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**OAK RIDGE  
NATIONAL  
LABORATORY**

**MARTIN MARIETTA**

**Oak Ridge National Laboratory  
Health and Safety Long-Range Plan  
Fiscal Years 1989-1995**

OPERATED BY  
MARTIN MARIETTA ENERGY SYSTEMS, INC.  
FOR THE UNITED STATES  
DEPARTMENT OF ENERGY

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**OAK RIDGE NATIONAL LABORATORY  
HEALTH AND SAFETY LONG-RANGE PLAN  
FISCAL YEARS 1989-1995**

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June 1989

Prepared by the  
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## ACRONYMS AND INITIALISMS

ACGIH	American Council of Government Industrial Hygienists
ACM	asbestos-containing materials
ALARA	as low as reasonably achievable
ALPS	ALARA Program Support Facility
ANS	advanced neutron source
ANSI	American National Standards Institute
D&D	decontamination and decommissioning
DOE	(U.S.) Department of Energy
DOELAP	Department of Energy Laboratory Accreditation Program
DOT	(U.S.) Department of Transportation
DSO	division safety officer
E&HP	Environmental and Health Protection
EOC	Emergency Operations Center
EPA	(U.S.) Environmental Protection Agency
ERFU	Environmental Restoration and Facilities Upgrade (Program)
FP&P	fire prevention and protection
FY	fiscal year
GPE	general plant equipment
GPP	General Plant Project
HFIR	High Flux Isotope Reactor
HMIS	Hazardous Materials Information System
HPRR	Health Physics Research Reactor
HQ	(DOE) Headquarters
IARC	International Agency for Research on Cancer
IH	Industrial Hygiene
LERC	Laboratory Emergency Response Center
LI	line item
LSS	laboratory shift supervisor
MSDS	Material Safety Data Sheet
MUMPS	Massachusetts General Hospital Utility Multi-Programming System
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NSRs	Nuclear Criticality Safety Approvals
NTP	National Toxicology Program
O&M	Operations and Maintenance
OHIS	Occupational Health Information System
ORNL	Oak Ridge National Laboratory

ORO	(DOE) Oak Ridge Operations
OSHA	Occupational Safety and Health Administration
QA	quality assurance
QC	quality control
R&D	research and development
RAP	Remedial Action Program
RCO	radiation control officer
REIRS	Radiation Exposure Information Reporting System
RaSCaL	Radiation Standards and Calibration Laboratory
SAR	Safety Analysis Report
SARA	Superfund Amendments Reauthorization Act
SARP	Safety Analysis Report for Packaging
SCBA	self-contained breathing apparatus
SPP	standard practice procedure
TLD	thermoluminescent dosimeters
TLV	threshold limit value
TSA	technical safety appraisal
UOR	unusual occurrence reporting
WBCL	Whole-Body Counting Laboratory

## EXECUTIVE SUMMARY

The health and safety of its personnel is the first concern of ORNL and its management. The ORNL Health and Safety Program has the responsibility for ensuring the health and safety of all individuals assigned to ORNL activities. This document outlines the principal aspects of the ORNL Health and Safety Long-Range Plan and provides a framework for management use in the future development of the health and safety program.

Each section of this document is dedicated to one of the health and safety functions (i.e., health physics, industrial hygiene, occupational medicine, industrial safety, nuclear criticality safety, nuclear facility safety, transportation safety, fire protection, and emergency preparedness). Each section includes functional mission and objectives, program requirements and status, a summary of program needs, and program data and funding summary.

Highlights of FY 1988 included the following:

- New thermoluminescent dosimeters (TLDs) were issued in 1988 for the purpose of complying with the Department of Energy Laboratory Accreditation Program (DOELAP) requirements.
- The portable-ladder inspection program of the Plant and Equipment Division was implemented in FY 1988.
- Additional parking lots were added to provide sufficient parking spaces for the number of vehicles being driven to ORNL.

Future planned activities include the following:

- Extremity and neutron dosimetry TLD systems that are compatible with the beta-gamma TLD system will be installed in late FY 1989 and in early FY 1990.
- A plantwide survey of all buildings for asbestos-containing materials will begin in FY 1989. A full-scale asbestos removal program should begin immediately after completion of the survey.
- A safety training course for supervisors is to be developed in CY 1989 and will include accident and incident investigations.
- A Transportation Training Program is now being developed. Implementation will begin immediately following development.
- The cooling tower sprinkler system at HFIR is to be upgraded, converting the main building sprinkler to a wet-pipe type and extending sprinklers into selected unprotected areas, installing electrical transformer protection, and installing early fire warning systems in the control room.

There are several programmatic needs:

- A new posting program to meet the requirements specified in DOE Order 5480.11 is being implemented. In addition, implementation of requirements contained in a newly issued

DOE/ORO Contamination Control Policy Document will impact future operating costs. Such costs will not be trivial and have been included in projected operating costs.

- Comprehensive industrial hygiene surveys need to be performed routinely in all divisions and organizational units of the Laboratory.
- A carcinogen control program needs to be developed and implemented to ensure full compliance with DOE 5480.10. The program will involve development of a carcinogen inventory, workplace exposure assessments, posting, and written safety plans for the use of carcinogens.
- A recent feasibility study to modify the current ORNL medical facility cited inadequate emergency access and inappropriate facility layout for proper response to a multipatient emergency, insufficient capability for handling high-level contamination cases, etc.
- Review and appraisal of nuclear facilities—DOE Order 5480.5—requires each contractor to perform comprehensive independent internal reviews of all nuclear facilities at least annually. Complete implementation of this order will require a significant additional resource commitment.
- Without individual DOE program support for critical experiments to define nuclear properties of future program systems, ORNL will need to provide fiscal support for these experiments to validate computational codes used for nuclear criticality safety to determine margins of operations safety.
- Two fire protection pumpers more than 20 years old need to be replaced.

Details of each of the preceding items are included in the appropriate sections of this document.

