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TR-EDB: Test Reactor Embrittlement Data Base, Version 1

Prepared by
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Oak Ridge National Laboratory

Prepared for
U.S. Nuclear Regulatory Commission

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ABSTRACT

The Test Reactor Embrittlement Data Base (TR-EDB) is a collection of results from irradiations in materials test reactors. It complements the Power Reactor Embrittlement Data Base (PR-EDB), whose data are restricted to the results from the analysis of surveillance capsules in commercial power reactors. The rationale behind this restriction was the assumption that the results of test reactor experiments may not be applicable to power reactors and could, therefore, be challenged if such data were included. For this very reason the embrittlement predictions in the Reg. Guide 1.99, Rev. 2, were based exclusively on power reactor data. However, test reactor experiments are able to cover a much wider range of materials and irradiation conditions that are needed to explore more fully a variety of models for the prediction of irradiation embrittlement. These data are also needed for the study of effects of annealing for life extension of reactor pressure vessels that are difficult to obtain from surveillance capsule results.

The current data collection of the TR-EDB contains primarily Charpy test data, which are accompanied in most cases by tensile tests for the same irradiation conditions. Information is available for 1,230 different irradiated sets, 797 of which are from base material (plates and forgings), 378 from welds, and 55 from heat-affected-zone materials. The chemistries of the investigated materials span also a fairly wide range, particularly in the content of copper and nickel, which are considered the most important contributors to embrittlement sensitivity. Complete chemistry information is available for 1,095 of the 1,230 samples (after discarding the HAZ information).

The architecture of the TR-EDB is fully compatible with that of the PR-EDB so that the data from both databases can be easily merged, if desired. The data files are given in dBASE format and can be accessed with any personal computer using the DOS operating system. "User-friendly" utility programs have been written to investigate the 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

The Test Reactor Embrittlement Data Base (TR-EDB) is a collection of results from irradiations in materials test reactors. It complements the Power Reactor Embrittlement Data Base[1] (PR-EDB), whose data are restricted to the results from the analysis of surveillance capsules in commercial power reactors. The rationale behind this restriction was the assumption that the results of test reactor experiments may not be applicable to power reactors, and regulatory decisions could, therefore, be challenged if such data were included. For this very reason the embrittlement predictions in the Reg. Guide 1.99, Rev. 2 (ref. 2) were based exclusively on power reactor data. However, test reactor experiments are able to cover a much wider range of materials and irradiation conditions that are needed to explore more fully a variety of models for the prediction of irradiation embrittlement. These data are also needed for the study of effects of annealing for life extension of reactor pressure vessels that are difficult to obtain from surveillance capsule results (see, however ref. 3).

The scope and purpose of this program, which is sponsored by the Nuclear Regulatory Commission (NRC), can be summarized as follows:

1. Compile and verify a comprehensive collection of data from test reactor irradiation experiments of pressure vessel materials from U.S. and foreign laboratories.

2. Provide software support for the use of the data base by furnishing programs and maintaining compatibility with commercially available software.

3. Maintain compatibility with the PR-EDB.

4. Maintain compatibility with U.S. and International Standards.

5. Facilitate the exploration and verification of embrittlement prediction models.

6. Facilitate the exploration and verification of the effects of annealing for pressure vessel life extension.

The data collections for both data bases originated from the Material Properties Council* (MPC) data base, which contains both power and test reactor data. From this collection a first (unpublished) version of the embrittlement data base (EDB) was constructed and augmented with more recently reported data. For the reasons stated above a restricted version containing only surveillance data - the PR-EDB - was assembled under NRC sponsorship to be used primarily for regulatory purposes. The data in the PR-EDB were subsequently reviewed and verified by reactor vendors and utilities and released to the public as Version 1 in July 1991. An updated Version 2 is currently being released.[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 NRC-sponsored investigations at Materials Engineering Associates, Inc. (MEA) and Oak Ridge National Laboratory (ORNL), the International Atomic Energy Commission (IAEA)-sponsored program, and a variety of other irradiation experiments at laboratories in France, Germany, Japan,

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*Martin Prager, Final Report Evaluation, Analysis and Transfer of Materials Property Data, The Materials Properties Council, Inc..

and the United Kingdom. Release of research data from other countries is being negotiated. The origin of each data point is, of course, identified by reference in the data files. The authors of the TR-EDB were provided with copies of the raw data sheets used for the MPC data base. These sheets that were prepared by the original investigators contain some unpublished material, such as identification of the irradiation facility and pre-irradiation test data. Such data are included in the TR-EDB and identified in the NOTES in addition to the referenced data.

The current data collection of the TR-EDB contains primarily Charpy test data that are accompanied in most cases by tensile tests for the same irradiation conditions. Information is available for 1,230 different irradiated sets, 797 of which are from base material (plates and forgings), 378 from welds, and 55 from heat-affected-zone materials. The distribution of fluences (E > 1.0 MeV) and irradiation temperatures over these experiments is shown in Figure 1. Not surprisingly, most irradiations were performed at the typical operating temperature of power reactors around 550°F, but enough information for other temperatures is available to investigate in detail the influence of irradiation temperature on embrittlement. The chemistries of the investigated materials span also a fairly wide range, particularly in the content of copper and nickel, which are considered the most important contributors to embrittlement sensitivity. Complete chemistry information is available for 1,095 of the 1,230 samples (after discarding the HAZ information). The distribution in copper and nickel is shown in Figure 2. Several studies whose results are included in the TR-EDB deal specifically with the influence of chemical composition on embrittlement, primarily copper, nickel, and phosphorus. Section 2.5 lists all irradiation experiments that are currently included in the TR-EDB and gives a detailed description of facilities, methods, and goals. A summary of this information can also be found in the file E_LST_TR.dbf.

The data format that was chosen for both, the TR-EDB and PR-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 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. The more recent versions of these programs contain extensive facilities for generating reports including statistic, curve fitting, and graphic programs. For often-performed tasks a customized EDB software based on Clipper and FORTRAN has been written originally for the PR-EDB, which can be utilized with both data bases. An updated version of these programs is included in the current version of the TR-EDB (see Appendix A). No effort is being made to extend the scope of this software any further since commercially available software can be readily applied to the data bases for any conceivable application and can also be more readily adapted to Windows and other platforms.

The architecture of the TR-EDB is fully compatible with that of the PR-EDB so that the data from both data bases can be easily merged, if desired. (Some overlap does occur; a few data from the PR-EDB appear also in the TR-EDB to make the latter self-consistent.) However, there are some differences; some changes are due to the differences between power reactor surveillance and test reactor experiments while others are improvements on the first design of the PR-EDB and will be beneficial to both data bases. None of these changes affect the data themselves and the ability to combine and select corresponding data from both data bases. These changes will also not prevent the use of the EDB software package provided for both versions of the EDB. A complete and detailed discussion of the architecture and data structures of the TR-EDB will be given in the next section. A list of differences between the PR-EDB and the TR-EDB is given in Appendix B.

An important difference between surveillance capsule and test reactor experiments is the way the results are reported. A surveillance capsule report is part of a legal requirement that assures some degree of uniformity and consistency in its content. Test reactor experiments, on the other hand, are designed for specific investigations and the reports, particularly the older ones, present only the data that are deemed relevant to particular questions, without regard to their possible use in other research. This is quite understandable given the effort and cost involved in publications but results in incomplete information about the reported data sets; for instance, raw Charpy data are usually presented only as graphs, if at all. Additional difficulties arise whenever the results of the same experiment are reported in different publications without clearly indicating this fact. Frequently, different codes are used for the same material or experimental capsule, and a considerable amount of detective work is necessary to identify each single experiment or material. (Duplicate entries of this type have been identified in the original MPC Data Base.) For the reasons stated above, verification of the TR-EDB data is difficult and cannot be as thorough and comprehensive as in the PR-EDB. 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, of course, checked internally for correctness and consistency, and all unresolved problems are reported in the "NOTES." Every effort is being made to resolve discrepancies by contacting the original investigators.

The user of the TR-EDB is expected to have some familiarity with the dBASE philosophy and software to take full advantage of the information contained in the data base. Many simple inquiries and investigations can be handled, however, with the custom software supplied with the data. This program is menu-driven and self-explanatory requiring no special training. A description is given in Appendix A. It should be noted that the data in the TR-EDB (and the PR-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 a TR-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. It is left to the user to select or, perhaps, average the different values for the same quantity. Automated analysis of the raw data files in the TR-EDB (and the PR-EDB) is not recommended; additional evaluation, selection, and unit conversion will be necessary whenever these data are to be used for critical investigations and as support for the analysis of reactor safety issues. The creation of evaluated data files for such purposes is being considered for future releases.

The distribution diskette of TR-EDB, Version 1, which is in compressed format, can be ordered from Energy Science and Technology Software Center, P.O. Box 1020, Oak Ridge, TN 37831, Tel. (615) 576-2606.

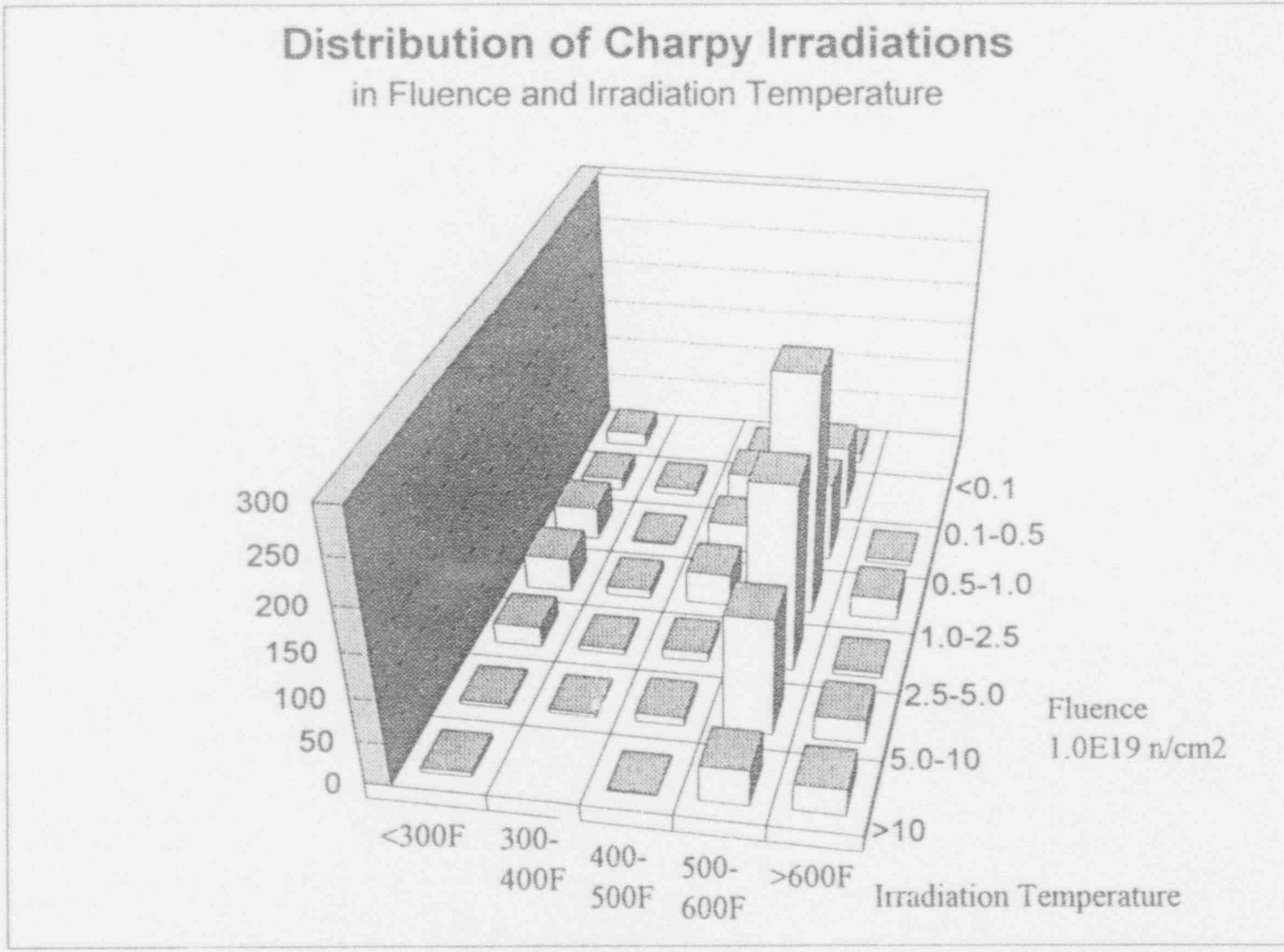

Fig. 1 Distribution of Charpy irradiations in fluence and irradiation temperature

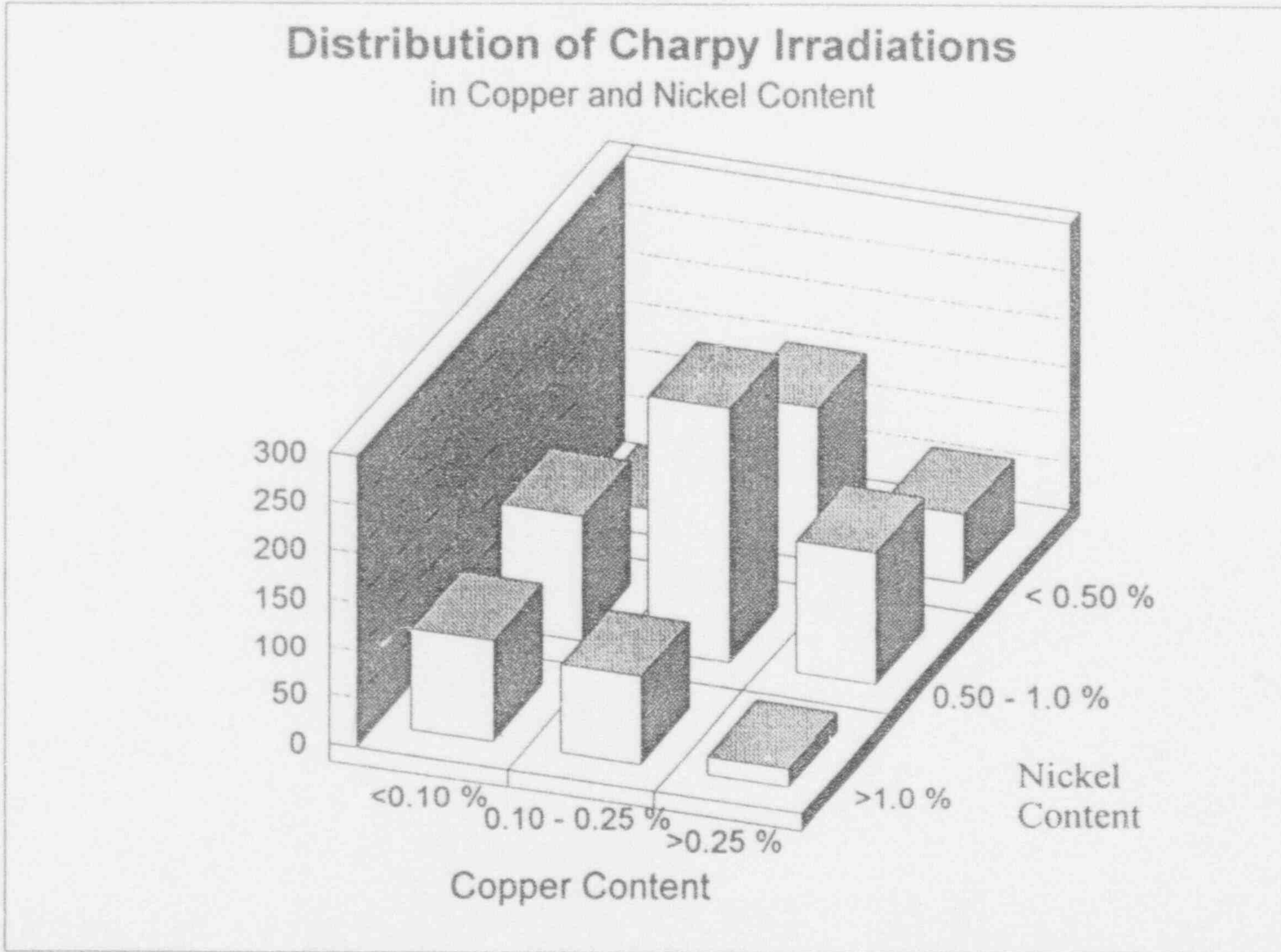

Fig. 2 Distribution of Charpy irradiations in copper and nickel content

2 ARCHITECTURE

2.1 Introduction

Most data collections are composed of one or more tables that are two-dimensional arrangements with rows called "records" and the columns designated as "fields." Each record represents an individual (person, test, reactor, etc.), and each field, a particular attribute. For example, a table for persons may list name, age, height, weight, etc., each in its designated field. A data base that consists of only one table is called "flat," and this is the format that was used for the older collections, including the MPC Data Base. This approach makes data retrieval easy, requiring no special software, but ignores completely any connections that may exist between different types of data. For instance, chemistry data are common to a particular material and must be repeated for every record that contains the same material. Also, more than one chemistry determination may be made for the same material such that not only the same chemistry is repeated over several records, but each record must provide room for several different chemistries. (This was actually the case in the MPC Data Base.) 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 the 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 related tables. For instance, all chemistry data are collected in a chemistry file, where each chemistry 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 also possible to list any number of different chemistry determinations for the same material. The downside is that several files must be linked together to extract the desired information, and considerable 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 very simplest data base applications. For the Embrittlement Data Base, both PR-EDB and TR-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 this 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 whenever 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 chemistry 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. All different determinations are kept in the TR-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 never considered in isolation but are always related to the same data for unirradiated material (baseline data) to determine the changes due to 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_TR.dbf for evaluated Charpy tests contains both irradiated and baseline data in the same record and also 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. In addition, fluences and irradiation temperatures are also listed with each data set although the same data are also collected in the file REAC_TR.dbf. (However, in this case fluences and temperatures are relative to the specimen or sets of specimen which may be different from the values for the whole capsule that are listed in REAC_TR.dbf.)

All data in the TR-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 which was also adopted for the PR-EDB provides the freedom to represent the data exactly as reported. For instance, prefixes, such as, >, <, or ~, can be included in the data fields. Missing data are represented as blank fields and not with some fictitious, impossible numerical value as it is necessary if the data are coded internally as numerical fields. The disadvantage 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 custom software described in Appendix A. Also required are additional structure files (identified with the extension *.str) that identify the numerical (and date) fields in the TR-EDB files since this information is no longer contained in the regular dBASE structure files.

A detailed description of the data files and the connecting key identifiers is given in the next two sections of this report. It is important to remember that this structure can easily be extended to accommodate additional types of data without change in the existing structure. Most of the files have a counterpart in the PR-EDB with essentially the same set of fields, including field names. A few fields have been added that were not needed in the PR-EDB, such as EXP_ID, or to remove ambiguities, such as the addition of a field for nominal temperature which was previously listed under maximum or minimum temperature. All these changes in the field structure have advantages for the PR-EDB also and will eventually be incorporated. Some changes in the naming of the files were also necessary to distinguish between the PR-EDB and TR-EDB, for instance, HEAT_LST.dbf is H_LST_TR.dbf in the TR-EDB and will eventually be renamed H_LST_PR.dbf for the PR-EDB. (See Appendix B.)

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 key identifiers are assigned by the manager of the data base in a manner that guarantees the unique labeling of experiments, materials, or source documents. The identifiers used in the reports do not always provide such unambiguous labeling. The following key identifiers are used in the current version of the TR-EDB:

1. EXP_ID

The data that are included in the TR-EDB were originally generated by specific experiments or groups of experiments that were designed to answer some specific questions. Accordingly, choice of irradiation conditions, types of specimen investigated, evaluation methods, and related aspects differ considerably from one experiment to another, and these differences have to be considered in the use of the data. For that reason a key identifier EXP_ID has been added to every record in almost all data files. EXP_ID is not primarily intended for linking the information between two or more data files; it's main link is to give a detailed description of each experiment in the file E_LST_TR.dbf and the related table in this report. Note that the identifier PLANT_ID in the material files in the PR-EDB, such as HEAT_LST.dbf, CHEM_PR.dbf, etc., is replaced by EXP_ID in the corresponding files H_LST_TR.dbf, CHEM_TR.dbf. 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. This policy will be extended to the PR-EDB in future releases. However, this key identifier is not presently used in the PR-EDB. The file REF_TR.dbf links references with experiments. Note that any given experiment is usually described in more than one reference and that the same reference may also 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. This key also identifies in the PR-EDB the surveillance program of the specified commercial power reactor. (Only the first three characters in PLANT_ID are used for this purpose.) No comparable link exits in the TR-EDB between the irradiation facility and materials or experiment. PLANT_ID links, therefore only irradiation environments to test data and does not appear in any of the materials files, such as CHEM_TR.dbf. Detailed information about the reactors identified by PLANT_ID is given in the file R_LST_TR.dbf

3. CAPSULE

Up to six characters are used to identify the irradiation capsule. As far as practical, the capsule identifications of the original reports were used. Sometimes specimens are lumped together which come from different capsules with similar fluences, and 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 PR-EDB and has been extended to the TR-EDB. It works as follows: The coding assigns the first letter to the material type, namely P_late, F_orging, W_eldment, H_eat-affected-zone material, or S_tandard reference material. The next three characters contain a general code related to the origin of the material with two additional characters to distinguish between different materials of the same origin. If practical, some correspondence between the HEAT_ID and report identifications is retained (e.g., the forging KS01 used in the Komponentsicherheits Program in Germany is named FKS_01). The last four letters are reserved to distinguish between different parts of the same material if different parts show markedly different material properties from those properties documented in the reports. For instance, SASTM S1 to SASTM S4 denote different sections of the 6-in. ASTM A302B reference plate, whose baseline properties vary considerably. The code SASTM without appendix will be reserved for the A302B correlation material that is used in Westinghouse reactors to avoid possible confusion with the PR-EDB; any other material from this plate of unidentified provenance is coded as SASTM X. The four-character appendix is also used to identify material that has been annealed after irradiation. The "anneal tag" has the form "Axy" for the first-time anneal and "Rxy" for any subsequent re-anneal. Details are given in the description of the file SHFTA_TR.dbf. The file H_LST_TR.dbf gives a complete list of identifiers used as HEAT_ID, together with the corresponding identifiers in the referenced reports.

The HEAT_ID provides the link between the material test data on the left side of Fig. 3 (e.g., SHFT_TR.dbf) and the fabrication and chemistry data on the right side (e.g., CHEM_TR.dbf). Chemistry and fabrication data are in many cases only available for the "generic" material, that is, for the plate or weldment as a whole, and not for a particular section dept 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 whenever no link exists for the full 10-character identifier. To find the chemistry data for annealed material it is necessary to go back to the parent material or, again, the first 6 characters of HEAT_ID. A similar situation exists for the HAZ materials; their chemistry 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_TR.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*, with L 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 well 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.

*Standard E399 applies formally only to CT specimens, but the extension to other types of specimens is straightforward.

6. REF_ID

In most files, each record is assigned a reference that indicates the source of the data. This is done by means of a 20-character field REF_ID. This identifier is usually a report number or a similar code that links it uniquely to the complete bibliographic information (i.e., author, title, and time of publication) which is given in the file TITL_TR.dbf. The linkage between experiments (EXP_ID) and reports (REF_ID) is given in the file REF_TR.dbf. The starting page of articles in a larger volume is included if this volume contains other, unrelated, material.

2.3 Organization of the TR-EDB Data Files

The current version of the TR-EDB is organized in a manner similar to the PR-EDB, as shown in Fig. 3. On top is the file E_LST_TR.dbf (Table 1) which contains a complete list of all experiments whose results are included in the TR-EDB. This file can be linked via the key identifier EXP_ID with any other TR-EDB file, except the reactor list, R_LST_TR.dbf, that does not refer to any particular experiment. Immediately below is the file S_LST_TR.dbf (Table 2) containing a complete list of test specimen sets which are used in the test reactor experiments. Specimen sets are characterized by type of the specimen, such as Charpy, Tensile, and the various forms of fracture mechanics specimen 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. (Fracture mechanics test data are not currently included in the TR-EDB for lack of time and manpower but listed in many irradiation capsules in S_LST_TR.dbf). Specimen sets for testing of the baseline properties of unirradiated materials are characterized by leaving the PLANT_ID field blank.

The data that are relevant for radiation embrittlement are distributed over three groups of data files. For each test listed in the specimen file, actual data from three groups of data can be obtained by linking via the appropriate key identifier. The first group, on the left of Fig. 3, consists of results of material property tests. Charpy, both individual tests and results of curve fittings, and tensile data are currently available (SHFT_TR.dbf, SHFTX_TR.dbf, SHFTA_TR.dbf, RAW_C_TR.dbf, and CV_RF_TR.dbf, for Charpy data and TEN_TR.dbf for tensile, Tables 20 through 25). (SHFTA_TR.dbf contains summaries of anneal experiments and SHFTX_TR.dbf unconventional measures of Charpy transition temperature). Each record in these files is uniquely characterized by the combination PLANT_ID, CAPSULE, HEAT_ID, and SPEC_ORI. Baseline data, which have no entries in PLANT_ID and CAPSULE (blank field), may also need an additional characterization through EXP_ID. (Different experiments for the same material have sometimes performed different tests for baseline values, though theoretically the same values may differ somewhat due to statistical fluctuations.)

The second group, in the middle of Fig. 3, contains data describing the reactor and radiation environment for each surveillance capsule. The file REAC_TR.dbf contains a detailed description of the fluence, irradiation temperature and irradiation time for each irradiation capsule. The file REAC_TR.dbf is linked with the others via the key identifiers PLANT_ID and CAPSULE. This linkage will not be needed in most cases because fluence and irradiation temperature are also given in the test data files, such as, SHFT_TR.dbf and TEN_TR.dbf. Note that the fluence values given in REAC_TR.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 specimen, listed in the test data files. However, many details, such as, values for fluence (E > 0.1 MeV) or dpa are listed - whenever available - in REAC_TR.dbf. The file R_LST_TR.dbf is a list of irradiation facilities used in the experiments, similar to REAC_LST.dbf in the PR-EDB. In contrast to power reactor surveillance there is no particular link between test reactor facilities and the experiments performed there. Thus, the only key identifier field in this file is PLANT_ID.

The third group on the right of Fig. 3 contains the information about the chemistry and fabrication of the materials used in the experiments. H_LST_TR.dbf lists all HEAT_IDs with reported codes, and CHEM_TR.dbf, HEAT_TR.dbf, WELD_TR.dbf, and HAZ_TR.dbf the actual chemistry and fabrication data. All these files are linked via HEAT_ID with the rest of the TR-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 TR-EDB files has a reference in the field REF_ID and one or more page numbers which allows to verify the sources from where the data were collected and, perhaps, to find additional information. Exceptions are again the file R_LST_TR.dbf and also E_LST_TR.dbf whose information comes from many different sources. References are also not listed in RAW_C_TR.dbf because the associated file CV_RF_TR.dbf has the necessary references. A detailed list of all reference with complete title, authors, time of publication is given in the file TITL_TR.dbf. The linkage to the other files is, of course, via REF_ID. The associated file REF_TR.dbf links all REF_IDs with the EXP_IDs (i.e., experiments with publications).

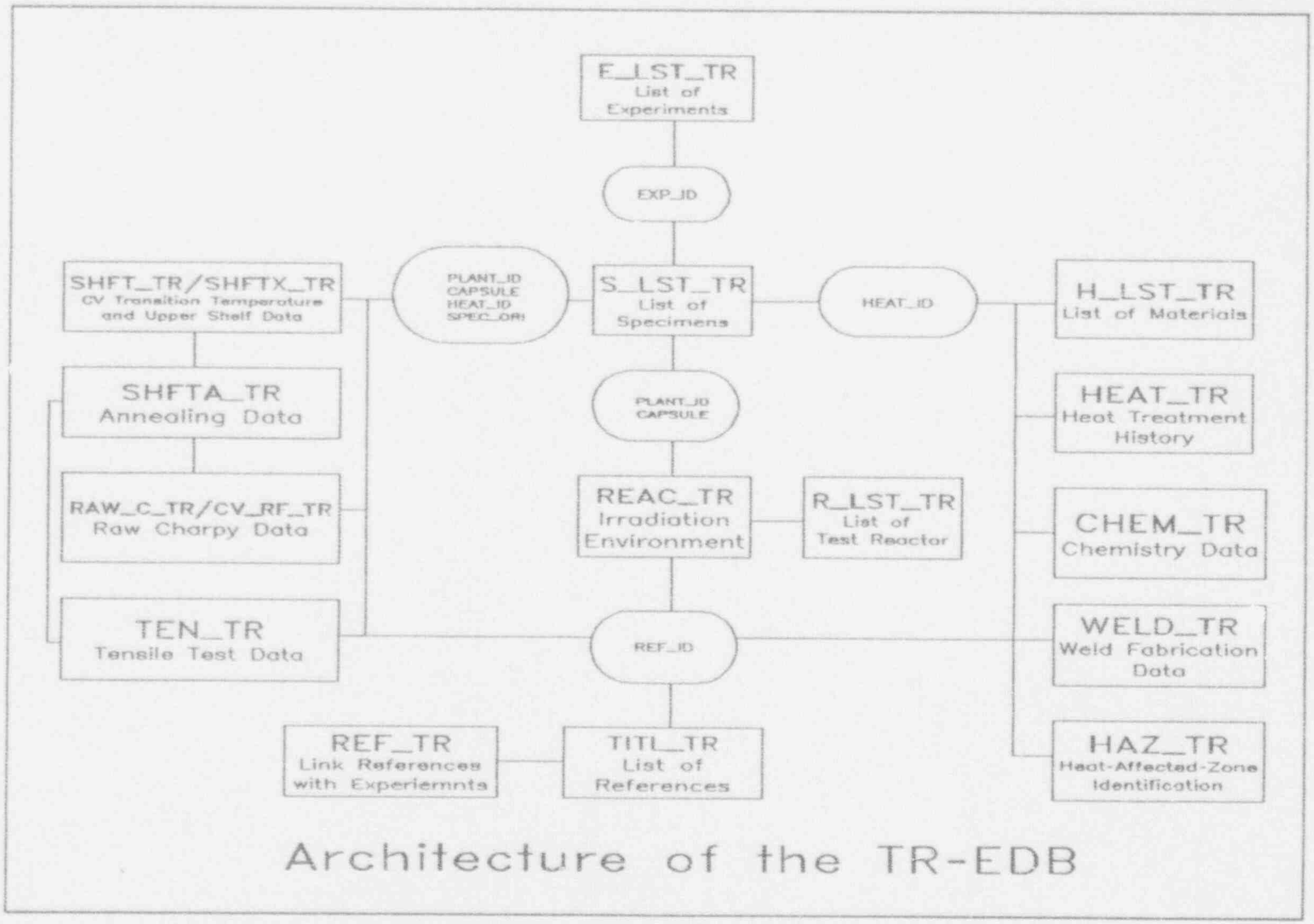

Fig. 3 Architecture of the TR-EDB

2.4 List of TR-EDB Files

1. E_LST_TR.dbf

This file lists all EXP_ID 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 given in Section 2.5. It is intended to include this information in the file in the form of memo fields, but the current software does not support this extension.

Table 1 Structure file for E_LST_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
EXP_DESCR	80	Description of Experiment
LABORATORY	30	Laboratory Responsible for the Experiment and Evaluation
AUTHORS	50	List of Principal Investigators
REACTORS	30	List of Reactors used in the Experiment

2. S_LST_TR.dbf

The object of this file is to provide a complete list of all specimen sets whose test data are contained in the other TR-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.) The information given in the reports is often sketchy in contrast to the surveillance reports which contain detailed lists and capsule drawings. A new field, REPORT_TAG, has been added to the old structure of 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 are reported containing individual test results, and "L" if only lines without points are presented in the graph. A blank field means that just numerical summaries are provided. The field SPEC_SIZE which was part of the file SPEC_LST.dbf in the PR-EDB has been removed from this file. This field cannot properly contain all the relevant dimensions for all possible test specimen and was, therefore, moved in extended form to the files containing the test results, such as, TEN_TR.dbf.

Table 2 Structure file for S_LST_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
PLANT_ID	6	Reactor Identification
CAPSULE	6	Surveillance or Experiment Capsule Identification
HEAT_ID	10	Identification Code for Given Material
SPEC_TYPE	3	Type of Specimen: Charpy (CV), TEN_sile, C_ompact T_ension, WOL
SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
SPEC_POS	10	Specimen Position: 1/4T, 1/2T, 3/4T, etc.
NO_OF_SPEC	3	Number of Specimen in Capsule or Experimental Set
REPORT_TAG	1	Type of Reporting: R_aw data, A_verages, G_raphs, L_ine Drawings
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

3. File SHFT_TR.dbf

SHFT_TR.dbf (Table 3) 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), whatever is listed in the report, and similarly for the upper shelf energy with both absolute and relative shift values. The tags U_FIT and I_FIT were added to indicated the type of fitting procedure used to determine transition temperature and upper shelf values for un-irradiated and irradiated data, respectively. Also included are the data describing the irradiation as applied to the Charpy specimen set. These 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. Further 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 can in other cases be determined from the equivalent full-power irradiation time; fields are provided in the file to contain either or both types of information. Not included is the transition temperature at 50% shear since it is seldom reported and is difficult to be determined reliably. It can also be readily reconstructed from the individual Charpy test data, whenever available. Also not included are transition temperatures at other energy levels or lateral expansion such as 15 ft-lb or 3 kgm (see Section 2.6 for units), which are sometimes listed in older reports. These data are relegated to the special file SHFTX_TR.dbf.

Table 3 Structure file for SHFT_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
PLANT_ID	6	Reactor Identification
CAPSULE	6	Surveillance or Experiment Capsule Identification
HEAT_ID	10	Identification Code for Given Material
PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
CSP_F1	10	Fluence > 1 MeV at Charpy Specimen Location [n/cm^2]
FLU_TAG	1	Tag for Fluence Determination: F_ission, S_caling, A_djustment
EFP_TIME	10	Effective Full Power Time of Irradiation
TIME_U	1	Unit of Time: S_econds, M_inutes, H_ours, D_ays, Y_ears
F1_RATE	10	Fluence Rate > 1 MeV at Capsule Center [$n/(cm^2 \cdot s)$]
CSP_TEMP	4	Irradiation Temperature of Charpy Specimen
UTT30	5	CVT at 30 ft-lb, Unirradiated Charpy Specimen
UTT50	5	CVT at 50 ft-lb, Unirradiated Charpy Specimen
ULE35	5	CVT at Lateral Expansion = 35 mils, Unirrad. Charpy Spec.
UUSE	5	Upper Shelf Energy, Unirradiated Charpy Specimen
U_FIT	1	Tag for Fitting (Unirr. Data): H_and drawn, hyp. T_angent, O_ther
ITT30	5	CVT at 30 ft-lb, Irradiated Charpy Specimen
ITT50	5	CVT at 50 ft-lb, Irradiated Charpy Specimen
ILE35	5	CVT at Lateral Expansion = 35 mils, Irrad. Charpy Spec.
IUSE	5	Upper Shelf Energy, Irradiated Charpy Specimen
I_FIT	1	Tag for Fitting (Irr. Data): H_and drawn, hyp. T_angent, O_ther
DTT30	5	CVT Shift at 30 ft-lb (ITT30 - UTT30)
DTT50	5	CVT Shift at 50 ft-lb (ITT50 - UTT50)
DLE35	5	CVT Shift at Lateral Expansion = 35 mils (ILE35 - ULE35)
DUSE_ABS	5	Absolute Drop in Upper Shelf Energy (UUSE - IUSE)
DUSE_REL	5	Percent Drop in Upper Shelf Energy
TEMP_U	1	Unit used for Temperature Data
USE_U	5	Unit used for Energy Data (in Upper Shelf Energy)
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

4. SHFTA_TR.dbf

The information in SHFTA_TR.dbf (Table 4) provides a summary of the annealing processes studied in the experiments included in the TR-EDB. In order to fit the results of annealing experiments into the existing framework of the TR-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 through an "anneal tag" which has the form Axy, where x and y are each some digit or letter, with x characterizing the irradiation and y the annealing procedure. Any subsequent re-annealing is indicated by a tag Rxy. 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 just considering material as a newly created steel. Both raw Charpy and tensile data are listed in this manner in the respective files RAW_C_TR.dbf and TEN_TR.dbf.

The study of annealing effects requires, of course, the information about how each annealed material came into being, and this is the primary content of the file SHFTA_TR.dbf. This file gives a complete list of all anneal tags that are used with any parent material together with fluence, irradiation temperature, anneal temperature and anneal duration together with the reactor and capsule identification, PLANT_ID and CAPSULE, respectively. Because the anneal tags are unique, the information in SHFTA_TR.dbf allows the tracing of the HEAT_ID of any annealed material (i.e., any HEAT_ID containing an anneal tag) to the parent material and to reconstruct 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 re-irradiation after anneal, 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-re-irradiation cycle together with the shifts in these parameters, depending on what is reported. Re-annealing after re-irradiation is placed in a second record in which the material with the first anneal tag serves as parent material and a new tag Rxy is defined for the second cycle. This procedure can be repeated as often as necessary. Frequently whole capsules filled with specimen were irradiated and subsequently annealed (and sometimes re-irradiated, etc.) without determining embrittlement status after irradiation. Irradiated values before anneal 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 addition, such as, transition temperatures at 50 ft-lb and 35 mil lateral expansion) in the file SHFT_TR.dbf.

