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EVALUATION OF NUCLEAR FACILITY DECOMMISSIONING PROJECTS
PROGRAM

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EVALUATION OF NUCLEAR FACILITY DECOMMISSIONING PROJECTS PROGRAM

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INTRODUCTION

To date there have been only a small number of nuclear facility retirements and decommissionings that are representative of the nuclear power stations that will require decommissioning in the future. At present, several of the earlier demonstration and small power generating facilities have reached the end of their useful lives and have been or will be decommissioned in the near future. These include facilities such as the Plum Brook test reactor and the Shippingport Atomic Power Station. The Nuclear Regulatory Commission (NRC), through the Office of Nuclear Regulatory Research, has funded this program to evaluate these and other decommissioning projects over a several-year period.

The objective of the Evaluation of Nuclear Facility Decommissioning Projects (ENFDP) program is to provide the NRC licensing staff with data which will allow an assessment of radiation exposure during decommissioning and the implementation of ALARA techniques. The data will also provide information to determine the funding level necessary to ensure timely and safe decommissioning operations.

More specifically, we will 1) compare actual decommissioning costs, methods and radiation exposures with those estimated by the Battelle-PNL and ORNL NUREGs on decommissioning, 2) determine how effectively exposure reduction techniques can be applied to decommissioning activities to meet ALARA objectives and 3) evaluate the lessons learned concerning various decommissioning methods.

The work necessary to achieve this objective has been divided into the following four tasks which will be covered in more detail. These are:

- Identification of Facilities
- Data Collection
- Analysis & Reporting
- Summary Comparisons

IDENTIFICATION OF FACILITIES

Candidate facilities where decommissioning activities will be occurring are identified and, with the NRC Program Manager's concurrence, chosen as potential sites for data collection. Facility selection is based on the applicability of decommissioning data to other projects. Selected facilities are chosen either because their configuration is in someway typical of a BWR, PWR, Research reactor, or Test reactor; or because some aspects of the work (i.e. techniques for exposure reduction) may be applicable to decommissioning these basic reactor types. Once these sites are chosen and working agreements are established data collection can actively begin.

Potential facilities for future inclusion in this study are:

- Humboldt Bay 1
- Foreign facilities (West Germany, England, Sweden)

As other representative sites begin decommissioning activities or planning, they will be included for field evaluation during the ensuing fiscal years. The number of facilities included in the study may be constrained to some extent by the availability of resources to adequately perform the data collection work.

DATA COLLECTION

Data from facility decommissioning will be gathered through subcontracts with the licensees, by data collection at the facility and by a search of published data.

The data to be collected during the field evaluations of decommissioning projects will provide an as complete as practicable chronology of the facility's decommissioning. Data accumulation will start at the earliest feasible time to include engineering, ALARA review and other efforts preliminary to the actual decommissioning.

ANALYSIS & REPORTING

The reports to be described are the basic reports used in the Decommissioning Data System (DDS). In addition, MAPPER (a proprietary computer software package) provides the ability to produce supplementary reports by manipulating the data available in the basic report formats. The descriptions of these reports are intentionally idealized. All reports may not be used, simply because this information may not be available at each facility.

General Information

This report is a free format input report designed to accommodate descriptive data of any kind. Entries may be given any title and related to any facility system by a system component number. Data are entered in any format on any subject. The report should be used to record information that does not fit into any of the report types organized by column. This includes facility location, description, owners, operators, builders. Summary data may also be included where it is not readily derivable from other reports or from a convenient reference.

Decommissioning Code Table/Index

The code/index table contains a list of items, including facility buildings, systems, components, and budgetary items, assigning a corresponding identification number to each. This index which is common to all reactor facilities included in the program, enables a more detailed comparison of facility decommissioning efforts. The full utilization of this data base will not be possible until an adequate number of facilities are included in the DDS.

This basic report type may be expanded to include tables or indices of other kinds related to facility decommissioning. Candidate tables are labor category wage rates, shipping company rates, shipping company name codes, disposal site name codes and rates, or archived file tape names.

Significant Event Report

This report is used to record the facility's operating history, which in some cases could impact facility decommissioning. It contains dates, system/component numbers, and event descriptions. Noteworthy events such as construction completion, startups, shutdowns, and significant incidents and accidents are also recorded in the report.