## 1. INTRODUCTION AND MANAGEMENT OVERVIEW

### Introduction

The Oak Ridge National Laboratory (ORNL), established in 1943 on the 15,000-ha Oak Ridge Reservation in East Tennessee, is owned by the U.S. Department of Energy (DOE) and operated by Martin Marietta Energy Systems, Inc. The ORNL site (X-10 site) is located 13 km southwest of Oak Ridge, Tennessee, on Bethel Valley Road and comprises 3563 ha. The main Laboratory area encompasses 445 ha. Principal research and development (R&D) facilities consist of nuclear research reactors, particle accelerators, hot cells, engineering process development facilities, radioisotope production facilities, and research facilities in physics, chemistry, environmental sciences, and biomedical sciences (principally located at the Y-12 site). The central site lies in Bethel Valley, while satellite R&D facilities and some of the solid and liquid waste disposal areas lie in Melton Valley. The relative isolation of the ORNL complex has served to minimize the effects of inadvertent releases of hazardous substances because of its distance from potential targets.

ORNL began its existence in 1943 as the Clinton Laboratories, a pilot plant for testing and development of the  $^{239}\text{Pu}$  production and chemical separations processes. Major facilities at the time included the X-10 Graphite Reactor, a chemical pilot plant, and numerous support laboratories and shops. Its wartime mission was fulfilled by 1945; however, because of its unique capabilities, the commercial production of radioisotopes was initiated, and new research programs were added. ORNL soon emerged as one of the world's largest nuclear research centers. The spectrum of Laboratory programs continued to expand through the years until ORNL had established an international reputation in the fields of reactor technology, chemical technology, basic research in the physical and life sciences, radiation protection, and R&D in the production and utilization of radioisotopes.

Coincident with the establishment of the DOE, a primary mission of ORNL became to support national energy goals through scientific research and technology development, with emphasis on long-term, high-risk efforts. The Laboratory has become a multidisciplinary institution with many diverse capabilities and areas of expertise. Although its primary mission remains the development of improved and environmentally acceptable energy technologies and basic research in the engineering, physical, life, and social sciences, it retains the flexibility to respond to national research needs. Examples of recent new initiatives are R&D programs in hazardous waste technology and global environmental concerns.

### Management Overview

The Safety Policy of Martin Marietta Energy Systems states:

Martin Marietta Energy Systems  
is committed to maintaining safe and healthful  
working conditions for all employees.

Whenever our safety objective conflicts with other objectives, safety shall be our first concern.

The health and safety of its personnel is the first concern of ORNL and its management. Because of this fact, the Laboratory has established a distinguished record for safe operation. The most recent accomplishments in this area include

- the 1988 DOE Award of Excellence, Option II, DOE's highest award, presented for maintaining the incidence of lost workday and restricted work cases equal to or below 1 for 4 consecutive years, and
- the 1988 National Safety Council Award of Honor, presented for working 5,404,035 hours without a lost workday injury.

The National Safety Council Award of Honor was presented to ORNL for the fourteenth consecutive year. The Laboratory is committed to continued improvement of our health and safety program to ensure that all personnel will have a safe and healthful environment.

While the ultimate responsibility for maintaining the health and safety of Laboratory personnel rests with line management, the Laboratory has established a comprehensive oversight function responsible for monitoring day-to-day activities and acting in a proactive fashion to prevent potential hazards from becoming actual risks to health or safety. The functions addressed in this report are located in four different ORNL organizations. Those organizations are listed below, along with their specific areas of responsibility:

Environmental and Health Protection Division

Health Physics  
Industrial Hygiene

Health Division

Occupational Medicine

Laboratory Protection Division

Fire Protection  
Emergency Preparedness

Office of Operational Safety

Industrial Safety  
Criticality Safety  
Facility Safety  
Transportation Safety

This document outlines the principal aspects of the ORNL Health and Safety Long-Range Plan and provides a framework for management use in the future development of the health and safety program.

The ORNL Health and Safety Program has the responsibility for ensuring the health and safety of all individuals assigned to ORNL activities. This responsibility includes ensuring compliance with all appropriate ORNL and Energy Systems procedures, DOE orders, and state and federal laws and regulations; development and implementation of procedures to support the Laboratory's health

and safety program; identification and development of actions to ensure the health and safety of personnel; operation of a comprehensive training program for health and safety personnel and members of the general Laboratory population; maintenance of an effective emergency response capability in the event of an incident threatening health and safety; and implementation of an effective internal audit program to evaluate the effectiveness of the health and safety program.

A number of areas included within the Laboratory's health and safety program are receiving special emphasis in order to strengthen the Laboratory's environment, health, and safety management program. These special areas of emphasis are summarized in the *Report of the ORNL Critical Facilities Review Team (Y/EA-95)* dated October 1987 and include commitments to

- establish mechanisms for proactively acquiring, interpreting, and distributing relevant orders, regulations, and requirements relating to health and safety;
- increase formality in procedures and practices related to health and safety issues;
- strengthen the health and safety training program, on the basis of a comprehensive needs analysis;
- further develop emergency preparedness procedures and practices to provide a comprehensive Laboratory approach; and
- strengthen the internal audit activity responsible for review of the health and safety program.

Plans are now being developed on an Energy Systems basis to address these critical areas of emphasis. Issues relating to communication of regulatory requirements, formality of procedures, establishment of a comprehensive training program, and development of a rigorous internal audit program cut across all of the disciplinary areas included in this document. Oak Ridge National Laboratory is committed to a comprehensive regulatory oversight program that ensures traceability of all regulatory requirements to the operating level, a coordinated health and safety training program for all individuals working on the Laboratory site, and an aggressive internal audit program to guarantee compliance with all relevant regulatory requirements.



## **2. HEALTH PHYSICS LONG-RANGE PLAN**

### **2.1 MISSION AND OBJECTIVES**

The principal mission of ORNL's health physics program is to identify, evaluate, and control any radiation and contamination hazards that exist in the work environment. Included within this mission is the accurate assessment of exposures received by individuals required to work in environments containing such hazards. This responsibility includes acquiring, calibrating, and servicing radiation-monitoring instruments; operating a personnel monitoring program for evaluating and reporting external and internal radiation exposures; and maintaining an effective radiation-protection surveillance program. Laboratory management supports this mission and encourages those responsible for its execution to develop and carry out timely and economically feasible radiation protection programs.