Table 4 Structure file for SHFTA_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
PLANT_ID	6	Reactor Identification
CAPSULE	6	Surveillance or Experiment Capsule Identification
HEAT_ID	10	Identification Code for Given Material
PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
CSP_F1	10	Fluence > 1 MeV at Charpy Specimen Location [n/cm²]
CSP_TEMP	4	Irradiation Temperature of Charpy Specimen
ANN_TAG	4	Tag Added to the HEAT_ID to Identify Annealed Material
ANN_TEMP	3	Annealing Temperature
ANN_HRS	4	Duration of Annealing in Hours [hours]
PLANT_ID_R	6	Reactor Identification for Re-irradiation
CAPSULE_R	6	Capsule Identification for Re-irradiation
CSP_F1_R	10	Fluence > 1.0 MeV During Re-irradiation [n/cm²]
CSP_TEMP_R	4	Irradiation Temperature During Re-irradiation
UTT30	5	CVT at 30 ft-lb, Unirradiated Charpy Specimen
ITT30	5	CVT at 30 ft-lb, Irradiated Charpy Specimen
DTT30	5	CVT Shift at 30 ft-lb (ITT30 - UTT30)
IATT30	5	CVT at 30 ft-lb, After Annealing
RTT30	5	Recovery of TT30 After Annealing (ITT30 - IATT30)
IARTT30	5	CVT at 30 ft-lb, After Annealing and Re-irradiation
UUSE	5	Upper Shelf Energy, Unirradiated Charpy Specimen
IUSE	5	Upper Shelf Energy, Irradiated Charpy Specimen
DUSE_ABS	5	Absolute Drop in Upper Shelf Energy (UUSE - IUSE)
IAUSE	5	Upper Shelf Energy, After Annealing
RUSE_ABS	5	Recovery of Upper Shelf Energy (IAUSE -IUSE)
IARUSE	5	Upper Shelf Energy, After Annealing and Re-irradiation
TEMP_U	1	Unit used for Temperature Data
USE_U	5	Unit used for Energy Data (in Upper Shelf Energy)
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

4. File SHFTX_TR.dbf (Table 5)

This file lists the non-standard determinations for Charpy transition temperature before and after irradiation with appropriate definitions for the non-standard data. The fluence data are the same as in SHFT_TR.dbf.

Table 5 Structure for SHFTX_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
PLANT_ID	6	Reactor Identification
CAPSULE	6	Surveillance or Experiment Capsule Identification
HEAT_ID	10	Identification Code for Given Material
PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
CSP_F1	10	Fluence > 1 MeV at Charpy Specimen Location [n/cm^2]
FLU_TAG	1	Tag for Fluence Determination: F_ission, S_caling, A_djustment
EFP_TIME	10	Effective Full Power Time of Irradiation
TIME_U	1	Unit of Time: S_econds, M_inutes, H_ours, D_ays, Y_ears
F1_RATE	10	Fluence Rate > 1 MeV at Capsule Center [$n/(cm^2 \cdot s)$]
CSP_TEMP	4	Irradiation Temperature of Charpy Specimen
UTTX	5	CVT at Specified Non-standard Value, Unirradiated Charpy Specimen
ITTX	5	CVT at Specified Non-standard Value, Irradiated Charpy Specimen
DTTX	5	CVT Shift at Specified Non-standard Value (ITTX - UTTX)
TT_DEF	5	Quantity for which Transition Temperature is Specified
TT_DEF_U	5	Unit of Quantity for which Transition Temperature is Specified
TEMP_U	1	Unit used for Temperature Data
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

5. Files RAW_C_TR.dbf and CV_RF_TR.dbf

RAW_C_TR.dbf (Table 6) gives a complete list of individual Charpy test results. (See p. 39 at the end of the section for a partial listing.) In addition to the materials test results the key identifiers are listed to link the raw data with the evaluations in SHFT_TR.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 all different sets in RAW_C_TR.dbf is contained in the associated file CV_RF_TR.dbf. This file includes in addition to the key identifiers the references for the raw data that are not part of RAW_C_TR.dbf to save space, since each specimen in the same set has the same reference. Newly added to this file is information about the Charpy test equipment, that is also common to each whole set. The structure of this file is listed below (Table 7), and a partial listing of the records is given at the end of the section (p. 40). 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 the file SHFT_TR.dbf. However, these combination capsules are not listed in RAW_C_TR to avoid the duplication of data. Instead, these combination sets were placed in a separate file, RAW_FT_TR.dbf, to aid the user in determining their content. These combinations are also contained in the ASCII file RAW_C_TR.dat which is used for the EDB fitting programs.

Table 6 Structure file for RAW_C_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
PLANT_ID	6	Reactor Identification
CAPSULE	6	Surveillance or Experiment Capsule Identification
HEAT_ID	10	Identification Code for Given Material
PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
SPEC_ID	8	Specimen Identifier
TST_TEMP	6	Test Temperature of Specimen
TST_TEMP_U	1	Unit of Temperature used in TST_TEMP
IMP_E	6	Impact Energy of Charpy Specimen
IMP_E_U	5	Unit of Energy used in IMP_E
FRACT_APP	3	Fracture Appearance Value [% shear]
LAT_EXP	4	Lateral Expansion of Charpy Specimen
LAT_EXP_U	3	Unit of Length used in LAT_EXP
CSP_F1	10	Fluence > 1 MeV at Charpy Specimen Location [n/cm^2]
CSP_TEMP	4	Irradiation Temperature of Charpy Specimen
CSP_TEMP_U	1	Unit of Temperature used in CSP_TEMP

Table 7 Structure file for CV_RF_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
PLANT_ID	6	Reactor Identification
CAPSULE	6	Surveillance or Experiment Capsule Identification
HEAT_ID	10	Identification Code for Given Material
PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
TUP_TYPE	1	Type of Tup Used: A_STM, D_IN, ...
TUP_VEL	5	Velocity of Tup on Impact
VEL_U	5	Unit used for Tup Velocity
MAX_E	4	Maximum Impact Energy
USE_U	5	Unit used for Energy Data (in Upper Shelf Energy)
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

6. File TEN_TR.dbf

The file TEN_TR.dbf (Table 8) 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. The dimensions of the specimen have been added to the file since a large variety of different diameters are used in the experiments which may influence the measured results.

Table 8 Structure file for TEN_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
PLANT_ID	6	Reactor Identification
CAPSULE	6	Surveillance or Experiment Capsule Identification
HEAT_ID	10	Identification Code for Given Material
PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
SPEC_ORI	2	Specimen Orientation: TL, LT, TS, etc.
TSP_F1	10	Fluence > 1 MeV at Tensile Specimen Location [n/cm²]
TSP_TEMP	4	Irradiation Temperature of Tensile Specimen
SPEC_ID	8	Specimen Identifier
TST_TEMP	4	Test Temperature of Specimen
TEMP_U	1	Unit used for Temperature Data
YSL	5	Lower Yield Strength of Tensile Specimen
YSU	5	Upper Yield Strength of Tensile Specimen
UTS	5	Ultimate Tensile Strength
STRESS_U	6	Unit of Stress
ULG	4	Ultimate Elongation of Tensile Specimen [%]
TLG	4	Total Elongation of Tensile Specimen [%]
RA	4	Reduction in Area of Tensile Specimen [%]
SPEC_DIAM	4	Diameter (or Cross Section) of Tensile Specimen
GAGE_LEN	4	Gage Length of Tensile Specimen
TOTAL_LEN	4	Total Length of Tensile Specimen
LENGTH_U	3	Unit of Length
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

7. File R_LST_TR.dbf

There are substantial differences between material test reactors and commercial power reactors; however, the structure of the PR-EDB file REAC_LST.dbf has been retained with a few additions to retain compatibility between the two data bases. The NOTES field has been added to augment the information about the reactor and two fields concerning the power output, both thermal and electric. The same structure will be used for future releases of the PR-EDB file, R_LST_PR.dbf (Table 9), which is also included in the TR-EDB since some materials tests (as opposed to the mandated pressure vessel surveillance) have been performed in power reactors.

Table 9 Structure file for R_LST_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
PLANT_ID	6	Reactor Identification
REAC_TYPE	3	Reactor Type: PWR, BWR, or TR
REAC_NAME	50	Reactor Name
LOCATION	30	Reactor Location
PLANT_OP	50	Reactor Operator or Utility
PLANT_DES	25	Reactor Designer or Vendor
ARCH_ENG	50	Reactor Architect/Engineer
VESSEL_MFG	50	Reactor Vessel Manufacturer
OUTPUT_TH	5	Thermal Output of the Reactor [Mw]
OUTPUT_E	5	Electricity Output of the Reactor [Mw]
NOTES	30	Pertinent Information Related to Data Entries, If Needed

8. File REAC_TR.dbf (Table 10)

The fluence determination in test reactor experiments is much more varied than in power reactors whose surveillance programs are subject to regulation by NRC or the 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 milli barn (mb) cross section of the $^{54}Fe(n,p)$ reaction. Conversion to the 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, whenever it is reported, together with the standard damage fluences with uncertainties. The field FLU_TAG is used to indicate the type of fluence determination: The character F indicates that only fission fluence is reported, S indicates the scaling procedure described above, 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 start-up and removal dates of the experiment capsules. In some cases, the capsules have 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 which indicates how the irradiation temperature was determined. This field was also included in the REAC_PR.dbf file of the PR-EDB; however, instead of numbers a letter is used for test reactors with C for calculated (or estimated) temperatures, M for melt wires, and T for thermocouples, the most frequently used technique in test reactor experiments.

Table 10 Structure file for REAC_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
PLANT_ID	6	Reactor Identification
CAPSULE	6	Surveillance or Experiment Capsule Identification
START_DATE	10	Data at Start of Irradiation [MM/DD/YYYY]
STOP_DATE	10	Date at End of Irradiation [MM/DD/YYYY]
CONFIG	6	Indicator for Change in Irradiation Environment
EFP_TIME	10	Effective Full Power Time of Irradiation
TIME_U	1	Unit of Time: S_econds, M_inutes, H_ours, D_ays, Y_ears
CAP_T_MIN	4	Minimum Irradiation Temperature at Capsule Center
CAP_T_MAX	4	Maximum Irradiation Temperature at Capsule Center
CAP_T_NOM	4	Nominal Irradiation Temperature for Capsule
TEMP_RANGE	4	Temperature Variations within the Capsule
TEMP_U	1	Unit used for Temperature Data
TEMP_TAG	1	Irr. Temp. Determination: C_alcul., T_hermocouples, M_elt wires
CAP_F1	10	Fluence > 1 MeV at Capsule Center [n/cm^2]
F1_UNC	3	Uncertainty of Fluence > 1.0 MeV [% Standard Deviation]
FLU_TAG	1	Tag for Fluence Determination: F_ission, S_caling, A_djustment
F1_RATE	10	Fluence Rate > 1 MeV at Capsule Center [$n/(cm^2 \cdot s)$]
CAP_FP1	10	Fluence > 0.1 MeV at Capsule Center [n/cm^2]
FP1_TO_F1	4	Ratio of Fluence E > 0.1 MeV to Fluence E > 1.0 MeV
FP1_UNC	3	Uncertainty of Fluence > 0.1 MeV [% Standard Deviation]
CAP_FISS	10	Equivalent Fission Fluence E > 1 Mev as Determined from Dosimetry
F1_TO_FISS	4	Ratio of Calculated to Equivalent Fission Spectrum E > 1.0 MeV
CAP_DPA	10	Displacements per Atom of Iron at Capsule Center
DPA_TO_F1	10	Ratio of dpa to Fluence E > 1.0 MeV
DPA_UNC	3	Uncertainty of Displacements per Atom [% Standard Deviation]
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

9. File H_LST_TR.dbf

The file H_LST_TR.dbf (Table 11) relates the material codes given in HEAT_ID to the descriptions and heat numbers given in the reports and in the MPC data base. It also includes the ASTM (or European standard) material classification, the supplier of the material, and the thickness. SOURCE gives specific information about the origin of the material (if available), namely SCR-ap, if it was obtained from excess material during the fabrication of a pressure vessel (this applies also to welds), CUTOUT for nozzle cutouts, and SIM-ulated welds, if the material was not obtained from an actual weld seam but fabricated from excess plate material using the same filler and flux. Finally, FABR_icated means, that the material was fabricated exclusively for irradiation experiments. (A complete listing is given on p. 44 at the end of the section.)

Table 11 Structure file for H_LST_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
HEAT_ID	10	Identification Code for Given Material
RPT_ID	20	Material Identifier Used in Referenced Reports
HEAT_NO	10	Heat Number of Material Used by Supplier
PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
MAT_ID	10	Material Classification: A302B, A5082, A533B1, etc.
SUPPLIER	20	Supplier of Material
THICKNESS	6	Thickness of Base Material
LENGT_U	3	Unit of Length
SOURCE	10	Source of Material: FABR_icated, SCR_ap, SIM_ulated Weld, CUTOUT
MPC_ID	5	Reference Number Assigned by Combustion Engineering (MPC)
MPC_HEAT	7	Material Heat Number (MPC)
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

10. File CHEM_TR.dbf

The file CHEM_TR.dbf (Table 12) lists the chemistries 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 just HEAT, depending on what is revealed in the reports. The term WIRE is used if the chemistry of the filler wire, rather than that of the actual weld material, has been reported. Other terms listed in SPEC_ID are the identifiers of the test specimen whose chemistry was determined. All different chemistry determinations for the same material are listed as reported, but duplications are omitted. (A partial listing is given on p. 55 at the end of the section.)

Table 12 Structure file for CHEM_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
HEAT_ID	10	Identification Code for Given Material
PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
MAT_ID	10	Material Classification: A302B, A5082, A533B1, etc.
CHEM_LAB	15	Chemistry Laboratory or Procedure Identification
METHOD	30	Method for Determining the Chemistry
SPEC_ID	8	Specimen Identifier
C	5	Weight Percent Carbon
MN	5	Weight Percent Manganese
P	5	Weight Percent Phosphorus
S	5	Weight Percent Sulfur
SI	5	Weight Percent Silicon
NI	5	Weight Percent Nickel
CR	5	Weight Percent Chromium
MO	5	Weight Percent Molybdenum
CU	5	Weight Percent Copper
V	5	Weight Percent Vanadium
B	5	Weight Percent Boron
CS	5	Weight Percent Cesium
TI	5	Weight Percent Titanium
CO	5	Weight Percent Cobalt
N	5	Weight Percent Nitrogen
O	5	Weight Percent Oxygen
SB	5	Weight Percent Antimony
AS	5	Weight Percent Arsenic
ZR	5	Weight Percent Zirconium
AL	5	Weight Percent Aluminum
AL_SOL	5	Weight Percent Aluminum in Solution
AL_INT	5	Weight Percent Aluminum Interstitial
PB	5	Weight Percent Lead
W	5	Weight Percent Tungsten
SN	5	Weight Percent Tin
ZN	5	Weight Percent Zinc
TA	5	Weight Percent Tantalum
H	5	Weight Percent Hydrogen
NB	5	Weight Percent Niobium
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

11. File HEAT_TR.dbf

The file HEAT_TR.dbf (Table 13) 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. A new field, NOMTEMP_x, is added to the old HEAT_PR.dbf file in the PR-EDB to indicate the nominal temperature of the treatment step, if no MAXTEMP_x and MINTEMP_x is reported. RANGE, if reported, indicates then the deviation from the nominal temperature (in both directions if ± is attached). (A partial listing is given on p. 56 at the end of the section.)

Table 13 Structure file for HEAT_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
HEAT_ID	10	Identification Code for Given Material
PROD_ID	3	Material Type: P_late, F_orging, W_eld, HAZ, or SRM
SUPPLIER	15	Supplier of Material
HEAT_TREAT	15	Facility Performing Heat Treatment
HEAT_NO	10	Heat Number of Material Used by Supplier
SUPPL_ID	10	Identifier Used by Supplier
MINTEMP_1	4	Heat Treatment Minimum Temperature, Run 1
MAXTEMP_1	4	Heat Treatment Maximum Temperature, Run 1
NOMTEMP_1	4	Heat Treatment Nominal Temperature, Run 1
RANGE_1	3	Heat Treatment Temperature Range, Run 1
HOURS_1	6	Heat Treatment Duration, Run 1 [hours]
QCHM_1	2	Quench Method, Run 1
ID_1	1	N_ormalizing, A_ustenizing, T_empering, Stress R_elief, Run 1
MINTEMP_2	4	Heat Treatment Minimum Temperature, Run 2
MAXTEMP_2	4	Heat Treatment Maximum Temperature, Run 2
NOMTEMP_2	4	Heat Treatment Nominal Temperature, Run 2
RANGE_2	3	Heat Treatment Temperature Range, Run 2
HOURS_2	6	Heat Treatment Duration, Run 2 [hours]
QCHM_2	2	Quench Method, Run 2
ID_2	1	N_ormalizing, A_ustenizing, T_empering, Stress R_elief, Run 2
MINTEMP_3	4	Heat Treatment Minimum Temperature, Run 3
MAXTEMP_3	4	Heat Treatment Maximum Temperature, Run 3
NOMTEMP_3	4	Heat Treatment Nominal Temperature, Run 3
RANGE_3	3	Heat Treatment Temperature Range, Run 3

Table 13 (continued)

Field name	No. chrs.	Description
HOURS_3	6	Heat Treatment Duration, Run 3 [hours]
QCHM_3	2	Quench Method, Run 3
ID_3	1	N_ormalizing, A_ustenizing, T_empering, Stress R_elief, Run 3
MINTEMP_4	4	Heat Treatment Minimum Temperature, Run 4
MAXTEMP_4	4	Heat Treatment Maximum Temperature, Run 4
NOMTEMP_4	4	Heat Treatment Nominal Temperature, Run 4
RANGE_4	3	Heat Treatment Temperature Range, Run 4
HOURS_4	6	Heat Treatment Duration, Run 4 [hours]
QCHM_4	2	Quench Method, Run 4
ID_4	1	N_ormalizing, A_ustenizing, T_empering, Stress R_elief, Run 4
MINTEMP_5	4	Heat Treatment Minimum Temperature, Run 5
MAXTEMP_5	4	Heat Treatment Maximum Temperature, Run 5
NOMTEMP_5	4	Heat Treatment Nominal Temperature, Run 5
RANGE_5	3	Heat Treatment Temperature Range, Run 5
HOURS_5	6	Heat Treatment Duration, Run 5 [hours]
QCHM_5	2	Quench Method, Run 5
ID_5	1	N_ormalizing, A_ustenizing, T_empering, Stress R_elief, Run 5
MINTEMP_6	4	Heat Treatment Minimum Temperature, Run 6
MAXTEMP_6	4	Heat Treatment Maximum Temperature, Run 6
NOMTEMP_6	4	Heat Treatment Nominal Temperature, Run 6
RANGE_6	3	Heat Treatment Temperature Range, Run 6
HOURS_6	6	Heat Treatment Duration, Run 6 [hours]
QCHM_6	2	Quench Method, Run 6
ID_6	1	N_ormalizing, A_ustenizing, T_empering, Stress R_elief, Run 6
MINTEMP_7	4	Heat Treatment Minimum Temperature, Run 7
MAXTEMP_7	4	Heat Treatment Maximum Temperature, Run 7
NOMTEMP_7	4	Heat Treatment Nominal Temperature, Run 7
RANGE_7	3	Heat Treatment Temperature Range, Run 7
HOURS_7	6	Heat Treatment Duration, Run 7 [hours]
QCHM_7	2	Quench Method, Run 7
ID_7	1	N_ormalizing, A_ustenizing, T_empering, Stress R_elief, Run 7
MINTEMP_8	4	Heat Treatment Minimum Temperature, Run 8
MAXTEMP_8	4	Heat Treatment Maximum Temperature, Run 8
NOMTEMP_8	4	Heat Treatment Nominal Temperature, Run 8
RANGE_8	3	Heat Treatment Temperature Range, Run 8
HOURS_8	6	Heat Treatment Duration, Run 8 [hours]
QCHM_8	2	Quench Method, Run 8
ID_8	1	N_ormalizing, A_ustenizing, T_empering, Stress R_elief, Run 8
TEMP_U	1	Unit used for Temperature Data
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

12. File WELD_TR.dbf

The file WELD_TR.dbf (Table 14) 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 plus the supplier of the weld is also listed. (A partial listing is given on p. 57 at the end of the section.)

Table 14 Structure file for WELD_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
HEAT_ID	10	Identification Code for Given Material
WLD_TYPE	3	Weld Type
WLD_CODE	10	Identification Code used by Weld Manufacturer
HEAT_1	10	HEAT_ID of the Plate on one side of the Weld
HEAT_2	10	HEAT_ID of the Plate on the other side of the Weld
WELD_SUPLY	15	Supplier of Weld Material
WIRE_TYPE	10	Type of Weld Wire Used in the Weld
WIRE_HEAT	10	Weld Wire Heat Identifier
FLUX_TYPE	10	Type of Flux Used in the Weld
FLUX_LOT	10	Weld Flux Lot Identifier
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

13. File HAZ_TR.dbf

The file HAZ_TR.dbf (Table 15) identifies the base material and weldments used to prepare the heat-affected-zone specimens. (A partial listing is given on p. 58 at the end of the section.)

Table 15 Structure file for HAZ_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
HEAT_ID	10	Identification Code for Given Material
HEAT_B	10	HEAT_ID of the Base Material Used in the HAZ
HEAT_W	10	HEAT_ID of the Weld Material Connected with the HAZ
REF_ID	20	Reference Identifier
PAGES	20	Page Number(s)
NOTES	30	Pertinent Information Related to Data Entries, If Needed

14. File TITL_TR.dbf

Most TR-EDB files contain a reference in the field REF_ID plus page numbers for each record. The complete bibliographic listing, including author, title, report number, and date of publication, is located in the file TITL_TR.dbf (Table 16). Each listing may extend over more than one record because of the limited length the title field REF_TITL 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 (i.e., 1, 2, .. etc.). The list of authors and experiments described in the reference may also extend over more than one record. A complete listing of this file is given on p. 59 at the end of the section.

Table 16 Structure file for TITL_TR.dbf

Field name	No. chrs.	Description
EXP_ID	6	Experiment Identification
REF_ID	20	Reference Identifier
ALT_REF	20	Alternative Reference (not used as REF_ID)
CONT	2	Continuation Tag for References Occupying More than One Record
AUTHOR_1	25	First Author (or continuation from preceding record, same ref.)
AUTHOR_2	25	Next Author (may be continued in the next record for same ref.)
REF_TITLE	80	Bibliographic Reference
PUB_DATE	10	Date of Publication
TAG	1	Used for Internal Operation

15. File REF_TR.dbf
This file 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 cover more than one experiment. The field MPC_ID identifies the reports and data that were included in the MPC data base.

Table 17 Structure file for TITL_TR.dbf

Field name	No. chrs.	Description
TAG	1	Used for Internal Operation
EXP_ID	6	Experiment Identification
REF_ID	20	Reference Identifier
MPC_ID	3	Reference Number Assigned by Combustion Engineering (MPC)

Tables 18 through 34 give partial or complete listings of the TR-EDB files discussed earlier.

Table 18 Listing of E_LST

E_LST_TR: Page 1

EXP_ID	EXP_DESCR	LABORATORY	AU
BET-AN	Annealing Experiments Performed by Westinghouse at the Bettis Laboratory	Bettis Laboratory	J.
BWREXP	Irradiation Experiments Performed by GE with a Variety of BWR-PV Materials	General Electric Co.	J.
CEA	Experiments in French Reactors Sponsored by Commissariat à l'Energy Atomique		C.
EPR-AN	Annealing Experiments Sponsored by the Electric Power Research Institute (EPRI)		T.
FKS-G	Irr. Program at Geesthacht to Verify Safety Margins for German Licensing Rules	GKSS-Forschungszentrum	J.
FKS-K	Irr. program by KWU to verify safety margins for German licensing rules	Kraftwerkunion AG	J.
HAW-AN	Compilation of Results from Annealing Experiments by J.R. Hawthorne		J.
HFIR	HFIR Surveillance Program and Related Experiments at ORNL	Oak Ridge National Laboratory	R.
HSST-0	Heavy Section Steel Technology (HSST) Program, Initial Characterization	Oak Ridge National Laboratory	C.
HSST-1	Heavy Section Steel Irradiation (HSSI) Experiments, Series 1, at ORNL	Oak Ridge National Laboratory	W.
HSST-2	Heavy Section Steel Irradiation (HSSI) Experiments, Series 2, at ORNL	Oak Ridge National Laboratory	R.
HSST-3	Heavy Section Steel Irradiation (HSSI) Experiments, Series 3, at ORNL	Oak Ridge National Laboratory	R.
HSST-4	Heavy Section Steel Irradiation (HSSI) Experiments, Series 4, at ORNL	Oak Ridge National Laboratory	R.
IAEA	IAEA Co-ordinated Research Program for Irradiation of Advanced RPV Steels	Int. Atomic Energy Agency	
IAEAB	IAEA Co-ordinated Research Program: AERE Contribution	UK Atomic Energy Authority	L.
IAEAC	IAEA Co-ordinated Research Program: Skoda Contribution	Skoda National Corporation	M.
IAEAD	IAEA Co-ordinated Research Program: RISO Contribution	Riso National Laboratories	C.
IAEAF	IAEA Co-ordinated Research Program: CEN Contribution	Centre d'Etudes Nucléaires	P.
IAEAG	IAEA Co-ordinated Research Program: GKSS Contribution	GKSS	W.
IAEAI	IAEA Co-ordinated Research Program: Bhabha Contribution	Bhabha Atomic Research Centre	K.
IAEAJ	IAEA Co-ordinated Research Program: Japan At. Res. Inst. Contribution	Japan Atomic Energy Res. Inst.	S.
IAEAK	IAEA Co-ordinated Research Program: KFA Contribution	Kernforschungsanstalt	D.
IAEAM	IAEA Co-ordinated Research Program: Steel manufacturer's Contribution		
IAEAU	IAEA Co-ordinated Research Program: NRL Contribution	Naval Research Laboratory	J.
JPDR	Japan Power Demonstration Reactor (JPDR) Surveillance Program	Japan Atomic Energy Res. Inst.	M.
KFA	Misc. Irradiation Experiment Performed at the Kernforschungsanstalt (KFA), FRG	Kernforschungsanstalt	D.
KRB	Experiments Concerning the Decommisioned Reactor KRB-A, Gundremmingen, Germany	Materials Engineering Assoc.	J.
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.
MCD-AN	Compilation of Results from Annealing Experiments by B. McDonald		B.
MEA-AN	Post-irradiation Annealing Experiments at Materials Engineering Ass., Inc. (MEA)	Materials Engineering Assoc.	J.
MEA-RT	Study of the Influence of Fluence Rates on Irradiation Embrittlement at MEA	Materials Engineering Assoc.	J.
MOLBR3	Irradiation Experiments in Support of the BR3 Reactor at Mol, Belgium	Materials Engineering Assoc.	A.
MRI-1	Test of Hydrogen Influence in Steels performed at Materials Research, Idaho		C.
NRL-1	Exploratory Irradiation Studies of A533, A543, and A302 Steels at NRL	Naval Research Laboratory	J.
NRL-2	Irradiation Experiments with HSST Material at the Naval Research Laboratory	Naval Research Laboratory	J.
NRL-3	Test of Irradiation Sensitivity for Commercial and Improved Steels at NRL	Naval Research Laboratory	J.
NRL-4	Notch Ductility Degradation of Low Alloy Steels with Low-to Intermediate Fluence	Naval Research Laboratory	J.
NRL-AN	Investigation of Cyclic Irradiation and Annealing Effects in A533-B Welds	Naval Research Laboratory	J.
NRL-EP	NRL-EPRI Research Program (RP886-2)	Naval Research Laboratory	J.
ORRPSF	Surveillance Dosimetry Improvement Program, ORR-PSF Metallurgical Irradiation	Oak Ridge National Laboratory	J.
PR-EDB	Experiments in Support of U.S. Power Reactor Surveillance	Metal Properties Council	L.
RRA	Series of Experiments Performed at Rolls Royce Associates, UK.	Rolls Royce and Associates	T.
SM-1	Experiments with Demonstration Melt A533 Plates	Naval Research Laboratory	J.
SM-2	Exp. w. Split-Melts to Study the Influence of Residual Elements in A302-B Steels	Naval Research Laboratory	J.
SM-3	Exp. w. Split-Melts to Study the Influence of Residual Elements in A543 Steels	Naval Research Laboratory	J.
SM-4	Experiments with Split-Melts to Study Nickel-Copper Interactions	Materials Engineering Assoc.	J.
SM-5	Experiments with Split-Melts to Study Copper-Phosphorus Interaction	Materials Engineering Assoc.	J.
SRM	Irradiation of Standard Reference Materials in Power and Test Reactors	ASTM	J.
VDE	Steel Irradiation Program Sponsored by Verein Deutscher Eisenhüttenleute	Kernforschungsanstalt	D.
YR	Investigations in Support of the Yankee Rowe Reactor	Naval Research Laboratory	C.

_TR.dbf

HORS	LOCATION	REACTORS
. Hall, D.J. Seman	Pittsburgh, PA	ETR
. Kass, et al.	San Jose, CA	HM3
Guionnet, P. Petrequin, P. Soulat, et al.		
. Mager		UVAR
Alf, D. Beilmann, et al.	Geesthacht, Germany	FRG-2
Föhl, Ch. Leitz, D. Anders	Erlangen	VAK
. Hawthorne		
. Nanstad, et al.	Oak Ridge, TN	HFIR, ORR
. Childress, W.J. Steizman	Oak Ridge, TN	
. Steizman, G.R. Berggren, et al.	Oak Ridge, TN	ORR
. Nanstad, G.R. Berggren, et al.	Oak Ridge, TN	BSR
. Nanstad, G.R. Berggren, et. al.	Oak Ridge, TN	BSR
. Nanstad, G.R. Berggren, et al.	Oak Ridge, TN	BSR
	Vienna, Austria	
. Davies, et al.	Harwell, Oxfordshire, U.K.	HERALD
Brumovsky	Plzen, Czechoslovakia	WWR
. Debel	Roskilde, Denmark	
Petrequin, et al.	Saclay, France	TRITON
Spalthoff, et al.	Geesthacht, Germany	FRG-2, KKS, VAK
. Sivaramakrishnan	Bombay, India	CIRUS
Miyazono	Tokyo, Japan	JMTR
Pachur	Jülich, Germany	FRJ-1, FRJ-2
. Hawthorne	Washington, DC	UBR
Kawasaki, et al.	Tokyo, Japan	JPDR
Pachur	Jülich, Germany	FRJ-1, FRJ-2, HFR
. Hawthorne	Lanham, MD	UBR
. Serpan, Jr.		LITR, UCRR
McDonald		
. Hawthorne	Lanham, MD	UBR
. Hawthorne	Lanham, MD	UBR
Fabry, et al.	Lanham, MD	UBR
. Brinkman, J.M. Meeston		ETR, MTR
. Hawthorne	Washington, DC	LITR, MTR, UCRR
. Hawthorne	Washington, DC	MTR, UCRR
. Hawthorne	Washington, DC	UCRR
. Hawthorne	Washington, DC	UBR
. Hawthorne, H.E. Watson, F.J. Loss	Washington, DC	UBR
. Hawthorne, H.E. Watson	Washington, DC	BSR
. Hawthorne, et al.	Oak Ridge, TN	
. Steele, C.Z. Serpan, Jr.		
. Williams, et al.	Derby, England	DIDO, HERALD, PLUTO
. Hawthorne	Washington, DC	ATR, BR, ETR, UCRR
. Hawthorne	Washington, DC	LITR, UBR
. Hawthorne	Washington, DC	LITR
. Hawthorne	Lanham, MD	UBR
. Hawthorne	Lanham, MD	UBR
. Hawthorne		
Pachur	Jülich, Germany	FRJ-2
. Serpan, Jr., J.R. Hawthorne	Washington, DC	Y2

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Table 19 Partial listing of S_LST_TR.dbf

S_LST_TR.dbf: Page 1

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			PEETOS	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	
C	BWREXP	HM3	X03	FKKM01	CV					NEDO 21708	4-1; 4-11	
C	BWREXP	HM3	X03	PCPR02	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X03	PHA101	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X03	PML10X	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X03	PVY_01	CV	TL				NEDO 21708	4-1; 4-10	
C	BWREXP	HM3	X03	WCPR01	CV	TL				NEDO 21708	4-1; 4-11	

Table 20 Pa

SHFT_TR.dbf: Page 1

TAG	EXP_ID	PLANT_ID	CAPSULE	HEAT_ID	PROD_ID	SPEC_ORI	CSP_F1	FLU_TAG	EFP_TIME	TIME_U	F1_RATE	CSP_TEMP	UTT30	UTT50	ULE3
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	CTR	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	-4
C	CEA	MELUS	CHOUCA	PFRA1A	P	LT	6.560E+19	S	0.25	Y		285			
C	CEA	MELUS	CHOUCA	PFRA1B	P	LT	4.690E+19	S	0.25	Y		285	-39	-25	-3
C	CEA	MELUS	CHOUCA	PFRA1B	P	LT	5.250E+19	S	0.25	Y		285			
C	CEA	MELUS	CHOUCA	PFRA1C	P	LT	4.750E+19	S	0.25	Y		285	-31	-13	-2
C	CEA	MELUS	CHOUCA	PFRA1C	P	LT	5.320E+19	S	0.25	Y		285			
C	CEA	MELUS	CHOUCA	PFRA1D	P	LT	6.080E+19	S	0.25	Y		285	-42	-32	-4
C	CEA	MELUS	CHOUCA	PFRA1D	P	LT	7.370E+19	S	0.25	Y		285			
C	CEA	MELUS	CHOUCA	PFRA1E	P	LT	6.060E+19	S	0.25	Y		285	-24	-13	-2
C	CEA	MELUS	CHOUCA	PFRA1E	P	LT	6.690E+19	S	0.25	Y		285			
C	CEA	MELUS	CHOUCA	PFRA1F	P	LT	4.750E+19	S	0.25	Y		285			

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S	UUSE	U_FIT	ITT30	ITT50	ILE35	IUSE	I_FIT	DTT30	DTT50	DLE35	DUSE_ABS	DUSE_REL	TEMP_U	USE_U	REF_ID	PAGES	NOTES
			465					335					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			460					330					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			465					335					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			460					330					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			440					310					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			450					320					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			440					310					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			450					320					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			315					280					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			365					330					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			315					280					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			365					330					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			365					330					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			340					305					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			365					330					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
			340					305					F	ft-lb	WAPD-TM-1095	2; 3; 4; 17	
								0			5		F	ft-lb	NEDO-21708	4-11	
								18			10		F	ft-lb	NEDO-21708	4-11	
								0			2		F	ft-lb	NEDO-21708	4-11	
								75			0		F	ft-lb	NEDO-21708	4-10	
								22			0		F	ft-lb	NEDO-21708	4-10	
								5			4		F	ft-lb	NEDO-21708	4-10	
								0			0		F	ft-lb	NEDO-21708	4-10	
								0			13		F	ft-lb	NEDO-21708	4-11	
								0			8		F	ft-lb	NEDO-21708	4-11	
								0			10		F	ft-lb	NEDO-21708	4-10	
								17			4		F	ft-lb	NEDO-21708	4-11	
								18			5		F	ft-lb	NEDO-21708	4-11	
								21			13		F	ft-lb	NEDO-21708	4-11	
								93			10		F	ft-lb	NEDO-21708	4-10	
								35			0		F	ft-lb	NEDO-21708	4-10	
								5			2		F	ft-lb	NEDO-21708	4-10	
								0			5		F	ft-lb	NEDO-21708	4-10	
								0			3		F	ft-lb	NEDO-21708	4-11	
								65			19		F	ft-lb	NEDO-21708	4-11	
								0			3		F	ft-lb	NEDO-21708	4-10	
								36			5		F	ft-lb	NEDO-21708	4-11	
								46			8		F	ft-lb	NEDO-21708	4-11	
								32			11		F	ft-lb	NEDO-21708	4-11	
								113			19		F	ft-lb	NEDO-21708	4-10	
								30			0		F	ft-lb	NEDO-21708	4-10	
								85			36		F	ft-lb	NEDO-21708	4-10	
								0			8		F	ft-lb	NEDO-21708	4-10	
								18			0		F	ft-lb	NEDO-21708	4-11	
								100			28		F	ft-lb	NEDO-21708	4-11	
								18			0		F	ft-lb	NEDO-21708	4-10	
			37	62	53			81	95	94			C	J	ASTM STP 725/20	22; 28	
	195					139					56		C	J	ASTM STP 725/20	22; 32	
			29	44	41			68	69	74			C	J	ASTM STP 725/20	22; 28	
	200					162					38		C	J	ASTM STP 725/20	22; 32	
			11	20	16			42	32	44			C	J	ASTM STP 725/20	22; 28	
	192					169					23		C	J	ASTM STP 725/20	22; 32	
			-3	8	2			39	41	43			C	J	ASTM STP 725/20	22; 28	
	184					189					-5		C	J	ASTM STP 725/20	22; 32	
			39	50	44			63	63	65			C	J	ASTM STP 725/20	22; 28	
	192					153					39		C	J	ASTM STP 725/20	22; 32	
	232					186					46		C	J	ASTM STP 725/20	22; 32	

