule:

Modification: Yes ☐

Reference:

Page: Date: year: month: day:

Appendix C

Completion Instructions (Irradiated Capsule)

- Reactor: name of reactor.
- Capsule: surveillance or experiment capsule identification.
- Start date: date at start of irradiation.
- Stop date: date at end of irradiation.
- Configuration: indicator for change in irradiation environment.
- EFP_time: effective full-power time of irradiation (s).
- Capsule nominal temp.: nominal irradiation temperature for capsule.
- Temp. range: temperature variation within capsule.
- Capsule maximum temp.: maximum irradiation temperature at capsule center.
- Temp. tag: method used to determine capsule irradiation temperature; C_alculate, T_thermocouple, and M_elt wires.
- Temp. control method: irradiation temperature control method, if any.
- Fluence, $E > 1$ MeV: fluence $E > 1$ MeV at capsule center (n/cm^2).
- Uncertainty of fluence, $E > 1$ MeV: uncertainty of fluence, $E > 1$ MeV (% standard deviation).
- Fluence, $E > 0.5$ MeV: fluence $E > 0.5$ MeV at capsule center (n/cm^2).
- Fluence, $E > 0.1$ MeV: fluence $E > 0.1$ MeV at capsule center (n/cm^2).
- Fluence, $E < 0.414$ eV: fluence $E < 0.414$ MeV at capsule center (n/cm^2).
- Flux, $E > 1$ MeV: fluence rate $E > 1$ MeV.
- Fluence tag: tag for fluence determination; F_ission, S_caling, and A_djustment.
- C/E ratio: ratio of calculated fluence to measured fluence evaluation, $E > 1$ MeV.
- Dpa: displacement per atom of iron at capsule center.
- Dpa energy tag (MeV): lower energy boundary in dpa calculation, if $E > 0.0$ MeV..
- Neutron detection: radiometric, HAFM, and SSTD used in fluence determination.
- Transport code: neutron transport code used in fluence evaluation.
- Adjustment code: neutron djustment code used in fluence evaluation.
- Modification: put an X in box if the data are modifications of earlier, mistakenly reported data.
- Reference: title of the original measurement documentation.
- Page: page of original measurement documentation where present results are located.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Charpy Impact Testing

[illegible]

Remark Charpy:

Modification: Yes ☐ Reference:

Page:

Date: year: month: day:

Appendix C

Appendix C

Completion Instructions (Charpy Impact)

- . Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, RPV cladding, etc.)
- . Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- . Material type: forging, plate, weldment, HAZ, or standard reference material (SRM).
- . Heat No: heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Specimen type: type of impact specimen (e.g., CVN; Type B, Type C, or Izod) according to ASTM E23.
- . Specimen position: distance between top surface of material and location of the specimen, 0T, 1/4T, 1/2T, 3/4T, and 1T thickness.
- . Machine capacity: maximum impact energy of Charpy hammer, generally 300 J, (J).
- . Tup type: type of tup used: ISO or ASTM.
- . Operator: responsible engineer.
- . Reactor: reactor where specimens were irradiated.
- . Capsule: surveillance or experiment capsule identification.
- . Irradiation temp.: average temperature of capsule during irradiation in (°C).
- . Specimen ID: identification code of specimen given by testing laboratory.
- . Orientation: specimen orientation according ASTM E616 (T-L, L-T, etc.).
- . Fluence: specimen fluence $E > 1\text{MeV (n/cm}^2\text{)}$.
- . Testing temp.: testing temperature (°C).
- . Impact Energy: energy absorbed by failure of a Charpy V-notched specimen (J).
- . Lateral expansion: lateral expansion of a standard Charpy V-notched specimen. (mm)
- . Shear fracture: percentage of shear fracture surface according to ASTM-E 23.
- . Maximum velocity: velocity of the hammer just before touching the specimen (m/sec).
- . Anneal tag: identification used for annealing specimen; for example, 450°C annealing temperature with 168 hours annealing time can be tagged as 450/168 (°C/h).
- . Remarks: remarks on impact testing; nonstandard specimen size; and qualification of test results (high, medium, or low reliability), if possible.
- . Remark Charpy: any remarks on testing, validity of results, applied method, etc.
- . Modification: put an X in box if current report is a modification of earlier presented results.
- . Reference: title of original measurement documentation.
- . Page: Page of original measurement documentation where present results are located.
- . Date: date of test.

Charpy Transition Temperature and Upper-Shelf Energy

[illegible]

Modification: Yes ☐

Page: Date: year: month: day:

Appendix C

Completion Instruction (Charpy Transition Temperature)

- . Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- . Reactor: reactor where specimens were irradiated.
- . Irradiation temp.: average temperature of capsule during irradiation (°C).
- . EFP_time: effective full-power time (s).
- . Data fit tag: tag for data fitting: H_and drawn, hyp. T_angent, O_ther (please specify).
- . Operator: operator or responsible engineer.
- . Material type: forging, plate, weldment, HAZ, or standard reference material (SRM).
- . Heat No.: heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Orientation: specimen orientation according to ASTM E616 (T-L, L-T, etc.).
- . Fluence: Fluence > 1 MeV at specimen location (n/cm²).
- . UTT30: Charpy transition temperature at 30 ft-lb, unirradiated specimen.
- . UTT50: Charpy transition temperature at 50 ft-lb, unirradiated specimen.
- . ULE35: Charpy transition temperature at 35 mil lateral expansion, unirradiated specimen.
- . UUSE: Charpy upper-shelf energy, unirradiated specimen.
- . ITT30: Charpy transition temperature at 30 ft-lb, irradiated specimen.
- . ITT50: Charpy transition temperature at 50 ft-lb, irradiated specimen.
- . ILE35: Charpy transition temperature at 35 mil lateral expansion, irradiated specimen.
- . IUSE: Charpy upper-shelf energy, irradiated specimen.
- . DTT30: Charpy transition temperature shift at 30 ft-lb, (ITT30-UTT30).
- . DTT50: Charpy transition temperature shift at 50 ft-lb, (ITT50-UTT50).
- . DLE35: Charpy transition temperature shift at 35 mil lateral expansion, (ILE35-ULE35).
- . DUSE: Absolute upper-shelf energy drop, (UUSE-IUSE).
- . Remarks: remarks on impact testing; and qualification of the test results (high, medium, low reliability), if possible.
- . Remark: remarks on testing, validity of results, applied method, etc.
- . Modification: put an X in box if current report is a modification of earlier presented results.
- . Reference: title of original measurement documentation.
- . Page: Page of original measurement documentation where present results are located.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Charpy Transition Temperature per Nonstandard Index and Upper-Shelf Energy

Standard name:	Reactor:	Capsule:	Irradiation temp. (°C):
EEP time (s):	Data fit tag:	Operator:	

Material type	Heat No.	Orientation	Fluence E > 1 MeV (n/cm ²)	UTTX (°C)	ITTX (°C)	DTTX (°C)	TTX DEF (J)	ULEX (°C)	ILEX (°C)	DLEX (°C)	LEX DEF (mil)	UUSE (J)	IUSE (J)	DUSE (J)	Remarks

Remark:

Modification: Yes ☐ Reference:

Page:

Date: year: month: day:

Appendix C

Appendix C

Completion instructions (Charpy Transition Temperature per Nonstandard Index)

- . Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- . Reactor: reactor name where specimens were irradiated.
- . Irradiation temp.: average temperature of capsule during irradiation (°C).
- . EFP_time: effective full-power time (s).
- . Data fit tag: tag for data fitting: H_and drawn, hyp. T_angent, O_ther (please specify)
- . Operator: operator or responsible engineer.
- . Material type: forging, plate, weldment, HAZ, or standard reference material (SRM).
- . Heat No: heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Orientation: specimen orientation according to ASTM E616 (T-L, L-T, etc.)
- . Fluence: fluence > 1 MeV at specimen location (n/cm²).
- . UTTX: Charpy transition temperature at specified nonstandard index, unirradiated specimen.
- . ITTX: Charpy transition temperature at specified nonstandard index, irradiated specimen.
- . DTTX: Charpy transition temperature shift at specified non-standard index, (ITTX-UTTX).
- . TTX_DEF: Quantity of impact energy for which transition temperature is specified.
- . ULEX: Charpy transition temperature at specified nonstandard index, unirradiated specimen.
- . ILEX: Charpy transition temperature at specified nonstandard index, irradiated specimen.
- . DLEX: Charpy transition temperature shift at specified nonstandard index, (ILEX-ULEX).
- . LEX_DEF: Quantity of lateral expansion for which transition temperature is specified.
- . UUSE: Charpy upper-shelf energy, unirradiated specimen.
- . IUSE: Charpy upper-shelf energy, irradiated specimen.
- . DUSE: Absolute upper-shelf energy drop, (UUSE-IUSE).
- . Remarks: remarks on impact testing, nonstandard specimen size, and qualification of the test results (high, medium, or low reliability), if possible.
- . Remark: remarks on testing, validity of results, applied method, etc.
- . Modification: put an X in box if current report is a modification of earlier presented results.
- . Reference: Title of original measurement documentation.
- . Page: Page of original measurement documentation where present results are located.

**NRC/ORNL EMBRITTLEMENT DATA BASE (EDB)
OF REACTOR PRESSURE VESSEL MATERIALS**

Charpy Transition Temperature and Upper-Shelf Energy per Annealing Experiment

Standard name:	Reactor:	Capsule:	Irradiation temp. (°C):
Reactor reirr.:	Capsule reirr.:	Reirradiation temp. (°C):	Data fit tag:

Material type	Heat No.	Anneal tag (°C/h)	Orient-ation	Fluence E>1MeV (n/cm²)	UTT30 (°C)	ITT30 (°C)	DTT30 (°C)	IATT30 (°C)	RTT30 (°C)	IARTT30 (°C)	UUSE (J)	DUSE (J)	IAUSE (J)	RUSE (J)	IARUSE (°C)

Remark:

Modification: Yes ☐ Reference:

Page:

Date: year: month: day:

Appendix C

Appendix C

Completion Instructions (Charpy Transition Temperature per Annealing Experiment)

- . Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- . Reactor: reactor where specimens were irradiated.
- . Capsule: surveillance or experiment capsule identification.
- . Irradiation temp.: average temperature of capsule during irradiation ($^{\circ}\text{C}$).
- . Reactor_reirr: reactor name where specimens were irradiated, for reirradiation.
- . Capsule_reirr: surveillance or experiment capsule identification, for reirradiation.
- . Re-irradiation temp.: average temperature of capsule during reirradiation in ($^{\circ}\text{C}$).
- . Data fit tag: tag for data fitting: H_and drawn, hyp. T_angent, O_ther (please specify).
- . Material type: forging, plate, weldment, HAZ, or standard reference material (SRM).
- . Heat No: heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Anneal. tag: identification used for annealing specimen; for example, 450°C annealing temperature with 168 hours annealing time can be tagged as 450/168 ($^{\circ}\text{C/h}$).
- . Orientation: specimen orientation according ASTM E-616 (T-L, L-T, etc.).
- . Fluence: fluence $> 1\text{ MeV}$ at specimen location, (n/cm^2).
- . UTT30: Charpy transition temperature at 30 ft-lb, unirradiated specimen.
- . ITT30: Charpy transition temperature at 30 ft-lb, irradiated specimen.
- . DTT30: Charpy transition temperature shift at 30 ft-lb, (ITT30-UTT30)
- . IATT30: Charpy transition temperature at 30 ft-lb, after annealing.
- . RTT30: recovery of 30 ft-lb transition temperature, after annealing (ITT30-IATT30).
- . IARTT30: Charpy transition temperature at 30 ft-lb, after annealing and reirradiation.
- . UUSE: Charpy upper-shelf energy, unirradiated specimen.
- . IUSE: Charpy upper-shelf energy, irradiated specimen.
- . DUSE: absolute upper-shelf energy drop, (UUSE-IUSE).
- . IAUSE: Charpy upper-shelf energy, after annealing.
- . RUSE: recovery of upper-shelf energy, after annealing (IAUSE-IUSE).
- . IARUSE: Charpy upper-shelf energy, after annealing and reirradiation.
- . Remark: remarks on testing, validity of results, applied method, etc.
- . Modification: put an X in box if current report is a modification of earlier presented results.
- . Reference: title of original measurement documentation.
- . Page: page of original measurement documentation where present results are located.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Tensile Testing

Component:

Standard name:	Material type:	Heat No.:	Specimen position:
Specimen type:	Specimen size:	Gage length:	Machine capacity:
Reactor:	Capsule:	Irradiation temp.(°C):	

[illegible]

Remark tensile:

Modification: Yes ☐ Reference:

Page:

date: year: month: day:

Appendix C

Completion Instructions (Tensile)

- Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, RPV, cladding, etc.).
- Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- Material type: forging, plate, weldment, casting, pipe, etc.
- Heat No: heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- Specimen position: distance between top surface of material and location of specimen; 0T, 1/4T, 1/2T, 3/4T, and 1T thickness.
- Specimen type: type of specimen (e.g., smooth round, notched bar) according to ASTM E8.
- Specimen size: specimen diameter or cross section.
- Gage length: gage length of tensile specimen.
- Reactor: reactor where specimens were irradiated.
- Capsule: surveillance or experiment capsule identification.
- Irradiation temp.: average temperature of capsule during irradiation ($^{\circ}\text{C}$).
- Specimen id.: identification code of specimen given by testing laboratory.
- Orientation: specimen orientation according to ASTM E23, and E616.
- Notch factor: stress intensity factor characterizing notch stress intensity.
- Fluence: specimen fluence, $E > 1 \text{ MeV (n/cm}^2\text{)}$.
- Test temp.: testing temperature ($^{\circ}\text{C}$).
- Yield stress: stress at yield-point or yield strength measured according to ASTM E8 (MPa).
- Ultimate strength: ultimate tensile strength measured according to ASTM E8 (MPa).
- True frac. strength: true fracture strength (the rupture load end of tensile diagram divided by fracture area (MPa)).
- Uniform elongation: uniform elongation measured according to ASTM E8 (%).
- Total elongation: total elongation measured according to ASTM E8 (%).
- Reduction of area: reduction of area according to ASTM E8 (%).
- Remark tensile: remarks on testing, validity of results, applied method, testing machine, etc.
- Modification: put an X in box if current report is a modification of earlier results.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Static Fracture Toughness K_{IC} Testing

Component:

Standard name:	Material type:	Heat No.:	Specimen position:
Specimen type:	Specimen size (mm):	Crack starter notch:	Disp. gage location:
Loading rate (MPa/m/s):	Machine capacity:	Operator:	K_{IC} method:
Reactor:	Capsule:	Irradiation temp. (°C):	

Specimen ID	Orientation	Fluence $E > 1\text{MeV}$ (n/cm ²)	Testing temp. (°C)	Crack size (mm)	K_Q (MPa√m)	Validity	K_{IC} (MPa√m)	P_Q (kN)	P_{MAX} (kN)	Yield stress (MPa)	Ultimate strength (MPa)

Remark K_{IC} :

Modification: Yes ☐ Reference:

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Date: year: month: day:

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Completion Instructions (K_{IC})

- Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, etc.).
- Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- Material type: forging, plate, weldment, casting, pipe, etc.
- Heat No: heat number of plate, forging or weld metal; unique identifier of a quantity of material produced together in the foundry.
- Specimen position: distance between top surface of material and location of specimen, 0T, 1/4T, 1/2T, 3/4T, and 1T thickness.
- Specimen type: type of specimen (e.g., SEB, CT, DCT) according to ASTM E399.
- Specimen size (mm): specimen thickness and specimen width, for example, 25.4×50.8 (mm).
- Crack starter notch: type of crack starter notch.
- Disp. gage location: location of displacement gage.
- Loading rate: fracture test loading rate (MPa/m/s).
- Operator: responsible engineer.
- K_{IC} method: method associated with determination of K_{IC} or ASTM standard version date.
- Reactor: reactor name where specimens were irradiated.
- Capsule: surveillance or experiment capsule identification.
- Irradiation temp.: average temperature of capsule during irradiation ($^{\circ}\text{C}$).
- Specimen ID: identification code of the specimen given by testing laboratory.
- Orientation: specimen orientation according to ASTM E399, and E616.
- Fluence: specimen fluence, $E > 1 \text{ MeV (n/cm}^2\text{)}$.
- Test temp: testing temperature ($^{\circ}\text{C}$).
- Crack size: initial crack length a_0 (mm).
- K_Q (MPa/m): fracture toughness per load P_Q , (MPa/m).
- Validity: one or more letters for a specimen indicates that the test results did not meet one of the ASTM E399-90 validity criteria. A_ Thickness too thin; B_ crack length too short; C_ Fatigue crack length measurement does not meet the requirement; and D_ $P_{MAX}/P_Q > 1.1$.
- K_{IC} : static plane-strain fracture toughness (MPa/m).
- P_Q : load determined in 9.1.1 of ASTM E399-90.
- P_{MAX} : maximum load specimen was able to sustain.
- Yield stress: material yield stress (MPa).
- Ultimate strength: material ultimate tensile strength (MPa).
- Remark K_{IC} : remarks on testing, validity of results, applied method, testing machine etc.
- Modification: put an X in box if current report is a modification of earlier results.
- Reference: title of original measurement documentation.

Static Fracture Toughness K_{IC} Testing

Standard name:	Material type:	Heat No.:	Specimen position:
Specimen type:	Specimen size (mm):	Side groove (%):	K _{IC} technique:
Loading rate (mm/min):	Machine capacity:	Operator:	K _{IC} method:
Reactor:	Capsule:	Irradiation temp. (°C):	

[illegible]

Date: year: month: day:

Appendix C

Appendix C

Completion Instructions (K_{IC})

- Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, etc.).
- Standard name: Standard material designation (e.g., SA533 Grade B) used to identify product type.
- Material type: forging, plate, weldment, casting, pipe, etc.
- Heat No: heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- Specimen position: distance between top surface of material and location of specimen, 0T, 1/4T, 1/2T, 3/4T, and 1T thickness.
- Specimen type: type of specimen (e.g., SEB, CT).
- Specimen size (mm): specimen thickness and specimen width, for example, 25.4×50.8 , (mm).
- Side groove: percentage of side groove of specimen.
- K_{IC} technique: multiple-specimen technique or single-specimen technique.
- Loading rate: fracture test loading rate in term of cross head or actuator speed (mm/min).
- Operator: responsible engineer.
- K_{IC} method: method associated with determination of K_{IC} such as Modified J Expression, Moving Crack Correction, Merkle Corten J method, or ASTM standard version date.
- Reactor: reactor where specimens were irradiated.
- Capsule: surveillance or experiment capsule identification.
- Irradiation temp.: average temperature of capsule during irradiation ($^{\circ}\text{C}$).
- Specimen ID.: identification code of specimen given by testing laboratory.
- Orientation: specimen orientation according to ASTM E23, and E616.
- Fluence: specimen fluence, $E > 1 \text{ MeV (n/cm}^2\text{)}$.
- Testing temp: testing temperature ($^{\circ}\text{C}$).
- Crack size: average initial crack length a_0 (mm).
- Δa : total crack extension during test (mm).
- J_{IC} : calculated J-integral value per ASTM E813 in (kJ/m^2), or J-integral at cleavage.
- Frac. tag: fracture type tag: A_Cleavage fracture, B_Stable tearing but does not cross 1-mm exclusion line with fast fracture at P_{MAX} , C_Stable tearing with no cleavage, D_Stable tearing extended past the 1.5-mm exclusion line with cleavage thereafter.
- Validity: one or more letters for a specimen indicate that test results did not meet one of the ASTM E813 validity criteria: A_Thickness too thin, B_Uncracked ligament too short, C_Crack length measurement did not meet the requirement, D_Specimen demonstrated brittle cleavage fracture.
- J_{IC} : validated J-integral value per ASTM E813, in (kJ/m^2).
- K_{IC} : plane strain fracture toughness calculated from J_{IC} , ($\text{Mpa}\sqrt{\text{m}}$) or toughness from J at cleavage.
- T-avg: average tearing modulus.
- Yield stress: material yield stress (MPa).
- Ultimate strength: material ultimate tensile strength (MPa).
- Remark K_{IC} : remarks on testing, validity of results, applied method, testing machine, etc.
- Modification: put an X in box if current report is a modification of earlier results.
- Reference: title of original measurement documentation.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Dynamic Fracture Toughness K_{ID} Testing

Component:

Standard name:	Material type:	Heat No.:	Specimen position:
Specimen type:	Specimen size (mm):	Crack starter notch:	Disp. gage location:
	Machine capacity:	Operator:	K_{ID} method:
Reactor:	Capsule:	Irradiation temp. (°C):	

Specimen ID	Orien- tation	Fluence $E > 1\text{MeV}$ (n/cm^2)	Testing temp. (°C)	Crack size (mm)	K_Q ($\text{MPa}\sqrt{\text{m}}$)	Valid- ity	K_{ID} ($\text{MPa}\sqrt{\text{m}}$)	P_Q (kN)	Test time (ms)	Static yield (MPa)	Dynamic yield (MPa)