The general objectives of ORNL's Health Physics program are to ensure that

- work environments are routinely surveyed for the presence of radiation and contamination hazards;
- radiation detection instruments that accurately and dependably measure radiation and contamination are used;
- exposures received by individuals accessing areas where radiation and contamination hazards exist are accurately determined;
- records of exposures are maintained in such a manner that they can be reliably retrieved and will allow exposure "trending" studies; and
- exposures are kept as low as reasonably achievable (ALARA) in all operations involving radiation or contamination hazards.

To accomplish the general mission and objectives, this long-range plan identifies several program and administrative elements. The current status of activities aimed at meeting these requirements is summarized.

### **2.2 PROGRAM REQUIREMENTS AND STATUS**

#### **2.2.1 External Radiation Exposure Control**

ORNL has numerous facilities that produce levels of radiation well beyond normal background and where controls must be exercised to protect the health of personnel assigned to perform work there. Such facilities range from accelerators, where the radiation level during operation may be extremely high, to small radiochemical laboratories, where the radiation levels are much less intense and may at times barely exceed background.

Control of exposures at such facilities is structured around a program which requires that (1) a continuous surveillance program aimed at quantifying the presence of radiation is in place; (2) radiation areas are identified, and access to such areas is controlled; (3) individuals are properly metered for the exposure they are receiving; and (4) the individuals performing work involving exposure to radiation are trained in the basic concepts of radiation protection and relevant procedures.

### **2.2.2 External Dosimetry**

Radiation dosimetry is required for any employee who works with radioactive materials or radiation-generating devices, or for any employee who is judged to have the potential to receive an occupational radiation dose exceeding 100 mrem committed effective dose equivalent (2% of the applicable Radiation Protection Standard).

Radiation workers at ORNL are provided with thermoluminescent dosimeters (TLDs) capable of measuring the radiation dose received by the wearer from beta, gamma, or neutron sources. Beta-gamma dosimetry is provided for all radiation workers; neutron dosimetry is provided for personnel whose activities pose a significant potential for neutron exposure. Individual TLD response to known radiation fields is determined using standard sources at the ORNL Radiation Standards and Calibration Laboratory and well-characterized fields from the Health Physics Research Reactor. TLDs are analyzed at the External Dosimetry Laboratory, where their response is interpreted as dose to the wearer.

The TLD-based dosimetry system was modified in 1988. Comprehensive procedure development and quality assurance/quality control (QA/QC) documentation are necessary to meet DOE Laboratory Accreditation Program (DOELAP) requirements. Algorithm development is necessary to provide precise deconvolution of the TLD response in mixed radiation fields, particularly in neutron fields and in soft beta and X-ray fields. Completion of procedures and algorithm development necessary for DOELAP accreditation is scheduled late in FY 1989, when Energy Systems will submit its application for DOELAP review. Characterizations of many work-area radiation fields also need to be updated so that appropriate dosimetry can be supplied. A systematic review will begin in FY 1989. Extremity and neutron dosimetry TLD systems that are compatible with the beta-gamma TLD system will also be installed in late FY 1989 and in early FY 1990.

### **2.2.3 Internal Radiation Exposure Control**

Effective internal radiation exposure control procedures are essential to a quality ALARA program. Internal exposures are minimized through all phases of the life of a facility or piece of equipment. Health Physics input into the design phase of a new facility incorporates the best available radiation protection knowledge and technology. Ventilation schemes that use negative pressure and proper air flows to contain airborne radioactivity help to minimize the number of areas where respiratory protection is required. Timely airborne monitoring and contamination surveys and appropriate postings and radiation work permits are central to minimizing internal contamination. Entrance requirements to contaminated areas are clearly posted. Effective protective clothing for contamination zones and a respiratory protection program that meets ANSI Z88.2 standards are available. Temporary containment structures are used for maintenance procedures to protect nearby personnel.

Tracking of exposures following positive bioassay or whole-body counts is another vital part of the overall ALARA program. Internal dose calculations are carried out according to procedures when significant internal exposures occur.

#### **2.2.4 Internal Dosimetry**

Internal dosimetry is provided in vivo (whole-body and organ counting) and in vitro (radiochemical analysis of urine and feces). In vivo techniques estimate directly the quantity of radioactive material in particular organs or in the whole body but are insensitive to radiations with limited ability to penetrate tissue. In vitro radioassay is very sensitive to small quantities of radioactive material, but it is time-consuming; and metabolic models must be used to determine the amount of material in the body or organ of interest. Sampling or monitoring frequency in either case depends on the material being analyzed and the potential for exposure. Internal dose is evaluated after a confirmed exposure based on consideration of the retention and distribution of radioactive materials in organs over time. This behavior is typically determined by examination of both in vivo and in vitro analytical results.

Available office space at the Whole-Body Counting Laboratory (WBCL) is inadequate for programmatic needs. Throughput requirements at the WBCL are expected to quadruple in the next 3 or 4 years because of increasing remedial investigation and remedial action programs at ORNL. Two-shift counting is planned in FY 1989 to partially address this need. A shadow-shield counter has been provided to dramatically increase throughput for fission product determination without the need for elaborate laboratory facilities. Two new shielded rooms equipped with low-energy photon detectors are necessary for transuranium actinide counting requirements.

#### **2.2.5 Instrumentation**

Fixed and portable radiation monitoring instrumentation must be provided for use by health physicists and operations personnel to determine the types of ambient radiation fields present in the work environment and the level of the radiation hazard from these fields. The instruments must be appropriate for the anticipated radiation hazards and must be calibrated to deliver an accurate response. A sufficient number of working calibrated instruments must be available commensurate with the need. Instruments known to be defective or due for periodic routine maintenance and calibration are delivered to the ORNL Radiation Standards and Calibration Laboratory. Trained technicians perform the required maintenance, tests, and repairs in a fully equipped electronics shop. Instrument response is then standardized in a known radiation field of the appropriate type and strength.