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Table 21 Partial listin

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TAG	EXP_ID	PLANT_ID	CAPSULE	HEAT_ID	PROD_ID	SPEC_ORI	CSP_F1	CSP_TEMP	ANN_TAG	ANN_TEMP	ANN_HRS	PLANT_ID_R	CAPSULE_R	CSP_F1_R	CSP_TEMP_R	VTT30	ETT
E	EPR-AN	UVAR	EX1	WEPR19	W	TL	8.400E+18	288	A17	427	55					-16	
E	EPR-AN	UVAR	EX1	WEPR19	W	TL	8.400E+18	288	A18	427	168					-16	
E	EPR-AN	UVAR	EX1	WEPR19	W	TL	8.400E+18	288	A19	454	1.5					-16	
E	EPR-AN	UVAR	EX1	WEPR19	W	TL	8.400E+18	288	A1F	316	2						
E	EPR-AN	UVAR	EX1	WEPR19	W	TL	8.400E+18	288	A1G	316	168						
E	EPR-AN	UVAR	EX1	WEPR19	W	TL	8.400E+18	288	A1H	343	184						
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A11	343	168					-21	
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A12	399	168					-21	
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A13	371	168					-2'	
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A14	399	1.5					-2'	
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A15	399	24					-21	
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A16	454	168					-2'	
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A18	427	168					-2'	
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A19	454	1.5					-2'	
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A1D	427	4					-2'	
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A1F	316	2						
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A1G	316	168						
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A1H	343	184						
E	EPR-AN	UVAR	EX1	WEPR23	W	TL	8.400E+18	288	A1I	427	16						
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.400E+18	288	A11	343	168					-67	
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.400E+18	288	A12	399	168					-67	
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.600E+18	288	A13	371	168					-67	
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.600E+18	288	A14	399	1.5					-67	
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.400E+18	288	A15	399	24					-6"	
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.400E+18	288	A16	454	168					-67	
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.400E+18	288	A18	427	168					-67	
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.400E+18	288	A19	454	1.5					-67	
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.400E+18	288	A1E	427	24					-67	
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.400E+18	288	A1F	316	2						
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.400E+18	288	A1G	316	168						
E	EPR-AN	UVAR	EX1	WEPR24	W	TL	8.400E+18	288	A1H	343	184						
E	EPR-AN	UVAR	EX2	WEPR19	W	TL	7.700E+18	288	A23	371	168	UVAR	EX2	7.700E+18	288	-16	
E	EPR-AN	UVAR	EX2	WEPR19	W	TL	7.700E+18	288	A26	454	168	UVAR	EX2	7.700E+18	288	-16	
E	EPR-AN	UVAR	EX2	WEPR19	W	TL	7.700E+18	288	A28	427	168	UVAR	EX2	7.700E+18	288	-16	
E	EPR-AN	UVAR	EX2	WEPR19	W	TL	7.700E+18	288	A2A	354	168	UVAR	EX2	7.700E+18	288	-16	
E	EPR-AN	UVAR	EX2	WEPR19	W	TL	7.700E+18	288	A2B	404	168	UVAR	EX2	7.700E+18	288	-16	
E	EPR-AN	UVAR	EX2	WEPR19	W	TL	7.700E+18	288	A2C	434	168	UVAR	EX2	7.700E+18	288	-16	
	EPR-AN	UVAR	EX2	WEPR19 A23	W	TL	7.700E+18	288	B23	371	168						
	EPR-AN	UVAR	EX2	WEPR19 A26	W	TL	7.700E+18	288	B26	454	168						
	EPR-AN	UVAR	EX2	WEPR19 A28	W	TL	7.700E+18	288	B28	427	168						
E	EPR-AN	UVAR	EX2	WEPR23	W	TL	7.700E+18	288	A23	371	168	UVAR	EX2	7.700E+18	288	-21	
E	EPR-AN	UVAR	EX2	WEPR23	W	TL	7.700E+18	288	A26	454	168	UVAR	EX2	7.700E+18	288	-21	
E	EPR-AN	UVAR	EX2	WEPR23	W	TL	7.700E+18	288	A28	427	168	UVAR	EX2	7.700E+18	288	-21	
E	EPR-AN	UVAR	EX2	WEPR23	W	TL	7.700E+18	288	A2A	354	168	UVAR	EX2	7.700E+18	288	-21	
E	EPR-AN	UVAR	EX2	WEPR23	W	TL	7.700E+18	288	A2B	404	168	UVAR	EX2	7.700E+18	288	-21	
E	EPR-AN	UVAR	EX2	WEPR23	W	TL	7.700E+18	288	A2C	434	168	UVAR	EX2	7.700E+18	288	-21	
	EPR-AN	UVAR	EX2	WEPR23 A23	W	TL	7.700E+18	288	B23	371	168						
	EPR-AN	UVAR	EX2	WEPR23 A26	W	TL	7.700E+18	288	B26	454	168						
	EPR-AN	UVAR	EX2	WEPR23 A28	W	TL	7.700E+18	288	B28	427	168						
E	EPR-AN	UVAR	EX2	WEPR24	W	TL	7.700E+18	288	A23	371	168	UVAR	EX2	7.700E+18	288	-67	
E	EPR-AN	UVAR	EX2	WEPR24	W	TL	7.700E+18	288	A26	454	168	UVAR	EX2	7.700E+18	288	-67	
E	EPR-AN	UVAR	EX2	WEPR24	W	TL	7.700E+18	288	A28	427	168	UVAR	EX2	7.700E+18	288	-67	
E	EPR-AN	UVAR	EX2	WEPR24	W	TL	7.700E+18	288	A2A	354	168	UVAR	EX2	7.700E+18	288	-67	
E	EPR-AN	UVAR	EX2	WEPR24	W	TL	7.700E+18	288	A2B	404	168	UVAR	EX2	7.700E+18	288	-67	
E	EPR-AN	UVAR	EX2	WEPR24	W	TL	7.700E+18	288	A2C	434	168	UVAR	EX2	7.700E+18	288	-67	
	EPR-AN	UVAR	EX2	WEPR24 A23	W	TL	7.700E+18	288	B23	371	168						
	EPR-AN	UVAR	EX2	WEPR24 A26	W	TL	7.700E+18	288	B26	454	168						

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0	DTT30	IATT30	RTT30	IARTT30	UUSE	IUSE	DUSE_ABS	IAUSE	RUSE_ABS	IARUSE	TEMP_U	USE_U	REF_ID	PAGES	NOTES
1	97	16	65		83	57	26	91	34		C	J	EPRI NP-2712/V2	7-9	
1	97	4	77		83	57	26	85	28		C	J	EPRI NP-2712/V2	7-9	
[illegible]	97	27	54		83	57	26	72	15		C	J	EPRI NP-2712/V2	7-9	
											C		EPRI NP-2712/V2	6-249	TENSILE ONLY
											C		EPRI NP-2712/V2	6-249	TENSILE ONLY
											C		EPRI NP-2712/V2	6-249	TENSILE ONLY
1	72	38	13		91	64	27	79	15		C	J	EPRI NP-2712/V2	7-10	
1	72	2	49		91	64	27	89	25		C	J	EPRI NP-2712/V2	7-10	
1	72	24	27		91	64	27	83	19		C	J	EPRI NP-2712/V2	7-10	
1	72	11	40		91	64	27	82	18		C	J	EPRI NP-2712/V2	7-10	
1	72	22	29		91	64	27	81	17		C	J	EPRI NP-2712/V2	7-10	
1	72	-12	63		91	64	27	96	32		C	J	EPRI NP-2712/V2	7-10	
1	72	1	50		91	64	27	95	31		C	J	EPRI NP-2712/V2	7-10	
1	72	7	44		91	64	27	87	23		C	J	EPRI NP-2712/V2	7-10	
1	72	-6	55		91	64	27	92	28		C	J	EPRI NP-2712/V2	7-10	
											C		EPRI NP-2712/V2	6-249	TENSILE ONLY
											C		EPRI NP-2712/V2	6-249	TENSILE ONLY
											C		EPRI NP-2712/V2	6-249	TENSILE ONLY
											C		EPRI NP-2712/V2	6-249	TENSILE ONLY
7	60	-9	2		180	138	42	156	18		C	J	EPRI NP-2712/V2	7-11	
7	60	-24	17		180	138	42	154	16		C	J	EPRI NP-2712/V2	7-11	
7	60	-25	18		180	138	42	163	25		C	J	EPRI NP-2712/V2	7-11	
7	60	-29	22		180	138	42	161	23		C	J	EPRI NP-2712/V2	7-11	
7	60	-25	18		180	138	42	169	31		C	J	EPRI NP-2712/V2	7-11	
7	60	-62	55		180	138	42	170	32		C	J	EPRI NP-2712/V2	7-11	
7	60	-52	45		180	138	42	174	36		C	J	EPRI NP-2712/V2	7-11	
7	60	-41	34		180	138	42	140	2		C	J	EPRI NP-2712/V2	7-11	
7	60	-36	29		180	138	42	171	33		C	J	EPRI NP-2712/V2	7-11	
											C		EPRI NP-2712/V2	6-249	TENSILE ONLY
											C		EPRI NP-2712/V2	6-249	TENSILE ONLY
											C		EPRI NP-2712/V2	6-249	TENSILE ONLY
				85	83					58	C	J	EPRI NP-2712/V2	7-9	
				28	83					64	C	J	EPRI NP-2712/V2	7-0	
				32	83					69	C	J	EPRI NP-2712/V2	7-9	
				82	83					50	C	J	EPRI NP-2712/V2	7-9	
				66	83					59	C	J	EPRI NP-2712/V2	7-9	
				26	83					67	C	J	EPRI NP-2712/V2	7-9	
5		65	20			58		60	2		C	J	EPRI NP-2712/V2	7-9	
8		-11	39			64		80	16		C	J	EPRI NP-2712/V2	7-9	
2		10	22			69		76	7		C	J	EPRI NP-2712/V2	7-9	
				49	91					73	C	J	EPRI NP-2712/V2	7-10	
				12	91					93	C	J	EPRI NP-2712/V2	7-10	
				37	91					90	C	J	EPRI NP-2712/V2	7-10	
				73	91					68	C	J	EPRI NP-2712/V2	7-10	
				45	91					78	C	J	EPRI NP-2712/V2	7-10	
				27	91					75	C	J	EPRI NP-2712/V2	7-10	
9		33	16			73		80	7		C	J	EPRI NP-2712/V2	7-10	
2		-10	22			93		104	11		C	J	EPRI NP-2712/V2	7-10	
7		-6	41			90		90	0		C	J	EPRI NP-2712/V2	7-10	
				-13	180					135	C	J	EPRI NP-2712/V2	7-11	
				-40	180					167	C	J	EPRI NP-2712/V2	7-11	
				-17	180					142	C	J	EPRI NP-2712/V2	7-11	
				9	180					129	C	J	EPRI NP-2712/V2	7-11	
				-2	180					140	C	J	EPRI NP-2712/V2	7-11	
				-29	180					145	C	J	EPRI NP-2712/V2	7-11	
3		-8	-5			135		146	11		C	J	EPRI NP-2712/V2	7-11	
0		-65	25			167		182	15		C	J	EPRI NP-2712/V2	7-11	

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Table 22 Partial listin

SHFTX_TR: Page 1

EXP_ID	PLANT_ID	CAPSULE	HEAT_ID	PROD_ID	SPEC_ORI	CSP_F1	FLU_TAG	EFP_TIME	TIME_U	F1_RATE	CS
HFIR	HFIR	2-2	FHFR02HB2	F	ST	5.260E+17	A	15.0	Y	1.110E+09	9
HFIR	HFIR	3-2	FHFR02HB3	F	ST	4.880E+17	A	15.0	Y	1.030E+09	9
HFIR	HFIR	4-3	FHFR01	F	TL	1.850E+17	A	17.5	Y	3.340E+08	9
HFIR	HFIR	5-1	PHFR01	P	LT	1.890E+16	A	15.0	Y	2.530E+07	9
HFIR	HFIR	A-X1	PHFR01	P	LT	1.150E+17	A	15.0	Y	2.430E+08	9
HFIR	HFIR	A-X2	PHFR01	P	LT	1.340E+17	A	17.5	Y	2.430E+08	9
HFIR	HFIR	B-X1	FHFR01	F	TL	3.440E+16	A	2.3	Y	4.660E+08	9
HFIR	HFIR	B-X2	FHFR01	F	TL	9.900E+16	A	6.4	Y	4.890E+08	9
HFIR	HFIR	B-X3	FHFR01	F	TL	2.310E+17	A	15.0	Y	4.890E+08	9
HFIR	HFIR	B-X4	FHFR01	F	TL	4.010E+17	A	17.5	Y	7.270E+08	9
HFIR	HFIR	C-X1	FHFR02HB2	F	ST	8.200E+16	A	2.3	Y	1.100E+09	9
HFIR	HFIR	C-X2	FHFR02HB2	F	ST	2.260E+17	A	[illegible].4	Y	1.100E+09	9
HFIR	HFIR	C-X3	FHFR02HB2	F	ST	6.140E+17	A	17.5	Y	1.100E+09	9
HFIR	HFIR	D-X1	FHFR02HB3	F	ST	9.550E+16	A	2.3	Y	1.290E+09	9
HFIR	HFIR	D-X2	FHFR02HB3	F	ST	2.840E+17	A	6.4	Y	1.400E+09	9
HFIR	HFIR	D-X3	FHFR02HB3	F	ST	7.120E+17	A	17.5	Y	1.030E+09	9
HFIR	ORR	HFC-3	PHFR01	P	TL	2.340E+18	A	70.0	H	9.590E+12	9
HFIR	ORR	HFC-4	PHFR01 10	P	TS	2.340E+18	A	70.0	H	9.590E+12	9
HFIR	ORR	HFC-P1	PHFR01	P	LT	2.340E+18	A	70.0	H	9.590E+12	9
HFIR	ORR	HFC-W1	WHFR01	W	TL	2.340E+18	A	70.0	H	9.590E+12	9
HFIR	ORR	HFC-W2	WHFR02	W	TL	2.340E+18	A	70.0	H	9.590E+12	9
VDE	FRJ-2	X01030	FVDE0D	F	LS	1.000E+19	A				30
VDE	FRJ-2	X01030	FVDE0D	F	LS	1.000E+19	A				30
VDE	FRJ-2	X01030	FVDE0D	F	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	FVDE0D	F	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	HHSS03	HAZ	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	HHSS03	HAZ	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	HVDE0B	HAZ	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	HVDE0B	HAZ	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	HVDE0C	HAZ	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	HVDE0C	HAZ	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	HVDE0D	HAZ	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	HVDE0D	HAZ	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	PVDE0B	P	LT	1.000E+19	A				30
VDE	FRJ-2	X01030	PVDE0B	P	LT	1.000E+19	A				30
VDE	FRJ-2	X01030	PVDE0B	P	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	PVDE0B	P	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	PVDE0C	P	LT	1.000E+19	A				30
VDE	FRJ-2	X01030	PVDE0C	P	LT	1.000E+19	A				30
VDE	FRJ-2	X01030	PVDE0C	P	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	PVDE0C	P	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	SHSS02A	SRM	LT	1.000E+19	A				30
VDE	FRJ-2	X01030	SHSS02A	SRM	LT	1.000E+19	A				30
VDE	FRJ-2	X01030	SHSS02A	SRM	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	SHSS02A	SRM	TL	1.000E+19	A				30
VDE	FRJ-2	X01030	WHSS03	W	TS	1.000E+19	A				30
VDE	FRJ-2	X01030	WHSS03	W	TS	1.000E+19	A				30
VDE	FRJ-2	X01030	WVDE0B	W	TS	1.000E+19	A				30
VDE	FRJ-2	X01030	WVDE0B	W	TS	1.000E+19	A				30
VDE	FRJ-2	X01030	WVDE0C	W	TS	1.000E+19	A				30
VDE	FRJ-2	X01030	WVDE0C	W	TS	1.000E+19	A				30
VDE	FRJ-2	X01030	WVDE0D	W	TS	1.000E+19	A				300
VDE	FRJ-2	X01030	WVDE0D	W	TS	1.000E+19	A				300
VDE	FRJ-2	X01040	FVDE0D	F	LS	1.000E+19	A				400
VDE	FRJ-2	X01040	FVDE0D	F	LS	1.000E+19	A				400
VDE	FRJ-2	X01040	FVDE0D	F	TL	1.000E+19	A				400
VDE	FRJ-2	X01040	FVDE0D	F	TL	1.000E+19	A				400

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E_U	FT_RATE	CSP_TEMP	UTTX	ITTX	DTTX	TT_DEF	TT_DEF_U	TEMP_U	REF_ID	PAGES	NOTES
	1.110E+09	95	-79		56	30	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	1.030E+09	95	-62		54	30	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	3.340E+08	95	-62		33	15	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	2.530E+07	95	-21		11	15	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	2.430E+08	95	-21		29	15	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	2.430E+08	95	-21		42	15	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	4.660E+08	95	-62		10	15	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	4.890E+08	95	-62		17	15	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	4.890E+08	95	-62		33	15	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	7.270E+08	95	-62		35	15	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	1.100E+09	95	-79		14	30	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	1.100E+09	95	-79		29	30	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	1.100E+09	95	-79		66	30	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	1.290E+09	95	-62		19	30	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	1.400E+09	95	-62		33	30	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	1.030E+09	95	-62		64	30	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	9.590E+12	95	-12		47	15	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	9.590E+12	95	-21		56	15	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	9.590E+12	95	-21		56	15	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	9.590E+12	95	-18		44	20	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
	9.590E+12	95	-21		47	20	FT-LB	C	ASTM STP 1046	21	ALSO ORNL/TM-1
		300	-73	-60		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-15	
		300	-65	-52		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-157	
		300	-75	-70		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-157	
		300	-65	-40		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-157	
		300	-64	-50		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 2; PP. 33-34	
		300	-58	-30		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 2; PP. 33-34	
		300	-47	-7		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 4; PP. 70-71	
		300	-37	1		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 4; PP. 70-71	
		300	-90	-26		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 6; PP. 112-113	
		300	-68	5		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 6; PP. 112-113	
		300	-55	-90		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-157	
		300	-38	-45		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-157	
		300	-24	-2		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 4; PP. 70-71	
		300	-15	14		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 4; PP. 70-71	
		300	-21	-2		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 4; PP. 70-71	
		300	-14	6		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 4; PP. 70-71	
		300	-87	-60		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 6; PP. 112-113	
		300	-65	-40		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 6; PP. 112-113	
		300	-80	-55		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 6; PP. 112-113	
		300	-65	-40		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 6; PP. 112-113	
		300	-16	1		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 2; PP. 33-34	
		300	-5	28		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 2; PP. 33-34	
		300	-15	7		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 2; PP. 33-34	
		300	1	23		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 2; PP. 33-34	
		300	-68	-30		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 2; PP. 33-34	
		300	-62	-13		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 2; PP. 33-34	
		300	-43	-23		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 4; PP. 70-71	
		300	-37	-8		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 4; PP. 70-71	
		300	-43	25		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 6; PP. 112-113	
		300	-32	44		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 6; PF. 112-113	
		300	-43	-45		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-157	
		300	-30	-20		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-157	
		400	-73	-46		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-157	
		400	-65	-33		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-157	
		400	-75	-60		3.5	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-157	
		400	-65	-40		5.2	MK/C2	C	BERICHT SUMMARY	TABLE 8; PP. 156-157	

Table 23 Partial listing of RAW_C_T

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TAG	EXP_ID	PLANT_ID	CAPSULE	HEAT_ID	PROD_ID	SPEC_ORI	SPEC_ID	TST_TEMP	TST_TEMP_U	IMP_E	IMP_
*	BET-AN	ETR	C-7	PBETOS	P	LT	S07	280.0	F	6.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S06	325.0	F	5.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S14	350.0	F	13.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S20	350.0	F	10.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S04	400.0	F	24.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S11	400.0	F	12.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S15	400.0	F	18.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S02*	425.0	F	24.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S13*	425.0	F	29.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S16	425.0	F	38.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S18*	425.0	F	22.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S27	425.0	F	23.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S09*	440.0	F	28.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S03*	450.0	F	41.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S08*	450.0	F	28.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S10*	450.0	F	23.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S24	450.0	F	25.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S26	450.0	F	22.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S29*	450.0	F	33.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S31	450.0	F	25.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S05*	475.0	F	36.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S17*	475.0	F	33.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S19	475.0	F	43.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S21	475.0	F	33.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S22	475.0	F	23.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S23	525.0	F	37.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S25	525.0	F	37.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S01	550.0	F	69.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S12	550.0	F	57.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S28	550.0	F	58.0	ft-l
*	BET-AN	ETR	C-7	PBETOS	P	LT	S30*	550.0	F	33.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U01	185.0	F	12.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U19	250.0	F	8.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U24	250.0	F	7.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U27*	250.0	F	7.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U31	275.0	F	11.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U10	300.0	F	20.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U26	310.0	F	12.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U30	320.0	F	9.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U02*	325.0	F	18.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U04*	325.0	F	43.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U11*	325.0	F	38.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U12*	325.0	F	31.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U15*	325.0	F	24.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U14*	350.0	F	29.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U17	350.0	F	18.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U23*	350.0	F	29.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U29*	350.0	F	28.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U08*	355.0	F	42.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U09	360.0	F	51.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U05	375.0	F	60.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U07	375.0	F	47.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U21*	375.0	F	41.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U25*	375.0	F	22.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U06	400.0	F	56.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U16	400.0	F	42.0	ft-l
*	BET-AN	ETR	C-7	PBETOU	P	LT	U18	400.0	F	42.0	ft-l

R.dbf

E_U	FRACT_APP	LAT_EXP	LAT_EXP_U	CSP_F1	CSP_TEMP	CSP_TEMP_U
b				1.240E+19	450	F
b				1.220E+19	450	F
b				1.560E+19	450	F
b				1.660E+19	450	F
b				1.150E+19	450	F
b				1.460E+19	450	F
b				1.560E+19	450	F
b				8.500E+18	450	F
b				1.490E+19	450	F
b				1.590E+19	450	F
b				1.650E+19	450	F
b				1.900E+19	450	F
b				1.390E+19	450	F
b				9.200E+18	450	F
b				1.350E+19	450	F
b				1.390E+19	450	F
b				1.730E+19	450	F
b				1.880E+19	450	F
b				2.100E+19	450	F
b				2.510E+19	450	F
b				1.150E+19	450	F
b				1.590E+19	450	F
b				1.650E+19	450	F
b				1.660E+19	450	F
b				1.700E+19	450	F
b				1.700E+19	450	F
b				1.730E+19	450	F
				8.300E+18	450	F
				1.460E+19	450	F
				1.950E+19	450	F
				2.290E+19	450	F
				7.800E+18	450	F
				1.950E+19	450	F
				2.370E+19	450	F
				2.530E+19	450	F
				2.930E+19	450	F
				1.120E+19	450	F
				2.510E+19	450	F
				2.730E+19	450	F
				8.100E+18	450	F
				9.000E+18	450	F
				1.150E+19	450	F
				1.270E+19	450	F
				1.660E+19	450	F
				1.500E+19	450	F
				1.880E+19	450	F
				2.290E+19	450	F
				2.630E+19	450	F
				1.020E+19	450	F
				1.050E+19	450	F
				9.000E+18	450	F
				9.200E+18	450	F
				2.170E+19	450	F
				2.390E+19	450	F
				9.000E+18	450	F
				1.730E+19	450	F
				1.900E+19	450	F

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Table 24 Partial listing of CV_RF_TR.dbf

CV_RF_TR: Page 2

TAG	EXP_ID	PLANT_ID	CAPSULE	HEAT_ID	PROD_ID	SPEC_ORI	TUP_TYPE	TUP_VEL	VEL_U	MAX_E	USE_U	REF_ID	PAGES	NOTES
	EPR-AM			WEPR24 A12	W	TL						EPRI NP-2712/V2	APP. G, P.1206	IA
	EPR-AM			WEPR24 A13	W	TL						EPRI NP-2712/V2	APP. G, P.1012	IA
	EPR-AM			WEPR24 A14	W	TL						EPRI NP-2712/V2	APP. G, P.1076	IA
	EPR-AM			WEPR24 A15	W	TL						EPRI NP-2712/V2	APP. G, P.1142	IA
	EPR-AM			WEPR24 A16	W	TL						EPRI NP-2712/V2	APP. G, P.1460	IA
	EPR-AM			WEPR24 A18	W	TL						EPRI NP-2712/V2	APP. G, P.1334	IA
	EPR-AM			WEPR24 A19	W	TL						EPRI NP-2712/V2	APP. G, P.1398	IA
	EPR-AM			WEPR24 A1E	W	TL						EPRI NP-2712/V2	APP. G, P.1272	IA
	EPR-AM			WEPR24 A33	W	TL						EPRI NP-2712/V2	APP. G, P.2158	IA
	EPR-AM			WEPR24 A36	W	TL						EPRI NP-2712/V2	APP. G, P.2220	IA
	EPR-AM			WEPR24 R23	W	TL						EPRI NP-2712/V2	APP. G, P.1906	IARA
	EPR-AM			WEPR24 R26	W	TL						EPRI NP-2712/V2	APP. G, P.2030	IARA
	EPR-AM			WEPR24 R28	W	TL						EPRI NP-2712/V2	APP. G, P.1968	IARA
	EPR-AM			WEPR24 RA	W	TL						EPRI NP-2712/V2	APP. G, P.722	HOMOGENEITY TEST
	EPR-AM			WEPR24 RH	W	TL						EPRI NP-2712/V2	APP. G, P.723	HOMOGENEITY TEST
	EPR-AM	UVAR	EX1	WEPR19	W	TL						EPRI NP-2712/V2	APP. G, P.787	
	EPR-AM	UVAR	EX1	WEPR23	W	TL						EPRI NP-2712/V2	APP. G, P.828	
	EPR-AM	UVAR	EX1	WEPR24	W	TL						EPRI NP-2712/V2	APP. G, P.867	
	EPR-AM	UVAR	EX2	WEPR19 A23	W	TL						EPRI NP-2712/V2	APP. G, P.1548	IAR
	EPR-AM	UVAR	EX2	WEPR19 A26	W	TL						EPRI NP-2712/V2	APP. G, P.1806	IAR
	EPR-AM	UVAR	EX2	WEPR19 A28	W	TL						EPRI NP-2712/V2	APP. G, P.1680	IAR
	EPR-AM	UVAR	EX2	WEPR19 A2A	W	TL						EPRI NP-2712/V2	APP. G, P.1482	IAR
	EPR-AM	UVAR	EX2	WEPR19 A2B	W	TL						EPRI NP-2712/V2	APP. G, P.1614	IAR
	EPR-AM	UVAR	EX2	WEPR19 A2C	W	TL						EPRI NP-2712/V2	APP. G, P.1744	IAR
	EPR-AM	UVAR	EX2	WEPR23 A23	W	TL						EPRI NP-2712/V2	APP. G, P.1570	IAR
	EPR-AM	UVAR	EX2	WEPR23 A26	W	TL						EPRI NP-2712/V2	APP. G, P.1828	IAR
	EPR-AM	UVAR	EX2	WEPR23 A28	W	TL						EPRI NP-2712/V2	APP. G, P.1702	IAR
	EPR-AM	UVAR	EX2	WEPR23 A2A	W	TL						EPRI NP-2712/V2	APP. G, P.1504	IAR
	EPR-AM	UVAR	EX2	WEPR23 A2B	W	TL						EPRI NP-2712/V2	APP. G, P.1636	IAR
	EPR-AM	UVAR	EX2	WEPR23 A2C	W	TL						EPRI NP-2712/V2	APP. G, P.1766	IAR
	EPR-AM	UVAR	EX2	WEPR24 A23	W	TL						EPRI NP-2712/V2	APP. G, P.1592	IAR
	EPR-AM	UVAR	EX2	WEPR24 A26	W	TL						EPRI NP-2712/V2	APP. G, P.1846	IAR
	EPR-AM	UVAR	EX2	WEPR24 A28	W	TL						EPRI NP-2712/V2	APP. G, P.1722	IAR
	EPR-AM	UVAR	EX2	WEPR24 A2A	W	TL						EPRI NP-2712/V2	APP. G, P.1526	IAR
	EPR-AM	UVAR	EX2	WEPR24 A2B	W	TL						EPRI NP-2712/V2	APP. G, P.1658	IAR
	EPR-AM	UVAR	EX2	WEPR24 A2C	W	TL						EPRI NP-2712/V2	APP. G, P.1784	IAR
	EPR-AM	UVAR	EX3	WEPR19	W	TL						EPRI NP-2712/V2	APP. G, P.2050	
	EPR-AM	UVAR	EX3	WEPR23	W	TL						EPRI NP-2712/V2	APP. G, P.2070	
	EPR-AM	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	LT						ORNL/TM-10444	93; 117	CODES IC3, HB1A, AND HB4A
	HFIR			PHFR01	P	TL						ORNL/TM-10444	143	1/4-IN. DEPTH
	HFIR			PHFR01 10	P	LS						ORNL/TM-10444	123	1-IN. DEPTH; D92W DID NOT BREA
	HFIR			PHFR01 10	P	TL						ORNL/TM-10444	143	1-IN. DEPTH
	HFIR			PHFR01 10	P	TS						ORNL/TM-10444	142	1-IN. DEPTH;MD25 FROM 1/4-IN.L
	HFIR			PHFR01X	P	LT						ORNL/TM-10444	120	MD60, MD6E, MD2A, MD6A: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; 116	CODE HB2

Table 25 Partial listing of TEN_TR

TEN_TR.dbf: Page 1

EXP_ID	PLANT_ID	CAPSULE	HEAT_ID	PROD_ID	SPEC_ORI	TSP_FI	TSP_TEMP	SPEC_ID	TST_TEMP	TEMP_U	YSL	YSU	UTS	STRE
CEA			FFRAR2	F	T				25	C	462.0		594.0	MPa
CEA			FFRAR2	F	T				290	C	436.0		592.0	MPa
CEA			PFRAR1	P	T				25		434.0		583.0	MPa
CEA			PFRAR1	P	T				290		410.0		581.0	MPa
CEA			WFRA00	W	T				RT	C	526.0		599.0	MPa
CEA			WFRA01	W	T				RT	C	529.0		602.0	MPa
CEA			WFRA02	W	T				RT	C	516.0		581.0	MPa
CEA			WFRA03	W	T				RT	C	538.0		616.0	MPa
CEA			WFRA04	W	T				RT	C	556.0		627.0	MPa
CEA			WFRA05	W	T				RT	C	482.0		568.0	MPa
CEA			WFRA06	W	T				RT	C	456.0		546.0	MPa
CEA			WFRA07	W	T				RT	C	514.0		607.0	MPa
CEA			WFRA08	W	T				RT	C	542.0		627.0	MPa
CEA			WFRA11	W	T				RT	C	517.0		627.0	MPa
CEA			WFRA12	W	T				RT	C	433.0		555.0	MPa
CEA			WFRA13	W	T				RT	C	470.0		584.0	MPa
CEA			WFRA14	W	T				RT	C	480.0		601.0	MPa
CEA			WFRA15	W	T				RT	C	426.0		548.0	MPa
CEA	TRITON	XX	FFRAR2	F	T	3.100E+19	290		70	C	550.0		665.0	MPa
CEA	TRITON	XX	FFRAR2	F	T	3.100E+19	290		290	C	504.0		638.0	MPa
CEA	TRITON	XX	PFRAR1	P	T	3.100E+19	290		80	C	494.0		633.0	MPa
CEA	TRITON	XX	PFRAR1	P	T	3.100E+19	290		290	C	470.0		631.0	MPa
EPR-AN			WEPR19	W	T			EE4	32	F	75.0		91.0	ksi
EPR-AN			WEPR19	W	T			EE10	75	F	67.0		86.0	ksi
EPR-AN			WEPR19	W	T			EE5	75	F	71.0		89.0	ksi
EPR-AN			WEPR19	W	T			EE3	120	F	71.0		87.0	ksi
EPR-AN			WEPR19	W	T			EE1	200	F	67.0		63.0	ksi
EPR-AN			WEPR19	W	T			EE12	200	F	68.0		82.0	ksi
EPR-AN			WEPR19	W	T			EE2	300	F	66.0		81.0	ksi
EPR-AN			WEPR19	W	T			EE6	400	F	64.0		80.0	ksi
EPR-AN			WEPR19	W	T			EE7	550	F	64.0		81.0	ksi
EPR-AN			WEPR19 A11	W	T			E7	75	F	73.0		91.0	ksi
EPR-AN			WEPR19 A11	W	T			E8	75	F	67.0		83.0	ksi
EPR-AN			WEPR19 A15	W	T			E6	75	F	76.[illegible]		91.0	ksi
EPR-AN			WEPR19 A18	W	T			E4	75	F	78.0		93.0	ksi
EPR-AN			WEPR19 A1F	W	T			E5	75	F	89.0		102.0	ksi
EPR-AN			WEPR19 A1G	W	T			E1	75	F	88.0		103.0	ksi
EPR-AN			WEPR19 A1H	W	T			E2	75	F	78.0		92.0	ksi
EPR-AN			WEPR19 A31	W	T			E25	75	F	90.0		111.0	ksi
EPR-AN			WEPR19 A33	W	T			E26	75	F	94.0		106.0	ksi
EPR-AN			WEPR19 R21	W	T			E18	75	F	72.0		91.0	ksi
EPR-AN			WEPR19 R23	W	T			E19	75	F	87.0		102.0	ksi
EPR-AN			WEPR19 R28	W	T			E13	75	F	76.0		92.0	ksi
EPR-AN			WEPR23	W	T			PP4	32	F	68.0		86.0	ksi
EPR-AN			WEPR23	W	T			PP5	75	F	63.0		68.0	ksi
EPR-AN			WEPR23	W	T			PP10	75	F	66.0		84.0	ksi
EPR-AN			WEPR23	W	T			PP3	120	F	64.0		83.0	ksi
EPR-AN			WEPR23	W	T			PP1	200	F	62.0		78.0	ksi
EPR-AN			WEPR23	W	T			PP12	200	F	61.0		77.0	ksi
EPR-AN			WEPR23	W	T			PP2	300	F	59.0		76.0	ksi
EPR-AN			WEPR23	W	T			PP6	400	F	57.0		77.0	ksi
EPR-AN			WEPR23	W	T			PP7	550	F	57.0		77.0	ksi
EPR-AN			WEPR23 A11	W	T			P7	75	F	70.0		72.0	ksi
EPR-AN			WEPR23 A11	W	T			P8	75	F	64.0		80.0	ksi
EPR-AN			WEPR23 A15	W	T			P6	75	F	68.0		84.0	ksi
EPR-AN			WEPR23 A18	W	T			P4	75	F	73.0		91.0	ksi
EPR-AN			WEPR23 A1F	W	T			P5	75	F	82.0		97.0	ksi

.dbf

S_U	ULG	TLG	RA	SPEC_DIAM	GAGE_LEN	TOTAL_LEN	LENGTH_U	REF_ID	PAGES
								ASTM STP 819/64	65; 66
								ASTM STP 819/64	65; 66
								ASTM STP 819/64	65; 66
								ASTM STP 819/64	65; 66
		22.0	74.0		50		mm	ASTM STP 782/392	397
		26.5	74.0		50		mm	ASTM STP 782/392	397
		26.7	73.5		50		mm	ASTM STP 782/392	397
		25.0	70.0		50		mm	ASTM STP 782/392	397
		23.6	69.5		50		mm	ASTM STP 782/392	397
		26.7	70.0		50		mm	ASTM STP 782/392	397
		26.6	68.0		50		mm	ASTM STP 782/392	397
		27.0	69.5		50		mm	ASTM STP 782/392	397
		24.8	66.0		50		mm	ASTM STP 782/392	397
		20.3			50		mm	ASTM STP 782/392	397
		28.8	70.0		50		mm	ASTM STP 782/392	397
		27.6	64.5		50		mm	ASTM STP 782/392	397
		28.1	68.0		50		mm	ASTM STP 782/392	397
		31.0	70.5		50		mm	ASTM STP 782/392	397
								ASTM STP 819/64	65; 66
								ASTM STP 819/64	65; 66
								ASTM STP 819/64	65; 66
								ASTM STP 819/64	65; 66
	11.0	24.6	63.0					EPRI NP-2712/V2	G-247
	12.3	22.3	51.0					EPRI NP-2712/V2	G-247
	10.3	23.3	63.0					EPRI NP-2712/V2	G-247
	9.9	24.4	63.0					EPRI NP-2712/V2	G-247
	8.4	21.2	63.0					EPRI NP-2712/V2	G-247
	11.3	27.4	55.0					EPRI NP-2712/V2	G-247
	8.4	20.0	60.0					EPRI NP-2712/V2	G-247
	9.4	20.3	60.0					EPRI NP-2712/V2	G-247
	8.8	16.9	55.0					EPRI NP-2712/V2	G-247
	12.1	25.6	61.0					EPRI NP-2712/V2	G-249
	11.1	22.9	61.0					EPRI NP-2712/V2	G-249
	9.8	19.9	58.0					EPRI NP-2712/V2	G-249
	11.3	22.6	61.0					EPRI NP-2712/V2	G-249
	11.1	22.4	57.0					EPRI NP-2712/V2	G-249
	11.9	22.3	61.0					EPRI NP-2712/V2	G-249
	10.4	19.1	57.0					EPRI NP-2712/V2	G-249
	10.9	22.7	61.0					EPRI NP-2712/V2	G-251
	11.7	23.3	56.0					EPRI NP-2712/V2	G-251
	11.3	23.3	58.0					EPRI NP-2712/V2	G-251
	12.2	23.8	56.0					EPRI NP-2712/V2	G-251
	12.2	24.5	58.0					EPRI NP-2712/V2	G-251
	13.1	27.3	68.0	4.52			mm	EPRI NP-2712/V2	G-253
	13.1	26.8	63.0	4.52			mm	EPRI NP-2712/V2	G-253
	15.0	27.8	65.0	4.52			mm	EPRI NP-2712/V2	G-253
	11.1	25.1	63.0	4.52			mm	EPRI NP-2712/V2	G-253
	11.2	23.8	65.0	4.52			mm	EPRI NP-2712/V2	G-253
	10.3	21.3	63.0	4.52			mm	EPRI NP-2712/V2	G-253
	10.4	21.8	63.0	4.52			mm	EPRI NP-2712/V2	G-253
	10.7	21.2	63.0	4.52			mm	EPRI NP-2712/V2	G-253
	8.8	18.0	60.0	4.52			mm	EPRI NP-2712/V2	G-253
	12.8	25.0	63.0					EPRI NP-2712/V2	G-255
	11.3	22.6	59.0					EPRI NP-2712/V2	G-255
	10.0	20.5	59.0					EPRI NP-2712/V2	G-255
	11.3	24.4	59.0					EPRI NP-2712/V2	G-255
	11.3	23.3	59.0					EPRI NP-2712/V2	G-255

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Table 26 Listing of R_LST_TR.dbf