Remark K_{ID} :

Modification: Yes ☐ Reference:

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Date: year: month: day:

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Completion Instruction (K_{ID})

- . Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, etc.).
- . Standard name: Standard material designation (e.g., SA533 Grade B) used to identify product type.
- . Material type: forging, plate, weldment, casting, pipe, etc.
- . Heat No: Heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Specimen position: distance between top surface of material and location of specimen; 0T, 1/4T, 1/2T, 3/4T, and 1T thickness.
- . Specimen type: type of specimen (e.g., 1TSEB, PCCV, 1TCT, DCT).
- . Specimen size (mm): specimen thickness and specimen width, for example, 25.4×50.8 (mm).
- . Crack starter notch: type of crack starter notch.
- . Disp. gage location: location of displacement gage.
- . Operator: responsible engineer.
- . K_{ID} method: method associated with determination of K_{ID} or ASTM standard version date.
- . Reactor: reactor where specimens were irradiated.
- . Capsule: surveillance or experiment capsule identification.
- . Irradiation temp.: average temperature of capsule during irradiation ($^{\circ}\text{C}$).
- . Specimen ID: identification code of specimen given by testing laboratory.
- . Orientation: specimen orientation according to ASTM E23, and E616.
- . Fluence: specimen fluence, $E > 1 \text{ MeV (n/cm}^2\text{)}$.
- . Test temp: testing temperature ($^{\circ}\text{C}$).
- . Crack size: average initial crack length a_0 (mm).
- . K_{Qc} : fracture toughness per load P_{Qc} ($\text{MPa}\sqrt{\text{m}}$).
- . Validity: one or more letters for a specimen indicates that test results did not meet one of the ASTM E399-90 validity criteria: A Thickness too thin, B crack length too short, C Fatigue crack length measurement does not meet the requirement, and $D_{P_{MAX}}/P_{Qc} > 1.1$.
- . K_{IDc} : dynamic plane-strain fracture toughness, ($\text{MPa}\sqrt{\text{m}}$).
- . P_{Qc} : load determined in 9.1.1 of ASTM E399-90.
- . Test time: test time to reach load (P_{Qc}) corresponding to K_{Qc} .
- . Static yield: material static yield stress, (MPa).
- . Dynamic yield: material dynamic yield stress, (MPa).
- . Remark K_{ID} : remarks on testing, validity of results, applied method, testing machine, etc.
- . Modification: put an X in box if current report is a modification of earlier results.
- . Reference: title of original measurement documentation.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Dynamic Fracture Toughness K_{ID} Testing

Component:

Standard name:	Material type:	Heat No.:	Specimen position:
Specimen type:	Specimen size (mm):	Side groove (%):	Disp. gage location:
	Machine capacity:	Operator:	K_{ID} method:
Reactor:	Capsule:	Irradiation temp. (°C):	

Specimen ID	Orien- tation	Fluence E > 1MeV (n/cm ²)	Testing temp. (°C)	Crack size (mm)	Δa (mm)	J_Q (kJ/m ²)	Valid- ity	J_{ID} (kJ/m ²)	K_{ID} (MPa√m)	Loading rate (MPa√m/s)	Static yield (MPa)	Dynamic yield (MPa)

Remark K_{ID} :

Modification: Yes ☐ Reference:

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Date: year: month: day:

Appendix C

Appendix C

Completion Instructions (K_{JD})

- Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, etc.).
- Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- Material type: forging, plate, weldment, casting, pipe, etc.
- Heat No.: heat number of plate, forging or weld metal; unique identifier of a quantity of material produced together in the foundry.
- Specimen position: distance between top surface of material and location of specimen, 0T, 1/4T, 1/2T, 3/4T, and 1T thickness.
- Specimen type: type of specimen (e.g., 1TSEB, PCCV, 1TCT).
- Specimen size: specimen thickness and specimen width, for example, 25.4×50.8 (mm).
- Side groove: percentage of side groove of specimen.
- Operator: responsible engineer.
- K_{JD} method: method associated with determination of K_{JD} , such as Merckle-Corten J method, or method used to determine dynamic yield stress.
- Reactor: reactor name where specimens were irradiated.
- Capsule: surveillance or experiment capsule identification.
- Irradiation temp.: average temperature of capsule during irradiation ($^{\circ}\text{C}$).
- Specimen ID.: identification code of specimen given by testing laboratory.
- Orientation: specimen orientation according to ASTM E23, and E616.
- Fluence: specimen fluence, $E > 1 \text{ MeV (n/cm}^2\text{)}$.
- Testing temp.: testing temperature ($^{\circ}\text{C}$).
- Crack size: average initial crack length a_0 (mm).
- Δa : total crack extension during test (mm).
- J_Q : calculated J-integral value per ASTM E813 in (kJ/m^2), or J value at cleavage.
- Validity: one or more letters for a specimen indicates that test results did not meet of the ASTM E813 validity criteria: A_Thickness too thin, B_Uncracked ligament too short, C_Crack length measurement does not meet the requirement, D_Specimen demonstrated brittle cleavage fracture.
- J_{ID} : validated J-integral value.
- K_{JD} : plane strain fracture toughness calculated from J_{ID} ($\text{MPa}\sqrt{\text{m}}$), or toughness from J at cleavage.
- Loading rate: fracture test loading rate, average stress intensity factor rate ($\text{MPa}\sqrt{\text{m/s}}$).
- Static yield: material static yield stress (MPa).
- Dynamic yield: material dynamic yield stress (MPa).
- Remark K_{JD} : remarks on testing, validity of results, applied method, testing machine, etc.
- Modification: put an X in box if current report is a modification of earlier results.
- Reference: title of original measurement documentation.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Crack Arrest Fracture Toughness K_{Ia} Testing