Many radiation instruments in the inventory have outdated designs; replacement parts are not available. Instruments are replaced as resources are identified, and a formal plan is being developed as a line item for comprehensive upgrading of the inventory. The mechanism for procuring suitable portable radiation-monitoring instruments is dependent on Laboratory overhead funds. Operational requirements demand that a limited number of instrument models be maintained in order to control costs. Competitive bidding tends to increase the number of designs in inventory.

#### **2.2.6 Respiratory Protection Program**

Protection against the presence of airborne radioactivity is an inherent part of the radiation protection program at ORNL. A very important part of that program is the use of respiratory

protection in the form of masks (either partial or full and either air-supplied or demand-supplied) as well as pressurized whole-body suits. At ORNL, the Radiation Protection Section works in concert with the Industrial Hygiene Section and the Quality Department in carrying out the respiratory protection program. Responsibilities are divided, with the Radiation Protection Section being primarily responsible for specifying the needs for protection in radioactively contaminated environments, surveying respirators for the presence of contamination following use, and surveying respirators for the presence of contamination after cleaning.

The Industrial Hygiene Section maintains the supply of respiratory protection equipment required for routine uses (some emergency respiratory protection equipment is maintained by the Laboratory Protection Department), trains laboratory personnel in the proper use of respirators, and tests and certifies those who have been trained. The Quality Department tests the filtering abilities of each respirator before it is assigned to the Industrial Hygiene Section for use.

### **2.2.7 Workplace Air Monitoring for Radionuclides**

The objectives of the air monitoring program are to provide early warning of accidental releases of airborne radionuclides to the work environment and to provide the basis for establishing routine bioassay programs. Most of ORNL's air monitors use very old technology, and some air monitors continue to utilize vacuum tube electronics. Updated technology will provide added accuracy, sensitivity, reliability, and specific nuclide detection capability. A plan that describes the activities necessary to correct current deficiencies and also addresses future needs is being written. Some of the planned activities are (1) designing an instrument network interface for tying all health physics instruments in a facility to a central readout device, (2) reviewing current equipment to see if it meets regulatory and technical needs, (3) reviewing planned future operations, and (4) determining what the state of technology is and if further technical development is desirable.

Improvements to the air monitoring system include the following: (1) approximately 170 air monitors have been evaluated to determine the adequacy of air flow measurements, and the data have been reviewed for appropriate corrective actions; (2) a draft instrument upgrade plan is being written and developed for submission as a line-item project; and (3) an instrument network interface continues in the design stage.

### **2.2.8 Radiation Monitoring and Contamination Control**

Appropriately designed facilities, controls, and procedures are necessary to contain radioactive materials and to keep personnel exposures to radioactive contamination ALARA. Surveillance programs are required to evaluate the effectiveness of containment, controls, and procedures; to ensure that radioactive contamination hazards are identified and evaluated; and to ensure that appropriate procedures and personnel protective apparel are used. Instrumentation for detecting radioactive contamination must be deployed, maintained, and calibrated; and personnel must be trained in the use of radiation-monitoring equipment, in the use of protective apparel, and in procedures and techniques for contamination control. Bioassay and whole-body counting programs are required to monitor personnel with potential for internal exposures and to document findings.

Currently, procedures to provide for adequate control of radioactive materials and control of exposures to personnel are in place. Procedures are reviewed and updated as required. Facilities for processing significant quantities of radioactive materials undergo preoperational and annual reviews

by an independent safety committee appointed by the Laboratory Director. Operating divisions have implemented training programs for radiation workers, but additional training will be required to comply with DOE Order 5480.11. Radiation surveillance programs are in place, and contamination hazards are identified by zone designations. Because of the dynamic nature of Laboratory operations, these zone designations must be continually evaluated and upgraded. Instrumentation for detecting and monitoring radioactive contamination is deployed, maintained, and calibrated according to procedure. Instrument needs to meet updated requirements are being identified, and the purchase of additional instruments has begun. Instruments and equipment to upgrade capabilities for emergency response and remote area radiological evaluations are being purchased. Whole-body counting and bioassay programs that evaluate and document personnel internal exposures are in place.

### **2.2.9 ORNL ALARA Program**

ORNL has had an ALARA program since it began operations in the early 1940s. The program has evolved since that time, and Laboratory management has been committed to ensuring that the program will continue to be included in all Laboratory operations.

ORNL's current program draws upon three important sources. First is the set of procedures addressing ALARA found in the *Health Physics Procedure Manual*. These five procedures detail responsibilities and address those areas necessary for the successful reduction of exposures. Second is the practice of setting realistic, quantifiable exposure-reduction goals for those activities involving significant exposure to personnel. Third, and most important, is the emphasis now being placed by the ORNL ALARA Committee on reducing exposures. This committee, headed by the ORNL Associate Director for Support and Services, reviews projects and/or programs by providing policy direction in the area of dose reduction. With additional dose-trending capabilities, the committee will focus on the analysis of exposure burdens on a facility-specific and/or job-specific basis to provide a clearer focus for dose-reduction efforts.

### **2.2.10 Radiation Dose Records**

Radiation dose records are maintained for each employee and visitor to ORNL. Both external and internal dosimetry monitoring results are contained in the records. External monitoring results are stored as dose or dose equivalent; internal monitoring results are stored as activity of a particular radionuclide in the organ per unit volume or per sample. Individual occupational radiation exposure reports are provided on request to individuals and annually to the Radiation Exposure Information Reporting System. Summary reports are provided to ORNL division representatives for ALARA planning and trending purposes.

The Occupational Health Information Management System/Health Physics Information Management System provides centralized electronic data storage and retrieval capabilities for the Corporation. Dosimetry records are not currently maintained as vital records as required by DOE orders. Original records are stored in more than one location, with no provision for fireproof storage, and records for a given individual do not necessarily reside in a single location. Information retrieval is cumbersome and resource-intensive for records dating back more than 5 years. Staffing levels are not adequate for anticipated ALARA tracking and trending requirements or for ensuring 45-day response to dosimetry report requests, as required by federal policy guidance. Office space

for existing and anticipated records activity staffing is about one-third of what is required. The ALARA Support Facility Line-Item Project (discussed in the following sections) is intended to provide the necessary office area.