R_LST_TR.dbf: Page 1

TAG	PLANT_ID	REAC_TYPE	REAC_NAME	LOCATION	PLANT_OP	PLANT_DES
	ATR	TR	Advanced Test Reactor	Washington, DC	Naval Research Laboratory	
	BGR	TR	Brookhaven Graphite Reactor		Brookhaven National Laboratory	
	BSR	TR	Bulk Shielding Reactor	Oak Ridge, Tennessee	Oak Ridge National Laboratory	
	CIRUS				BARC, India	
	CVTR	TR	Carolinas Virginia Tube Reactor	Parr, South Carolina		
	DIDO		DIDO Heavy Water Research Reactor	Harwell, U.K.	AERE Harwell, U.K.	
	ETR	TR	Engineering Test Reactor		Bettis Atomic Power Laboratory	
	FRG-2	TR	Forschungs Reaktor Geesthacht FRG-2	Geesthacht, Germany		
	FRJ-2	TR	Forschungs Reaktor Jülich FRJ-2	Jülich, Germany	Kernforschungsanstalt (KFA), Jülich, Germany	
	HERALD	TR	HERALD Light Water Research Reactor	Harwell, U.K.	AERE, Harwell, U.K.	
	HFIR		High Flux Isotope Reactor	Oak Ridge, Tennessee	Oak Ridge National Laboratory	
	HWCTR	TR				
	IRL	TR	Industrial Reactor Laboratory	Plainsboro, New Jersey		
	JMTR	LWR	Japan Material Testing Reactor	Japan	JAERI, Japan	
	JPDR	TR	Japan Power Demonstration Reactor	Tokaimura, Japan	Japan Atomic Energy Research Institute (JAERI)	
	KE	TR	Hanford K Production Reactor East			
	KWU				KWU, Germany	
	KWU-DB		Unknown Reactors Used in KWU Data Base			
	LITR	TR	Low Intensity Test Reactor	Oak Ridge, Tennessee	Oak Ridge National Laboratory	
	MELUS	TR	Melusine	Grenoble, France	DMG-SEN, France	
	MERLIN		MERLIN			
	MTR	TR	Materials Test Reactor		National Reactor Test Station	
	NRLX	TR	Unspecified Reactor Experiment		Naval Research Laboratory	
	ORR		Oak Ridge Research Reactor	Oak Ridge, Tennessee	Oak Ridge National Laboratory	
	PLUTO	TR	PLUTO Heavy Water Research Reactor			
	TRINO1	TR	Test Reactor		Westinghouse	
	TRITON	LWR	Triton	Fontenay-aux-Roses, France	SEN, France	
	UBR	TR	University of Buffalo Reactor	Buffalo, New York	Nuclear Science and Technology Facility, SUNY	
	UCRR	TR	Union Carbide Research Reactor	Tuxedo, New York		
	FRJ-1	TR	Forschungs Reaktor Jülich FRJ-1	Jülich, Germany	Kernforschungsanstalt (KFA), Jülich, Germany	
	UVAR	TR	University of Virginia Research Reactor			
	VAK	BWR	Versuchsatomkraftwerk	Kahl, Germany		
	WR1	TR	Westinghouse Reactor 1		Westinghouse	
	WR2	TR	Westinghouse Reactor 2		Westinghouse	
	WR3	TR	Westinghouse Reactor 3		Westinghouse	
	WWRS	LWR		Skoda, Czechoslovakia		
	XFRR	TR	Unspecified (TRITON, SILOE, MELUSINE, OSIRIS)	France	Saclay, France	

Table 27 Partial li

REAC_TR.dbf: Page 1

TAG	EXP_ID	PLANT_ID	CAPSULE	START_DATE	STOP_DATE	CONFIG	EFP_TIME	TIME_U	CAP_T_MIN	CAP_T_MAX	CAP_T_NOM	TEMP_RANGE	TEMP_U	TEMP_TAG	CAP_FT	F1_UNC
E	RET-AN	ETR	C-7								450		F			
E	BWREXP	HK3	X01								545		F	1	2.000E+17	
E	BWREXP	HK3	X02								545		F	1	1.500E+18	
E	BWREXP	HK3	X03								545		F	1	3.700E+18	
E	CEA	MELUS	CHOUCA				0.25	Y	285	295	288		C	T	5.000E+19	
E	CEA	TRITON	SIAT								290		C	T	3.000E+19	
E	CEA	XFRR	XX													
E	EPR-AN	UVAR	EX1	01/ /1979	04/ /1979		91	D	286	291	288		C	T	8.400E+18	
E	EPR-AN	UVAR	EX2	05/ /1979	09/ /1979	1 OF 2	153	D	275	302	288		C	T	7.500E+18	
E	EPR-AN	UVAR	EX2	10/ /1979	02/ /1980	2 OF 2	152	D	274	302	288		C	T	7.500E+18	
E	EPR-AN	UVAR	EX3	10/ /1979	05/ /1980		170	D	273	303	288		C	T	1.500E+19	
E	FKS-K	VAK	A1				100	D	282	288			C	M	2.000E+19	
E	FKS-K	VAK	A1/B1				100	D	282	288			C	M	2.000E+19	
E	FKS-K	VAK	B1				100	D	282	288			C	M	2.000E+19	
E	FKS-K	VAK	I				174	D			315		C	M		
E	FKS-K	VAK	II-1				41	D			285		C	M		
E	FKS-K	VAK	II-2				81	D			285		C	M		
E	FKS-K	VAK	II-3				164	D			285		C	M		
E	KAW-AN	UBR	84-02								550		F		2.400E+19	
E	KAW-AN	UCRR	A4 64								500		F			
E	KAW-AN	UCRR	C3 55								550		F			
E	KAW-AN	UCRR	D3 72								550		F			
E	KAW-AN	UCRR	D3 74								550		F			
E	KAW-AN	UCRR	D3 78								550		F			
E	HFIR	HFIR	1-1	11/08/1965	08/04/1969		2.3	Y	120	129			F	1	3.810E+16	
E	HFIR	HFIR	1-2	11/08/1965	10/18/1983		15.0	Y	120	129			F	1	2.870E+17	
E	HFIR	HFIR	1-3	11/08/1965	11/15/1986		17.5	Y	120	129			F	1	4.020E+17	
E	HFIR	HFIR	1-4	11/08/1965	02/14/1974		6.4	Y	120	129			F	1	1.230E+17	
E	HFIR	HFIR	1-6	11/08/1965	08/04/1969		2.3	Y	120	129			F	1	3.060E+16	
E	HFIR	HFIR	1-9	11/08/1965	02/14/1974		6.4	Y	120	129			F	1	7.580E+16	
E	HFIR	HFIR	2-1	11/08/1965	08/04/1969		2.3	Y	120	129			F	1	8.180E+16	
E	HFIR	HFIR	2-13	11/08/1965	02/14/1974		6.4	Y	120	129			F	1	2.260E+17	
E	HFIR	HFIR	2-14	11/08/1965	08/04/1969		2.3	Y	120	129			F	1	8.180E+16	
E	HFIR	HFIR	2-2	11/08/1965	10/18/1983		15.0	Y	120	129			F	1	5.260E+17	
E	HFIR	HFIR	2-4	11/08/1965	02/14/1974		6.4	Y	120	129			F	1	2.260E+17	
E	HFIR	HFIR	2-5	11/08/1965	11/15/1986		17.5	Y	120	129			F	1	6.140E+17	
E	HFIR	HFIR	2-7	11/08/1965	11/15/1986		17.5	Y	120	129			F	1	6.140E+17	
E	HFIR	HFIR	3-1	11/08/1965	08/04/1969		2.3	Y	120	129			F	1	8.620E+16	
E	HFIR	HFIR	3-2	11/08/1965	10/18/1983		15.0	Y	120	129			F	1	4.880E+17	
E	HFIR	HFIR	3-3	11/08/1965	11/15/1986		17.5	Y	120	129			F	1	5.030E+17	
E	HFIR	HFIR	3-4	11/08/1965	02/14/1974		6.4	Y	120	129			F	1	2.090E+17	
E	HFIR	HFIR	3-5	11/08/1965	11/15/1968		17.5	Y	120	129			F	1	6.470E-17	
E	HFIR	HFIR	3-6	11/08/1965	08/04/1969		2.3	Y	120	129			F	1	1.050E+17	
E	HFIR	HFIR	3-8	11/08/1965	11/13/1986		17.5	Y	120	129			F	1	9.840E+17	
E	HFIR	HFIR	3-9	11/08/1965	02/14/1974		6.4	Y	120	129			F	1	3.230E+17	
E	HFIR	HFIR	4-1	11/08/1965	08/04/1969		2.3	Y	120	129			F	1	3.060E+16	
E	HFIR	HFIR	4-2	11/08/1965	10/18/1983		15.0	Y	120	129			F	1	1.770E+17	
E	HFIR	HFIR	4-3	11/08/1965	11/15/1986		17.5	Y	120	129			F	1	1.850E+17	
E	HFIR	HFIR	4-4	11/08/1965	02/14/1974		6.4	Y	120	129			F	1	7.580E+16	
E	HFIR	HFIR	4-6	11/08/1965	08/04/1969		2.3	Y	120	129			F	1	3.810E+16	
E	HFIR	HFIR	4-8	11/08/1965	11/15/1986		17.5	Y	120	129			F	1	4.020E+17	
E	HFIR	HFIR	4-9	11/08/1965	02/14/1974		6.4	Y	120	129			F	1	1.230E+17	
E	HFIR	HFIR	5-1	11/08/1965	10/18/1983		15.0	Y	120	129			F	1	1.200E+16	
E	HFIR	HFIR	6-1	11/08/1965	10/18/1983		15.0	Y	120	129			F	1	1.130E+17	
E	HFIR	HFIR	6-2	11/06/1965	11/15/1986		17.5	Y	120	129			F	1	1.330E+17	
E	HFIR	HFIR	6-3	11/08/1965	11/15/1986		17.5	Y	120	129			F	1	1.220E+17	
E	HFIR	HFIR	7-6	11/08/1965	11/15/1986		17.5	Y	120	129			F	1	1.310E+17	

sting of REAC_TR.dbf

FLU_FAC	F1_RATE	CAP_FP1	FP1_TO_F1	FP1_UNC	CAP_FISS	F1_TO_FISS	CAP_DPA	DPA_TO_F1	DPA_UNC	REF_ID	PAGES	NOTES
				±10						WAPD-TM-1095	2; 3	RANGE OF FLUENCES
										NEDO-21708	4-11	
										NEDO-21708	4-11	
										NEDO-21708	4-11	
S	7.000E+12		2.03					1.320E-21		ASTM STP 725/20	23 - 26	
S							2.500E-02			ASTM STP 819/63	66; 68	
										ASTM STP 819/29	30	UNSPECIFIED CEA TEST REACTOR
										EPRI NP-2712/V2	6-1 TO 6-8	
										EPRI NP-2712/V2	6-1 TO 6-8	BEFORE ANNEALING
										EPRI NP-2712/V2	6-1 TO 6-8	AFTER ANNEALING
										EPRI NP-2712/V2	6-1 TO 6-8	
A	2.200E+12									ASTM STP 782/520	531 - 534	
A	2.200E+12									ASTM STP 782/520	531 - 534	COMBINATION CAPSULES A1 AND B1
A	2.200E+12									ASTM STP 782/520	531 - 534	
S										ASTM STP 782/412	416 - 417	RANGE OF FLUENCES
S										ASTM STP 782/412	416 - 417	RANGE OF FLUENCES
S										ASTM STP 782/412	416 - 417	RANGE OF FLUENCES
S										ASTM STP 782/412	416 - 417	RANGE OF FLUENCES
S		7.100E+19			2.000E+19					NRL 8287	24	ADDITIONAL DATA FROM MPC
F					2.300E+19					NRL 8287	24	
F					2.000E+19					NRL 8287	10; 24	STRESS APPLIED DURING IRR.
F					3.000E+19					NRL 8287	24	
F					2.700E+19					NRL 8287	24	
F					3.600E+19					NRL 8287	24	
A	5.170E+08									ORNL/TM-10444	14; 15; 89; 221	
A	6.060E+08									ORNL/TM-10444	14; 15; 90; 221	
A	7.270E+08									ORNL/TM-10444	14; 15; 90; 221	
A	6.060E+08									ORNL/TM-10444	14; 15; 89; 221	
A	4.160E+08									ORNL/TM-10444	14; 15; 89; 221	
A	3.730E+08									ORNL/TM-10444	14; 15; 89; 221	
A	1.110E+09						1.160E-04			ORNL/TM-10444	14; 15; 91; 222	DPA FROM ASTM STP 1046, P.21
A	1.110E+09						3.210E-04			ORNL/TM-10444	14; 15; 91; 223	DPA FROM ASTM STP 1046, P.21
A	1.110E+09						1.160E-04			ORNL/TM-10444	14; 15; 91; 223	DPA FROM ASTM STP 1046, P.21
A	1.110E+09						7.470E-04			ORNL/TM-10444	14; 15; 91; 222	DPA FROM ASTM STP 1046, P.21
A	1.110E+09						3.210E-04			ORNL/TM-10444	14; 15; 91; 222	DPA FROM ASTM STP 1046, P.21
A	1.110E+09						8.730E-04			ORNL/TM-10444	14; 15; 91; 222	DPA FROM ASTM STP 1046, P.21
A	1.110E+09						8.730E-04			ORNL/TM-10444	14; 15; 91; 222	DPA FROM ASTM STP 1046, P.21
A	1.170E+09									ORNL/TM-10444	14; 15; 92; 223	
A	1.030E+09						7.010E-04			ORNL/TM-10444	14; 15; 92; 223	DPA FROM ASTM STP 1046, P.21
A	9.200E+08									ORNL/TM-10444	14; 15; 92; 223	
A	1.030E+09									ORNL/TM-10444	14; 15; 92; 223	
A	1.170E+09									ORNL/TM-10444	14; 15; 92; 224	
A	1.420E+09									ORNL/TM-10444	14; 15; 92; 224	
A	1.780E+09									ORNL/TM-10444	14; 15; 92; 224	
A	1.780E+09									ORNL/TM-10444	14; 15; 92; 224	
A	4.160E+08									ORNL/TM-10444	14; 15; 89; 224	
A	3.730E+08									ORNL/TM-10444	14; 15; 90; 224	
A	3.340E+08						2.700E-04			ORNL/TM-10444	14; 15; 90; 225	DPA FROM ASTM STP 1046, P.21
A	3.730E+08									ORNL/TM-10444	14; 15; 89; 225	
A	5.170E+08									ORNL/TM-10444	14; 15; 89; 225	
A	7.270E+08									ORNL/TM-10444	14; 15; 90; 225	
A	6.060E+08									ORNL/TM-10444	14; 15; 89; 225	
A	2.530E+07									ORNL/TM-10444	14; 15; 93; 226	CAP_F1 AND F1_RATE: ESTIMATED
A	2.380E+08									ORNL/TM-10444	14; 15; 93; 226	
A	2.400E+08									ORNL/TM-10444	14; 15; 93; 227	
A	2.210E+08									ORNL/TM-10444	14; 15; 93; 227	
A	2.370E+08									ORNL/TM-10444	14; 15; 93; 228	

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Table 28 Listing of H_LST_TR.dbf

H_LST_TR.dbf: Page 1

TAG	EXP_ID	HEAT_ID	RPI_ID	HEAT_NO	PROD_ID	MAT_ID	SUPPLIER	THICKNESS	LENGTH_U	SOURCE	MPC_ID	MPC_HEAT	REF_ID	PAGES	NOTES
E	BET-AN	PBETOP	CODE P	A4658	P	A3028		8.375	in				WAPD-TM-1095	2	ALSO SEE WAPD-TM-895
E	BET-AN	PBETOS	CODE S, SHELL NO. 1	20869-1	P	A3028		4.0	in				WAPD-TM-1095	2	ALSO SEE WAPD-TM-895
E	BET-AN	PBETOU	CODE U, SHELL NO. 2	21478-10	P	A3028		4.0	in				WAPD-TM-1095	2	ALSO SEE WAPD-TM-895
E	BWREXP	F98340	HEAT 9-8340	98340	F	A5082					E16	98340	NEDO-21708	1-1; 4-1; 4-8; 4-11	
E	BWREXP	FE28VW	HEAT F28VW	F28VW	F	A5082					E16	F28VW	NEDO-21708	1-1;4-1;4-8;4-11;A-7	
E	BWREXP	FKKM01	KKM FORGING		F	A5082					E16	KKM	NEDO-21708	1-1; 4-1; 4-8; 4-11	
E	BWREXP	PCPR02	G3802-1 FOR HAZ & W	C2331-2	P	A53381					E16	23312	NEDO-21708	4-1; 4-8; 4-10	
E	BWREXP	PHA101	G4804-2	C4114-2	P	A53381	LUKENS STEEL				E16	41142	NEDO-21708	4-1; 4-8; 4-10	
E	BWREXP	PML10X		C5013-2	P	A3028	LUKENS STEEL				E16	50132	NEDO-21708	4-1; 4-8; 4-10	MAY BE PML102, SEE NEDC-30833
E	BWREXP	PVY_01	PC. 1-14	C3017-2	P	A53381	LUKENS STEEL				E16	30172	NEDO-21708	4-1; 4-8; 4-10	
E	BWREXP	WCPR01	G2802-1 AND G2802-2		W	A53381	COMBUSTION ENG.			SIM	E16		NEDO-21708	4-1; 4-8; 4-11	SEE MDE-103-0986
E	BWREXP	WML102			W	A5336					E16		NEDO-21708	4-1; 4-8; 4-11	
E	BWREXP	WVY_01			W	A53381	CHICAGO BRIDGE				E16		NEDO-21708	4-1; 4-8; 4-10	
E	CEA	FFRA0B	CODE B		F	A5083					E27	B	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	FFRA0C	CODE C		F	A5083					E27	C	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	FFRA0D	CODE D		F	A5083					E27	D	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	FFRA0E	CODE E		F	A5083					E27	E	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	FFRA0F	CODE F		F	A5083					E27	F	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	FFRA0G	CODE G		F	A5083					E27	G	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	FFRA0J	CODE J		F	A5083					E27	J	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	FFRAJ2	CODE J2		F	A5083					E27	J21,J22	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	FFRAP1	CODE P1		F	A5083							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	FFRAP2	CODE P2		F	A5083							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	FFRAP3	CODE P3		F	A5083							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	FFRAR2	CODE R2		F	A5083					E27	R2	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	PFRA0A	CODE A		P	A53381					E27	A	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	PFRA0H	CODE H		P	A53381					E27	H	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	PFRA0K	CODE K		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA0L	CODE L		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA0M	CODE M		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA0W	CODE W		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA0Q	CODE Q		P	A53381					E27		ASTM STP 819/29	30; 31; 32; 33	MPC = Q1,Q2,Q3,Q4; PFRA03A & B
E	CEA	PFRA1A	CODE A (GA)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1B	CODE B (GB)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1C	CODE C (GC)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1D	CODE D (GD)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1E	CODE E (GE)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1F	CODE F (GF)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1G	CODE G (GG)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1H	CODE H (GH)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1K	CODE K (GK)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1N	CODE N (GN)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1R	CODE R (GR)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1S	CODE S (GS)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA1T	CODE T		P	A5083	CREUSOT LOIRE CO.	25.0	mm				ASTM STP 725/20	22	
E	CEA	PFRA1U	CODE U		P	A5083	CREUSOT LOIRE CO.	25.0	mm				ASTM STP 725/20	22	
E	CEA	PFRA1V	CODE V		P	A5083	CREUSOT LOIRE CO.	25.0	mm				ASTM STP 725/20	22	
E	CEA	PFRA1Z	CODE Z (GZ)		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRA2I	CODE I		P	A53381							ASTM STP 819/29	30; 31; 37; 38	
E	CEA	PFRAJ1	CODE J1		P	A53381					E27	J11,J12	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	PFRAR1	CODE R1		P	A53381					E27	R1	ASTM STP 819/29	30; 31; 32; 33	
E	CEA	WFRA00	WELD NO. 0		W	A53381		60.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRA01	WELD NO. 1		W	A53381		60.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRA02	WELD NO. 2		W	A53381		60.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRA03	WELD NO. 3		W	A53381		60.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRA04	WELD NO. 4		W	A53381		60.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRA05	WELD NO. 5		W	A53381		60.0	mm		E29		ASTM STP 782/392	394	

Table 28 (continued)

H_LST_TR.dbf: Page 2

TAG	EXP_ID	HEAT_ID	RPT_ID	HEAT_NO	PROD_ID	MAT_ID	SUPPLIER	THICKNESS	LENGTH_U	SOURCE	MPC_ID	MPC_HEAT	REF_ID	PAGES	NOTES
E	CEA	WFRA06	WELD NO. 6		W	A533B1		60.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRA07	WELD NO. 7		W	A533B1		60.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRA08	WELD NO. 8		W	A533B1		60.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRAOX	CODE X		W								ASTM STP 819/29	30; 31; 32; 33	
E	CEA	WFRAOY	CODE Y		W								ASTM STP 819/29	30; 31; 32; 33	
E	CEA	WFRAOZ	CODE Z		W								ASTM STP 819/29	30; 31; 32; 33	
E	CEA	WFRA11	WELD NO. 11		W	A5083		220.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRA12	WELD NO. 12		W	A533B1		85.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRA13	WELD NO. 13		W	A533B1		85.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRA14	WELD NO. 14		W	A533B1		85.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRA15	WELD NO. 15		W	A533B1		85.0	mm		E29		ASTM STP 782/392	394	
E	CEA	WFRAG7	CODE G7		W								ASTM STP 819/29	30; 31; 32; 33	NOT TESTED
E	CEA	WFRAJ5	CODE J5		W								ASTM STP 819/29	30; 31; 32; 33	NOT TESTED
E	EPR-AN	WEPR19 EA	CODE E19		W	A533B1	COMBUSTION ENG	8.75	in	FABR			EPRI NP-2712/V2	APP. G, P.588	HOMOGENEITY TEST
E	EPR-AN	WEPR19 EH	CODE E19		W	A533B1	COMBUSTION ENG	8.75	in	FABR			EPRI NP-2712/V2	APP. G, P.589	HOMOGENEITY TEST
E	EPR-AN	WEPR23 PA	CODE E23		W	A533B1	COMBUSTION ENG	9.75	in	FABR			EPRI NP-2712/V2	APP. G, P.657	HOMOGENEITY TEST
E	EPR-AN	WEPR23 PH	CODE E23		W	A533B1	COMBUSTION ENG	9.75	in	FABR			EPRI NP-2712/V2	APP. G, P.658	HOMOGENEITY TEST
E	FKS-G	FGKSS[illegible]	GKSS-M		F	20MnMoNi55							GKSS-1	TABLE 1	FORGING RING
E	FKS-G	FKS_02	KS02		F	22NiMoCr37				F/BR			GKSS-1	TABLE 1	FORGING RING
E	FKS-G	FKS_13	KS13		F	20MnMoNi55				FABR			ASTM STP 1011/115	117	FORGED RING
E	FKS-G	FKS_15	KS15		F	20MnMoNi55				FABR			GKSS-1	TABLE 1	FORGING SLAB
E	FKS-G	FKS_16	KS16		F	22NiMoCr37				FABR			GKSS-1	TABLE 1	FORGING SLAB
E	FKS-G	FKS_16C	KS16, SECTION C		F	22NiMoCr37				FABR			GKSS-1	TABLE 1; TABLE 2	FORGING SLAB
E	FKS-G	FKS_16D	KS16, SECTION D		F	22NiMoCr37				FABR			GKSS-1	TABLE 1; TABLE 2	FORGING SLAB
E	FKS-G	FKS_16E	KS16, SECTION E		F	22NiMoCr37				FABR			GKSS-1	TABLE 1; TABLE 2	FORGING SLAB
E	FKS-G	FKS_16G	KS16, SECTION G		F	22NiMoCr37				FABR			GKSS-1	TABLE 1; TABLE 2	FORGING SLAB
E	FKS-G	FKS_16H	KS16, SECTION H		F	22NiMoCr37				FABR			GKSS-1	TABLE 1; TABLE 2	FORGING SLAB
E	FKS-G	FKS_16K	KS16, SECTION K		F	22NiMoCr37				FABR			GKSS-1	TABLE 1; TABLE 2	FORGING SLAB
E	FKS-G	FKS_16M	KS16, SECTION M		F	22NiMoCr37				FABR			GKSS-1	TABLE 1; TABLE 2	FORGING SLAB
E	FKS-G	FKS_16S	KS16S		F	22NiMoCr37				FABR			ASTM STP 1011/115	117	FORGED BAR
E	FKS-L	WGKSSM	GKSS-S		W	20MnMoNi55							GKSS-1	TABLE 1	WELD OF FORGING RING FFRG14
E	FKS-G	WKS_01	KS01SG		W	22NiMoCr37							GKSS-1	TABLE 1	WELD OF FORGING SHELL FFRG08
E	FKS-K	FKS_01	KS01		F	22NiMoCr37		250	mm	FABR			ASTM STP 782/520	524	FORGING SHELL
E	FKS-K	FKS_12	KS12		F	20MnMoNi55		300	mm	FABR			ASTM STP 782/520	524	FORGING SHELL
E	FKS-K	FKS_12 ESR	KS12, ESR REGION		F	20MnMoNi55		300	mm	FABR			ASTM STP 782/520	524	FORGING SHELL
E	FKS-K	FKS_7B	KS07B		F	22NiMoCr37		120	mm	FABR			ASTM STP 782/520	525	FORGING SLAB
E	FKS-K	WFRG01	SERIES NO. 1 WELD		W	S3Mo							ASTM STP 782/412	414	ELECTRODE S3Mo, LW 320 FLUX
E	FKS-K	WFRG02	SERIES NO. 2 WELD		W	S3Mo							ASTM STP 782/412	414	ELECTRODE S3Mo, LW 320 FLUX
E	FKS-K	WFRG03	SERIES NO. 3 WELD		W	S3NiMo							ASTM STP 782/412	414	ELECTRODE S3NiMo;OP 41 TT FLUX
E	FKS-K	WFRG04	SERIES NO. 4 WELD		W	S3NiMo							ASTM STP 782/412	414	ELECTRODE S3NiMo;OP 41 TT FLUX
E	FKS-K	WFRG05	SERIES NO. 5 WELD		W	S3NiMo1							ASTM STP 782/412	414	ELECTRODE S3NiMo1; OP 41 TT
E	FKS-K	WFRG06	SERIES NO. 6 WELD		W	S3NiMo1							ASTM STP 782/412	414	ELECTRODE S3NiMo1; P 230 FLUX
E	FKS-K	WFRG07	SERIES NO. 7 WELD		W	NiCrMo1							ASTM STP 782/412	414	ELECTRODE NiCrMo1; LW 320 FLUX
E	FKS-K	WFRG08	SERIES NO. 8 WELD		W	NiCrMo1							ASTM STP 782/412	414	ELECTRODE NiCrMo1; LW 320 FLUX
E	FKS-K	WFRG09	SERIES NO. 9 WELD		W	NiCrMo1							ASTM STP 782/412	414	ELECTRODE NiCrMo1; LW 320 FLUX
E	FKS-K	WFRG10	SERIES NO. 10 WELD		W	NiCrMo1							ASTM STP 782/412	414	ELECTRODF NiCrMo1; LW 320 FLUX
E	FKS-K	WFRG11	SERIES NO. 11 WELD		W	S3NiMo							ASTM STP 782/412	414	ELECTRODE S3NiMo; OP 41 TT
E	FKS-K	WFRG12	SERIES NO. 12 WELD		W	S3NiMo1							ASTM STP 782/412	414	ELECTRODE S3NiMo1; OP 41 TT
E	FKS-K	WFRG13	SERIES NO. 13 WELD		W	S3NiMo1							ASTM STP 782/412	414	ELECTRODE S3NiMo1; LW 330 FLUX
E	FKS-K	WFRG14	SERIES NO. 14 WELD		W	NiCrMo1							ASTM STP 782/412	414	ELECTRODE S3NiMo1; LW 320 FLUX
E	FKS-K	WFRG15	SERIES NO. 15 WELD		W	EKbMo23							ASTM STP 782/412	414	ELECTRODE EKbMo23
E	FKS-K	WFRG16	SERIES NO. 16 WELD		W	EKbCrMo1							ASTM STP 782/412	414	ELECTRODE EKbCrMo1
E	FKS-K	WFRG17	SERIES NO. 17 WELD		W	EKbNiMo							ASTM STP 782/412	414	ELECTRODE EKbNiMo
E	FKS-K	WFRG18	SERIES NO. 18 WELD		W	EKbNiMo							ASTM STP 782/412	414	ELECTRODE EKbNiMo
E	FKS-K	WFRG19	SERIES NO. 19 WELD		W	EKbNiMoCr							ASTM STP 782/412	414	ELECTRODE EKbNiMoCr
E	HAW-AN	FNR041	CODE Q41		F	A5082							NRL 8287	24	
E	HAW-AN	FNR071	CODE Q71		F	A5082							NRL 8287	24	

Table 28 (continued)

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TAG	EXP_ID	HEAT_ID	RPT_ID	HEAT_NO	PROD_ID	MAT_ID	SUPPLIER	THICKNESS	LENGTH_U	SOURCE	MPC_ID	MPC_HEAT	REF_ID	PAGES	NOTES
E	HAW-AN	PCFP1T	CODE 1T		P	A533B							NRL 8287	24; 25	
E	HAW-AN	PHBU	CODE HBU		P	A302B		10.5	in				NRL 8287	10	
E	HAW-AN	PHR09B	CODE 09B		P	A302B							NRL 8287	24; 25	
E	HAW-AN	SASTM 036	REF.PL., CODE 036	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR			NRL 8287	4; 25	
E	HAW-AN	WNRLOA	CODE AW		W	A533B							NRL 8287	24; 25	
E	HAW-AN	WNR096	CODE 096		W	A533B							NRL 8287	24; 25	
E	HFIR	FHFR01	CODES HB1 AND HB4	6335890	F	A105II				SCR			ORNL/TM-10444	14; 16; 105	
E	HFIR	FHFR02HB2	CODE HB2	3336610	F	A350LF3	TAYLOR FORGE			SCR			ORNL/TM-10444	14; 16; 105	
E	HFIR	FHFR02HB3	CODE HB3	3336610	F	A350LF3	TAYLOR FORGE			SCR			ORNL/TM-10444	14; 16; 105	
E	HFIR	PHFR01	CODES IC3,HB1A,HB4A	P0818	P	A212B	LUKENS STEEL	3.0	in	NOZZLE DR.			ORNL/TM-10444	14; 16; 105	
E	HFIR	PHFR01 10	CODES IC3,HB1A,HB4A	P0818	P	A212B	LUKENS STEEL	3.0	in	NOZZLE DR.			ORNL/TM-10444	14; 16; 105	SPECIMEN TAKEN AT 1 IN.
E	HFIR	PHFR01X	CODES IC3,HB1A,HB4A	P0818	P	A212B	LUKENS STEEL	3.0	in	NOZZLE DR.			ORNL/TM-10444	14; 16; 105	NO PWHT
E	HFIR	WHFR01	NOZZLE-TO-SHELL WELD	OC11A	W	A350LF3	ALLIS CHALMERS	3.0	in				ORNL/TM-10444	105; 112	QUALIFICATION WELD
E	HFIR	WHFR02	SEAM WELD	P54808	W	A212B	ORNL	2.5	in	FABR			ORNL/TM-10444	105; 125	HT. NO. P54808, OC11A
E	HSST-0	SHSS01C 0T	HSST01, SECT.C, 0-T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01C 12	HSST01, SECT.C, 1/2T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01C 14	HSST01, SECT.C, 1/4T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01C 1T	HSST01, SECT.C, 1-T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01C 34	HSST01, SECT.C, 3/4T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01E 0T	HSST01, SECT.E, 0-T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01E 14	HSST01, SECT.E, 1/4T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01K 0T	HSST01, SECT.K, 0-T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01K 12	HSST01, SECT.K, 1/2T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01K 13	HSST01, SECT.K, 1/3T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01K 14	HSST01, SECT.K, 1/4T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01K 18	HSST01, SECT.K, 1/8T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01K 1T	HSST01, SECT.K, 1-T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01K 34	HSST01, SECT.K, 3/4T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01K 38	HSST01, SECT.K, 3/8T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01K 58	HSST01, SECT.K, 5/8T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01K 78	HSST01, SECT.K, 7/8T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01KE0T	HSST01, SECT.K, 0-T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	146, 147	SET TO DETERMINE EDGE EFFECTS
E	HSST-0	SHSS01KE12	HSST01, SECT.K, 1/2T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	149, 150	SET TO DETERMINE EDGE EFFECTS
E	HSST-0	SHSS01KE14	HSST01, SECT.K, 1/4T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	147, 148, 149	SET TO DETERMINE EDGE EFFECTS
E	HSST-0	SHSS01MU0T	HSST01, SECT.MU, 0-T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01MU12	HSST01, SECT.MU,1/2T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01MU14	HSST01, SECT.MU,1/4T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01SH14	HSST01, SECT.SH,1/4T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS01SH1T	HSST01, SECT.SH,1-T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02A	HSST02, SECTION A	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR	E08	HSST02	ORNL-4816/3	76; 78	
E	HSST-0	SHSS02AH	HSST02, SECTION AH	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR	E08	HSST02	ORNL-4816/3	3; 4; 7; 8	
E	HSST-0	SHSS02AH0T	HSST02, SECT.AH, 0-T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02AH14	HSST02, SECT.AH,1/4T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02B 12	HSST02, SECT.B, 1/2T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02C 12	HSST02, SECT.C, 1/2T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02F	HSST02, SECTION F	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR	E08	HSST02	ORNL-4816/3	3; 4; 7; 8	
E	HSST-0	SHSS02F 0T	HSST02, SECT.F, 0-T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02F 14	HSST02, SECT.F, 1/4T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02FB	HSST02, SECTION FB	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR	E08	HSST02	ORNL-4816/3	3; 4; 7; 8	
E	HSST-0	SHSS02FB0T	HSST02, SECT.FB, 0-T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02FB12	HSST02, SECT.FB,1/2T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02FB14	HSST02, SECT.FB,1/4T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02FB38	HSST02, SECT.FB,3/8T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02HC	HSST02, SECTION HC	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR	E08	HSST02	ORNL-4816/3	3; 4; 7; 8	
E	HSST-0	SHSS02HC0T	HSST02, SECT.HC, 0-T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02HC12	HSST02, SECT.HC,1/2T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02HC14	HSST02, SECT.HC,1/4T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	

Table 28 (continued)

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TAG	EXP_ID	HEAT_ID	RPT_ID	HEAT_NO	PROD_ID	MAT_ID	SUPPLIER	THICKNESS	LENGTH_U	SOURCE	MPC_ID	MPC_HEAT	REF_ID	PAGES	NOTES
E	HSST-0	SHSS02HC1T	HSST02, SECT.HC, 1-T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS02HC34	HSST02, SECT.HC,3/4T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03CA	HSST03, SECTION CA	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			ORNL-4816/3	3; 4; 7; 8	
E	HSST-0	SHSS03CA0T	HSST03, SECT.CA, 0-T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03CA14	HSST03, SECT.CA,1/4T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03CB	HSST03, SECTION CB	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			ORNL-4816/3	3; 4; 7; 8	
E	HSST-0	SHSS03CB0T	HSST03, SECT.CB,0-T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03CB14	HSST03, SECT.CB,1/4T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03E	HSST03, SECTION E	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			ORNL-4816/3	3; 4; 7; 8	
E	HSST-0	SHSS03E 0T	HSST03, SECT.E, 0-T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03E 12	HSST03, SECT.E, 1/2T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03E 14	HSST03, SECT.E, 1/4T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03E 1T	HSST03, SECT.E, 1-T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03E 34	HSST03, SECT.E, 3/4T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03GA	HSST03, SECTION GA	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			ORNL-4816/3	3; 4; 7; 8	
E	HSST-0	SHSS03GA0T	HSST03, SECT.GA, 0-T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03GA14	HSST03, SECT.GA,1/4T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03GU	HSST03, SECTION GU	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03J	HSST03, SECTION J	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			ORNL-4816/3	76; 78	
E	HSST-0	SHSS03LF	HSST03, SECTION LF	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03LG	HSST03, SECTION LG	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-0	SHSS03PL	HSST03, SECTION PL	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-4092	1, 2, 17	
E	HSST-1	SHSS01B 14	HSST01, SEC. B, 1/4T	A1008-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			ORNL-4871	10	
E	HSST-1	SHSS02FB13	HSST02, SECT.FB,1/3T	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			ORNL-4871	42, 43	
E	HSST-1	WHSS51B	HSST NO. 51, SECT.BP		W	A533B1		11.75	in				ORNL-4871	1, 2, 3	FROM HSST 01, SECTION L
E	HSST-1	WHSS53E	HSST NO. 53, SECT.E2		W	A302B		6.375	in				ORNL-4871	1, 2, 3, 15	PVRC #315, CODE CASE 1339
E	HSST-2	WHSS61	61W, ALSO CODE W, W1		W	A533B1	B&W	9.75	in	FABR			NUREG/CR-5696	9	FABR. BY B&W FOR WESTINGHOUSE
E	HSST-2	WHSS62	62W		W	A508Z	B&W	12.0	in	CUTOUT			NUREG/CR-5696	9	TWO FILLER WIRES USED
E	HSST-2	WHSS62A	62WA (ALSO: 62W(2))		W	A508Z	B&E	12.0	in	CUTOUT	E23	62W	NUREG/CR-5696	9	FILLER WIRE A
E	HSST-2	WHSS62B	26WB (ALSO: 62W(1))		W	A508Z	B&W	12.0	in	CUTOUT	E23	62W	NUREG/CR-5696	9	FILLER WIRE B
E	HSST-2	WHSS63	63W (ALSO: 63W)		W	A508Z	B&W	12.0	in	CUTOUT			NUREG/CR-5696	9	
E	HSST-2	WHSS64	64W		W	A508Z	B&W	12.0	in	CUTOUT			NUREG/CR-5696	9	
E	HSST-2	WHSS65	65W		W	A508Z	B&W	12.0	in	CUTOUT			NUREG/CR-5696	9	
E	HSST-2	WHSS66	66W		W	A508Z	B&W	12.0	in	CUTOUT			NUREG/CR-5696	9	
E	HSST-2	WHSS67	67W		W	A508Z	B&W	12.0	in	CUTOUT			NUREG/CR-5696	9	
E	HSST-4	SHSS02GA	HSST02, SECTION GA	A1195-1	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-3978	1, 2	
E	HSST-4	WHSS68	68W, CODE CGS		W	A533B1	COMBUSTION ENG.	0.178	m				NUREG/CR-3978	1, 2	MADE FOR EPRI
E	HSST-4	WHSS69	69W, CODE CHS		W	A533B1	COMBUSTION ENG.	0.300	m				NUREG/CR-3978	1, 2	MADE FOR EPRI
E	HSST-4	WHSS70	70W, CODE MK-W-124		W	A533B1	B&W	0.175	m				NUREG/CR-3978	1, 2	
E	HSST-4	WHSS71	71W, CODE MK-W-80		W	A533B1	B&W	0.175	m				NUREG/CR-3978	1, 2	
E	IAEA	FFRAI1	CODE FF, F4		F	A5083	FRAMATOME	230.0	mm	CUTOUT	E32	FG2C13	IAEA TRS 265	5	OTHER MPC ID = F41, F42, F43
E	IAEA	FFRAI2	CODE FM		F	A5083	FRAMATOME	220.0	mm	CUTOUT			IAEA TRS 265	5	PARENT FORGING OF WFRAI2
E	IAEA	FJAPI1	CODE JF (212, 213)		F	A5083	JAPAN STEEL	302.0	mm	SCR	E32	JF212	IAEA TRS 265	5	
E	IAEA	HFRAI2	CODE FX; FROM WFRAI2		HAZ	A5083							IAEA TRS 265	5; 97	SEE ASTM STP 1046
E	IAEA	HJAPI2	HAZ OF JW		HAZ	A533B1							IAEA TRS 265	5; 94; 103	HAZ OF WJAPI2
E	IAEA	PFRAI1	CODE FP, F3		P	A533B1	MARREL	310.0	mm		E32	F63449	IAEA TRS 265	5	
E	IAEA	PJAPI1	CODE JP (107)		P	A533B1	NIPPON STEEL	251.0	mm		E32	JP107	IAEA TRS 265	5	
E	IAEA	SHSS03	HSST03, UNSPEC.SECT.	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5	
E	IAEA	SHSS03LK	HSST03, SECTION LK	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 99	RISO ANALYSIS PHASE 1
E	IAEA	WFRAI2	CODE FW		W	A5083	FRAMATOME	220.0	mm		E32	F61-F64	IAEA TRS 265	5	
E	IAEA	WFRGI1	CODE GW		W	A533B2	THYSSEN	250.0	mm		E32	FRG	IAEA TRS 265	5	
E	IAEA	WJAPI2	CODE JW (1/4 T)		W	A533B1	MITSUBISHI	248.0	mm		E32	JW502	IAEA TRS 265	5	
E	IAEAB	SHSS03MW	HSST03, SECTION MW	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 100	
E	IAEAB	SHSS03MX	HSST03, SECTION MX	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 100	BLOCK MX
E	IAEAB	WJAPI23/4T	CODE JW, 3/4 T		W	A533B1	MITSUBISHI	248.0	mm				IAEA TRS 265	5; 103	3/4 T LOCATION OF WJAPI2
E	IAEAC	SHSS03LJ	HSST03, SECTION LJ	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 99	
E	IAEAD	WFRAI2 01	CODE FW, 01 LOCATION		W	A5083	FRAMATOME	220.0	mm				IAEA TRS 265	5; 88	BLOCK 14