Component:

Standard name:	Material type:	Heat No.:	Specimen position:
Specimen type:	Specimen size (mm):	Side groove (%):	Crack starter type:
	Machine capacity:	Operator:	K_{Ia} method:
Reactor:	Capsule:	Irradiation temp. (°C):	

Specimen ID	Orientation	Fluence $E > 1\text{MeV}$ (n/cm ²)	Test temp. (°C)	Crack size (mm)	Crack size at arrest (mm)			K_I (MPa√m)	Validity	K_{Ia} (MPa√m)	K_O (MPa√m)	Static yield (MPa)	Dynam. yield (MPa)
					a_1	a_2	a_3						

Remark K_{Ia} :

Modification: Yes ☐ Reference:

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Appendix C

Completion Instructions (K_{Ia})

- Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, etc.).
- Standard name: Standard material designation (e.g., SA533 Grade B) used to identify product type.
- Material type: forging, plate, weldment, casting, pipe, etc.
- Heat No: heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- Specimen position: distance between top surface of material and location of specimen, 0T, 1/4T, 1/2T, 3/4T, and 1T thickness.
- Specimen type: type of specimen (e.g., SEB, PCCV, CT).
- Specimen size: specimen thickness and specimen width, for example, 25.4×50.8 (mm).
- Side groove: percentage of side groove of specimen.
- Crack starter type: specimen crack starter type, B_rittle W_eld or DUPLEX.
- Operator: responsible engineer.
- K_{Ia} method: method associated with determination of K_{Ia} , such as method used to determine dynamic yield stress, or ASTM standard version date.
- Reactor: reactor where specimens were irradiated.
- Capsule: surveillance or experiment capsule identification.
- Irradiation temp.: average temperature of capsule during irradiation ($^{\circ}\text{C}$).
- Specimen ID.: identification code of specimen given by testing laboratory.
- Orientation: specimen orientation according to ASTM E23, and E616.
- Fluence: specimen fluence, $E > 1 \text{ MeV (n/cm}^2\text{)}$.
- Test temp: testing temperature ($^{\circ}\text{C}$).
- Crack size: average initial crack length a_0 (mm).
- Crack size at arrest: crack length at arrest, a_1 is measured at 1/4 point of net thickness, a_2 is at mid-thickness, and a_3 is at 3/4 point of net thickness (mm).
- K_{Ia} : crack arrest fracture toughness ($\text{MPa}\sqrt{\text{m}}$).
- Validity: one or more letters for a specimen indicates that test results did not meet one of the ASTM E1221-88 validity criteria: A, B_Unbroken ligament too short, C_specimen too thin, or D, E_insufficient crack-jump length.
- K_{Ia} : plane strain crack arrest fracture toughness ($\text{MPa}\sqrt{\text{m}}$).
- K_{Oa} : toughness associated with the initiation of crack propagation at initial crack length, in ($\text{MPa}\sqrt{\text{m}}$).
- Static yield: material static yield stress (MPa).
- Dynamic yield: material dynamic yield stress (MPa).
- Remark K_{Ia} : any remark on testing, validity of results, applied method, testing machine, etc.
- Modification: put an X in box if current report is a modification of earlier results.
- Reference: title of original measurement documentation.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Drop Weight Testing

Component:	Heat No:
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Standard name:	Material type:	Specimen type:	Crack starter type:
Specimen position:	Machine capacity:	Reactor:	Capsule:

Specimen ID	Orient-ation	Irrad. temp. (°C)	Fluence E > 1MeV (n/cm²)	Testing temp. (°C)	Test result	Remarks

Remark drop weight:

Modification: Yes ☐ Reference:

Page: Date: year: month: day:

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Appendix C

Completion Instructions (Drop Weight)

- . Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, RPV cladding, etc.)
- . Heat No: heat number of plate, forging or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- . Material type: forging, plate, weldment, HAZ, or standard reference material (SRM).
- . Specimen type: type of drop weight specimen (e.g., P-1, P-2, and P-3) according to ASTM E208.
- . Crack starter type: single pass or two passes for crack starter bead.
- . Specimen position: distance between top surface of material and location of specimen, 0T, 1/4T, 1/2T, 3/4T, and 1T thickness.
- . Reactor: reactor where specimens were irradiated.
- . Capsule: surveillance or experiment capsule identification.
- . Specimen ID: identification code of specimen given by testing laboratory.
- . Orientation: specimen orientation with respect to rolling or forging direction.
- . Irrad. temp.: average temperature of capsule during irradiatio (°C).
- . Fluence: specimen fluence $E > 1 \text{ MeV}$.
- . Testing temp: testing temperature in (°C).
- . Test result: drop weight test result: 1_Break, 2_No break, or 3_No test.
- . Remarks: remarks on drop weight testing; nonstandard specimen size; and qualification of test results (high, medium, or low reliability), if possible.
- . Remark drop weight: remarks on testing, validity of results, applied method, etc.
- . Modification: put an X in box if current report is a modification of earlier presented results.
- . Reference: title of original measurement documentation.
- . Page: page of original measurement documentation where present results are located.
- . Date: date of test.