### 2.3 SUMMARY OF PROGRAM NEEDS

- A new posting program to meet the requirements specified in DOE Order 5480.11 is being implemented. In addition, implementation of requirements contained in a newly issued DOE/ORO Contamination Control Policy Document will impact future operating costs. Such costs will not be trivial and have been included in projected operating costs.
- Trending of exposures and the ability to analyze exposures received in the completion of some job assignments will permit a clearer focus for dose-reduction efforts in the future. Facility design changes, made as the result of ALARA reviews, could result in major expenditures in construction and/or modification of a facility.
- Programs for which radiation-protection surveillance is provided are dynamic, making staffing needs difficult to predict. It is believed that the impact of new regulations and adaptation of "best practices" in radiation protection will result in a need for additional staffing, with increased needs as high as 50% possible.
- Acquisition and deployment of a mobile unit to support radiation-protection surveillance activities in remote areas is viewed as a critical need in the future. Numerous remedial investigation/feasibility study demonstration projects are beginning. Funding for these projects will be provided through a combination of 1991 operating funds and a companion GPE request.
- Improvements to the air monitoring system include the following: (1) approximately 170 air monitors have been evaluated to determine the adequacy of air flow measurements, and the data have been reviewed for appropriate corrective actions; (2) a draft instrument upgrade plan is being written and developed as a 1992 line-item project; and (3) an instrument network interface continues in the design stage.
- Existing external thermoluminescent dosimetry (TLD) systems were replaced for both ORNL radiation workers and the general Laboratory population in FY 1989. Characterization of workplace radiation fields will be reevaluated beginning in FY 1989 and continuing for about 2 years.
- Current office and laboratory space is inadequate. Space and facility needs are addressed in the planned ALARA Program Support Facility (ALPS). The ALPS Line-Item Project is scheduled for funding in FY 1993. It will allow the consolidation of personnel radiation-monitoring programs and laboratories at ORNL and replace the inadequate facilities in which these programs are now housed.
- Space, equipment, and facility needs for instrument calibration were addressed with the completion of the Radiation Standards and Calibration Facility in FY 1988. No facility exists or is planned for instrument susceptibility testing.
- A formal plan for a comprehensive upgrading of portable radiation instrumentation is being developed. Funding will be pursued through a line-item submission.

- Facilities for storing and retrieving of dosimetry records are inadequate to fully meet DOE requirements for vital records. Additional administrative and technical staffing is needed both for current reporting requirements and for anticipated ALARA activities.

#### **2.4 PROGRAM DATA AND FUNDING SUMMARY**

This section consists of program data sheets and schedules that describe the activities within this functional area. Table 2.1 summarizes overall funding by funding type.

1. Program Category		2. Reporting Period 5/01/89 through 5/31/89															
3. Project Title HEALTH PHYSICS DISIPLINE FWP NO : ACTIVITY NO :		4. Program Representative				Funding Type:											
		5. Project Engineer				Funding Year:											
6. Project Number WBS	7. Subproject Title	8. Fiscal Year and Months															
		FY-1989				FY-1990				FY-1991				FY-1992			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	HEALTH PHYSICS INSTRUMENT UPGRADE																9
	REALISTIC PHANTOM CONSTRUCTION AND CALIBRATION				9												
	WHOLE-BODY COUNTER CAPABILITY UPGRADE								9								
	MOBILE SURVEILLANCE UNIT											3					
	ALARA SUPPORT FACILITY																9
SHADING INDICATES STATUS AND COMPLETION		12 ← MONTH				SYMBOL				Comments:							
ACTIVITY SCHEDULE		← FORECAST				MILESTONE LEVEL 0 1 2 3 4											

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: RADIATION PROTECTION PROGRAMS

CONTACT: M. M. BUTLER

PROGRAM CATEGORY: HEALTH PHYSICS

PLANT: ORNL

PROJECT NO: 1.01

STATUTORY REQ: DOE/EPA

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.1.01

SCOPE: This activity provides radiation protection surveillance for all ORNL operating facilities and for ongoing environmental upgrade and waste management programs.

JUSTIFICATION: Radiation protection surveillance for all operations involving the presence of contamination hazards. Additionally, accepted operating practices are now including what is promoted as "best available technology" concepts.

FACILITIES:

STATUS/COMMENTS:

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<u>FUNDING YEARS:</u> 88-?			<u>TEC (\$K1000):</u> 37867											
<u>BER CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
H	BO	EXP	37867	2247	2420	3000	3300	3750	4000	4400	4750	5000	5000	
		<u>TOTAL:</u>	<u>37867</u>	<u>2247</u>	<u>2420</u>	<u>3000</u>	<u>3300</u>	<u>3750</u>	<u>4000</u>	<u>4400</u>	<u>4750</u>	<u>5000</u>	<u>5000</u>	

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: RADIATION PROTECTION UPGRADE

CONTACT: R. J. FORBES

PROGRAM CATEGORY: HEALTH PHYSICS

PLANT: ORNL

PROJECT NO: 1.02

STATUTORY REQ: DOE/DOELAP

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.1.02

SCOPE: The scope of the improvements would provide an analysis of the requirements documents, establishment of risk assessments, quality assurance plans, standard operating procedures, records and data management, and other management systems. The corrective action is to upgrade radiological programs (radiation protection, internal dosimetry, external dosimetry, and informational management) to comply with the above statutory requirements.

JUSTIFICATION: NQA-1, DOZIAP, and TSA (criteria) establishes the requirements for the quality assurance systems that must be in place to provide assurance that program requirements for radiological protection programs are achieved. The project provides the analysis and work requirements to comply with the statutory requirements for the radiological programs.