Table 28 (continued)

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TAG	EXP_ID	HEAT_ID	RPT_ID	HEAT_NO	PROD_ID	MAT_ID	SUPPLIER	THICKNESS	LENGTH_U	SOURCE	MPC_ID	MPC_HEAT	REF_ID	PAGES	NOTES
E	IAEAD	WFRAI23/4T	CODE FW, 3/4 T		W	A5083	FRAMATOME	220.0	mm				IAEA TRS 265	5; 88	
E	IAEAF	SHSS03LO	HSST03, SECTION LO	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 99	
E	IAEAF	SHSS03LU	HSST03, SECTION LU	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 90	
E	IAEAG	SHSS03MD	HSST03, SECTION MD	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 99	
E	IAEAG	SHSS03WR	HSST03, SECTION WR	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 107; 108	GKSS ANALYSIS
E	IAEAG	SHSS03PC	HSST03, SECTION PC	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 99	GKSS ANALYSIS PHASE 2
E	IAEAI	PFRAI13/4T	CODE FP, 3/4 T		[illegible]	A533B1	MARREL	310.0	mm				IAEA TRS 265	5; 95	3/4 T LOCATION OF PFRAI1
E	IAEAJ	SHSS03GGLZ	HSST03, SECT. [illegible]	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 100	COMBINATION OF SECT. GG AND LZ
E	IAEAK	SHSS03MG	HSST03, SEC. [illegible]	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 100	
E	IAEAM	FFRAI1 0T	CODE FF, 0T LOCATION			A5083	FRAMATOME	230.0	mm	CUTOUT			IAEA TRS 265	5; 95	0 T LOCATION OF FFRAI1
E	IAEAM	FFRAI11/2T	CODE FF, 1/2 T		F	A5083	FRAMATOME	230.0	mm	CUTOUT			IAEA TRS 265	5; 95	1/2 T LOCATION OF FFRAI1
E	IAEAM	FFRAI13/4T	CODE FF, 3/4 T			A5083	FRAMATOME	230.0	mm	CUTOUT			IAEA TRS 265	5; 95	3/4 T LOCATION OF FFRAI1
E	IAEAM	FJAPI1 0T	CODE JF, 0T LOCATION		F	A5083	JAPAN STEEL	302.0	mm	SCR			IAEA TRS 265	5; 90	0 T LOCATION OF FJAPI1
E	IAEAM	FJAPI11/2T	CODE J, 1/2 T		F	A5083	JAPAN STEEL	302.0	mm	SCR			IAEA TRS 265	5; 90	1/2 T LOCATION OF FJAPI1
E	IAEAM	FJAPI13/4T	CODE JF, 3/4		F	A5083	JAPAN STEEL	302.0	mm	SCR			IAEA TRS 265	5; 90	3/4 T LOCATION OF FJAPI1
E	IAEAM	PFRAI1 0T	CODE FP, 0T LOCATION		P	A533B1	MARREL	310.0	mm				IAEA TRS 265	5; 94	0 T LOCATION OF PFRAI1
E	IAEAM	PFRAI11/2T	CODE FP, 1/2 T		P	A533B1	MARREL	310.0	mm				IAEA TRS 265	5; 87	1/2 T LOCATION OF PFRAI1
E	IAEAM	PJAPI1 0T	CODE JP		P	A533B1	NIPPON STEEL	251.0	mm				IAEA TRS 265	5; 90	0 T LOCATION OF PJAPI1
E	IAEAM	PJAPI1 1T	CODE JP		P	A533B1	NIPPON STEEL	251.0	mm				IAEA TRS 265	5; 90	1 T LOCATION OF PJAPI1
E	IAEAM	PJAPI11/2T	CODE JP		P	A533B1	NIPPON STEEL	251.0	mm				IAEA TRS 265	5; 90	1/2 T LOCATION OF PJAPI1
E	IAEAM	PJAPI13/4T	CODE JP		P	A533B1	NIPPON STEEL	251.0	mm				IAEA TRS 265	5; 90	3/4 T LOCATION OF PJAPI1
E	IAEAM	PJAPI2	CODE LG (PM OF JW)		P	A533B1	JAPAN STEEL	248.0	mm				NUREG/CR-2487	3	PARENT PLATE OF WJAPI2
E	IAEAM	PJAPI2 0T	PM OF JW		P	A533B1	JAPAN STEEL	248.0	mm				IAEA TRS 265	5; 93	0T LOCATION OF PJAPI2
E	IAEAM	SHSS03A	HSST03, SECTION A	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 98	MIXTURE OF 1/4 T AND 3/4 T
E	IAEAM	SHSS03A 14	HSST03, SECTION A	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 98	
E	IAEAM	SHSS03A 34	HSST03, SECTION A	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 98	
E	IAEAM	SHSS03Z	HSST03, SECTION Z	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 98	BOTTOM; LUKENS ANALYSIS
E	IAEAM	SHSS03Z 14	HSST03, SECT. Z 1/4T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 98	LUKENS ANALYSIS
E	IAEAM	SHSS03Z 34	HSST03, SECT. Z 3/4T	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 98	LUKENS ANALYSIS
E	IAEAM	WJAPI2 0T	CODE JW, SURFACE		W	A533B1	MITSUBISHI	248.0	mm				IAEA TRS 265	5; 87	SURFACE OF WJAPI2
E	IAEAM	WJAPI21/2T	CODE JW, 1/2 T		W	A533B1	MITSUBISHI	248.0	mm				IAEA TRS 265	5; 87	1/2 T LOCATION OF WJAPI2
E	IAEAU	FJAPI2	JFM		F	A5083		100.0	mm				NUREG/CR-5357/152	158	
E	IAEAU	PJAPI4	JRQ		P	A533B1		225.0	mm				NUREG/CR-5357/152	155	
E	IAEAU	PJAPI5	JPC		P			30.0	mm				NUREG/CR-5357/152	155	
E	IAEAU	PJAPI6	JPB		P			30.0	mm				NUREG/CR-5357/152	155	
E	IAEAU	PJAPI7	JPG		P			30.0	mm				NUREG/CR-5357/152	155	
E	IAEAU	SHSS03MUME	HSST03, SECT. MU/ME	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			IAEA TRS 265	5; 108	MIXTURE OF SECTIONS MU AND ME
E	IAEAU	WJAPI3	JWQ		W			100.0	mm				NUREG/CR-5357/152	155	
E	JPDR	HJAPO2	HAZ OF WJAPO2		HAZ	A302B							ASTM STP 484/74	76; 77; 85	
E	JPDR	HJAPO3	2.25Cr-1Mo HAZ		HAZ	A5421							ASTM STP 484/74	87; 88	
E	JPDR	PJAPO2	PLATE		P	A302B							ASTM STP 484/74	76; 77; 84	
E	JPDR	PJAPO3	2.25Cr-1Mo PLATE		P	A5421		150.0	mm				ASTM STP 484/74	87; 88	
E	JPDR	PJAPO4	MnMoNi		P	A533B1		165.0	mm				ASTM STP 484/74	87; 88	
E	JPDR	PJAPO5	2.25Cr-1Mo PLATE		P	2.25Cr-1Mo		25.0	mm				ASTM STP 484/74	87; 88	
E	JPDR	PJAP15	2.25Cr-1Mo PLATE		P	2.25Cr-1Mo		25.0	mm				ASTM STP 484/74	87; 88	PJAPO5 WITH 1% NICKEL ADDED
E	JPDR	PJAP25	2.25Cr-1Mo PLATE		P	2.25Cr-1Mo		25.0	mm				ASTM STP 484/74	87; 88	PJAPO5 WITH 2% NICKEL ADDED
E	JPDR	WJAPO2	WELD (JAPAN)		W	A302B							ASTM STP 484/74	76; 77; 85	
E	JPDR	WJAPO3	2.25Cr-1Mo WELD		W	A5421							ASTM STP 484/74	87; 86	
E	KFA	SHSS03LB	HSST03, SECTION LB	C2703	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			PACHUR 1988	FILE NO. 506	BLOCK 3 OF HSST-03 LB
E	KFA	SHSS03LB-3	HSST03, SECTION LB 3	C2703	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			PACHUR 1988	FILE NO. 506	
E	KFA	SHSS03LF-4	HSST03, SECTION LF 4	C2703	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			PACHUR 1988	FILE NO. 602	
E	KFA	SHSS03LS-4	HSST03, SECTION LS 4	C2703	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			PACHUR 1988	FILE NO. 601	
E	KFA	SHSS03MC-8	HSST03, SECTION MC 8	C2703	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			PACHUR 1988	FILE NO. 608	
E	KFA	SHSS03MD-3	HSST03, SECTION MD 3	C2703	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			PACHUR 1988	FILE NO. 507	
E	KFA	SHSS03MI-3	HSST03, SECTION MI 3	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			PACHUR 1988	FILE NO. 508	
E	KFA	WFRGI1P	THYSSEN WELD GW1 CV		W	A533B2	THYSSEN						PACHUR 1988	FILE NO. 311; 310	PRECRACKED CHARPY
E	KFA	WFRGI2	THYSSEN WELD GW2		W	A533B2	THYSSEN						PACHUR 1988	FILE NO. 304; 303	SUPPLEMENT TO IAEA EXPERIMENT

Table 28 (continued)

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TAG	EXP_ID	HEAT_ID	RPT_ID	HEAT_NO	PROD_ID	MAT_ID	SUPPLIER	THICKNESS	LENGTH_U	SOURCE	MPC_ID	MPC_HEAT	REF_ID	PAGES	NOTES
E	KRB	FKRB01	GEA RING SEGMENT		F	20NiMoCr26	GENERAL ELECTRIC	119.0	mm	FORG. RING			NUREG/CR-3228/V4/78	78; 79; 83	
E	KRB	FKRB02	GEA-1 (SIDE 1)		F	20NiMoCr26	GENERAL ELECTRIC						NUREG/CR-3228/V4/78	78; 79; 83	
E	KRB	FKRB03	GEA-2 (SIDE 2)		F	20NiMoCr26	GENERAL ELECTRIC						NUREG/CR-3228/V4/78	78; 79; 83	
E	KRB	FKRB04	GEB RING SEGMENT		F	20NiMoCr26	GENERAL ELECTRIC	119.0	mm	FORG. RING			NUREG/CR-3228/V4/78	78; 79; 83	
E	KRB	FKRB05	GEB-1 (SIDE 1)		F	20NiMoCr26	GENERAL ELECTRIC						NUREG/CR-3228/V4/78	78; 79; 83	
E	KRB	FKRB06	GEB-2 (SIDE 2)		F	20NiMoCr26	GENERAL ELECTRIC						NUREG/CR-3228/V4/78	78; 79; 83	
E	KRB	FKRB07	RING 7.1 (VESSEL)	931-157	F	20NiMoCr26	GENERAL ELECTRIC			SCR			NUREG/CR-3228/V4/78	78; 79; 83	
E	KRB	HKRB01	GUNDREMMINGEN HAZ		HAZ	20NiMoCr26	GENERAL ELECTRIC						NUREG/CR-3228/V4/78	78; 79; 83; 85	
E	KRB	WKRB02	GEA-1 AND GEA-2		W	20NiMoCr26	GENERAL ELECTRIC						NUREG/CR-3228/V5/36	36	BETWEEN PLATES GEA-1 AND GEA-2
E	KRB	WKRB03	GEB-1 AND GEB-2		W	20NiMoCr26	GENERAL ELECTRIC						NUREG/CR-3228/V5/36	36	BETWEEN PLATES GEB-1 AND GEB-2
E	KWU-PR	FGER01	001		F	22NiMoCr37							KWU-0186	2; TABLE 1	
E	KWU-PR	FGER02	002		F	22NiMoCr37							KWU-0186	2; TABLE 1	
E	KWU-PR	FGER03	003		F	22NiMoCr37							KWU-0186	2; TABLE 1	
E	KWU-PR	FGER04	004		F	22NiMoCr37							KWU-0186	2; TABLE 1	
E	KWU-PR	FGER05	005		F	22NiMoCr37							KWU-0186	2; TABLE 1	
E	KWU-PR	FGER06	006		F	22NiMoCr37							KWU-0186	2; TABLE 1	
E	KWU-PR	FGER07	007		F	22NiMoCr37							KWU-0186	2; TABLE 1	
E	KWU-PR	HGER03	003		HAZ	22NiMoCr37							KWU-0186	2; TABLE 1	
E	KWU-PR	HGER05	005		HAZ	22NiMoCr37							KWU-0186	2; TABLE 1	
E	KWU-PR	WGER10	010		W	NiCrMo1							KWU-0186	2; TABLE 1	
E	KWU-PR	WGER11	011		W	NiCrMo1							KWU-0186	2; TABLE 1	
E	KWU-PR	WGER12	012		W	NiCrMo1							KWU-0186	2; TABLE 1	
E	KWU-PR	WGER13	013		W	NiCrMo1							KWU-0186	2; TABLE 1	
E	KWU-PR	WGER14	014		W	NiCrMo1							KWU-0186	2; TABLE 1	
E	LAC	HLAC01	HAZ OF WP-1056		HAZ	A302B	ALLIS CHALMERS	4.0	in				NE&D 8/95	95; 96	
E	LAC	PLAC03	WP-1056		P	A302B	ALLIS CHALMERS	4.0	in				NE&D 8/95	95; 96	
E	LAC	PLAC04	WP-1057		P	A302B	ALLIS CHALMERS	4.0	in				NE&D 8/95	95; 96	
E	LAC	PLAC043/4T	WP-1057		P	A302B	ALLIS CHALMERS	4.0	in				NE&D 8/95	99	3/4 T LOCATION OF PLAC04
E	LAC	PLAC05	WP-1058		P	A302B	ALLIS CHALMERS	4.0	in				NE&D 8/95	95; 96	
E	LAC	PLAC053/4T	WP-1058		P	A302B	ALLIS CHALMERS	4.0	in				NE&D 8/95	99	3/4 T LOCATION OF PLAC05
E	LAC	WLAC01	WELD OF WP-1056		W	A302B	ALLIS CHALMERS	4.0	in	SIM			NE&D 8/95	95; 96	
E	MEA-AN	PLUK03	02819	D-2819	P	A533B1	LUKENS STEEL	210.0	mm				NUREG/CR-3229	1; 3; 5	A533B1 PER NUREG/CR-5469
E	MEA-AN	PLUK04	A5401, SLAB 2		P	A533B1	LUKENS STEEL	8.5	in				NUREG/CR-5469	72; 74	USED FOR WMEAW7
E	MEA-AN	WKRB01	GUNDREMMINGEN WELD		W	20NiMoCr26	GENERAL ELECTRIC						NUREG/CR-3228/V4/130	78; 79; 83	
E	MEA-AN	WMEA8A	W8A	3P8393	W	A533B1	LUKENS STEEL	8.25	in	FABR			NUREG/CR-3228/V1/73	73; 77; 78	SEE NUREG/CR-5469
E	MEA-AN	WMEA8B	W8B	3P8393	W	A533B1	LUKENS STEEL	8.25	in	FABR			NUREG/CR-3228/V1/73	73; 77; 78	SEE NUREG/CR-5469
E	MEA-AN	WMEA9A	W9A	3P8393	W	A533B1	LUKENS STEEL	8.25	in	FABR			NUREG/CR-3228/V1/73	73; 77; 78	SEE NUREG/CR-5469
E	MEA-AN	WMEAW4	WW4		W	A533B1	COMBUSTION ENG.			FABR			NUREG/CR-3228/V3/114	115	SEE NUREG/CR-5469
E	MEA-AN	WMEAW7	WW7	3P2320	W	A533B1	COMBUSTION ENG.	8.50	in	FABR			NUREG/CR-3228/V3/114	115; 119	SEE NUREG/CR-5469
E	MEA-RT	PNRLG23	CODE 23G		P	A533B							NUREG/CR-5493	4	
E	MOLBR3	PMOLOA	MOL PLATE A		P	A302B	LUKENS STEEL	12	in				MEA-2218	3; 58	
E	MOLBR3	SHSS03LB-4	HSST03, SECTION LB-4	C2703	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			MEA-2218	20; 47	BLOCK 4 OF HSST-03 LB
E	MOLBR3	SHSS03LC	HSST03, SECTION LC	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			MEA-2218	3; 60	
E	MOLBR3	SHSS03MC	HSST03, SECTION MC	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			MEA-2218	3; 61	
E	MOLBR3	SHSS03MC-7	HSST03, SECTION MC-7	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			MEA-2218	20; 47	03MC, BLOCK VII SPEC_ID = MC-
E	MOLBR3	WMOL01	MOL WELD W1, BRW-1		W		B&W	2.63	in				MEA-2218	3; 49	
E	MOLBR3	WMOL02	MOL WELD W2, BRW-2		W		B&W	1.6	in				MEA-2218	3; 51	
E	MOLBR3	WMOL03	MOL WELD W3, BRW 3		W		B&W	2.6	in				MEA-2218	3; 53	
E	MOLBR3	WMOL0D	MOL WELD D, BRW-D		W		B&W	2.75	in				MEA-2218	3; 56	
E	MOLBR3	WMOL0E	MOL WELD E, BRW-E		W	A302B	EPRI	4.0	in				MEA-2218	3; 58	SA WELD QC2
E	MRI-1	SASTME	190784, LOT NO. 31	K-13438	SRM	A302B	U.S. STEEL	4.0	in	FABR			ASTM STP 484/42	43; 44; 45	
E	MRI-1	SASTMF	B427-1, LOT NO. 51	B-427-1	SRM	A542I1	LUKENS STEEL	6.25	in	FABR			ASTM STP 484/42	43; 44; 45	
E	NRL-1	HVEN20	HAZ OF WVEN20		HAZ	A533B1	VENDOR	8.0	in		E04	19	NRL 7011	2; 16	
E	NRL-1	HW__16	HAZ OF WW__16		HAZ	A533B1	WESTINGHOUSE	7.20	in		E04	6	NRL 7011	2; 16	
E	NRL-1	PB&W13			P	A533B1	B&W	8.125	in		E04	3	NRL 6772	3	
E	NRL-1	PB&W13 0T			P	A533B1	B&W	8.125	in			3	NRL 6772	5	0 T LOCATION OF PB&W13
E	NRL-1	PB&W13 ORG			P	A533B1	B&W	8.125	in			3	NRL 7011	3	BEFORE SRA

Table 28 (continued)

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TAG	EXP_ID	HEAT_ID	RPT_ID	HEAT_NO	PROD_ID	MAT_ID	SUPPLIER	THICKNESS	LENGTH_U	SOURCE	MPC_ID	MPC_HEAT	REF_ID	PAGES	NOTES
E	WRL-1	PB&W131/2T			P	A53381	B&W	8.125	in			3	WRL 7011	18	1/2 T LOCATION OF PB&W13
E	WRL-1	PB&W19			P	A53381	B&W	5.75	in		E0416	9	WRL 6772	3	
E	WRL-1	PB&W19 0T			P	A53381	B&W	5.75	in				WRL 6772	5	0 T LOCATION OF PB&W19
E	WRL-1	PB&W191/2T			P	A53381	B&W	5.75	in				WRL 6772	5	1/2 T LOCATION OF PB&W19
E	WRL-1	PLUK01	CODE EB8		P	A533B		8.0	in		E24	LUKENSR	WRL 8357	2; 3; 11	
E	WRL-1	PLUK02	CODE ED8		P	A533B		8.0	in		E24	LUKENSJ	WRL 8357	2; 3; 12	
E	WRL-1	PLUK11			P	A53381	LUKENS STEEL	4.0	in		E04 1	1	WRL 6772	3	
E	WRL-1	PLUK11 0T			P	A53381	LUKENS STEEL	4.0	in				WRL 6772	5; 6	0 T LOCATION OF PLUK11
E	WRL-1	PLUK111/2T			P	A53381	LUKENS STEEL	4.0	in				WRL 6772	5; 6	1/2 T LOCATION OF PLUK11
E	WRL-1	PLUK12			P	A53381	LUKENS STEEL	8.0	in		E04 2	2	WRL 6772	3	
E	WRL-1	PLUK12 0T			P	A53381	LUKENS STEEL	8.0	in				WRL 6772	5; 6	0 T LOCATION OF PLUK12
E	WRL-1	PLUK121/2T			P	A53381	LUKENS STEEEL	8.0	in				WRL 6772	5; 6	1/2 T LOCATION OF PLUK12
E	WRL-1	PLUK18			P	A533C2	LUKENS STEEL	4.0	in		E0415	8	WRL 6772	3	
E	WRL-1	PLUK18 0T			P	A533C2	LUKENS STEEL	4.0	in				WRL 6772	5	FACE OF PLUK18
E	WRL-1	PLUK18 1T			P	A533C2	LUKENS STEEL	4.0	in				WRL 6772	5	ROOT OF PLUK18
E	WRL-1	PLUK18 ORG			P	A533C2	LUKENS STEEL	4.0	in				WRL 7011	3	PLUK18 BEFORE SRA
E	WRL-1	PLUK181/2T			P	A533C2	LUKENS STEEL	4.0	in				WRL 6772	5	1/2 T LOCATION OF PLUK18
E	WRL-1	PVEN14	VENDOR STEEL NO.14		P	A53381	LUKENS STEEL	6.375	in		E04	4	WRL 6772	3	
E	WRL-1	PVEN15	VENDOR STEEL NO.15		P	A53382	LUKENS STEEL	6.375	in		E04	5	WRL 6772	3	
E	WRL-1	PVEN15 0T	VENDOR 15, 0T		P	A53382	LUKENS STEEL	6.375	in				WRL 6772	5; 6	0 T LOCATION OF PVEN15
E	WRL-1	PVEN151/2T	VENDOR 15, 1/2 T		P	A53382	LUKENS STEEL	6.375	in				WRL 6772	5; 6	1/2 T LOCATION OF PVEN15
E	WRL-1	PVEN20	VENDOR STEEL NO.20		P	A53381	UNIDENTIF. VENDOR	8.0	in		E04	19	WRL 7011	2	
E	WRL-1	PVEN20 0T	VENDOR 20, 0T		P	A53381	UNIDENTIF. VENDOR	8.0	in				WRL 7011	16; 21	0 T LOCATION OF PVEN20
E	WRL-1	PVEN20 ORG	PVEN20, BEFORE SRA		P	A53381	UNIDENTIF. VENDOR	8.0	in				WRL 7011	3	PVEN20 BEFORE SRA
E	WRL-1	PW__16	WESTINGHOUSE, PL.1		P	A53381	WESTINGHOUSE	7.5	in		E0412	6	WRL 6772	3	
E	WRL-1	PW__17	WESTINGHOUSE, PL.2		P	A53381	WESTINGHOUSE	7.5	in		E0414	7	WRL 6772	3	
E	WRL-1	SASTMD	A5431 REFERENCE PL.		SRM	A5431	U.S. STEEL	8.0	in	FABR			WRL 7011	2	
E	WRL-1	SASTMDS1	SECT. 1 OF SASTMD		SRM	A5431	U.S. STEEL	8.0	in	FABR			WRL 7011	3	
E	WRL-1	SASTMDS101	SEC. 1, 0 T		SRM	A5431	U.S. STEEL	8.0	in	FABR			WRL 7011	16	SECTION 1, SURFACE
E	WRL-1	SASTMDS112	SEC. 1, 1/2 T		SRM	A5431	U.S. STEEL	8.0	in	FABR			WRL 7011	16	SECTION 1, 1/2 T
E	WRL-1	SASTMDS114	SEC. 1, 1/4 T		SRM	A5431	U.S. STEEL	8.0	in	FABR			WRL 7011	22	SECTION 1, 1/4 T
E	WRL-1	SASTMDS2	SECT. 2 OF SASTMD		SRM	A5431	U.S. STEEL	8.0	in	FABR.			WRL 7011	3	
E	WRL-1	SASTMDS212	SEC. 2, 1/2 T		SRM	A5431	U.S. STEEL	8.0	in	FABR			WRL 7011	16	SECTION 2, 1/2 T
E	WRL-1	SASTMDS214	SEC. 2, 1/4 T		SRM	A5431	U.S. STEEL	8.0	in	FABR			WRL 7011	22	SECTION 2, 1/4 T
E	WRL-1	SASTMDS3	SECT. 3 OF SASTMD	HEAT NO.2	SRM	A5431	U.S. STEEL	8.0	in	FABR.			WRL 7011	19	
E	WRL-1	WB&W19			W	A53381	B&W	5.75	in		E0425		WRL 6772	3	
E	WRL-1	WB&W19 0T			W	A53381	B&W	5.75	in				WRL 6772	5	0 T LOCATION OF WB&W19
E	WRL-1	WB&W19 ORG			W	A53381	B&W	5.75	in				WRL 7011	3	WB&W19 BEFORE SRA
E	WRL-1	WB&W191/2T			W	A53381	B&W	5.75	in				WRL 6772	5; 6	1/2 T LOCATION OF WB&W19
E	WRL-1	WB&W60	CODE W1 (ALSO W)		W	A533B		9.75	in		E23	W1	WRL 8357	2; 3; 13	
E	WRL-1	WLUK18			W	A533C2	LUKENS STEEL	4.0	in		E0426		WRL 6772	3	
E	WRL-1	WLUK18 0T	WLUK18, FACE		W	A533C2	LUKENS STEEL	4.0	in				WRL 6772	5	FACE OF WLUK18
E	WRL-1	WLUK18 1T	WLUK18, ROOT		W	A533C2	LUKENS STEEL	4.0	in				WRL 6772	5	ROOT OF WLUK18
E	WRL-1	WLUK181/2T	WLUK18, 1/2 T		W	A533C2	LUKENS STEEL	4.3	in				WRL 6772	5; 6	1/2 T LOCATION OF WLUK18
E	WRL-1	WVEN20			W	A53381	UNSPECIFIED VENDOR	8.0	in		E04	14	WRL 7011	2	
E	WRL-1	WVEN20 1T	WVEN20, ROOT		W	A53381	UNSPECIFIED VENDOR	8.0	in			14	WRL 7011	16; 21	ROOT LOCATION OF WVEN20
E	WRL-1	WVEN21			W	A53381	UNSPECIFIED VENDOR	8.0	in		E04	14A	WRL 7011	2	
E	WRL-1	WW__16			W	A53381	WESTINGHOUSE	7.5	in		E0423		WRL 6772	3	
E	WRL-2	SHSS01	HSST01	A1008-1	SRM	A53381	LUKENS STEEL	12.0	in	FABR			WE&D 17/116	116	
E	WRL-2	SHSS01AA	HSST01, SECT. AA	A1008-1	SRM	A53381	LUKENS STEEL	12.0	in	FABR			WE&D 17/116	116	SEE WCAP-7414
E	WRL-2	SHSS01AB	HSST01, SECT. AB	A1008-1	SRM	A53381	LUKENS STEEL	12.0	in	FABR			WE&D 17/116	116	SEE WCAP-7414
E	WRL-2	SHSS02	HSST02, UNSPEC.SECT.	A1195-1	SRM	A53381	LUKENS STEEL	12.0	in	FABR		HSST02	WE&D 17/116	116	
E	WRL-2	SHSS02 0T	HSST02, UNSPEC.SECT.	A1195-1	SRM	A53381	LUKENS STEEL	12.0	in	FABR			WE&D 17/116	119	0 T LOCATION
E	WRL-2	WHSS50	HSST NO. 50		W	A53381	COMBUSTION ENG.	12.0	in		E07	HSST	WE&D 17/116	116; 123	SEE WCAP-7414
E	WRL-3	FNRQB9	CODE QB9		F	A5082		6.5	in		E17	2V806	WRL 8171	2; 3; 9	
E	WRL-3	HASTM	HAZ OF SASTM		HAZ	A302B		6.0	in		E17	C4076	WRL 8171	2; 3; 6	
E	WRL-3	HME53A	HAZ OF WME53A		HAZ	A53381	LUKENS	6.0	in	FABR			WJRS 7-72/369	370S; 371S; 374S	

Table 28 (continued)

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TAG	EXP_ID	HEAT_ID	RPT_ID	HEAT_NO	PROD_ID	MAT_ID	SUPPLIER	THICKNESS	LENGTH_U	SOURCE	MPC_ID	MPC_HEAT	REF_ID	PAGES	NOTES
E	NRL-3	HNRL01	HAZ OF WNRL01		HAZ	A533B	COMBUSTION ENG.	10.0	in		E12	HAZP1	ASTM STP 570/83	87; 88; 94	
E	NRL-3	HNRL03	HAZ OF WNRL03		HAZ	A533B	COMBUSTION ENG.	9.75	in		E12	HAZP3	ASTM STP 570/83	87; 88; 97	PARENT PLATE IS PWRL03
E	NRL-3	HNRL04	HAZ OF WNRL04		HAZ	A533B	COMBUSTION ENG.	9.0	in		E12	HAZP4	ASTM STP 570/83	87; 88	
E	NRL-3	HNRL05	HAZ OF WNRL05		HAZ	A533B	COMBUSTION ENG.	9.625	in		E1224	P5	ASTM STP 683/235	238; 239; 242	
E	NRL-3	HNRL06	HAZ OF WNRL06		HAZ	A533B	COMBUSTION ENG.	9.75	in		E1226	HAZ6	ASTM STP 683/235	238; 239; 247	
E	NRL-3	PWRL01	PLATE 1		P	A533B	COMBUSTION ENG.	10.0	in		E12	P1	ASTM STP 570/83	88; 87; 90	CODE CEP1 IN NRL 8287
E	NRL-3	PWRL02	PLATE 2		P	A533B	COMBUSTION ENG.	10.0	in		E12	P2	ASTM STP 570/83	87; 88	CODE CEP2 IN NLR 8287
E	NRL-3	PWRL03	PLATE 3		P	A533B	COMBUSTION ENG.	9.75	in			P3	ASTM STP 683/235	238; 239	
E	NRL-3	PWRL04	PLATE 4		P	A533B	COMBUSTION ENG.	9.0	in			P4	ASTM STP 683/235	238; 239	
E	NRL-3	PWRL05	PLATE 5		P	A533B	COMBUSTION ENG.	9.625	in		E1222	P5	ASTM STP 683/235	238; 239; 241	
E	NRL-3	PWRL06	PLATE 6		P	A533B	COMBUSTION ENG.	9.75	in		E1225	P6	ASTM STP 683/235	238; 239; 242	
E	NRL-3	PWRL07	PLATE 7		P	A533B	COMBUSTION ENG.	9.75	in		E1228	P7	ASTM STP 683/235	238; 239; 243	
E	NRL-3	PWRL3U		C4076	P	A302B	LUKENS STEEL	6-3/8	in	FABR			NRL 8006/III-A	45	
E	NRL-3	SASTM 3/4T	REF.PL., 3/4T LOC.	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR			NRL 8171	2	
E	NRL-3	SASTM H	REF.PL., HAZ PARENT	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR			NRL 8171	2	PARENT MATERIAL FOR HASTM
E	NRL-3	WHE53A	FROM PHE53A	1P3607	W	A533B2	LUKENS STEEL	6.0	in				WJRS 7-72/369	370S; 371S; 375S	USED DEMO MELT AS BASE
E	NRL-3	WNRL01	WELD 1		W	A533B	COMBUSTION ENG.	10.0	in		E12	WELD1	ASTM STP 570/83	87; 88; 95	CODE CEW1 IN NRL 8287
E	NRL-3	WNRL02	WELD 2		W	A533B	COMBUSTION ENG.	10.0	in		E12	WELD2	ASTM STP 570/83	87; 88	CODE CEW2 IN NRL 8287
E	NRL-3	WNRL03	WELD 3		W	A533B	COMBUSTION ENG.	9.75	in			WELD3	ASTM STP 683/235	238; 239	SEE NRL 8136
E	NRL-3	WNRL04	WELD 4		W	A533B	COMBUSTION ENG.	9.0	in			WELD4	ASTM STP 683/235	238; 239	SEE NRL 8136
E	NRL-3	WNRL06	WELD 6		W	A533B	COMBUSTION ENG.	9.75	in		E1227	WELD6	ASTM STP 683/235	238; 239; 244	SEE NRL 8136
E	NRL-4	SASTM F26	REF.PL., CODE F26	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR	E24	A0421	NRL 8357	2; 3; 10	
E	NRL-4	SHSS03MU	HSST03, SECTION MU	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NRL 8357	2	
E	NRL-4	WB&W01	CODE NRL 1 (N1)		W	A533B					E22	NRL1	NRL 8357	2; 3; 15	
E	NRL-4	WB&W02	CODE NRL 2 (N2)		W	A533B					E22	NRL2	NRL 8357	2; 3; 16	
E	NRL-4	WB&W03	CODE NRL 3 (N3)		W	A533B					E22	NRL3	NRL 8357	2; 3; 17	
E	NRL-4	WB&W04	CODE NRL 4 (N4)		W	A533B					E22	NRL4	NRL 8357	2; 3; 18	
E	NRL-4	WB&W05	CODE NRL 5 (N5)		W	A533B					E22	NRL5	NRL 8357	2; 3; 19	
E	NRL-4	WB&W06	CODE NRL 6 (N6)		W	A533B					E22	NRL6	NRL 8357	2; 3; 22	
E	NRL-4	WB&W07	CODE NRL 7 (N7)		W	A533B					E22	NRL7	NRL 8357	2; 3; 20	
E	NRL-4	WB&W08	CODE NRL 8 (N8)		W	A533B					E22	NRL8	NRL 8357	2; 3; 21	
E	NRL-4	WMY_01	CODE MY	1P3571	W	A533B1	COMBUSTION ENG.	10.0	in	SIM	E23	MY	NRL 8357	2; 3; 12	SEE CR 75-269
E	NRL-AN	WB&W86	CODE V86		W	A533B		12.0	in		E25	CEV86	ASTM STP 725/63	64; 65; 67	
E	NRL-AN	WCE_84	CODE V84		W	A533B		8.125	in		E25	CE884	ASTM STP 725/63	64; 65; 67	
E	NRL-EP	FB&W01	CODE BCB		F	A5082		10.25	in		E20	BWEPRI	NRL 8327	2; 3	
E	NRL-EP	PEPR1B	CODE CAB		P	A533B					E20	EPR1B	NRL 8327	2; 3	
E	NRL-EP	PEPR1C	CODE CBB		P	A533B					E20	EPR1C	NRL 8327	2; 3	
E	NRL-EP	SASTM W	REF.PL., CODE W	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR	E20	A0421	NRL 8327	2; 3	
E	NRL-EP	SASTM W1/2	REF.PL., CODE W,1/2T	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR			EPRI NP-2782	3-5; 6-2	1/2 T LOCATION OF SASTM W
E	NRL-EP	WEPR04	CODE E4		W	A533B		8.38	in	FABR	E20	E4	NRL 4431/1	12	SEE EPRI NP-2782, PP. 3-1, 3-5
E	NRL-EP	WEPR043/4T	CODE E4		W	A533B		8.38	in	FABR			EPRI NP-2782	3-5; 6-3	3/4 T LOCATION OF WEPR04
E	NRL-EP	WEPR19	CODE E19 (EP-19)		W	A533B1	COMBUSTION ENG.	8.75	in	FABR	E20	E19	NRL 8327	2; 3	SEE EPRI NP-2782
E	NRL-EP	WEPR23	CODE E23 (EP-23)		W	A533B1	COMBUSTION ENG.	9.25	in	FABR	E20	E23	NRL 8327	2; 3	SEE EPRI NP-2782
E	NRL-EP	WEPR24	CODE E24 (EP-24)		W	A533B1	COMBUSTION ENG.	8.75	in	FABR	E20	E24	NRL 8327	2; 3	SEE EPRI NP-2782
E	ORRPSF	FKFA01	CODE K		F	22NiMoCr37	KFA	295.0	mm				NUREG/CR-3295/V2	4	
E	ORRPSF	FMOL01	CODE MO		F	A5083	MOL	238.0	mm				NUREG/CR-3295/V2	4	
E	ORRPSF	SASTM F23	REF.PL., CODE F23	A0421	SRM	A302B	U.S. STEEL	152.0	mm	FABR			NUREG/CR-3295/V2	4	
E	ORRPSF	SHSS03PSF	HSST03, UNSPEC.SECT.	C2702	SRM	A533B1	LUKENS STEEL	12.0	in	FABR			NUREG/CR-3295/V2	4	
E	ORRPSF	WRRA_PSF	CODE R		W	A533B	RR&A	160.0	mm				NUREG/CR-3295/V2	6	
E	PR-EDB	HBR_01	FROM S-5503-2/3	192472/3	HAZ	A302B		6.0	in	SIM	E16		ASTM STP 481	149; 150; 151	
E	PR-EDB	PBR_01	S-5503-2/3	192462/3	P	A302B		6	in	SCR	E16		ASTM STP 481	146; 147; 148; 149	
E	PR-EDB	PDR101	MELT 19716, SLAB 38	19716	P	A302B	LUKENS STEEL	5.75	in	SCR			ASTM STP 481	175	
E	PR-EDB	PHM301	S-4201-2	A0638-2	P	A302B	LUKENS STEEL	5.0	in	SCR	E16		ASTM STP 481	201	SEE GECR-4443, C-1
E	PR-EDB	PHM302	S-4201-4	20239-3	P	A302B	LUKENS STEEL	5.0	in	SCR	E16		ASTM STP 481	201	SEE GECR-4443, C-1
E	PR-EDB	PYR_01	MELT 19281; MARK B	19281-2	P	A302B	LUKENS STEEL	8.5	in		E16		ASTM STP 481	157	
E	PR-EDB	WBR_01	FROM S-5503-2/3	192462/3	W	A302B	COMBUSTION ENG.	6.0	in	SIM	E16		ASTM STP 481	149; 150	SEE GECR-4442
E	RRA	HRRA01	21 FROM W03-PA5		HAZ	A533B	RR&A			FABR			ASTM STP 782/343	344; 354	3/4 T LOCATION