Radionuclide Inventory

An inventory of radionuclides present in each facility system or component is contained in the radionuclide inventory report. The amount and concentration of each radionuclide, the measurement date, and a description of each system's material composition will be recorded. Also to be noted will be whether a radionuclide present in a system is the result of neutron activation or contamination.

Project Cost/Exposure Report

This report is the main repository of cost and exposure information for a decommissioning project. Both estimated and actual costs, man-hours, man-rem and work schedules are listed for each activity. The decommissioning code table/index enables this data to be easily sorted for comparison and analysis.

Dose Rates And Contamination Report

Dose rates and contamination levels at locations throughout each facility prior to decommissioning are recorded. Also included in this report is the measurement location relative to a reference facility map and other information concerning the measurement such as date and type of survey.

Project Labor Report

Decommissioning labor costs, exposure, and man-weeks for each decommissioning activity are recorded at a frequency compatible with available data. This report supplements the project cost/exposure report by providing data on how costs and exposures accumulate over the course of a decommissioning project.

ALARA Report

This report contains a record of ALARA efforts by activity specification or system component number. The affected facility system, date, cost items, exposure information, and a description of the ALARA effort are listed. This report can be used to calculate by activity specification number (or system component number) the total estimated man-rem saved as well as total cost incurred through the implementation of the ALARA effort.

Shipment Report

Volumes, weights, and other physical data concerning wastes generated in decommissioning are recorded by activity, system or component. These data are listed for shipments of material from the decommissioning site. Trip lengths and vehicle dose rates are recorded in order to allow calculation of public exposure.

Disposal Costs

The costs associated with each waste disposal shipment are recorded in the disposal costs report. Costs are divided into transportation, burial, and container categories. Costs for each container type in the shipment are also listed.

Surveillance Report

The surveillance report is used to record annual costs and exposures associated with long term surveillance of a decommissioned facility. Under normal conditions a surveillance report would not be required for a facility decommissioned under the DECON mode.

Public Dose Report

The exposure of the public to radiation which results from the decommissioning of nuclear facilities is one criterion which is to be considered during the pre-decommissioning evaluation phase. This report presents an estimate of such exposure information, based on extrapolations of measurement data and numerous assumptions, including both routine and accident conditions.

Computed Reports

The data in all of these reports is summarized in this series of computed reports. In these reports the costs and radiation exposures are compared with other decommissioning data to yield information such as costs per megawatt day of operations or man-rem per curie of radionuclide inventory. Inflation adjustment tables are also included to enable cost comparisons between years.

To date the decommissioning data system contains decommissioning information concerning the following facilities:

| <u>Facility</u> | <u>Type</u> | <u>Reference Document</u> |
|------------------------------------------------------|-------------|---------------------------|
| Elk River Reactor | BWR | NUREG/CR-2985 |
| Enrico Fermi-1 Reactor | FBR | NUREG/CR-3116 |
| NCSU R-3 Reactor | RR | NUREG/CR-3370 |
| Ames Laboratory Research Reactor | RR | NUREG/CR-3336 |
| Reference BWR (NUREG/CR-0672) | BWR | UNI-2461 |
| Reference PWR (NUREG/CR-0130) | PWR | UNI-2462 |
| Reference Research and Test Reactors (NUREG/CR-1756) | RTR RRR | UNI-2463 UNI-2596 |

SUMMARY COMPARISONS

After decommissioning data have been obtained from a reasonable number of facilities of each type (PWR, BWR, Research and Test Reactors), comparisons can then be made between the experiences at these facilities and the NRC studies pertaining to decommissioning. These comparisons will provide a basis for evaluating the success of various decommissioning methods actually used in the field and for selecting the most effective techniques.

The specific activities in this task will include:

- Comparing specific site data with information provided in the reference NRC document for the type of facility.
- Comparing relative costs and decommissioning techniques used at each site.
- Developing a system that can be used by the NRC to evaluate future licensee decommissioning plans for adequacy, based on the field experience gained during this program.
- Issuing a report summarizing the results of this study.

Successful completion of the comparison studies is contingent on acquisition of a sufficient amount of field data. For this reason, completion of this task will have to wait until after FY 1985 or until a sufficient number of decommissioning projects have been evaluated. Initial comparison with the earlier NRC decommissioning studies can be initiated as early as FY 1984, but not until perhaps FY 1985 will enough data have been collected to emphasize this work.