NDT Temperature per Drop Weight Testing

[illegible]

Date: year: month: day:

Appendix C

Completion Instructions (Drop Weight NDT)

- . Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- . Reactor: reactor name where specimens were irradiated.
- . Capsule: surveillance or experiment capsule identification.
- . Irradiation temp.: average temperature of capsule during irradiation (°C).
- . Operator: responsible engineer.
- . Material type: forging, plate, weldment, HAZ, or standard reference material (SRM).
- . Heat No: Heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Orientation: specimen orientation with respect to rolling of forging direction.
- . Specimen type: type of drop weight specimen (e.g., P-1, P-2, and P-3) according to ASTM E208.
- . Crack starter type: single pass or two passes for crack starter bead.
- . Fluence: specimen fluence $E > 1\text{MeV}$.
- . NDT temp: nil-ductility transition temperature (°C).
- . Remarks: remarks on drop weight testing; non-standard specimen size; and qualification of test results (high, medium, or low reliability), if possible.
- . Remark drop weight NDT: remarks on testing, validity of results, applied method, etc.
- . Modification: put an X in box if current report is a modification of earlier presented results.
- . Reference: title of original measurement documentation.
- . Page: page of original measurement documentation where present results are located.
- . Date: date of test.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Dynamic Tearing Testing

Component:

Standard name:	Material type:	Heat No.:	Specimen size:
Specimen position:	Machine capacity:	Tup type:	Operator:
Reactor:	Capsule:	Irradiation temp. (°C):	

Specimen ID	Orient- ation	Fluence E > 1MeV (n/cm ²)	Testing temp. (°C)	Impact energy (J)	Shear fracture (%)	Impact velocity (m/sec)	Remarks

Remark Dynamic tearing:

Modification: Yes ☐ Reference:

Page: Date: year: month: day:

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Completion Instructions (Dynamic Tearing)

- . Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, RPV cladding, etc.).
- . Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- . Material type: forging, plate, weldment, HAZ, or standard reference material (SRM).
- . Heat No: heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Specimen size: specimen dimension, specimen width and thickness (mm).
- . Specimen position: distance between top surface of material and location of specimen, 0T, 1/4T, 1/2T, 3/4T, and 1T thickness.
- . Machine capacity: maximum impact energy of dynamic tearing test hammer (J).
- . Tup type: type of tup used, or radius dimension of striker tup used (mm).
- . Operator: responsible engineer.
- . Reactor: reactor name where specimens were irradiated.
- . Capsule: surveillance or experiment capsule identification.
- . Irradiation temp.: average temperature of capsule during irradiation (°C).
- . Specimen ID: identification code of specimen given by testing laboratory.
- . Orientation: specimen orientation according to ASTM E616 (T-L, L-T, etc.).
- . Fluence: specimen fluence $E > 1 \text{ MeV}$.
- . Testing temp: testing temperature (°C).
- . Impact Energy: energy absorbed by failure of a dynamic tearing specimen (J).
- . Shear fracture: percentage of shear fracture surface according to ASTM-E604.
- . Impact velocity: velocity of hammer just before touching specimen (m/s).
- . Remarks: remarks on impact testing; non-standard specimen size; and qualification of test results (high, medium, or low reliability), if possible.
- . Remark dynamic tearing: emarks on testing, validity of results, applied method, etc.
- . Modification: put an X in box if current report is a modification of earlier presented results.
- . Reference: title of original measurement documentation.
- . Page: page of original measurement documentation where present results are located.
- . Date: date of test.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Transition Temperature and Upper Shelf Energy per Dynamic Tearing Testing

Standard name:	Reactor:	Capsule:	Irradiation temp. (°C):
EFP time (s):	Data fit tag:	Operator:	

Material type	Heat No.	Orient-ation	Fluence E > 1MeV (n/cm ²)	UTT05 (°C)	UUSE (J)	ITT05 (°C)	IUSE (J)	DTT05 (°C)	Remarks

Remark:

Modification: Yes ☐ Reference:

Page:

Date: year:

month:

day:

Appendix C

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Completion Instructions (Dynamic Tearing Transition Temperature)

- . Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- . Reactor: reactor name where specimens were irradiated.
- . Irradiation temp.: average temperature of capsule during irradiation (°C).
- . EFP_time: effective full-power time (s).
- . Data fit tag: tag for data fitting: H_and drawn, hyp. T_angent, or O_ther (please specify).
- . Operator: operator or responsible engineer.
- . Material type: forging, plate, weldment, HAZ, or standard reference material (SRM).
- . Heat No.: heat number of plate, forging or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Orientation: specimen orientation according to ASTM E616 (T-L, L-T, etc.).
- . Fluence: fluence, $E > 1 \text{ MeV}$ at specimen location (n/cm^2).
- . UTT05: DT transition temperature at 50% upper-shelf energy, unirradiated specimen.
- . UUSE: DT upper-shelf energy, unirradiated specimen.
- . ITT05: DT transition temperature at 50% upper shelf energy, irradiated specimen.
- . IUSE: DT upper-shelf energy, irradiated specimen.
- . DTT05: DT transition temperature shift at 50% upper-shelf energy, (ITT05-UTT05).
- . Remarks: remarks on testing; and qualification of test results (high, medium, or low reliability), if possible.
- . Remark: remarks on testing, validity of results, applied method, etc.
- . Modification: put an X in box if current report is a modification of earlier presented results.
- . Reference: title of original measurement documentation.
- . Page: page of original measurement documentation where present results are located.
- . Date: date of test.