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Table 28 (continued)

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TAG	EXP_ID	HEAT_ID	RPT_ID	HEAT_NO	PROD_ID	MAT_ID	SUPPLIER	THICKNESS	LENGTH_U	SOURCE	MPC_ID	MPC_HEAT	REF_ID	PAGES	NOTES
E	RRA	HRRA02	Z2 FROM WS3-PA5		HAZ	A533B	RR&A			FABR			ASTM STP 782/343	344; 354	1/4 T LOCATION
E	RRA	HRRA03	Z3 FROM WS3-WO3		HAZ	A533B	RR&A			FABR			ASTM STP 782/343	344; 354	1/4 T LOCATION
E	RRA	PRRA01	PA1 (WAS PX)		P	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 354	1/4 T + 3/4 T LOCATION
E	RRA	PRRA02	PA2 (WAS PE)		P	A533B	COMBUSTION ENG.	150.0	mm				ASTM STP 782/343	344; 346; 354	1/4 T + 3/4 T LOCATION
E	RRA	PRRA03A	PA3a (WAS PL)		P	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 354	1/4 + 3/4 T, UNSPEC. BLOCK
E	RRA	PRRA03B	PA3b		P	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 354	1/4 + 3/4 T, UNSPEC. BLOCK
E	RRA	PRRA04	PA4 (WAS FA)		P	A533B	MARREL FRERES S.A.	150.0	mm				ASTM STP 782/343	344; 346; 354	1/4 T + 3/4 T LOCATION
E	RRA	PRRA05	PA5 (WAS PB)		P	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 354	3/4 T LOCATION
E	RRA	SASTM RRA	PRA (WAS AO)	A0421	SRM	A302B	U.S. STEEL	150.0	mm	FABR			ASTM STP 782/343	344; 354	PIECE OF SASTM USED BY RRA
E	RRA	WRRA011/2T	WO1c, (1/2T)		W	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 352; 354	1/2 T LOCATION OF WRRA01
E	RRA	WRRA011/4T	WO1a (WAS 2W) (1/4T)		W	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 345; 354	1/4 T LOCATION
E	RRA	WRRA012/4T	WO1b (1/4T & 1/2T)		W	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 352; 354	1/4 T + 1/2 T LOC. OF WRRA01
E	RRA	WRRA013/4T	WO1d (3/4T)		W	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 352; 354	3/4 T LOCATION OF WRRA01
E	RRA	WRRA02	WO2 (WAS 1W)		W	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 345; 354	1/4 + 1/2 + 3/4 T LOCATION
E	RRA	WRRA03	WO3 (WAS WHA)		W	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 354	1/2 T LOCATION
E	RRA	WRRA04	WO4 (WAS WL)		W	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 354	1/4 T + 3/4 T LOCATION
E	RRA	WRRA11	WS1 (WAS WHE)		W	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 345; 354	1/5 T + 1/3 T LOCATION
E	RRA	WRRA12	WS2 (WAS SB)		W	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 345; 354	1/4 T + 3/5 T LOCATION
E	RRA	WRRA13	WS3 (WAS M)		W	A533B	RR&A	150.0	mm	FABR			ASTM STP 782/343	344; 345; 354	1/4 T LOCATION
E	RRA	WUK_01	UKW		W	A533B1	BABCOCK POWER	150.0	mm				ASTM STP 782/433	435	
E	SM-1	PME53A	PLATE A, INGOT 1	V22403	P	A533B1	LATROBE	6.0	in				NRL 7121	1; 4; 6; 23	
E	SM-1	PME53A 0T	PLATE A, INGOT 1	V22403	P	A533B1	LATROBE	6.0	in				NRL 7121	10	0 T LOCATION OF PME53A
E	SM-1	PME53A1/2T	PLATE A, INGOT 1	V22403	P	A533B1	LATROBE	6.0	in				NRL 7121	10	1/2 TLOCATION OF PME53A
E	SM-1	PME53A3/4T	PLATE A, INGOT 1	V22403	P	A533B1	LATROBE	6.0	in				NRL 7121	10	3/4 T LOCATION OF PME53A
E	SM-1	PME53B	PLATE B, INGOT 1	V22403	P	A533B2	LATROBE	6.0	in				NRL 7121	1; 4; 6; 23	
E	SM-1	PME53B 0T	PLATE B, INGOT 1	V22403	P	A533B2	LATROBE	6.0	in				NRL 7121	10	0 T LOCATION OF PME53B
E	SM-1	PME53B1/2T	PLATE B, INGOT 1	V22403	P	A533B2	LATROBE	6.0	in				NRL 7121	10	[illegible] T LOCATION OF PME53B
E	SM-1	PME53B3/4T	PLATE B, INGOT 1	V22403	P	A533B2	LATROBE	6.0	in				NRL 7121	10	3.[illegible] T LOCATION OF PME53B
E	SM-1	PME53C	PLATE C, INGOT 2	V22403	P	A533B1	LATROBE	6.0	in				NRL 7121	1; 4; 6; 23	
E	SM-1	PME53C 0T	PLATE C, INGOT 2	V22403	P	A533B1	LATROBE	6.0	in				NRL 7121	10	0 T LOCATION OF PME53C
E	SM-1	PME53C1/2T	PLATE C, INGOT 2	V22403	P	A533B1	LATROBE	6.0	in				NRL 7121	10	1/2 T LOCATION OF PME53C
E	SM-1	PME53C3/4T	PLATE C, INGOT 2	V22403	P	A533B1	LATROBE	6.0	in				NRL 7121	10	3/4 T LOCATION OF PME53C
E	SM-1	PME53D	PLATE D, INGOT 2	V22403	P	A533B2	LATROBE	6.0	in				NRL 7121	1; 4; 6; 23	
E	SM-1	PME53D 0T	PLATE D, INGOT 2	V22403	P	A533B2	LATROBE	6.0	in				NRL 7121	10	0 T LOCATION OF PME53D
E	SM-1	PME53D1/2T	PLATE D, INGOT 2	V22403	P	A533B2	LATROBE	6.0	in				NRL 7121	10	1/2 / LOCATION OF PME53D
E	SM-1	PME53D3/4T	PLATE D, INGOT 2	V22403	P	A533B2	LATROBE	6.0	in				NRL 7121	10	3/4 T LOCATION OF PME53D
E	SM-2	PME38A	CODE 38A, CAST 1A	Y9238	P	A302B	U.S. STEEL	0.5	in				NRL 8264	1; 2; 3	SEE NA 6
E	SM-2	PME38B	CODE 38B, CAST 1B	Y9238	P	A302B	U.S. STEEL	0.5	in				NRL 8264	1; 2; 3	SEE NA 6
E	SM-2	PME38C	CODE 38C, CAST 1C	Y9238	P	A302B	U.S. STEEL	0.5	in				NA 6/27	29; 30	
E	SM-2	PME39A	CODE 39A, CAST 1A	Y9239	P	A302B	U.S. STEEL	0.5	in				NRL 8264	1; 2; 3	SEE NA 6
E	SM-2	PME39B	CODE 39B, CAST 1B	Y9239	P	A302B	U.S. STEEL	0.5	in				NRL 8264	1; 2; 3	SEE NA 6
E	SM-2	PME39C	CODE 39C, CAST 1C	Y9239	P	A302B	U.S. STEEL	0.5	in				NA 6/27	29; 30	
E	SM-2	PME40A	CODE 40A, CAST 1A	Y9240	P	A302B	U.S. STEEL	0.5	in				NA 6/27	29; 30	
E	SM-2	PME40B	CODE 40B, CAST 1B	Y9240	P	A302B	U.S. STEEL	0.5	in				NRL 8264	1; 2; 3	SEE NA 6
E	SM-2	PME40C	CODE 40C, CAST 1C	Y9240	P	A302B	U.S. STEEL	0.5	in				NRL 8264	1; 2; 3	SEE NA 6
E	SM-2	PMEV61	CODE V61		P	A302B	U.S. STEEL	12.0	in		E21	V61	NRL 8264	1; 2; 3	
E	SM-2	PMEV63	CODE V63		P	A302B	U.S. STEEL	12.0	in		E21	V63	NRL 8264	1; 2; 3	
E	SM-2	PMEV65	CODE V65		P	A302B	U.S. STEEL	12.0	in		E21	V65	NRL 8264	1; 2; 3	
E	SM-2	PMEV67	CODE V67		P	A302B	U.S. STEEL	12.0	in		E21	V67	NRL 8264	1; 2; 3	
E	SM-2	PMEV71	CODE V71		P	A302B	U.S. STEEL	12.0	in		E21	V71	NRL 8264	1; 2; 3	
E	SM-2	PMEV73	CODE V73		P	A302B	U.S. STEEL	12.0	in		E21	V73	NRL 8264	1; 2; 3	
E	SM-2	PMEV75	CODE V75		P	A302B	U.S. STEEL	12.0	in		E21	V75	NRL 8264	1; 2; 3	
E	SM-2	PMEV77	CODE V77		P	A302B	U.S. STEEL	12.0	in		E21	V77	NRL 8264	1; 2; 3	
E	SM-3	PMEY2A	HEAT Y9272, CAST 2A	Y9272	P	A543I		0.5	in				NA 6/27	29; 30	3.5% NiCrMo
E	SM-3	PMEY2B	HEAT Y9272, CAST 2B	Y9272	P	A543I		0.5	in				NA 6/27	29; 30	3.5% NiCrMo
E	SM-3	PMEY2C	HEAT Y9272, CAST 2C	Y9272	P	A543I		0.5	in				NA 6/27	29; 30	3.5% NiCrMo
E	SM-3	PMEY3A	HEAT Y9273, CAST 2A	Y9273	P	A543I		0.5	in				NA 6/27	29; 30	7.5% NiCrMo

Table 28 (continued)

TAG	EXP_ID	HEAT_ID	RPT_ID	HEAT_NO	PROD_ID	MAT_ID	SUPPLIER	THICKNESS	LENGTH_U	SOURCE	MPC_ID	MPC_HEAT	REF_ID	PAGES	NOTES
E	SM-3	PMEY3B	HEAT Y9273, CAST 2B	Y9273	P	A543I		0.5	in				NA 6/27	29; 30	7.5% NiCrMo
E	SM-3	PMEY3C	HEAT Y9273, CAST 2C	Y9273	P	A543I		0.5	in				NA 6/27	29; 30	7.5% NiCrMo
E	SM-3	WNRL08	EXP. COMP. 1934		W	A543I		1.0	in				NA 6/27	42; 43; 44	EXPERIMENTAL COMPOSITION 1934
E	SM-3	WNRL09	EXP. COMP. 1936		W	A543I		1.0	in				NA 6/27	42; 43; 44	EXPERIMENTAL COMPOSITION 1936
E	SM-3	WNRL10	EXP. COMP. 1938		W	A543I		1.0	in				NA 6/27	42; 43; 44	EXPERIMENTAL COMPOSITION 1938
E	SM-3	WNRL11	EXP. COMP. 1948		W	A543I		1.0	in				NA 6/27	42; 43; 44	EXPERIMENTAL COMPOSITION 1948
E	SM-3	WNRL12	HY-80 (WELD)		W	A543I		2.0	in				NA 6/27	42; 43; 44	
E	SM-3	WNRL13	HY-80 (WELD)		W	A543I		2.0	in				NA 6/27	42; 43; 44	
E	SM-4	PME05A	PLATE 5, INGOT A		P	A302B		12.7	mm		E31	5A	ASTM STP 782/375	376; 377; 379	
E	SM-4	PME05B	PLATE 5, INGOT B		P	A302B		12.7	mm		E31	5B	ASTM STP 782/375	376; 377; 379	
E	SM-4	PME05C	PLATE 5, INGOT C		P	A302B	U.S. STEEL	12.7	mm		E31	5C	ASTM STP 782/375	376; 377; 379	
E	SM-4	PME05D	PLATE 5, INGOT D		P	A302B	U.S. STEEL	12.7	mm		E31	5D	ASTM STP 782/375	376; 377; 379	
E	SM-4	PME06A	PLATE 6, INGOT A		P	A302B	U.S. STEEL	12.7	mm		E31	6A	ASTM STP 782/375	376; 377; 379	
E	SM-4	PME06A NEW	PLATE 6, INGOT A		P	A302B	U.S. STEEL	12.7	mm				NUREG/CR-5216	2; 18	SET FROM DIFF. SECT. OF PLATE
E	SM-4	PME06B	PLATE 6, INGOT B		P	A302B	U.S. STEEL	12.7	mm		E31	6B	ASTM STP 782/375	376; 377; 379	
E	SM-4	PME06C	PLATE 6, INGOT C		P	A302B	U.S. STEEL	12.7	mm		E31	6C	ASTM STP 782/375	376; 377; 379	
E	SM-4	PME06CSI	PLATE 6, INGOT C		P	A302B	U.S. STEEL	12.7	mm				NUREG/CR-2511	10	MATERIAL + 0.35% SI
E	SM-4	PME06D	PLATE 6, INGOT D		P	A302B	U.S. STEEL	12.7	mm		E31	6D	ASTM STP 782/375	376; 377; 379	
E	SM-4	PME67C NEW	67, CAST C		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-5216	2; 19	SET FROM DIFF. SECT. OF PLATE
E	SM-4	PME68A NEW	68, CAST A		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-5216	2; 20	SET FROM DIFF. SECT. OF PLATE
E	SM-4	PME68C NEW	68, CAST C		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-5216	2; 21	SET FROM DIFF. SECT. OF PLATE
E	SM-5	PME66A	66, CAST A		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME66B	66, CAST B		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME66C	66, CAST C		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME66D	66, CAST D		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME67A	67, CAST A		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME67B	67, CAST B		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME67C	67, CAST C		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME67D	67, CAST D		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME68A	68, CAST A		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME68B	68, CAST B		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME68C	68, CAST C		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME68D	68, CAST D		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME69A	69, CAST A		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME69B	69, CAST B		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME69C	69, CAST C		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME69D	69, CAST D		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME70A	70, CAST A		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME70B	70, CAST B		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME70C	70, CAST C		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME70D	70, CAST D		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME71A	71, CAST A		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME71B	71, CAST B		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME71C	71, CAST C		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME71D	71, CAST D		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME72A	72, CAST A		P	A302B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME72B	72, CAST B		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME72C	72, CAST C		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SM-5	PME72D	72, CAST D		P	A533B	U.S. STEEL	0.5	in				NUREG/CR-4437	4; 13; 14	
E	SRM	HASTMA	HAZ OF SASTMA		HAZ	A212B	U.S. STEEL						ASTM DS54	63	HAZ LISTED UNDER A212B INFO.
E	SRM	SASTM	A302B REFERENCE PL.	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR		A0421	ASTM DS54	3; 22; 23	CORRELATION MATERIAL IN PR EDB
E	SRM	SASTM S1	REF.PL., SECTION 1	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR			ASTM DS54	66	SECTION 3 IN WRL 7011, P.17
E	SRM	SASTM S2	REF.PL., SECTION 2	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR			ASTM DS54	66	SECTION 4 IN WRL 7011, P.17
E	SRM	SASTM S3	REF.PL., SECTION 3	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR			ASTM DS54	66	SECTION 2 IN WRL 7011, P.17
E	SRM	SASTM S3SR	SECT. 3, STR. RELIEF	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR			ASTM DS54	66	ADDITONAL STRESS RELIEF
E	SRM	SASTM S4	REF.PL., SECTION 4	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR			ASTM DS54	66; 67	SECTION 1 IN WRL 7011, P.17
E	SRM	SASTM X	REF.PL.,UNSPEC.SECT.	A0421	SRM	A302B	U.S. STEEL	6.0	in	FABR			ASTM DS54	3; 22; 23	UNSPECIFIED PART OF THE PLATE

Table 28 (continued)

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TAG	EXP_ID	HEAT_ID	RPT_ID	HEAT_NO	PROD_ID	MAT_ID	SUPPLIER	THICKNESS	LENGTH_U	SOURCE	MPC_ID	MPC_HEAT	REF_ID	PAGES	NOTES
E	SRM	SASTMA	A212B REFERENCE PL.	A0456	SRM	A212B	U.S. STEEL	4.0	in	FABR			ASTM DS54	3; 62; 63; 69	
E	SRM	SASTMAS1	SECT. 1 OF SASTMA	A0456	SRM	A212B	U.S. STEEL	4.0	in	FABR			ASTM DS54	68	
E	SRM	SASTMAS2	SECT. 2 OF SASTMA	A0456	SRM	A212B	U.S. STEEL	4.0	in	FABR			ASTM DS54	68	
E	SRM	SASTMAS3	SECT. 3 OF SASTMA	A0456	SRM	A212B	U.S. STEEL	4.0	in	FABR			ASTM DS54	69	
E	SRM	SASTMB	NiCrMO REF.PL.,HY-80	74L204	SRM	NiCrMo	U.S. STEEL	3.0	in	FABR			ASTM DS54	3; 64; 70	
E	SRM	SASTMC	T-1	68P281	SRM	T-1	U.S. STEEL	2.0	in	FABR			ASTM DS54	3; 71	
E	VDE	FVDEOD	STAHL D	HY 80	F	NiCrMo	Rheinstahl AG			FABR			BERICHT SUMMARY	8; 10	
E	VDE	HHSS03	STAHL A/HSST03 SEC.J	C2702	HAZ	A533B1	MANNESMANN FORSCHUNG	12.0	in	FABR	E08 7		BERICHT SUMMARY	8; 10	SEE ORNL-4816, P. 76, 78
E	VDE	HVDEOB	HAZ FROM STAHL B		HAZ	MnNiMoV	HÜTTENW. OBERHAUSEN			FABR			BERICHT SUMMARY	8; 10	
E	VDE	HVDEOC	HAZ FROM STAHL C		HAZ	NiCrMo	PHOENIX RHEINROHR			FABR			BERICHT SUMMARY	8; 10	
E	VDE	HVDEOD	HAZ FROM STAHL D		HAZ	NiCrMO	KLÖCKNER-WERKE AG			FABR			BERICHT SUMMARY	8; 10	
E	VDE	PVDEOB	STAHL B		P	MnNiMoV	MANNESMANN AG			FABR			BERICHT SUMMARY	8; 10	
E	VDE	PVDEOC	STAHL C		P	NiCrMo	RHEINSTAHL AG			FABR			BERICHT SUMMARY	8; 10	
E	VDE	WHSS03	SCHWEISSGUT A		W	A533B1	MANNESMANN FORSCHUNG	12.0	in	FABR	E08 4	HSST03	BERICHT SUMMARY	8; 10	FROM HSST03 SECTION J
E	VDE	WVDEOB	STAHL B		W	MnNiMoV	HÜTTENW. OBERHAUSEN			FABR			BERICHT SUMMARY	8; 10	
E	VDE	WVDEOC	STAHL C		W	NiCrMo	PHOENIX RHEINROHR			FABR			BERICHT SUMMARY	8; 10	
E	VDE	WVDEOD	STAHL D		W	NiCrMO	KLÖCKNER-WERKE AG			FABR			BERICHT SUMMARY	8; 10	

Table 29 Partial lis

CHEM_TR.dbf: Page 1

TAG	EXP_ID	HEAT_ID	PROD_ID	MAT_ID	CHEM_LAB	METHOD	SPEC_ID	C	MN	P	S	SI	NI	CR	MO	CU	V	B
E	BET-AX	PBETOP	P	A302B			HEAT	0.190	1.500	0.012	0.026	0.270			0.480			
E	BET-AX	PBETOP	P	A302B	BETTIS		CHECK	0.220	1.740	0.008	0.017	0.310	0.120	0.100	0.460	0.200		
E	BET-AX	PBETOS	P	A302B			HEAT	0.210	1.400	0.027	0.035	0.220			0.460			
E	BET-AX	PBETOS	P	A302B	BETTIS		CHECK	0.220	1.530	0.023	0.031	0.470	0.080	0.080	0.470	0.140		
E	BET-AX	PBETOU	P	A302B			HEAT	0.190	1.170	0.015	0.027	0.210			0.480			
E	BET-AX	PBETOU	P	A302B	BETTIS		CHECK	0.210	1.340	0.021	0.027	0.220	0.230	0.140	0.500	0.220		
E	BWREXP	F98340	F	A5082			HEAT	0.210	0.550	0.007	0.016	0.110	0.620	0.300	0.650	0.130	<.024	
E	BWREXP	FE28VW	F	A5082			HEAT	0.240	0.700	0.008	0.011	0.010	0.790	0.360	0.610	0.090	<.002	
E	BWREXP	FKXMD1	F	A5082			HEAT	0.210	0.710	0.013	0.011	0.320	0.790	0.350	0.600	0.140	<.033	
E	BWREXP	PCPR02	P	A533B1			HEAT	0.230	1.340	0.023	0.013	0.210	0.630	0.140	0.490	0.160	<.002	
E	BWREXP	PNA101	P	A533B1			HEAT	0.240	1.460	0.026	0.011	0.250	0.690	0.130	0.530	0.120	<.002	
E	BWREXP	PVY_01	P	A533B1			HEAT	0.240	1.440	0.020	0.010	0.260	0.660	0.050	0.460	0.100	<.002	
E	BWREXP	WCPR01	W	A533B1			HEAT	0.140	1.300	0.021	0.012	0.080	0.740	0.040	0.510	0.210	<.002	
E	BWREXP	WML102	W	A533B			HEAT	0.110	1.270	0.023	0.016	0.140	0.900	0.040	0.500	0.190	<.002	
E	BWREXP	WVY_01	W	A533B1			HEAT	0.060	1.050	0.012	0.017	0.430	0.950	0.030	0.490	0.010	<.002	
E	CEA	FFRA0B	F	A508-3			HEAT	0.185	1.330	0.013	0.011	0.350	0.580	0.160	0.490	0.070	<0.05	
E	CEA	FFRA0C	F	A508-3			HEAT	0.165	1.240	0.011	0.013	0.290	0.830	0.170	0.490	0.080		
E	CEA	FFRA0D	F	A508-3			HEAT	0.140	1.420	0.012	0.008	0.320	0.660	0.150	0.500	0.070	0.006	
E	CEA	FFRA0E	F	A508-3			HEAT	0.155	1.450	0.010	0.011	0.300	0.700	0.160	0.480	0.060	<0.05	
E	CEA	FFRA0F	F	A508-3			HEAT	0.140	1.220	0.008	0.011	0.240	0.710	0.180	0.470	0.050		
E	CEA	FFRA0G	F	A508-3			HEAT	0.165	1.260	0.005	0.004	0.240	0.700	0.200	0.450	0.050		
E	CEA	FFRA0J	F	A508-3			HEAT	0.165	1.310	0.015	0.010	0.330	0.680	0.110	0.460	0.070	<0.05	
E	CEA	FFRAJ2	F	A508-3			HEAT	0.180	1.340	0.009	0.005	0.260	0.760	0.110	0.500	0.060	0.002	
E	CEA	FFRAP1	F	A508-3			HEAT	0.166	1.380	0.008	0.006	0.280	0.720	0.240	0.540	0.085	0.004	
E	CEA	FFRAP2	F	A508-3			HEAT	0.168	1.470	0.010	0.005	0.280	0.920	0.230	0.490	0.080	0.004	
E	CEA	FFRAP3	F	A508-3			HEAT	0.169	1.460	0.010	0.006	0.290	1.430	0.240	0.500	0.085	0.010	
E	CEA	FFRAR2	F	A508-3			HEAT	0.160	1.265	0.008	0.009	0.180	0.680	0.230	0.485	0.050	<.005	
E	CEA	PFRA0A	P	A533B1			HEAT	0.260	1.360	0.011	0.010	0.260	0.620		0.520	0.080		
E	CEA	PFRA0H	P	A533B1			HEAT	0.180	1.540	0.007	0.008	0.200	0.630	0.050	0.470	0.030		
E	CEA	PFRA0K	P	A533B1			HEAT	0.255	1.080	0.010	0.014	0.150	0.720	0.120	0.520	0.120	<0.05	
E	CEA	PFRA0L	P	A533B1			HEAT	0.235	1.280	0.010	0.015	0.220	0.720	0.130	0.500	0.120	<0.05	
E	CEA	PFRA0M	P	A533B1			HEAT	0.255	1.310	0.008	0.014	0.260	0.710	0.150	0.550	0.220	<0.05	
E	CEA	PFRA0N	P	A533B1			HEAT	0.250	1.350	0.008	0.014	0.250	0.660	0.150	0.500	0.220	<0.05	
E	CEA	PFRA0O	P	A533B1			HEAT	0.178	1.490	0.006	0.005	0.250	0.660	0.050	0.510	0.030	0.010	
E	CEA	PFRA1A	P	A533B1			HEAT	0.176	1.330	0.020	0.014	0.250	0.700	0.190	0.510	0.102		
E	CEA	PFRA1B	P	A533B1			HEAT	0.171	1.320	0.009	0.013	0.250	0.690	0.180	0.500	0.098		
E	CEA	PFRA1C	P	A533B1			HEAT	0.180	1.290	0.009	0.013	0.250	0.700	0.190	0.500	0.020		
E	CEA	PFRA1D	P	A533B1			HEAT	0.171	1.310	0.009	0.014	0.260	0.690	0.190	0.510	0.020		
E	CEA	PFRA1E	P	A533B1			HEAT	0.184	1.300	0.020	0.013	0.250	0.690	0.900	0.500	0.020		
E	CEA	PFRA1F	P	A533B1			HEAT	0.159	1.270	0.018	0.010	0.280	0.740	0.180	0.500	0.100		
E	CEA	PFRA1G	P	A533B1			HEAT	0.180	1.300	0.019	0.012	0.250	0.690	0.180	0.500	0.022		
E	CEA	PFRA1H	P	A533B1			HEAT	0.184	1.300	0.008	0.013	0.250	0.690	0.190	0.500	0.096		
E	CEA	PFRA1K	P	A533B1			HEAT	0.186	1.320	0.015	0.013	0.240	0.700	0.190	0.510	0.060		
E	CEA	PFRA1N	P	A533B1			HEAT	0.176	1.300	0.014	0.015	0.250	0.700	0.190	0.510	0.059		
E	CEA	PFRA1R	P	A533B1			HEAT	0.167	1.330	0.015	0.016	0.230	0.690	0.190	0.500	0.080		
E	CEA	PFRA1S	P	A533B1			HEAT	0.184	1.290	0.012	0.014	0.250	0.690	0.180	0.500	0.060		
E	CEA	PFRA1T	P	A508-3			HEAT	0.166	1.380	0.008		0.280	0.725	0.240	0.535	0.007		
E	CEA	PFRA1U	P	A508-3			HEAT	0.168	1.470	0.010		0.280	0.925	0.230	0.485	0.069		
E	CEA	PFRA1V	P	A508-3			HEAT	0.169	1.460	0.010		0.290	1.430	0.240	0.500	0.068		
E	CEA	PFRA1Z	P	A533B1			HEAT	0.154	1.290	0.020	0.015	0.250	0.710	0.190	0.500	0.061		
E	CEA	PFRA21	P	A533B1			HEAT	0.140	1.450	0.010	0.008	0.240	1.460	<0.05	0.490	0.070	<0.05	
E	CEA	PFRAJ1	P	A533B1			HEAT	0.180	1.480	0.009	0.004	0.220	0.660	0.200	0.570	0.020	0.002	
E	CEA	PFRAR1	P	A533B1			HEAT	0.190	1.350	0.008	0.020	0.270	0.560		0.550	0.070		
E	CEA	WFRAD0	W	A533B1			HEAT	0.044	1.180	0.010	0.008	0.227	0.865	0.053	0.383	0.021		
E	CEA	WFRAD1	W	A533B1			HEAT	0.053	1.420	0.019	0.011	0.237	0.685	0.110	0.430	0.027		
E	CEA	WFRAD2	W	A533B1			HEAT	0.051	1.240	0.016	0.013	0.193	0.695	0.093	0.360	0.180		
E	CEA	WFRAD3	W	A533B1			HEAT	0.054	1.250	0.018	0.012	0.273	1.115	0.098	0.415	0.028		

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S	TI	CO	N	O	SB	AS	ZR	AL	AL_SOL	AL_INT	PB	W	SN	ZN	TA	K	NB	REF_ID	PAGES	NOTES
		0.200		.0158														WAPD-TM-1095	13	MILL ANALYSIS
								0.013										WAPD-TM-1095	13	
		0.140		.0162														WAPD-TM-1095	13	MILL ANALYSIS
								0.028										WAPD-TM-1095	13	
		3.220		.0169														WAPD-TM-1095	13	MILL ANALYSIS
								0.045										WAPD-TM-1095	13	
																		NEDO-21708	4-1; 4-8	
																		NEDO-21708	4-1; 4-8	
																		NEDO-21708	4-1; 4-8	
																		NEDO-21708	4-1; 4-8	
																		NEDO-21708	4-1; 4-8	
																		NEDO-21708	4-1; 4-8	
																		NEDO-21708	4-1; 4-8	
																		NEDO-21708	4-1; 4-8	
																		NEDO-21708	4-1; 4-8	
																		ASTM STP 819/29	32	
																		ASTM STP 819/29	32	
																		ASTM STP 819/29	32	
																		ASTM STP 819/29	32	
																		ASTM STP 819/29	32	
																		ASTM STP 819/29	32	
																		ASTM STP 819/29	32	
					0.010	0.008		0.024					0.007					ASTM STP 819/29	32	
								0.033					0.007					ASTM STP 819/29	37	
								0.035					0.007					ASTM STP 819/29	37	
								0.039					0.007					ASTM STP 819/29	37	
		0.010																ASTM STP 819/66	65; 66	
																		ASTM STP 819/29	32	
																		ASTM STP 819/29	32	
																		ASTM STP 819/29	37	
																		ASTM STP 819/29	37	
																		ASTM STP 819/29	37	
																		ASTM STP 819/29	37	
																		ASTM STP 819/29	32	
								0.015					0.016					ASTM STP 819/29	37	
								0.021					0.016					ASTM STP 819/29	37	
								0.017					0.017					ASTM STP 819/29	37	
								0.023					0.005					ASTM STP 819/29	37	
								0.023					0.005					ASTM STP 819/29	-37	
								0.028					0.005					ASTM STP 819/29	37	
								0.014					0.016					ASTM STP 819/29	37	
								0.019					0.005					ASTM STP 819/29	37	
								0.024					0.011					ASTM STP 819/29	37	
								0.023					0.010					ASTM STP 819/29	37	
								0.018					0.013					ASTM STP 819/29	37	
								0.022					0.009					ASTM STP 819/29	37	
																		ASTM STP 725/20	24	
																		ASTM STP 725/20	24	
																		ASTM STP 725/20	24	
								0.030					0.011					ASTM STP 819/29	37	
																		ASTM STP 819/29	37	
					0.091	0.007		0.020					0.003					ASTM STP 819/29	32	
																		ASTM STP 819/29	32	
		0.013	0.007			0.010							0.005					ASTM STP 782/392	396	
		0.021	0.011			C.025							0.005					ASTM STP 782/392	394	
		0.020	0.012			0.020							0.006					ASTM STP 782/392	396	
		0.014	0.011			0.021							0.006					ASTM STP 782/392	396	

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Table 30 Partial listing

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TAG	EXP_ID	HEAT_ID	PROD_ID	SUPPLIER	HEAT_TREAT	HEAT_NO	SUPPL_ID	MINTEMP_1	MAXTEMP_1	NOMTEMP_1	RANGE_1	HOURS_1	QCHM_1	ID_1	MINTEMP_2	MAXTEMP_2	NOMTEMP_2
E	BET-AW	PBETOP	P			64658	CODE P	1650	1675			6.00	WQ	A	1150	1200	
E	BET-AW	PBETOS	P		PRESUMED	20869-2	CODE S	1650	1700			4.00	AC	A	1200	1250	
E	BET-AW	PBETOU	P		PRESUMED	21478-10	CODE U	1650	1700			4.00	AC	A	1200	1250	
E	CEA	PFRA12	P				A			940		1.00	AC	A			650
E	CEA	PFRA13	P				B			940		1.00	AC	A			650
E	CEA	PFRA14	P				C			940		1.00	AC	A			650
E	CEA	PFRA15	P				D			940		1.00	AC	A			650
E	CEA	PFRA16	P				E			940		1.00	AC	A			650
E	CEA	PFRA17	P				F			940		1.00	AC	A			650
E	CEA	PFRA18	P				G			940		1.00	AC	A			650
E	CEA	PFRA19	P				H			940		1.00	AC	A			650
E	CEA	PFRA20	P				K			940		1.00	AC	A			650
E	CEA	PFRA21	P				N			940		1.00	AC	A			650
E	CEA	PFRA22	P				R			940		1.00	AC	A			650
E	CEA	PFRA23	P				S			940		1.00	AC	A			650
E	CEA	PFRA24	P				Z			940		1.00	AC	A			650
E	CEA	PFRA25	P	CREUSOT LOIRE	CREUSOT LOIRE		T			885		5.00	AC	A			650
E	CEA	PFRA26	P	CREUSOT LOIRE	CREUSOT LOIRE		U			870		5.00	AC	A			650
E	CEA	PFRA27	P	CREUSOT LOIRE	CREUSOT LOIRE		V			860		5.00	AC	A			650
E	CEA	WFRA20	W				NO. 0			550		6.00		R			615
E	CEA	WFRA21	W				NO. 1			550		6.00		R			615
E	CEA	WFRA22	W				NO. 2			550		6.00		R			615
E	CEA	WFRA23	W				NO. 3			550		6.00		R			615
E	CEA	WFRA24	W				NO. 4			550		6.00		R			615
E	CEA	WFRA25	W				NO. 5			550		6.00		R			615
F	CEA	WFRA26	W				NO. 6			550		6.00		R			615
E	CEA	WFRA27	W				NO. 7			550		6.00		R			615
F	CEA	WFRA28	W				NO. 8			550		6.00		R			615
E	CEA	WFRA31	W				NO. 11			550		6.00		R			615
E	CEA	WFRA32	W				NO. 12			550		6.00		R			615
E	CEA	WFRA33	W				NO. 13			550		6.00		R			615
E	CEA	WFRA34	W				NO. 14			550		6.00		R			615
E	CEA	WFRA35	W				NO. 15			550		6.00		R			615
E	EPR-AW	WEPR19	W	COMBUSTION ENG.	COMBUSTION ENG.		EP-19			1150	50	50.00		R			
E	EPR-AW	WEPR23	W	COMBUSTION ENG.	COMBUSTION ENG.		EP-23			1150	50	50.00		R			
E	EPR-AW	WEPR24	W	COMBUSTION ENG.	COMBUSTION ENG.		EP-24			1150	50	50.00		R			
E	FKS-K	WFRG01	W				SERIES 1			570		32.00					600
E	FKS-K	WFRG02	W				SERIES 2			560		40.00					600
E	FKS-K	WFRG03	W				SERIES 3										
E	FKS-K	WFRG04	W				SERIES 4			550		8.00					605
E	FKS-K	WFRG05	W				SERIES 5			550		50.00					610
E	FKS-K	WFRG06	W				SERIES 6			550		10.00					610
E	FKS-K	WFRG07	W				SERIES 7			900		10.00					680
E	FKS-K	WFRG08	W				SERIES 8			680		11.00					900
E	FKS-K	WFRG09	W				SERIES 9			550		25.00					600
E	FKS-K	WFRG10	W				SERIES 10			550		29.00					600
E	FKS-K	WFRG11	W				SERIES 11										
E	FKS-K	WFRG12	W				SERIES 12			550		52.00					600
E	FKS-K	WFRG13	W				SERIES 13			550		40.00					600
E	FKS-K	WFRG14	W				SERIES 14			550		40.00					600
E	FKS-K	WFRG15	W				SERIES 15			550		10.50					600
E	FKS-K	WFRG16	W				SERIES 16			550		40.00					600
E	FKS-K	WFRG17	W				SERIES 17			550		8.00					600
E	FKS-K	WFRG18	W				SERIES 18			550		36.00					600
F	FKS-K	WFRG19	W				SERIES 19			550		49.00					600
E	WFIR	FWFB01	F			6335890	WB1, WB4			950		51.00		R			
E	WFIR	FWFB02WB2	F	TAYLOR FORGE		5334610	WB2			1525		4.00	AC	R			1525