FACILITIES:

STATUS/COMMENTS:

<u>FUNDING YEARS:</u> 88-91			<u>TEC (\$X1000):</u> 1339											
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
H	BO	EXP	1339	0	168	721	300	150	0	0	0	0	0	
<u>TOTAL:</u>			1339	0	168	721	300	150	0	0	0	0	0	

1. Program Category <b>HEALTH PHYSICS</b>		2. Reporting Period 5/01/89 through 5/31/89	
3. Project Title <b>RADIOLOGICAL PROTECTION IMPROVEMENTS PROGRAM</b>		4. Program Representative R. J. FORBES	Funding Type:
FWP NO : ACTIVITY NO :		5. Project Engineer	Funding Year:

6. Project Number WBS 1.02	7. Subproject Title	8. Fiscal Year and Months																											
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994							
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
	RADIOLOGICAL PROGRAMS (QUALITY ASSURANCE, PROCEDURES AND OTHER MANAGEMENT SYSTEMS)																												
	DEVELOPMENT OF AUTOMATED RECORDS MANAGEMENT SYSTEM																												
	UPDATE PROCEDURES AND OTHER PROGRAM DOCUMENTS																												

<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p>	<p>12 ← MONTH</p> <p>← FORECAST</p>	<p>SYMBOL</p> <p>MILESTONE LEVEL 0 1 2 3 4</p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: EXTERNAL DOSIMETRY

CONTACT: T. A. RHEA

PROGRAM CATEGORY: HEALTH PHYSICS

PLANT: ORNL

PROJECT NO: 1.03

STATUTORY REQ: DOE/DOELAP

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.1.03

SCOPE:

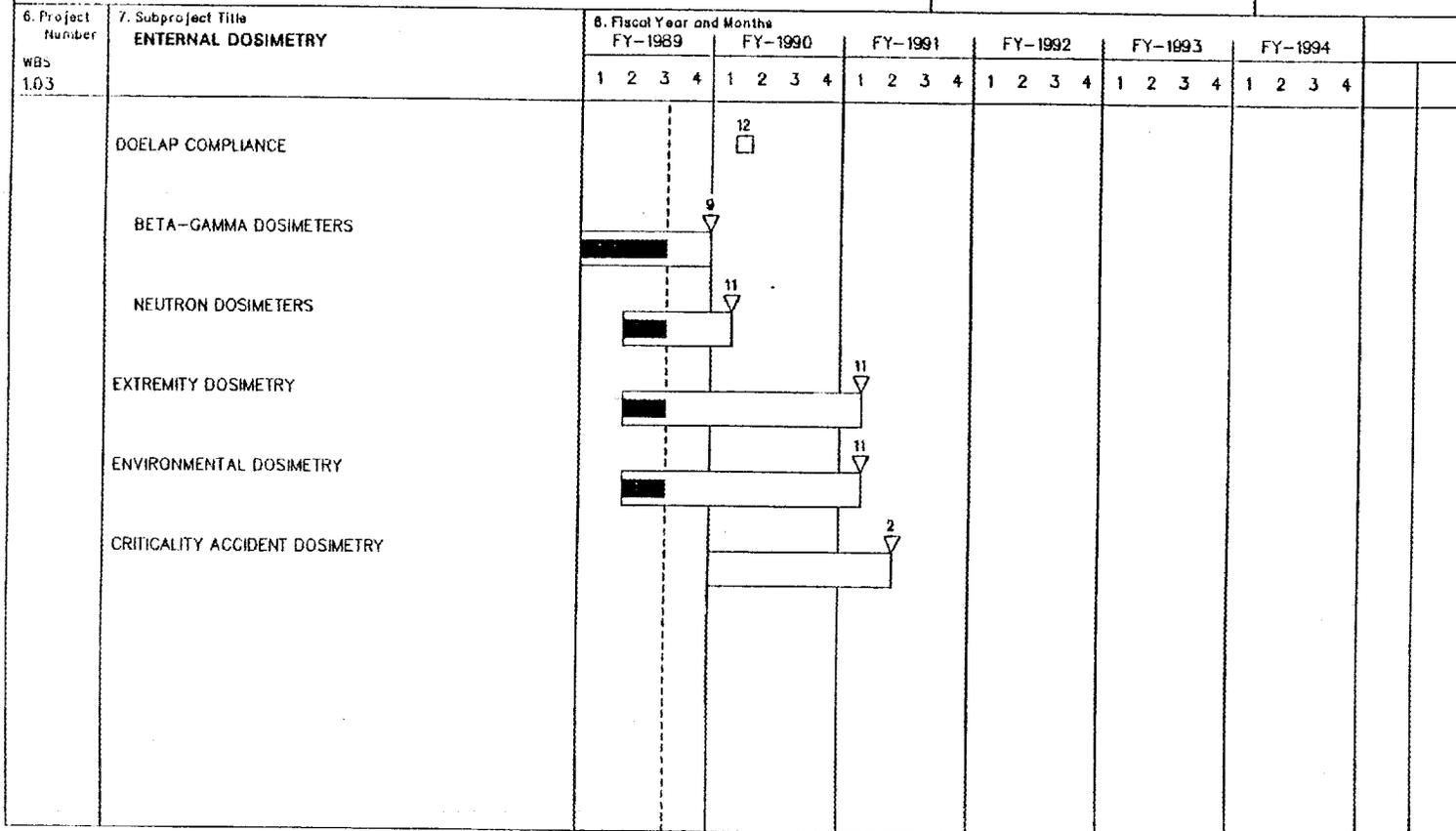
JUSTIFICATION: DOE Order 5480.11 requires personnel radiation dosimetry in areas where significant exposure potential exists. In implementing these measurement programs, the requirements of DOE Order 5480.15 (Department of Energy Laboratory Accreditation Program-DOELAP) must be met. Additionally extremity (ANSI N13.X) dosimetry programs are required when extremity exposures are significant. Areas which handle fissile or fissionable material require nuclear criticality accident dosimetry (ANSI N13.X); environmental radiation monitoring is needed to assess the environmental impact of plant operations.