NRC/ORNL EMBRITTLEMENT DATA BASE (EDB) OF REACTOR PRESSURE VESSEL MATERIALS

Hardness Testing

Component:

Standard name:	Material type:	Heat No.:	Specimen position:
Reactor:	Capsule:	Irradiation temp.(°C):	

Specimen ID	Fluence E > 1MeV (n/cm ²)	Hardness Number	Hardness method	Test load (N)	Load time (s)	Remarks

Remark hardness:

Modification: Yes ☐ Reference:

Page:

Date: Year: Month: Day:

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Appendix C

Appendix C

Completion Instructions (Hardness)

- . Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, RPV cladding, etc.)
- . Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- . Material type: forging, plate, weldment, HAZ, or standard reference material (SRM).
- . Heat No: heat number of plate, forging, or weld metal; unique identifier of a quantity of material produced together in the foundry.
- . Specimen position: distance between top surface of material and location of specimen, 0T, 1/4T, 1/2T, 3/4T, and 1T thickness.
- . Reactor: reactor name where specimens were irradiated.
- . Capsule: surveillance or experiment capsule identification.
- . Irradiation temp.: average temperature of capsule during irradiation (°C).
- . Specimen ID: identification code of specimen given by testing laboratory.
- . Fluence: specimen fluence $E > 1 \text{ MeV}$.
- . Hardness number: hardness number.
- . Hardness method: hardness test method: HB_Brinell test; HRA, HRB HRC, HR30N, HR45T_Rockwell test for A, B, C, 30N, and 45T scale, respectively; HV_Vickers test; or HK_Knoop test.
- . Test load: total test load (N).
- . Load time: test load time (s).
- . Remarks: remarks on hardness testing; non-standard specimen size; and qualification of test results (high, medium, low reliability), if possible.
- . Remark hardness: any remark on testing, validity of results, applied method, etc.
- . Modification: put an X in box if current report is a modification of earlier presented results.
- . Reference: title of original measurement documentation.
- . Page: page of original measurement documentation where present results are located.
- . Date: date of test.

Ultrasonic Testing

Sensor location (cm):

[illegible]

Remark ultrasonic:

Modification: Yes ☐ Reference:

Page:

Date: year: month: day:

Appendix C

Completion Instructions (Ultrasonic)

- Component: name of tested component (research heat, RPV ring, RPV nozzle, RPV weld, RPV cladding, etc.).
- Standard name: standard material designation (e.g., SA533 Grade B) used to identify product type.
- Material type: forging, plate, weldment, HAZ, or standard reference material (SRM).
- Heat No: heat number of plate, forging or weld metal; unique identifier of a quantity of material produced together in the foundry.
- Specimen position: distance between top surface of material and location of specimen, 0T, 1/4T, 1/2T, 3/4T, and 1T thickness.
- Reactor: reactor where specimens were irradiated.
- Capsule: surveillance or experiment capsule identification.
- Irradiation temp.: average temperature of capsule during irradiation ($^{\circ}\text{C}$).
- Sensor location: location of sensor away from notch or center of specimen (cm).
- Specimen ID: identification code of specimen given by testing laboratory.
- Fluence: specimen fluence $E > 1 \text{ MeV}$; or specify energy, such as $E > 0.1 \text{ MeV}$.
- Sample density: density of sample specimen (g/cm^3).
- Wave velocity longitudinal: longitudinal wave velocity, parallel to orientation of crack propagation of specimen (km/s).
- Wave velocity shear: shear wave velocity, parallel to orientation of crack propagation of specimen (km/s).
- Travel distance: P-wave or S-wave travel distance in sample specimen (cm).
- Remarks: remarks on ultrasonic testing; and qualification of test results (high, medium, or low reliability), if possible.
- Remark ultrasonic: remarks on testing, validity of results, applied method, etc.
- Modification: put an X in box if current report is a modification of earlier presented results.
- Reference: title of original measurement documentation.
- Page: page of original measurement documentation where present results are located.
- Date: date of test.

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10. SUPPLEMENTARY NOTES

C.J. Fairbanks, NRC Project Manager

11. ABSTRACT (200 words or less) Version 1 of the Embrittlement Data Base (EDB) is a comprehensive collection of data resulting from merging Version 2 of the Power Reactor Embrittlement Data Base (PR-EDB) and Version 1 of the Test Reactor Embrittlement Data Base (TR-EDB). Fracture toughness data were also integrated into Version 1 of the EDB. For power reactor data, the current EDB lists 1,029 transition-temperature shift data points (321 from plates, 125 from forgings, 115 from correlation monitor materials, 246 from welds, and 222 from heat-affected-zone (HAZ) materials) from Charpy specimens that were irradiated in 271 capsules from 101 commercial power reactors. For test reactor data, information is available for 1,308 different irradiated sets (352 from plates, 186 from forgings, 303 from correlation monitor materials, 396 from welds, and 71 from HAZs) and 268 different irradiated plus annealed data sets (89 from plates, 4 from forgings, 11 from correlation monitor materials, and 164 from weld materials). The data files of EDB are given in dBASE format and can be accessed with any personal computer using the DOS or WINDOWS operating system. A utility program has been written to investigate radiation embrittlement using this data base.

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