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WP_2	MAXTEMP_2	NOMTEMP_2	RANGE_2	HOURS_2	QCHM_2	ID_2	MINTEMP_3	MAXTEMP_3	NOMTEMP_3	RANGE_3	HOURS_3	QCHM_3	ID_3	TEMP_U	REF_ID	PAGES	NOTES
	1200			4.00	AC	T	1125	1150			24.00	FC	R	F	WAPD-TM-1095	2; 12	
	1250					T			1150		4.00		R	F	WAPD-TM-1095	2; 12	PRESUMED; RELIEVED 56 CYCLES
	1250				AC	T			1110		4.00		R	F	WAPD-TM-1095	2; 12	RELIEVED 56 CYCLES
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		650		10.00	AC	T								C	ASTM STP 725/20	22	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
		615		8.00		R								C	ASTM STP 782/392	394	
														F	EPRI NP-2712/V2	5-3	
														F	EPRI NP-2712/V2	5-3	
														F	EPRI NP-2712/V2	5-3	
		600		11.00										C	ASTM STP 782/412	415	
		600		27.00										C	ASTM STP 782/412	415	
														C	ASTM STP 782/412	415	NO DATA
		605		24.00										C	ASTM STP 782/412	415	
		610		18.00										C	ASTM STP 782/412	415	
		610		10.00										C	ASTM STP 782/412	415	
		680		15.00										C	ASTM STP 782/412	415	
		900		8.00					610		8.00			C	ASTM STP 782/412	415	
		600		10.00										C	ASTM STP 782/412	415	
		600		11.00										C	ASTM STP 782/412	415	
														C	ASTM STP 782/412	415	NO DATA
		600		20.50										C	ASTM STP 782/412	415	
		600		30.00										C	ASTM STP 782/412	415	
		600		16.30										C	ASTM STP 782/412	415	
		600		19.00										C	ASTM STP 782/412	415	
		600		16.00										C	ASTM STP 782/412	415	
		600		24.00										C	ASTM STP 782/412	415	
		600		25.00										C	ASTM STP 782/412	415	
		600		27.00										C	ASTM STP 782/412	415	
														F	ORNL/TM-10444	14	NO HEAT TREATMENT REPORTED
		1525		4.00	AC	A			1100		8.00	AC	T	F	ORNL/TM-10444	14; 105	

Table 31 Partial listing of WELD_TR.dbf

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TAG	EXP_ID	HEAT_ID	WLD_TYPE	WLD_CODE	HEAT_1	HEAT_2	WELD_SUPLY	WIRE_TYPE	WIRE_HEAT	FLUX_TYPE	FLUX_LOT	REF_ID	PAGES	NOTES
E	BWREXP	WBR_01			PBR_01	PBR_01	COMBUSTION ENG.					ASTM STP 481	147; 149	FROM NOZZLE DROPOUT
E	BWREXP	WCPR01	SAW		PCPR01	PCPR02	COMBUSTION ENG.					NEDO-21708	4-1; 4-8	
E	EPR-AN	WEPR19	SAW	EP-19			COMBUSTION ENG.	B-4 MOD	2P7511	L80	0575	EPRI NP-2712/V2	5-1; 5-3; H-14; H-17	FROM PL. HT. C3991 CODE 4106-1
E	EPR-AN	WEPR23	SAW	EP-23			COMBUSTION ENG.	B-4 MOD	2P7511	L80	0575	EPRI NP-2712/V2	5-1; 5-3; H-14; H-17	FROM PL. HT. C3991 CODE 4106-1
E	EPR-AN	WEPR24	SAW	EP-24			COMBUSTION ENG.	B-4 MOD	2P7511	L0091	0145	EPRI NP-2712/V2	5-1; 5-3; H-14; H-17	FROM PL. HT. C3991 CODE 4106-1
E	FKS-G	WGKSSR			FFRG14			20MnMoNi55				GKSS-1	TABLE 1	WELD OF FORGING RING FFRG14
E	FKS-G	WKS_01			FFRG08			22NiMoCr37				GKSS-1	TABLE 1	WELD OF FORGING SHELL FFRG08
E	FKS-K	WFRG01						S3Mo		LW 320		ASTM STP 782/412	414	ELECTRODE S3Mo, LW 320 FLUX
E	FKS-K	WFRG02						S3Mo		LW 320		ASTM STP 782/412	414	ELECTRODE S3Mo, LW 320 FLUX
E	FKS-K	WFRG03						S3NiMo		OP 41 TT		ASTM STP 782/412	414	ELECTRODE S3NiMo;OP 41 TT FLUX
E	FKS-K	WFRG04						S3NiMo		OP 41 TT		ASTM STP 782/412	414	ELECTRODE S3NiMo;OP 41 TT FLUX
E	FKS-K	WFRG05						S3NiMo1		OP 41 TT		ASTM STP 782/412	414	ELECTRODE S3NiMo1; OP 41 TT
E	FKS-K	WFRG06						S3NiMo1		P 230		ASTM STP 782/412	414	ELECTRODE S3NiMo1; P 230 FLUX
E	FKS-K	WFRG07						NiCrMo1		LW 320		ASTM STP 782/412	414	ELECTRODE NiCrMo1; LW 320 FLUX
E	FKS-K	WFRG08						NiCrMo1		LW 320		ASTM STP 782/412	414	ELECTRODE NiCrMo1; LW 320 FLUX
E	FKS-K	WFRG09						NiCrMo1		LW 320		ASTM STP 782/412	414	ELECTRODE NiCrMo1; LW 320 FLUX
E	FKS-K	WFRG10						NiCrMo1		LW 320		ASTM STP 782/412	414	ELECTRODE NiCrMo1; LW 320 FLUX
E	FKS-K	WFRG11						S3NiMo		OP 41 TT		ASTM STP 782/412	414	ELECTRODE S3NiMo; OP 41 TT
E	FKS-K	WFRG12						S3NiMo1		OP 41 TT		ASTM STP 782/412	414	ELECTRODE S3NiMo1; OP 41 TT
E	FKS-K	WFRG13						S3NiMo1		LW 320		ASTM STP 782/412	414	ELECTRODE S3NiMo1; LW 330 FLUX
E	FKS-K	WFRG14						NiCrMo1		LW 320		ASTM STP 782/412	414	ELECTRODE S3NiMo1; LW 320 FLUX
E	FKS-K	WFRG15						EKbMo23				ASTM STP 782/412	414	ELECTRODE EKbMo23
E	FKS-K	WFRG16						EKbCrMo1				ASTM STP 782/412	414	ELECTRODE EKbCrMo1
E	FKS-K	WFRG17						EKbNiMo				ASTM STP 782/412	414	ELECTRODE EKbNiMo
E	FKS-K	WFRG18						EKbNiMo				ASTM STP 782/412	414	ELECTRODE EKbNiMo
E	FKS-K	WFRG19						EKbNiMoCr				ASTM STP 782/412	414	ELECTRODE EKbNiMoCr
E	HFIR	WHFR01	SMA		PHFR01	PHFR02	ALLIS CHALMERS	E7018-A1	OC11A			ORNL/TM-10444	105; 112	QUALIFICATION TEST WELD
E	HFIR	WHFR02	SAW		PHFR01	PHFR01	ORNL	L40	AWS EA3	L80		ORNL/TM-10444	124; 125; 126; 127	COPPER ADDED DURING WELDING
E	HSST-1	WHSS51B	SAW	51, 89	BHSS01L	BHSS01L						ORNL-4871	1, 2, 3	FROM HSST 01, SECTION L
E	HSST-1	WHSS53E	ESW	53, E2				PVRC 315				ORNL-4871	1, 2, 3, 15	PVRC #315, CODE CASE 1339
E	HSST-2	WHSS61	SAW	61W			WESTINGHOUSE	MnMoNi		L80		NUREG/CR-5696	9	
E	HSST-2	WHSS62	SAW	62W			B&W	MnMoNi		L80		NUREG/CR-5696	9	REACTOR NOT IDENTIFIED
E	HSST-2	WHSS63	SAW	63W			B&W	MnMoNi		L80		NUREG/CR-5696	9	NOZZLE DROPOUT
E	HSST-3	WHSS64	SAW	64W			B&W	MnMoNi		L80		NUREG/CR-5696	9	NOZZLE DROPOUT
E	HSST-3	WHSS65	SAW	65W			B&W	MnMoNi		L80		NUREG/CR-5696	9	NOZZLE DROPOUT
E	HSST-3	WHSS66	SAW	66W			B&W	MnMoNi		L80		NUREG/CR-5696	9	NOZZLE DROPOUT
E	HSST-3	WHSS67	SAW	67W			B&W	MnMoNi		L80		NUREG/CR-5696	9	NOZZLE DROPOUT
E	HSST-4	WHSS68	SAW	CGS			COMBUSTION ENG.	MIL B4		L0091		NEA0 89/181	182	STRAIGHT-WALL GROOVE
E	HSST-4	WHSS69	SAW	CHS			COMBUSTION ENG.	MIL B4		L0091		NEA0 89/181	182	DOUBLE U GROOVE
E	HSST-4	WHSS70	SAW	MK-W-124			B&W	MnMoNi		L124		NEA0 89/181	182	DOUBLE V GROOVE
E	HSST-4	WHSS71	SAW	MK-W-80			B&W	MnMoNi		L80		NEA0 89/181	182	DOUBLE V GROOVE
E	IAEAM	WFRA12	SAW	FW	FFRA12		FRAMATOME					IAEA TRS 265	7	
E	IAEAM	WJAP12	SAW	JW	PJAP12		MITSUBISHI					IAEA TRS 265	6	
E	IAEAM	WJAP13		JWQ						MF-27X		NUREG/CR-5357	45	FLUX MF-27X
E	JPDR	WJAP02	SAW		PJAP02			MnMoNi				ASTM STP 484/74	76; 77; 85; 91	
E	JPDR	WJAP03	SAW		PJAP03			2.25Cr-1Mo				ASTM STP 484/74	87; 88	
E	KRB	WKRB01			FKRB07		GE	20NiMoCr26				NUREG/CR-3228/V4/78	78; 79	
E	KRB	WKRB02			FKRB02	FKRB03	GE	20NiMoCr26				NUREG/CR-3228/V4/78	78; 79	BETWEEN PLATES GEA-1 AND GEA-2
E	KRB	WKRB03			FKRB05	FKRB06	GE	20NiMoCr26				NUREG/CR-3228/V4/78	78; 79	BETWEEN PLATES GEB-1 AND GEB-2
E	KWU-PR	WGER10						NiCrMo1		LW 320		KWU-0186	2; TABLE 1	
E	KWU-PR	WGER11						NiCrMo1		LW 320		KWU-0186	2; TABLE 1	
E	KWU-PR	WGER12						NiCrMo1		LW 320		KWU-0186	2; TABLE 1	
E	KWU-PR	WGER13						NiCrMo1		GRAU LO		KWU-0186	2; TABLE 1	
E	KWU-PR	WGER14						NiCrMo1		LW 320		KWU-0186	2; TABLE 1	
E	LAC	WLAC01	SAW		PLAC02	PLAC03	ALLIS CHALMERS					NEA0 8/95	95; 96	
E	MEA-AN	WMEA8A	SAW	W8A	PLUK03		LUKENS	MnMoNi	3P8393	L80	0418	NUREG/CR-3228/V1/73	73; 77; 78	LOT 0418, CONTROL 8556
E	MEA-AN	WMEA8B	SAW	W8B			LUKENS	MnMoNi	3P8393	L80	0418	NUREG/CR-3228/V1/73	73; 77; 78	LOT 0418, CONTROL 8556

Table 32 Listing of HAZ_TR.dbf

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TAG	EXP_ID	HEAT_ID	HEAT_B	HEAT_W	REF_ID	PAGES	NOTES
E	IAEAM	HFRA12	FFRA12	WFRA12	IAEA TRS 265	97	
E	IAEAM	HJAP12	PJAP13	WJAP12	IAEA TRS 265	94; 103	
E	JPDR	HJAP02	PJAP02	WJAP02	ASTM STP 484/74	76; 77; 85	
E	JPDR	HJAP03	PJAP03	WJAP03	ASTM STP 484/74	87; 88	
E	KRB	HKRB01	FKRB07		NUREG/CR-3228/V4/78	78; 85	
E	KWU-PR	HGER03	FGER03		KWU-0186	2; TABLE 1	
E	KWU-PR	HGER05	FGER05		KWU-0186	2; TABLE 1	
E	LAC	HLAC01	PLAC03	WLAC01	NE&D 8/95	95; 96	
E	NRL-1	HVEN20	PVEN20	WVEN20	NRL 7011	16	
E	NRL-1	HW__16		WW__16	NRL 6772	5, 6	
E	NRL-3	HASTM	SASTM H		NRL 8171	2; 3; 6	
E	NRL-3	HME53A	PME53A	WME53A	WJRS 7-72/369	370S; 371S; 374S	
E	NRL-3	HNRL01	PNRL01		ASTM STP 570/83	87; 88; 94	
E	NRL-3	HNRL03	PNRL03		ASTM STP 570/83	87; 88; 97	
E	NRL-3	HNRL04			ASTM STP 570/83	87; 88; 92; 93	
E	NRL-3	HNRL05	PNRL05		NRL 8136	3; 4; 8	PARENT PLATE 5
E	NRL-3	HNRL06	PNRL06		NRL 8136	3; 4; 10	PARENT PLATE 6
E	PR-EDB	HBR_01			ASTM STP 481	147; 148; 149	
E	RRA	HRRA01	PRRA05	WRRA03	ASTM STP 782/343	344; 346	
E	RRA	HRRA02	PRRA05	WRRA13	ASTM STP 782/343	344; 346	
E	RRA	HRRA03	WRRA13	WRRA03	ASTM STP 782/343	344; 346	
E	SRM	HASTMA	SASTMA		ASTM DS54	63	
E	VDE	HHSS03	SHSS03J	WHSS03	ORNL-4816/76	76; 78	FROM HSST 03, SECTION J
E	VDE	HHSS03	SHSS03J	WHSS03	BERICHT SUMMARY	8-11	
E	VDE	HVDE0B	PVDE0B	WVDE0B	BERICHT SUMMARY	8-11	
E	VDE	HVDE0C	PVDE0C	WVDE0C	BERICHT SUMMARY	8-11	
E	VDE	HVDE0D	FVDE0D	WVDE0D	BERICHT SUMMARY	8-11	

Table 33 Listing of TITL_TR.dbf

TITL_TR.dbf: Page 1

TAG	EXP_ID	REF_ID	ALT_REF	CONT	AUTHOR_1	AUTHOR_2	REF_TITLE	PUB_DATE
	SRM	ASTM DS54		1	Hawthorne, J. R.		Radiation Effects Information Generated on the ASTM Reference	/ /1974
		ASTM DS54		2			Correlation-Monitor Steels, ASTM DS 54, American Society for Testing and	/ /1974
		ASTM DS54		3			Materials, Philadelphia, PA, 1974.	/ /1974
	FKS-G	ASTM STP 1011/115		1	Ahlf, J.	Ballmann, D.	Irradiation Programs to Establish the Safety Margins of German Licensing Rules	/ /1989
		ASTM STP 1011/115		2	Schmitt, F. J.		Relat :g to RPV Steel Embrittlement, ASTM STP 1011, pp. 115-129, American	/ /1989
		ASTM STP 1011/115		3			Society for Testing and Materials, Philadelphia, PA, 1989.	/ /1989
	HFIR	ASTM STP 1046/5		1	Nanstad, R. K.	et al.	Effects of 50°C Surveillance and Test Reactor Irradiations on Ferritic Pressure	/ /1990
		ASTM STP 1046/5		2			Vessel Steel Embrittlement, ASTM STP 1046, pp. 5-29, American Society for	/ /1990
		ASTM STP 1046/5		3			Testing and Materials, Phila?elphia, PA, 1990.	/ /1990
	PR-EDB	ASTM STP 481		1	Steele, L. E.	Serpan, C. Z., Jr.	Analysis of Reactor Vessel Radiation Effects Surveillance Programs, ASTM STP	/ /1970
		ASTM STP 481		2			481, American Society for Testing and Materials, Philadelphia, PA.	/ /1970
	NRL-1	ASTM STP 484/42		1	Brinkman, C. R.	Beeston, J. M.	The Effect of Hydrogen on the Ductile Properties of Irradiated Pressure Vessel	/ /1970
		ASTM STP 484/42		2			Steels, ASTM STP 484, pp. 42-73, American Society for Testing and Materials,	/ /1970
		ASTM STP 484/42		3			Philadelphia, PA, 1970.	/ /1970
	JPDR	ASTM STP 484/74		1	Kawasaki, M.	et al.	Evaluation of the Embrittlement of Pressure Vessel Steels Irradiation in JPDR,	/ /1970
		ASTM STP 484/74		2			ASTM STP 484, pp. 74-95, American Society for Testing and Materials,	/ /1970
		ASTM STP 484/74		3			Philadephia, PA, 1970.	/ /1970
	SM-1	ASTM STP 484/96		1	Hawthorne, J. R.		Demonstration of Improved Radiation Embrittlement Resistance of A533B Steel	/ /1970
		ASTM STP 484/96		2			Through Control of Selected Residual Elements, ASTM STP 484, pp. 96-127,	/ /1970
		ASTM STP 484/96		3			American Society for Testing and Materials, Philadelphia, PA, 1970.	/ /1970
	NRL-3	ASTM STP 570/83		1	Hawthorne, J. R.	Koziol, J. J.	Evaluation of Commercial Production A533-B Plates and Weld Deposits Tailored for	/ /1975
		ASTM STP 570/83		2			Improved Radiation Embrittlement Resistance, in Properties of Reactor Structural	/ /1975
		ASTM STP 570/83		3			Alloys After Neutron or Particle Irradiation, ASTM STP 570, pp. 83-102, American	/ /1975
		ASTM STP 570/8		4			Society for Testing and Materials, Philadelphia, PA, 1975.	/ /1975
	NRL-3	ASTM STP 683/235		1	Hawthorne, J. R.	Koziol, J. J.	Evaluation of Commercial Production A533-B Steel Plates and Weld Deposits with	/ /1979
		ASTM STP 683/235		2	Byrne, S. T.		Extra-Low Copper Content for Radiation Resistance, in Effects of Radiation on	/ /1979
		ASTM STP 683/235		3			Structural Materials, ASTM STP 683, pp. 235-251, American Society for Testing	/ /1979
		ASTM STP 683/235		4			and Materials, Philadelphia, PA, 1979.	/ /1979
	NRL-AN	ASTM STP 683/278		1	Hawthorne, J. R.	Watson, H. E.	Exploratory Investigations of Cyclic Irradiation and Annealing Effects on Notch	/ /1978
		ASTM STP 683/278		2	Loss, F. J.		Ductility of A533-B Weld Deposits, ASTM STP 683, pp. 278-294, American Society	/ /1978
		ASTM STP 683/278		3			for Testing and Materials, Philadelphia, PA, 1978.	/ /1978
	CEA	ASTM STP 725/20		1	Guionnet, C.	et al.	Radiation Embrittlement of a PWR Vessel Steel: Effects of Impurities and Nickel	/ /1981
		ASTM STP 725/20		2			Content, ASTM STP 725, pp. 20-37, American Society for Te-ting and Materials,	/ /1981
		ASTM STP 725/20		3			Philadelphia, PA, 1981.	/ /1981
	NRL-AN	ASTM STP 725/63		1	Hawthorne, J. R.	Watson, H. E.	Experimental Investigation of Multicycle Irradiation and Annealing Effects on	/ /1981
		ASTM STP 725/63		2	Loss, F. J.		Notch Ductility of A533-B Weld Deposits, ASTM STP 725, pp. 63-75, American	/ /1981
		ASTM STP 725/63		3			Society for Testing and Materials, Philadelphia, PA, 1981.	/ /1981
	PRA	ASTM STP 782/343		1	Williams, T. J.	et al.	The Influence of Neutron Exposure, Chemical Composition and Metallurgical	/ /1982
	IAEAB	ASTM STP 782/343		2			Condition on the Irradiation Shift of Reactor Pressure Vessel Steels, ASTM STP	/ /1982
		ASTM STP 782/343		3			782, pp. 343-374, American Society for Testing and Materials, Philadelphia, PA,	/ /1982
		ASTM STP 782/343		4			1982.	/ /1982
	SM-4	ASTM STP 782/375		1	Hawthorne, J. R.		Significance of Nickel and Copper Content to Radiation Sensitivity and	/ /1982
		ASTM STP 782/375		2			Postirradiation Heat Treatment Recovery of Reactor Vessel Steels, ASTM STP 782,	/ /1982
		ASTM STP 782/375		3			pp. 375-391, American Society for Testing and Materials, Philadelphia, PA, 1982.	/ /1982
	CEA	ASTM STP 782/392		1	Guionnet, C.	et al.	Radiation Embrittlement of PWR Reactor Vessel Weld Metals: Nickel and Copper	/ /1982
		ASTM STP 782/392		2			Synergism Effects, ASTM STP 782, pp. 392-411, American Society for Testing and	/ /1982
		ASTM STP 782/392		3			Materials, Philadelphia, PA, 1982.	/ /1982
	FKS-K	ASTM STP 782/412		1	Leitz, C.	et al.	Comparative Irradiation Study of Reactor Pressure-Vessel Steel Weld Metals, ASTM	/ /1982
		ASTM STP 782/412		2			STP 782, pp. 412-432, American Society for Testing and Materials, Philadelphia,	/ /1982
		ASTM STP 782/412		3			PA, 1982.	/ /1982
	IAEAB	ASTM STP 782/433		1	Davies, L. M.	Ingham, T.	Evaluation of Advanced Reactor Pressure Vessel Steels Under Neutron Irradiation,	/ /1982
	NRA	ASTM STP 782/433		2	Squires, R. L.		ASTM STP 782, pp. 433-463, American Society for Testing and Materials,	/ /1982
		ASTM STP 782/433		3			Philadelphia, PA, 1982.	/ /1982
	FKS-K	ASTM STP 782/520		1	Fohl, J.	Leitz, Ch.	Irradiation Experiments in the Testing Nuclear Power Plant VAK, ASTM STP 782,	/ /1982
		ASTM STP 782/520		2	Anders, D.		pp. 520-549, American Society for Testing and Materials, Philadelphia, PA, 1982.	/ /1982
	CEA	ASTM STP 819/29		1	Pierre Petrequin		Irradiation Embrittlement of Pressure Vessel Steels: A Review of Activities in	/ /1983
		ASTM STP 819/29		2			France, ASTM STP 819, pp. 29-52, American Society for Testing and Materials,	/ /1983

Table 33 (continued)

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TAG	EXP_ID	REF_ID	ALT_REF	CONT	AUTHOR_1	AUTHOR_2	REF_TITLE	PUB_DATE
		ASTM STP 819/29		3			Philadelphia, PA, 1983.	/ /1983
	CEA	ASTM STP 819/64		1	Soulat, P.	Petrequin, P.	Effect of Irradiation on Elastic-Plastic Toughness of Pressure Vessel Steels,	/ /1983
		ASTM STP 819/64		2	Houssin, B.		ASTM STP 819, pp. 64-85, American Society for Testing and Materials,	/ /1983
		ASTM STP 819/64		3			Philadelphia, PA, 1983.	/ /1983
	HSST-4	ASTM STP 870/1094		1	Berggren, R. G.	Hawthorne, J. R.	Analysis of Charpy V-Notch Impact Toughness of Irradiated A533-B Class 1 Plate	/ /1985
		ASTM STP 870/1094		2	Nanstad, R. K.		and Four Submerged-Arc Welds, ASTM STP 870, pp. 1094-1110, American Society for	/ /1985
		ASTM STP 870/1094		3			Testing and Materials, Philadelphia, PA, 1985.	/ /1985
	MCD-AN	ASTM STP 870/972		1	Macdonald, Bruce		Post-Irradiation Annealing Recovery of Commercial Pressure Vessel Steels, ASTM	/ /1985
		ASTM STP 870/972		2			STP 870, pp. 972-978, American Society for Testing and Materials, Philadelphia,	/ /1985
		ASTM STP 870/972		3			PA, 1985.	/ /1985
	FKS-G	ASTM STP 909/34		1	Ahlf, J.	et al.	Irradiation Behavior of Reactor Pressure Vessel Steels from the Research Program	/ /1986
		ASTM STP 909/34		2			on the Integrity of Components, ASTM STP 909, pp. 34-51, American Society for	/ /1986
		ASTM STP 909/34		3			Testing and Materials, Philadelphia, PA, 1986.	/ /1986
	CEA	ASTM STP 909/70		1	Petrequin, P.	Al Mundheri, M.	Effect of Irradiation on the Elasto-Plastic Toughnees of Pressure Vessel Steels,	/ /1986
	IAEAF	ASTM STP 909/70		2	Soulat, P.		ASTM STP 909, pp. 70-95, American Society for Testing and Materials,	/ /1986
		ASTM STP 909/70		3			Philadelphia, PA, 1986.	/ /1986
	SM-4	ASTM STP 956/461		1	Hawthorne, J. R.		Steel Impurity Element Effects on Postirradiation Properties Recovery by	/ /1987
		ASTM STP 956/461		2			Annealing, ASTM STP 956, pp. 461-479, American Society for Testing and	/ /1987
		ASTM STP 956/461		3			Materials, Philadelphia, PA, 1987.	/ /1987
	HSST-2	BAW-1975		1	Lowe, A. L., Jr.		Applicability of the HSST Program Second and Third Irradiation Series Data to	06/ /1987
	HSST-3	BAW-1975		2			the Integrity of Nuclear Reactor Vessels, BAW-1975, Babcock & Wilcox, Lynchburg,	06/ /1987
		BAW-1975		3			Virginia, June 1987.	06/ /1987
	VDE	BERICHT NO. 1		1			Ergebnisse der 1. Bestrahlung, Bericht No. 1, Kernforschungsanlage (KFA), GmbH,	03/ /1969
		BERICHT NO. 1		2			Institut für Reaktorwerkstoffe, Jülich, West Germany, March 1969.	03/ /1969
	VDE	BERICHT NO. 2		1			Ergebnisse der 2. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 2,	06/ /1969
		BERICHT NO. 2		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, June 1969.	06/ /1969
	VDE	BERICHT NO. 3		1			Ergebnisse der 3. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 3,	10/ /1969
		BERICHT NO. 3		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, October 1969.	10/ /1969
	VDE	BERICHT NO. 4		1			Ergebnisse der 4. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 4,	03/ /1970
		BERICHT NO. 4		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, March 1970.	03/ /1970
	VDE	BERICHT NO. 5		1			Ergebnisse der 5. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 5,	07/ /1970
		BERICHT NO. 5		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, July 1970.	07/ /1970
	VDE	BERICHT NO. 6		1			Ergebnisse der 6. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 6,	10/ /1971
		BERICHT NO. 6		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, October 1971.	10/ /1971
	VDE	BERICHT NO. 7		1			Ergebnisse der 7. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 7,	01/ /1972
		BERICHT NO. 7		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, January 1972.	01/ /1972
	VDE	BERICHT NO. 8		1			Ergebnisse der 8. Bestrahlung (Bleche and Schmiedestücke), Bericht No. 8,	02/ /1972
		BERICHT NO. 8		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, February 1972.	02/ /1972
	VDE	BERICHT NO. 9		1			Ergebnisse der 9. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 9,	03/ /1972
		BERICHT NO. 9		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, March 1972.	03/ /1972
	VDE	BERICHT NO.10		1			Ergebnisse der 10. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 10,	03/ /1972
		BERICHT NO.10		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, March 1972.	03/ /1972
	VDE	BERICHT NO.11		1			Ergebnisse der 11. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 11,	04/ /1972
		BERICHT NO.11		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, April 1972.	04/ /1972
	VDE	BERICHT NO.12		1			Ergebnisse der 12. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 12,	05/ /1972
		BERICHT NO.12		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, May 1972.	05/ /1972
	VDE	BERICHT NO.13		1			Ergebnisse der 13. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 13,	06/ /1972
		BERICHT NO.13		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, June 1972.	06/ /1972
	VDE	BERICHT NO.14		1			Ergebnisse der 14. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 14,	06/ /1972
		BERICHT NO.14		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, June 1972.	06/ /1972
	VDE	BERICHT NO.15		1			Ergebnisse der 15. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 15,	07/ /1972
		BERICHT NO.15		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, July 1972.	07/ /1972
	VDE	BERICHT NO.16		1			Ergebnisse der 16. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 16,	07/ /1972
		BERICHT NO.16		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, July 1972.	07/ /1972
	VDE	BERICHT NO.17		1			Ergebnisse der 17. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 17,	09/ /1972
		BERICHT NO.17		2			Kernforschungsanlage (KFA), GmbH, Jülich, West Germany, September 1972.	09/ /1972
	VDE	BERICHT NO.18		1			Ergebnisse der 18. Bestrahlung (Bleche und Schmiedestücke), Bericht No. 18,	09/ /1972

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TAG	EXP_ID	REF_ID	ALT_REF	CONT	AUTHOR_1	AUTHOR_2	REF_TITLE	PUB_DATE
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	HSST-1	ORNL-4871		1	Stelzman, W. J.	Berggren, R. G.	Radiation Strengthening and Embrittlement in Heavy-Section Steel Plates and	06/ /1973

Table 33 (continued)

TITL_TR.dbf: Page 9

TAG	EXP_ID	REF_ID	ALT_REF	CONT	AUTHOR_1	AUTHOR_2	REF_TITLE	PUB_DATE
		ORNL-4871		2			Welde, ORNL-4871, Oak Ridge National Laboratory, Oak Ridge, TN, June 1973.	06/ /1973
	HSST-0	ORNL-TM-3193		1	Childress, C. E.		Manual for ASTM A-533 Grade B Class 1 Steel (HSST Plate 03) Provided to the	03/ /1971
		ORNL-TM-3193		2			International Atomic Energy Agency, ORNL-TM-3193, Oak Ridge National Laboratory,	03/ /1971
		ORNL-TM-3193		3			Oak Ridge, TN, March 1971.	03/ /1971
	HSST-2	ORNL/NUREG/TM-120		1	Whitman, G. D.		Heavy-Section Steel Technology Program Quarterly Progress Report for January -	09/ /1977
		ORNL/NUREG/TM-120		2			March 1977, ORNL/NUREG/TM-120, Oak Ridge National Laboratory, Oak Ridge, TN,	09/ /1977
		ORNL/NUREG/TM-120		3			September 1977.	09/ /1977
	HFIR	ORNL/TM-10444		1	Cheverton, R. D.	Merkle, J. G.	Evaluation of HFIR Pressure-Vessel Integrity Considering Radiation	04/ /1988
		ORNL/TM-10444		2	Nanstad, R. K.		Embrittlement, ORNL/TM-10444, Oak Ridge National Laboratory, Oak Ridge, TN,	04/ /1988
		ORNL/TM-10444		3			April 1988.	04/ /1988
	KFA	PACHUR 1988		1	Pachur, D.		Transfer of data files generated by D. Pachur at KFA on the HP computer to the	08/ /1988
	IAEAK	PACHUR 1988		2			EDB during August 1988.	08/ /1988
	MOLBR3	PACHUR 1988		3				08/ /1988
	VDE	PACHUR 1988		4				08/ /1988
	NRL-3	TIS 4191		1	Hawthorne, J. R.	Koziol, J. J.	Evaluation of Commercial Production A533-B Plates and Weld Deposits Tailored for	06/11/1974
		TIS 4191		2	Byrne, S. T.		Improved Radiation Embrittlement Resistance, TIS-4191, presented at 7th ASTM	06/11/1974
		TIS 4191		3			International Symposium on Radiation Effects on Structural Materials,	06/11/1974
		TIS 4191		4			Gatlinburg, TN, June 11-13, 1974.	06/11/1974
	BET-AN	WAPD-TM-1095		1	Hall, J. F.	Seman, D. J.	The Effect of Post-Irradiation Annealing and Re-irradiation on the Fracture	07/00/1973
		WAPD-TM-1095		2			Properties of A302B Pressure Vessel Steel, WAPD-TM-1095, Bettis Atomic Power	07/00/1973
		WAPD-TM-1095		3			Laboratory, Pittsburgh, PA, July 1973.	07/00/1973
	HSST-2	WCAP-7414		1	Shabbits, W. O.	et al.	Heavy Section Fracture Toughness Properties of A533 Grade B Class 1 Steel Plate	12/ /1969
		WCAP-7414		2			and Submerged Arc Weldment, Heavy Section Steel Technology Program Technical	12/ /1969
		WCAP-7414		3			Report No. 6, WCAP-7414, Westinghouse Electric Corporation, Pittsburgh, PA,	12/ /1969
		WCAP-7414		4			December 1969.	12/ /1969
	NRL-3	WJRS 7-72/369		1	Hawthorne, J. R.		Radiation Resistant Weld Metal for Fabricating A533-B Nuclear Reactor Vessels,	07/ /1972
		WJRS 7-72/369		2			Welding Research Supplement, pp. 369-s - 375-s, July 1972.	07/ /1972

Table 34 Listing of REF_TR.dbf

REF_TR.dbf: Page 1

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	
	HSS"-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-7/.14	
	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	
	IAEAD	IAEA TRS 265	
	IAEAF	ASTM STP 909/70	
	IAEAF	IAEA TRS 265	
	IAEAG	GKSS-1	
	IAEAG	IAEA TRS 265	
	IAEAI	IAEA TRS 265	
	IAEAJ	IAEA TRS 265	
	IAEAK	PACHUR 1988	
	IAEAK	IAEA TRS 265	
	IAEAM	IAEA TRS 265	
	IAEAU	NUREG/CR-1128/III-B	E34
	IAEAU	NUREG/CR-1472/III-B	
	IAEAU	NUREG/CR-1783/III-A	
	IAEAU	NUREG/CR-2487	E32
	IAEAU	NUREG/CR-5357	
	IAEAU	NUREG/CR-5357/152	
	IAEAU	IAEA TRS 265	
	JPDR	ASTM STP 484/74	
	KFA	JUL-SPEZ-406	
	KFA	PACHUR 1988	
	KRB	NUREG/CR-3228/V4/78	
	KRB	NUREG/CR-3228/V5/36	
	KWU-PR	KWU-0186	
	LAC	NE&D 8/95	E02
	MCD-AN	ASTM STP 870/972	
	MEA-AN	NUREG/CR-3228/V1/73	
	MEA-AN	NUREG/CR-3228/V1/81	
	MEA-AN	NUREG/CR-3228/V1/87	
	MEA-AN	NUREG/CR-3228/V2/81	
	MEA-AN	NUREG/CR-3228/V3/114	
	MEA-AN	NUREG/CR-3228/V3/131	
	MEA-AN	NUREG/CR-3228/V3/136	
	MEA-AN	NUREG/CR-3228/V4/130	
	MEA-AN	NUREG/CR-3228/V4/161	
	MEA-AN	NUREG/CR-3228/V5/144	
	MEA-AN	NUREG/CR-3229	
	MEA-AN	NUREG/CR-5469	
	MEA-RT	NUREG/CR-3228/V1/92	
	MEA-RT	NUREG/CR-3228/V2/101	
	MEA-RT	NUREG/CR-3228/V3/153	
	MEA-RT	NUREG/CR-3228/V4/170	
	MEA-RT	NUREG/CR-3228/V5/190	
	MEA-RT	NUREG/CR-5493	
	MOLBR3	BR3 313/83-20	
	MOLBR3	MEA-2218	
	MOLBR3	PACHUR 1988	
	WRI-1	ASTM STP 484/42	
	NRL-1	NRL 6772	E04
	NRL-1	NRL 7011	E04
	NRL-2	NE&D 17/116	E07
	NRL-3	ASTM STP 570/83	E12
	NRL-3	ASTM STP 683/235	E12
	NRL-3	NRL 8006/III-A	E15
	NRL-3	NRL 8136	E19
	NRL-3	NRL 8171	E17
	NRL-3	TIS 4191	E12
	NRL-3	WJRS 7-72/369	E09
	NRL-4	NRL 8357	E22
	NRL-AN	ASTM STP 683/278	
	NRL-AN	ASTM STP 725/63	E25
	NRL-EP	EPRI NP-2782	E33
	NRL-EP	NRL 4431/I	
	NRL-EP	NRL 8327	E20
	ORRPSF	NUREG/CR-3228/V2/105	
	ORRPSF	NUREG/CR-3295/V1	E35
	ORRPSF	NUREG/CR-3295/V2	E35
	ORRPSF	NUREG/CR-3320/V1	
	ORRPSF	NUREG/CR-3320/V4	
	PR-EDB	ASTM STP 481	E16
	RRA	ASTM STP 782/343	
	RRA	ASTM STP 782/433	
	SM-1	ASTM STP 484/96	
	SM-1	NRL 3010/I-B	E13
	SM-1	NRL 7121	E05
	SM-1	NRL 7917	E14
	SM-2	NA 6/27	
	SM-2	NRL 8264	E21
	SM-3	NA 6/27	
	SM-4	ASTM STP 782/375	
	SM-4	ASTM STP 956/461	
	SM-4	HAWTHORNE SET D	
	SM-4	NUREG/CR-2511	
	SM-4	NUREG/CR-2948	E31
	SM-4	NUREG/CR-3228/V1/84	
	SM-4	NUREG/CR-3228/V3/146	
	SM-6	NUREG/CR-3228/V5/170	
	SM-4	NUREG/CR-5216	
	SM-4	NUREG/CR-5388	
	SM-5	NUREG/CR-3228/V2/90	
	SM-5	NUREG/CR-3228/V3/126	
	SM-5	NUREG/CR-3228/V4/137	
	SM-5	NUREG/CR-3228'V4/150	
	SM-5	NUREG/CR-3228/V4/174	
	SM-5	NUREG/CR-3228/V5/183	
	SM-5	NUREG/CR-4437	
	SM-5	NUREG/CR-5357	
	SM-5	NUREG/CR-5388	
	SRM	ASTM D554	E11
	VDE	BERICHT NO. 1	
	VDE	BERICHT NO. 2	
	VDE	BERICHT NO. 3	
	VDE	BERICHT NO. 4	
	VDE	BERICHT NO. 5	
	VDE	BERICHT NO. 6	
	VDE	BERICHT NO. 7	
	VDE	BERICHT NO. 8	
	VDE	BERICHT NO. 9	
	VDE	BERICHT NO.10	
	VDE	BERICHT NO.11	
	VDE	BERICHT NO.12	
	VDE	BERICHT NO.13	
	VDE	BERICHT NO.14	
	VDE	BERICHT NO.15	
	VDE	BERICHT NO.16	
	VDE	BERICHT NO.17	
	VDE	BERICHT NO.18	
	VDE	BERICHT NO.19	
	VDE	BERICHT NO.20	
	VDE	BERICHT NO.21	
	VDE	BERICHT NO.22	
	VDE	BERICHT NO.23	
	VDE	BERICHT NO.24	
	VDE	BERICHT SUMMARY	
	VDE	ORNL-4816/76	E08
	VDE	PACHUR 1988	
	TR	NRL 3616	

2.5 List of EXP_ID with Comments

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 to 3 x 10^{19} n/cm² (> 1.0 MeV) at the Engineering Test Reactor (ETR). The fluences received were determined by dosimetry for some of the specimen (identified by an * at the SPEC_ID), the reported fluences for others are just estimates. The irradiated Charpy specimen were tested, and the broken halves at both ends were reconstituted and annealed for different lengths of time at different temperatures. The arbitrarily assigned SPEC_IDS were given to the irradiated Charpy set; additional extensions _A and _B were added to the SPEC_ID of irradiated Charpy set for the reconstituted Charpy specimens, which were made from the broken halves of the irradiated Charpy set. (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 BWR-PV Materials

The irradiation experiments were done at three different fluences--2.0E17, 1.5E18, and 3.7E18 n/cm² (E > 1.0 MeV)--in the Humbold Bay reactor (HM3). All materials were from or similar to materials used in existing BWRs.