FACILITIES:

STATUS/COMMENTS: Upgrade programs to comply with DOELAP requirements, as well as ANSI N13.3, N545, and draft ANSI N13.X and applicable NRC Regulatory Guides. Comply with applicable elements of ANSI NQA-1.

FUNDING YEARS: 88			TEC (\$x1000): 8066										
SER CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR									
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
H	BA	EXP	7294	0	535	735	894	917	963	1021	1082	1147	0
H	BO	EXP	772	0	0	225	373	174	0	0	0	0	0
TOTAL:			8066	0	535	960	1267	1091	963	1021	1082	1147	0

1. Program Category <b>HEALTH PHYSICS</b>		2. Reporting Period 5/01/89 through 5/31/89	
3. Project Title <b>EXTERNAL DOSIMETRY PROGRAM UPGRADE</b>		4. Program Representative T. A. RHEA	Funding Type:
FWP NO : ACTIVITY NO :		5. Project Engineer	Funding Year:



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<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p>	<p>SYMBOL MILESTONE LEVEL</p> <p>0 1 2 3 4</p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: DOSIMETRY RECORDS

CONTACT: E. DIXON

PROGRAM CATEGORY: HEALTH PHYSICS

PLANT: ORNL

PROJECT NO: 1.04

STATUTORY REQ: ANSIN/DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.1.04

SCOPE: Dosimetry Records maintains radiation exposure records for each employee and visitor to ORNL. These records include external (TLD), internal (in-vivo and in-vitro), extremity dose and pocket meter exposure.

JUSTIFICATION: Dosimetry records are not currently maintained as vital records as required by DOE orders. Staffing levels are not adequate for ALARA requirements or for timely response to exposure summary requests. New DOE orders (5480.11) require the annual reporting of radiation dose to each individual. Resources for compliance are not available.

FACILITIES: The ALARA Support Facility will provide additional storage and office space

STATUS/COMMENTS: FTE funding for additional 1.5 programmer in 1990 and 1.0 clerical in 1991 and 1.0 clerical in 1992.

2-14

<u>FUNDING YEARS:</u> 89			<u>TEC (\$*1000):</u> 5862											
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
H	BO	CE	78	0	0	13	13	0	52	0	0	0	0	
H	BO	EXP	5784	0	0	492	612	716	826	936	1046	1156	0	
<u>TOTAL:</u>			<u>5862</u>	<u>0</u>	<u>0</u>	<u>505</u>	<u>625</u>	<u>716</u>	<u>878</u>	<u>936</u>	<u>1046</u>	<u>1156</u>	<u>0</u>	

1. Program Category <b>HEALTH PHYSICS</b>		2. Reporting Period 5/01/89 through 5/31/89																									
3. Project Title		4. Program Representative E. DIXON		Funding Type:																							
FWP NO : ACTIVITY NO :		5. Project Engineer		Funding Year:																							
6. Project Number WBS 1.04	7. Subproject Title <b>DOSIMETRY RECORDS</b>	8. Fiscal Year and Months																									
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994					
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
HPIMS DEVELOPMENT				3		12																					
HPIMS ONGOING																											
DOE 5480.11 COMPLIANCE																											

SHADING INDICATES STATUS AND COMPLETION

ACTIVITY SCHEDULE

12 ← MONTH

← FORECAST

SYMBOL MILESTONE LEVEL 0 1 2 3 4

Comments:

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: INTERNAL DOSIMETRY 3197-0000

CONTACT: M. THEIN

PROGRAM CATEGORY: HEALTH PHYSICS

PLANT: ORNL

PROJECT NO: 1.05

STATUTORY REQ: DOE/ANSI

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.1.05

SCOPE: Internal Dosimetry is comprised of two (whole-body and organ counting), in vitro (radiochemical analysis of wrink and flces), and the assessment of internal dose. The facility and environmental sample analysis program provides essential information for the contact of exposures, and for the implementation of the ALARA program.

JUSTIFICATION: We are not in compliance with DOE order 5480.11 and the Technical Safety Appraisal audits of 1988. Specific areas of deficiency that must be addressed are: throughput, minimum detectable activities, internal dose assessments, tracking of exposures following positive in vivo or in vitro results, legally defensible documentation, and Quality Assurance plans. The number of in vivo counts is estimated to increase at least four-fold in the next year. The number of in vitro bisassays are estimated to increase two-fold.

FACILITIES: Available space at the Whole-Body Counting Laboratory is inadequate for budgeted staff and equipment additions. Shower stalls are in need of renovation.

STATUS/COMMENTS: To meet the requirements of the new DOE Orders and other pertinent regulations, we will need additional staff (5 technicians, 1 internal dosimetrist), additional equipment (sadiation counters), and additional facilities (for housing staff and equipment).

FUNDING YEARS: 89				TEC (\$M1000): 6190										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
H	BO	GPP	250	0	0	250	0	0	0	0	0	0	0	0
H	BO	CE	280	0	0	55	40	185	0	0	0	0	0	0
H	BO	EXP	5660	0	0	938	1427	1571	1724	0	0	0	0	0
TOTAL:			6190	0	0	1243	1467	1756	1724	0	0	0	0	0

1. Program Category <b>HEALTH PHYSICS</b>		2. Reporting Period 5/01/89 through 5/31/89																							
3. Project Title  FWP NO : ACTIVITY NO :		4. Program Representative M. THEIN		Funding Type:																					
		5. Project Engineer		Funding Year:																					
6. Project Number WBS 1.05	7. Subproject Title	8. Fiscal Year and Months																							
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	WHOLE-BODY COUNTER CAPABILITY UPGRADE																								
	WHOLE-BODY COUNTER FACILITY UPGRADE																								
	RADIOASSAYS LABORATORY COUNTING EQUIPMENT UPGRADE																								
SHADING INDICATES STATUS AND COMPLETION																									
ACTIVITY SCHEDULE																									
SYMBOL MILESTONE LEVEL																									
Comments:																									

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 5/08/89

ACTIVITY/PROJECT: ALARA PROGRAM SUPPORT FACILITY (ALPS)

CONTACT: J. S. BOGARD

PROGRAM CATEGORY: HEALTH PHYSICS

PLANT: ORNL

PROJECT NO: 1.06

STATUTORY REQ: DOE/ANSI

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.1.06

SCOPE: Provide a facility (structures, support systems, utilities, instrumentation, computers, and other special features) to house the In-Vivo Radioassay (whole-Body Counting), Thermoluminescent Dosimeter (TLD) processing, and Dosimetry Records Laboratories at ORNL.