CEA

Experiments in French Reactors Sponsored by Commissariat à l'Energy Atomique

Experiments performed in support of French power reactors sponsored by the Commisariat à l'Energy Atomique (CEA) with the participation of different companies, mainly Framatome and EDF. Some of the experiments were run as research programs coordinated with the 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 the Electric Power Institute (EPRI). Three welds, coded WEPR19, WEPR23, and WEPR24, were irradiated in the University of Virginia Reactor (UVAR) and subsequently annealed. Some of the material was re-irradiated and re-annealed. Specifically, in CAPSULE EXP1 material was irradiated to a fluence of about 7.5E18 n/cm² (E > 1.0 MeV) and 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 anneal procedures repeated again by a second irradiation and anneal run. The contents of CAPSULE EXP3 were irradiated to twice the fluence without intermediate anneal for comparison with EXP2.

FKS-G

Irr. Program at Geesthacht 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 Geesthacht reactor FRG-2 and the results compared with the KTA predictions. This investigation is part of research program "Integrity of Components" (FKS). 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 compared with the KTA predictions. This investigation is part of the research program "Integrity of Components" (FKS). Another participant is the GKSS, Geesthacht, Germany, see EXP_ID = FKS-G.

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 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 MPC data base.

HFIR

HFIR Surveillance Program and Related Experiments at ORNL

This group of data was collected in connection with the surveillance program for the HFIR reactor 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_TR.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 ORR at ORNL to a higher fluence of 2.3E18 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 RAW_C_TR.dbf and RAW_C_FT.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, from the second plate, SHSS02, in other U.S. reactors. (The other correlation material, the 6-in. A302B plate SASTM was used in older power reactors.) The third plate, SHSS03, was used in the German VDE experiment, the IAEA Joint Programme, and the ORR PSF benchmark experiment. The purpose of the data collected 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 is 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 welds that were fabricated from these plates, WHSS51B and WHSS53E, were irradiated in the ORR. Fluences and irradiation temperatures differ widely between specimens and are reported for each individual specimen. Charpy transition temperature shifts and upper-shelf energies are determined for groups of specimen 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

Heavy Section Steel Irradiation (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 specimen, plus dosimeters. The capsules were rotated during irradiation to obtain uniform exposure of the large CT specimens; the smaller specimen 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

Heavy Section Steel Irradiation (HSSI) Experiments, Series 3, at ORNL

The third experiment in the HSSI series (see HSST-1 and HSST-2) investigates four welds, WHSS64 to WHSS67. It uses the same irradiation rig as HSST-2 with comparable results and problems.

HSST-4

Heavy Section Steel Irradiation (HSSI) Experiments, Series 4, at ORNL

The fourth experiment in the HSSI series investigates specimens of the HSST-2 plate, Section A, SHSS02A, and four welds, WHSS68 to WHSS71. The irradiation is again performed in three capsules at the BSR facility at ORNL, but the rigs are different and more tightly controlled in fluence and irradiation temperature.

IAEA

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

This is a program co-ordinated by the International Atomic Energy Agency (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_ID 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	Babha 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.

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 come 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 additional data on diskettes 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 pre-irradiation 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 UBR reactor with evaluations by J. R. Hawthorne in the Naval Research Laboratory. 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 Japan Power Demonstration Reactor (JPDR), including supplemental experiments.

KFA

Miscellaneous Irradiation Experiment Performed at the Kernforschungsanstalt (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 MEA.

LAC

Test Reactor Irradiations in Support of the LaCrosse Reactor

Several steel samples from the Lacrosse reactor were irradiated in the LITR and UCRR test reactors as supplement 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 Materials Engineering Associates, Inc.

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

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 the radiation embrittlement of commonly used pressure vessel materials.

NRL-2

Irradiation Experiments with HSST Material at the Naval Research Laboratory

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 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, to compare newer improved low-alloy steels 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/cm^2 (E > 1.0 MeV).

NRL-AN

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

This investigation is an annealing study on two commercially produced high-copper welds (Babcock & Wilcox and Combustion Engineering, respectively) with up to two cycles of irradiation-annealing-re-irradiation and two different annealing temperatures (650° 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, ORR-PSF Metallurgical Irradiation

An essential part of the Pressure Vessel Surveillance Program was the PSF Benchmark Field which simulates the surveillance-capsule-pressure-vessel configuration in the Poolside Facility (PSF) of the Oak Ridge Research Reactor (ORR). Six different materials consisting of two plates (SASTM F23 and SHSS03 PSF), two forgings (FKFA01 and FMOL01), and two welds (WEPR23 and WRRA_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, respectively, of a pressure vessel in power reactors. The fluence spectra and relative fluence rates in these capsules are similar to the ones in power reactors which provides some opportunity to validate surveillance programs.

PR-EDB

Experiments in Support of U.S. Power Reactor Surveillance

Data listed under this EXP_ID consist of 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, Ass. 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 the Naval Research Laboratory and, later, at Materials Engineering Associates, 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 due to 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 were performed with these materials including annealing.

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, PMEV63,.., PMEV67, PMEV71,..,PMEV77). The different 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 PMEVxx samples were annealed after irradiation.

SM-3

Experiments with Split-Melts to Study the Influence of Residual Elements in A543 Steels
Similar to SM-2 two 300-lb melts were split three ways but are from A543 heats, with aluminum and nitrogen added in various amounts (PMEY2A to PMEY3C). Associated welds are 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 include 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.

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 send 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) are reported, not the baseline values themselves. Some of the baseline values were included in the MPC data base and have been transferred to the TR-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, etc.; 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 Verein Deutscher Eisenhüttenleute

This is an extensive irradiation program sponsored by the Verein Deutscher Eisenhüttenleute (VDE). Four different steels, coded A, B ,C , 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_TR.dbf, CV_RF_TR.dbf, and RAW_C_TR.dbf as individual physical capsules). Specimen 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_C_FT.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 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_TR.dbf of the TR-EDB.

2.6 Use of Units

All data in the TR-EDB are given in the units of the original reports. (If reported in more than one unit, the data obtained directly from the test equipment are used, as indicated by whole numbers instead of fractions.) The ASTM recommends the use of the units given in the International System of Units (SI), as described in the ASTM Standard for Metric Practice. This standard provides also the guidance and constants for unit conversion. The basic units for this system are meter (m) for length, seconds (sec) for time, and kilogram (kg) for mass. Prior to the adoption of the International System the 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 U.S. 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 units of force, combined with meter and second. We shall identify this system of units as "other technical" (OT) units. The dual use of kg for force and mass is confusing, although the context makes it clear which meaning is attached to this symbol in a particular report. In the TR-EDB only one meaning is attached to any particular symbol as listed in the UNIT_TR.dbf in Table 35 and only the units listed in this file will appear in any unit field of the data files. Upper and lower cases are assigned to the unit symbols according to the ASTM Standard; this policy was not strictly followed in the PR-EDB but will be adopted in future releases.

Table 35 Units used in TR-EDB files

U_Name	U_Symbol	U_Type	U_System	SI_Unit	SI_Symbol	SI_Equiv
millimetre	mm	length	SI	metre	m	0.001 m
inch	in	length	US	metre	m	0.0254 m
mil (1/1000 inch)	mil	length	US	metre	m	0.0000254 m
metre (basic SI unit)	m	length	SI	metre	m	1.0 m
joule	J	energy	SI	joule	J	1.0 J
foot pound (pound force)	ft-lb	energy	US	joule	J	1.355818 J
kilogram (force) metre	kgm	energy	OT	joule	J	9.806650 J
mega pascal	MPa	stress	SI	pascal	Pa	1,000,000 Pa
kip (1000 pounds)/square inch	ksi	stress	US	pascal	Pa	689,575.7 Pa
kg (force)/square millimetre	kg/mm^2	stress	OT	pascal	Pa	980,665 Pa
degree Celsius (centigrade)	C	temperature	SI	degree Celsius	C	1.0 C
degree Fahrenheit	F	temperature	US	degree Celsius	C	1.8 C + 32
kelvin	K	temperature	SI	degree Celsius	C	1.0 C + 273.15
second	S	time		second	s	1.0 s
day	D	time		second	s	86,400 s
hour	H	time		second	s	3,600 s
year (365 days)	Y	time		second	s	3,153,600 s
metre per second	m/s	velocity	SI	metre per second	m/s	1.0 m/s
foot per second	ft/s	velocity	US	metre per second	m/s	0.3048 m/s

3 REFERENCES

1. F. W. Stallmann,, F. B. K. Kam, and B. J. Taylor, "PR-EDB: Power Reactor Embrittlement Data Base, Version 1," NUREG/CR-4816, June 1990.

2. "Radiation Embrittlement of Reactor Vessel Materials," Regulatory Guide 1.99, Revision 2, May 1988.

3. 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," NRL Report 6616, September 1967.

4. J. A. Wang, F. W. Stallmann, and F. B. K. Kam, "PR-EDB: Power Reactor Embrittlement Data Base, Version 2" NUREG/CR-4816, May 1993.

APPENDIX A. CUSTOM SOFTWARE FOR PROCESSING OF THE TR-EDB

A.1 INTRODUCTION

The software described in this appendix is the current implementation of a system that provides the user of the TR-EDB with the necessary tools to process the data and to create a variety of tables, Charpy fits, and other graphs for reports and verification of irradiation embrittlement predictions. This software was originally created for the PR-EDB, and the current version remains compatible with this data base. Since that time, a large assortment of software tools for relational data bases has become commercially available so that the custom tools described in this appendix are now less crucial for the convenience of the user. For this reason, no effort is being made at this time for an extensive update of the custom software. However, the current version is still quite useful for many routine tasks. In particular, the processing of numerical data given in character format can be quite tedious and sometimes unreliable with commercial software. Many applications require some pre-processing to convert the dBASE files in the TR-EDB (or PR-EDB) to a form suitable for input to the more business-oriented procedures. The current version of the custom software has been thoroughly tested for several years and has provided reliable output for all tasks for which it was designed.

The current version of the software package EDB-Utilities has been written in the Clipper language, which allows compilation of dBASE procedures and has facilities for menu and help screens so that the user can usually run the program without additional instructions. The program package provides the means for a number of file-manipulation tasks, including the display of data on the computer screen and hard copy to a printer. The dBASE and related software, such as Clipper, lack the facility for extensive mathematics/statistics calculations and scientific graphs. Some plotting and fitting programs have been written in FORTRAN using the IMSL and GRAFMATIC libraries and require ASCII files as input. These ASCII files can be created through the EDB-Utilities file-manipulation feature. An ASCII file that contains all data that are available in the TR-EDB for fitting of raw Charpy data, RAW_C_TR.dat, is part of the TR-EDB set of diskettes. Also included are the files CV_RS_TR.sum, CV_RS_TR.dat, and CV_RS_TR.dbf, which contain the results of the Monte Carlo uncertainty analysis from RAW_C_TR.dat with 200 iterations. The file CV_RS_TR.dat can be used as auxiliary input file for the multiple fitting program.

The primary output device for graphic presentations by the EDB-Utilities is the monitor screen in EGA or VGA format which is selected automatically depending on what the graphic card can accommodate. A screen capture facility is needed to send the plot to the printer. It is assumed that the screen capture is activated by the <Shift-PrintScreen> command, which is given by the graph program, if selected.

A.2 EDB-UTILITIES SOFTWARE PACKAGE

The EDB-Utilities package has been designed to provide the end user of the Embrittlement Data Base with convenient means to manipulate, view, plot, and fit the data that are given in dBASE format. There are four major options that can be selected from the first menu. (See Figure A.1.)

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

   a. Retrieve a file for manipulation
   b. Add or delete fields
   c. Use numerical data for calculations and place results in user-defined fields
   d. Add or delete records
   e. Reorder records
   f. Display or export data
   g. Save working file

   A detailed explanation of the different operations will be given in Sect. A.3.

2. Plot Data Exported from EDB files. Numerical data from dBASE files can be exported to ASCII files, as described in Sect. A.3.7, 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.

3. Fit and Plot Charpy Impact Data from EDB files. Raw Charpy impact data from a file in ASCII format, created from a raw Charpy file such as RAW_C_TR.dat, can be fitted to a hyperbolic tangent curve and the results plotted. A Monte Carlo uncertainty analysis program is included which 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. Extracting selected Charpy sets

   Details are given in Sect. A.5.

4. Run dBASE III PLUS OR dBASE IV. This option allows the user to run the dBASE program without exiting EDB-Utilities, provided dBASE III PLUS OR dBASE IV has been properly installed. (It is assumed that the directory containing the dBASE program is in the path given in the autoexec.bat file.) 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 PR-EDB files are character fields, and any numerical manipulation of data must first use the VAL(...) function to obtain numbers, and 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

The TR-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," or "numeric," or "date" fields, and this information is coded in a special manner at the head of the dBASE files. This information is used in the dBASE software for a variety of processing tasks. However, all data fields in the TR-EDB are of character type; this allows one to use blanks for missing data and also the introduction of scientific notation, for which dBASE III PLUS has no provisions. It requires, however, that the information about the actual data types must be provided in some other way to the processing codes in order to perform calculations, comparisons, and orderings. For this reason, a special "structure file" is assigned to each data file which has the same name but the extension .str instead of .dbf (e.g., REAC_PR.dbf has the structure file REAC_PR.str). This structure file has the same first five fields as the dBASE structure file, but in addition 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. It also has a description field DESC which contains detailed information about the data contained in the field, plus the type of units used (enclosed 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. Also included in the structure files are tag fields that are used for temporary selections in display and printing.

All 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 the EDB-Utilities, even after the program has been temporarily terminated. The original files remain as they are unless overwritten by the user.

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 TR-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 the EDB files are listed in a file STR_ALL.dbf, and this file is used to put information in the new structure file for such field names. (This file, together with the associated index file STR_ALL.ndx, is part of the distribution of the TR-EDB.) 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 automatically overwritten, even if they are incompatible. (Any structure file together with the dbf file may overwrite the original file at the

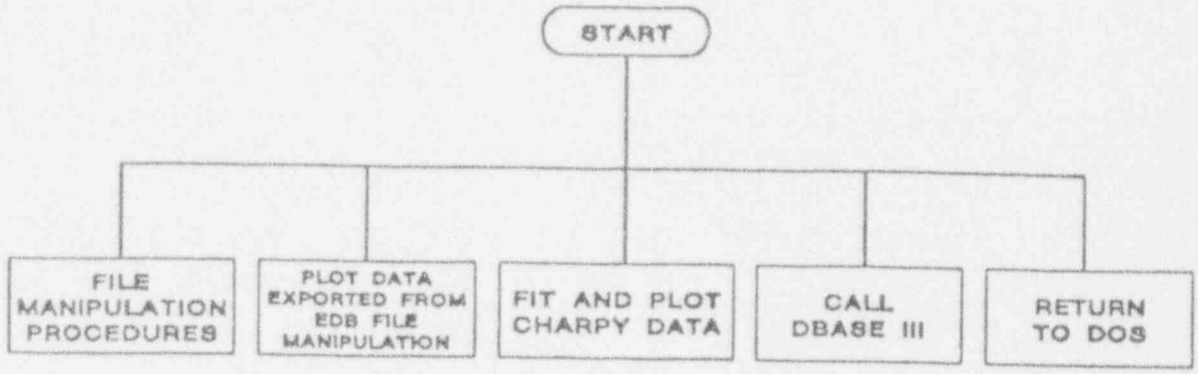

Fig. A.1 Major options selected from first menu

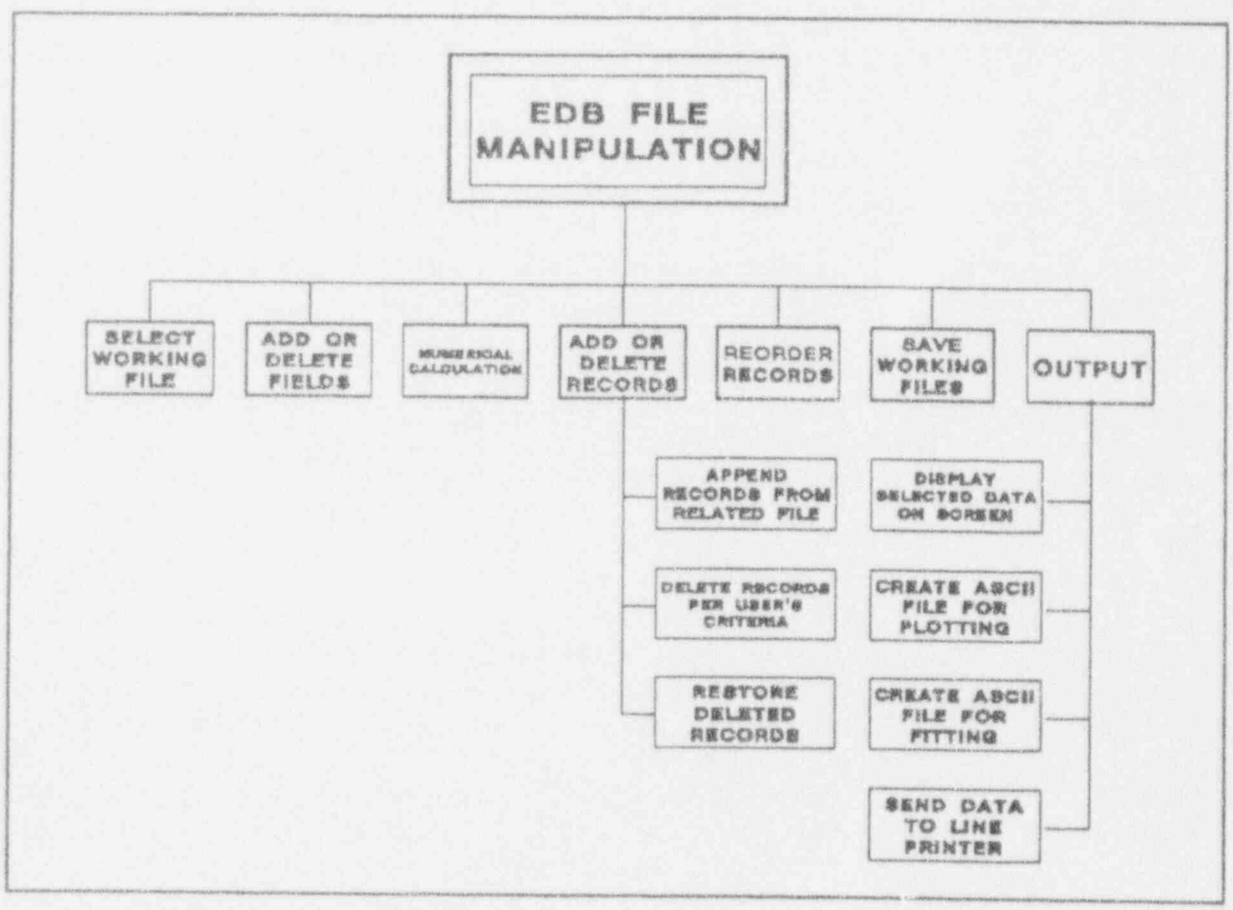

Fig. A.2 File-manipulation procedures

user's option.) 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 or 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 ones that had been added previously. Both additions and deletions become final only after the modification command is given; tentative additions and/or 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; first, records to be deleted are marked; following that step, the marked records are completely eliminated. The 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: deletion (marking) of records and restoring (unmarking). All records can be deleted if the restoration option is entered before deleting any records. Both procedures are done for records that satisfy conditions that are entered by the user in the menu screens provided. Using suitable sequences of deletions and restorations, practically all selection criteria can be satisfied (see Examples, Sect. A.6). 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 a PR-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 and the added file.

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

The data in the working file can be displayed on the screen or printed. A menu is provided which 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 will be distributed over several pages if the width of the output exceeds the number of lines permitted, and, of course, 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, RAW_C_TR.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 RAW_C_PR.str can be used to assure 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

The data input for the plotting program (Fig. A.3) is prepared by the file-manipulation procedures and exported to special plot files as described in the previous Sect. A.2. 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 given:

1. The name of the structure file that was associated with the working file from which the data set was prepared. The sole purpose of this file is to provide the information about which data fields should be used for the x- and y-coordinates, respectively. Thus, any structure file may be used which 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, but other fields may differ.

2. The plot title. The title will appear 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 will be used for (optional) legends that can be placed at any desired location in the plot and will appear in the same sequence as they are entered in the screen. Blanks as descriptions will be 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 includes also 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 the different data sets and the curves. Dashes of different densities can be selected for the curves.

Once the input is given, a picture of the plot will appear on the screen. Labeling of the axes is automatic, using the information from the input data and structure files. The user will be 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 choose to use the same plot data again, with a possible change in curves, symbols, colors, and the placement of the legend. The input information may also be changed selectively or completely erased (this applies only to the information that is generated during the plotting procedure, such as name of input files, title, and legends, but not to the data files which remain intact).

A.5 CHARPY FITTING AND PLOTTING

A.5.1 General Considerations

The EDB-Utilities software allows the creation of fits and plots for any given set of raw Charpy data using the hyperbolic tangent function. The program requires an input file in ASCII format that can be created by one of the options in the section for display and export discussed above. For convenience the file RAW_C_TR.dat that was created from RAW_C_TR.dbf is distributed with the TR-EDB data files. (This file contains some combination of sets from several physical capsules whenever there are too few specimen in anyone capsule. The dbf version of these combinations are found in RAW_C_FT.dbf and CV_RF_FT.dbf.) To be consistent with the PR-EDB software, all data are converted to U.S. units, the unit fields are removed, and a one-character field is added in front of SPEC_ID. If this field contains an asterisk, the record will be excluded from processing; this feature is useful for removing outliers. The program searches for the combination of PLANT_ID + CAPSULE + HEAT_ID + SPEC_ORI which are common to each set of raw Charpy data that are used for the determination of transition temperature and upper shelf energy. For some un-irradiated data (PLANT_ID and CAPSULE are blank) different sets were used for different experiments. Here, the only distinguishing identifier is EXP_ID which was, for this reason, added to the file RAW_C_TR.dbf but could not be retained in the ASCII file RAW_C_TR.dat. To permit the user to evaluate these sets separately additional set were added to the ASCII file in which the (blank) PLANT_ID was replaced by EXP_ID. Some evaluations were also performed from combinations of sets that come from different physical capsules but have similar fluences and irradiation temperatures. These sets with a different CAPSULE identification were also added to the ASCII file. All sets in the ASCII file that are not contained in RAW_C_TR.dbf are also placed in the dBASE file RAW_C_FT.dbf, which can be converted also to ASCII format.

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. (The starting value for the lower shelf is 3.0 J or 2.2 ft-lb) 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 U.S. and international units. The plots can be sent to the printer if a suitable screen capture program is active. All internal calculations are done in international units, centigrade and joule. The user has the option to select the range of temperature and energy values in the plot for convenient comparisons (e.g., overlays) of the curves. Points and curves that fall outside the range are ignored in the graph.

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, the 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 either given 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. This feature 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 which 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 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_TR.dat is distributed with the TR-EDB for this purpose. (See next Section A.5.4.)

A.5.4 Monte Carlo Uncertainty Analysis

Uncertainties for the fitting parameters are needed to determine 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. This 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 one created by the selection procedure (Sect. A.5.5). 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 which 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 international units), the number of specimens in the set, and the 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 which 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 whose data 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). Its 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 RAW_C_PR.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_TR.sum and CV_RS_TR.dat, respectively, are included in the data disks. The dBASE version of CV_RS_TR.dat, CV_RS_TR.dbf is also included in the package. The covariance file, which is very large and of limited usefulness, is not included.

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, if such subsets are processed repeatedly. This is accomplished through the data-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 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 RAW_C_PR.dat, which is included in the package and given as 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 (e.g., one obtained from the selection procedure described in Sect. A.5.5). 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 EDB-dBASE output file. The file RAW_C_RS.dat is included in the package and appears as 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.

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, which makes 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, 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 INSTALLATION AND EXECUTION

Running the EDB-Utilities with data files requires an IBM-compatible PC, preferably with 80286 (AT) or better processor, and a hard disk. At least 512 kb RAM is recommended. A matching co-processor 80287/80387 is also required. The graphics programs are written for an EGA screen with 640 × 350, or VGA, 640 × 480 pixel resolution. (The 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 TR-EDB plus software is being distributed on diskettes in compressed form. A directory with at least 5 Mb free space must be prepared on the hard disk to receive the set of files. Place the distribution disk into the appropriate diskette drive "D" (D being usually the drive A or B), and from the hard-disk directory give the command D:TR-EDB. This command will unpack the files and copy them to the hard disk. A list of data and program files is given in the file TR-EDB.lst and in Appendix C. 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 the user selects 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, except if 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 due to problems with the system, such as lack of memory. To retain the error message in these cases the executable file *.exe should be called directly and 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.

No examples are included in the current release of the software. However, all necessary input files are provided with default values, whenever appropriate.

APPENDIX B. DIFFERENCES BETWEEN CURRENT VERSIONS OF THE PR-EDB AND TR-EDB

B.1. DATA FILES

1. The following new files were added that are not part of the PR-EDB:
   1. E_LST_TR.dbf - List of experiments
   2. SHFTA_TR.dbf - Anneal data
   3. SHFTX_TR.dbf - Charpy transition temperatures for non-standard criteria

2. Some files were renamed to distinguish between TR-EDB and PR-EDB versions:
   1. SPEC_LST.dbf is renamed S_LST_TR.dbf
   2. REAC_LST.dbf is renamed R_LST_TR.dbf
   3. HEAT_LST.dbf is renamed H_LST_TR.dbf
   4. REF_TITL.dbf is renamed TITL_TR.dbf
   5. REF_LST.dbf is renamed REF_TR.dbf

   These files with the suffix PR will be introduced in future versions of the PR-EDB.

3. The field EXP_ID was added to all files, except R_LST_TR.dbf. It replaces the field PLANT_ID in HEAT_LST.dbf, HEAT_PR.dbf, CHEM_PR.dbf, WELD_PR.dbf, HAZ_PR.dbf, and REF_LST.dbf.

4. The field SPEC_SIZE was removed from the TR version of SPEC_LST.dbf (i.e. S_LST_TR.dbf). A REPORT_TAG was added to this file, and the NO_OF_SPEC field increased to 3 characters.

5. A number of fields was added to the file SHFT_TR.dbf to make it more self-sufficient. The field FLU_TAG characterizes the fluence determination, EFP_TIME, TIME_U, and F1_RATE give information about the fluence rates (these data are part of the file REAC_TR.dbf). Also added is the specimen irradiation temperature CSP_TEMP and the fields U_TAG and I_TAG for information about the fitting procedures for un-irradiated and irradiated specimen, respectively. The width of the fields DUSE_ABS and DUSE_REL have been increased to 5 to make them consistent with the other numerical fields.

6. Information about the Charpy test machine was added in the file CV_RF_TR.dbf.

7. More detailed information about the dimensions of the tensile specimen was added to the file TEN_TR.dbf. This information - in reduced form - is located in the file SPEC_LST.dbf of the current version of the PR-EDB. The number of fields for units has been reduced to one each for temperature and stress (in addition to the unit for length for the specimen dimensions). It can be assumed that the same units are used for the data in each individual test.

8. Three new fields were added to the file R_LST_TR.dbf (formerly REAC_LST.dbf), namely, two fields for the energy output both thermal and electric, and a NOTES field, which is part of most other files.

9. Several fields have been added to the files REAC_TR.dbf. Specific for test reactors is the information about "fission" fluence. This term refers to a method of fluence determination that was quite common in the early days of irradiation experiments. The fluence ($E > 1.0$ MeV) is determined from an activation dosimeter, usually $^{54}Fe(n,p)$, whose

cross-section relative to the E > 1.0 MeV portion of a fission spectrum is known (68 mb for $^{54}Fe(n,p)$). This cross section multiplied with the measured activity is defined as the "fission equivalent fluence", or, fission fluence, for short. Often a ratio between fission fluence and calculated fluence is reported, based on comparison between the spectrum in the capsule obtained from a neutron transport calculation and the fission spectrum. Fields for the fission spectrum, CAP_FISS, and the ratio F1_TO_FISS are now in the reactor file. Also added are fields for the ratios of fluence (E > 0.1 MeV) and dpa to fluence (E > 1.0 MeV), FP1_TO_F1 and DPA_TO_F1, respectively. These ratios are useful for determining damage exposure parameters for individual specimen if specimen fluences are different from capsule fluences. A further addition is that of a nominal (or target) irradiation temperature, if only one temperature value is reported, which may be neither a minimum or maximum value. The meaning of the field TEMP_TAG has been changed somewhat from that used for surveillance capsules; here, the characters "C", "T", or "M" are used, depending whether the temperature was only calculated, determined by thermocouples (the most frequent and reliable method for test reactors), or melt wires. A corresponding field for fluence determination methods, FLU_TAG, has also been added.

10. Fields for nominal temperature, NOMTEMP_x, have been added to each heat treatment run. In the PR-EDB file single temperature (target) values were relegated to the minimum temperature, leaving the maximum temperature blank. This procedure reduces the size of the file but is inappropriate and confusing.

11. Separate fields for authors have been added to the reference file, TITL_TR.dbf (formerly REF_TITL.dbf), for easy retrieval of publications of a specific author. Any number of authors for the same paper can be accommodated, using the continuation record, if necessary. The same procedure makes it possible to list more than one EXP_ID for the same paper. Also added is a field for alternative references, ALT_REF; this can be useful if a report is published under the sponsorship of more than one organization (e.g., as NUREG report and ORNL-TM). However, only one designation is used as REF_ID.

12. A field for MPC number, MPC_ID, was added to the file REF_TR (formerly REF_LST). The field PLANT_ID was replaced by EXP_ID, as in other files mentioned above.

B. 2 SOFTWARE

In addition to the removal of some bugs, the following changes have been made in the EDB software since it was distributed with the first version of the PR-EDB. These changes should make the software more useful while leaving all features of the previous version intact. Any user familiar with the old software will have no difficulty to use the new one, even without any additional explanation. The modified description is given in Appendix A. The new software has also been distributed with the Version 2 of the PR-EDB. The following changes were made:

1. An option is provided to convert the raw Charpy file RAW_C_PR.dbf or any other file with the same structure to a corresponding ASCII file that can be used in the Charpy fitting programs. An empty file RAW_C_DT.dbf and the file RAW_C_PR.str should be present. This file is optional but useful to establish that the input file has the correct structure. The input file is WORK.dbf (i.e., RAW_C_PR.dbf) must be retrieved in the same manner as any other file used for processing with the EDB software. The program performs all the necessary conversions and checking automatically, informs the user of any problems and provides appropriate options. This program eliminates the need for including the ASCII data in the distribution of the TR-EDB (but this may still be done as a convenience to the user).

2. The graphic output for both plotting and Charpy fitting programs has been extended to accommodate the VGA in addition to the EGA display. The choice is automatic, the VGA display is more aesthetically pleasing and will be used whenever possible.

3. Some choice of parameters that have been previously lost after exiting the program will be retained for subsequent runs. A typical example is the number of characters in a line and number of lines on a page for the printing program. Any setting used for one printout will be retained as default for future runs until changed instead of reverting to the initial default setting after exit. The same is true for the user settings in the Charpy fitting programs.

4. Both the plotting and the Charpy fitting programs have an additional option that allows the user to define the boundaries of the coordinates in the plotting window. For the plotting program, this option includes a choice of logarithmic coordinates in either or both coordinate axes. The affected axis has to start and end with an integer power of ten with a range not to exceed 8 decades. For the Charpy fitting program the range of test temperatures (in °C) and the maximum impact energy (in joules) may be specified. All data points and pieces of the curves that fall outside the specified ranges will not be displayed. This feature is especially useful for creating overlays that must be plotted in the same scale.

5. The printing of text next to the graphs of Charpy fitting containing transition temperature and upper shelf data has been eliminated. It has been difficult to place the text correctly because it depends on the printer and font size used and may also cause problems in some color printers such as HP Desk Jet 500C. The same information can be obtained through the Monte Carlo fitting program and is also displayed on the screen in the other fitting programs.

6. The format of the dBASE output of the Monte Carlo program has been changed slightly, providing the same room for the uncertainties as for the other data. (In addition, the program puts a blank instead of a -1 into the uncertainties if no information can be obtained.) The program for multiple fits on the same graph that uses this output as auxiliary file has been adjusted accordingly. Consequently the program will not run correctly with an auxiliary file that has been created with the old version of the EDB software. The file CV_RS_TR.dat that is being distributed with the TR_EDB has the correct format.

APPENDIX C. LIST OF FILES INCLUDED IN THE TR-EDB AND SOFTWARE.

C.1 Data Files:

E_LST_TR.dbf
E_LST_TR.str
S_LST_TR.dbf
S_LST_TR.str
SHFT_TR.dbf
SHFT_TR.str
SHFTX_TR.dbf
SHFTX_TR.str
SHFTA_TR.dbf
SHFTA_TR.str
RAW_C_TR.dbf
RAW_C_TR.str
CV_RF_TR.dbf
CV_RF_TR.str
TEN_TR.dbf
TEN_TR.str
R_LST_TR.dbf
R_LST_TR.str
REAC_TR.dbf
REAC_TR.str
H_LST_TR.dbf
H_LST_TR.str
CHEM_TR.dbf
CHEM_TR.str
HEAT_TR.dbf
HEAT_TR.str
WELD_TR.dbf
WELD_TR.str
HAZ_TR.dbf
HAZ_TR.str
TITL_TR.dbf
TITL_TR.str
REF_TR.dbf
REF_TR.str

C.2 **Auxiliary files:**

RAW_C_TR.dat	input file for fitting programs
RAW_C_FT.dbf	combinations and modification of RAW_C_TR.dbf for use in RAW_C_TR.dat
CV_RF_FT.dbf	companion file to RAW_C_FT.dbf
CV_RS_TR.dat	dBASE output file from Monte Carlo fitting (US units)
CV_RS_TR.dbf	dbf file created from CV_RS_TR.dat with references
CV_RS_TR.str	
CV_RS_TR.sum	summary output file in international units from Monte Carlo fitting
RAW_C_DT.dbf	empty file for creating ASCII file for fitting programs
RAW_C_PR.str	file to verify correct structure of input file for fits
STR_ALL.dbf	collection of all records used in structure (*.str) files
STR_ALL.ndx	index file used for constructing structure files

C.3 **Program files:**

EDB.bat
INTRO.exe
PLNK.exe
FITIN.exe
PLTIN.exe
PPLOT2.exe
STFIT2.exe
MTFIT2.exe
UTFIT2.exe
SELSYM.exe

C.4 **Supplementary input files for the EDB software:**

SYMDATA
SYMPLOT
SYMUSER
PLCOORD.dat
FTCOORD.dat
PROG.rbm
PLINFO.rbm
IDINFO.rbm
CUINFO.rbm
STINFO.rbm
MTINFO.rbm
UTINFO.rbm
MASTER.mem
MVSCR.mem
FILES.mem
PLOT.mem

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11. ABSTRACT *(200 words or less)*

The Test Reactor Embrittlement Data Base (TR-EDB) is a collection of results from irradiations in materials test reactors. It complements the Power Reactor Embrittlement Data Base (PR-EDB), whose data are restricted to the results from the analysis of surveillance capsules in commercial power reactors. The rationale behind this restriction was the assumption that the results of test reactor experiments may not be applicable to power reactors and could, therefore, be challenged if such data were included. For this very reason the embrittlement predictions in the Reg. Guide 1.99, Rev. 2, were based exclusively on power reactor data. However, test reactor experiments are able to cover a much wider range of materials and irradiation conditions that are needed to explore more fully a variety of models for the prediction of irradiation embrittlement. These data are also needed for the study of effects of annealing for life extension of reactor pressure vessels that are difficult to obtain from surveillance capsule results.

The current data collection of the TR-EDB contains primarily Charpy test data, which are accompanied in most cases by tensile tests for the same irradiation conditions. Information is available for 1,230 different irradiated sets, 797 of which are from base material (plates and forgings), 378 from welds, and 55 from heat-affected-zone materials. The chemistries of the investigated materials span also a fairly wide range, particularly in the content of copper and nickel, which are considered the most important contributors to embrittlement sensitivity. Complete chemistry information is available for 1,095 of the 1,230 samples (after discarding the HAZ information).

The architecture of the TR-EDB is fully compatible with that of the PR-EDB so that the data from both databases can be easily merged, if desired. The data files are given in dBAS format and can be accessed with any personal computer using the DOS operating system. "User-friendly" utility programs have been written to investigate the 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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