JUSTIFICATION: The Whole-Body Counter and TLD Processing Laboratories are currently housed in a 40-yr. old wood frame building with inadequate space and utilities. Expansion of these activities and upgrade of the Dosimetry Records activity is mandated by DOE Orders. Construction of ALPS will replace the existing inadequate facility and consolidate radiation protection functions at ORNL. Failure to do so will jeopardized ORNLs ability to receive and maintain DOE/LAP accreditation and will severely restrict the ability to document the ALARA program.

FACILITIES: Bldg. 2008, ALPS Facility (new construction).

STATUS/COMMENTS: ALPS is currently scheduled for submission as a 1993 Line Item Project

<u>FUNDING YEARS:</u> 89			<u>TEC (\$K1000):</u> 8410										
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>									
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
H	BO	LIP	8000	0	0	0	0	0	0	8000	0	0	0
H	BO	EXP	360	0	0	60	225	75	0	0	0	0	0
<u>TOTAL:</u>			<u>8360</u>	<u>0</u>	<u>0</u>	<u>60</u>	<u>225</u>	<u>75</u>	<u>0</u>	<u>8000</u>	<u>0</u>	<u>0</u>	<u>0</u>

1. Program Category <b>HEALTH PHYSICS</b>		2. Reporting Period 5/01/89 through 5/31/89																											
3. Project Title <b>ALARA PROGRAM SUPPORT FACILITY (ALPS)</b>		4. Program Representative J. S. BOGARD		Funding Type:																									
FWP NO : ACTIVITY NO :		5. Project Engineer D. P. REID		Funding Year:																									
6. Project Number	7. Subproject Title	8. Fiscal Year and Months																											
WBS		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994							
LOG		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
	ENGINEERING STUDIES																												
	CONSTRUCTION																												

SHADING INDICATES STATUS AND COMPLETION		12 ← MONTH		SYMBOL MILESTONE LEVEL		▽ □ ◇ ☆ ⊗		0 1 2 3 4		Comments:	
ACTIVITY SCHEDULE		← FORECAST									

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: PORTABLE & FIXED INSTRUMENT CALIBRATION

CONTACT: R. E. HALLIBURTON

PROGRAM CATEGORY: HEALTH PHYSICS

PLANT: ORNL

PROJECT NO: 1.07

STATUTORY REQ: ANSI/DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.1.07

SCOPE: This activity includes the calibration and maintenance of portable and fixed instrumentation as well as support of the external dosimetry program.

JUSTIFICATION: The program is necessary to ensure that adequate measurements are made prior to and during work activities involving ionizing radiation in order to maintain personnel exposures as low as reasonably achievable and to comply with the requirements of the documents cited above.

FACILITIES:

STATUS/COMMENTS:

<u>FUNDING YEARS:</u> 88			<u>TEC (\$x1000):</u> 10420											
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>	
H	BO	EXP	10420	0	860	1110	1200	1350	1400	1450	1500	1550	0	
<u>TOTAL:</u>			<u>10420</u>	<u>0</u>	<u>860</u>	<u>1110</u>	<u>1200</u>	<u>1350</u>	<u>1400</u>	<u>1450</u>	<u>1500</u>	<u>1550</u>	<u>0</u>	

**Table 2.1. Funding summary for Health Physics Program**

Funding type	Funding (\$ × 1000)								Total
	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	
Exp	3,983	7,281	8,331	8,703	8,913	7,807	8,378	8,853	62,249
GPP		250							250
GPE		68	53	185	52				358
LI						8,000			8,000
Total capital		318	53	185	52	8,000			8,608
Total (types)	3,983	7,599	8,384	8,888	8,965	15,807	8,378	8,853	70,857



### **3. INDUSTRIAL HYGIENE LONG-RANGE PLAN**

#### **3.1 MISSION AND OBJECTIVES**

The primary mission of the Industrial Hygiene (IH) function is to provide a work environment conducive to the health and well-being of employees, subcontractor employees, and the community through the anticipation, recognition, evaluation, and control of chemical and physical stresses arising in and from the workplace. This is accomplished, in part, by ensuring that Martin Marietta Energy Systems, Inc., is in full compliance with regulations of the U.S. Department of Energy (DOE), of the Occupational Safety and Health Administration (OSHA), and of other appropriate local, state, and federal agencies.

The objectives of the IH function are to

- plan, organize, implement, and audit the effectiveness of health protection programs;
- provide monitoring and analytical services for evaluation of employee exposure to chemical and physical stresses;
- ensure that documentation is adequate to demonstrate the continued effectiveness of health protection efforts;
- achieve and maintain the lowest practical level of employee exposure to physical and chemical stresses to ensure that actual exposures do not result in impaired health or well-being; and
- interpret and disseminate information regarding the protection of employee health.

#### **3.2 PROGRAM REQUIREMENTS AND STATUS**

##### **3.2.1 Compliance and Health Protection**

##### **3.2.1.1 DOE 5480.10 Program Areas**

**Requirements.** Program requirements associated with DOE Order 5480.10 are

- identification of health hazards,
- health hazard evaluation,
- control measures,
- periodic review and monitoring,
- employee education,
- medical monitoring, and
- data management.

For the health hazard identification program to function as required, a hazard inventory for all major facilities and processes must be developed and maintained to list environmental factors and stresses present and to summarize monitoring data. All engineering or maintenance projects and line organization operation methods/procedures must receive IH review and approval. The IH Section must develop and maintain documentation and hazard identification programs, protocols, and procedures.

The IH Section also has the responsibility for evaluating identified health hazards. The Section must maintain current copies of all relevant DOE "mandatory" and "reference" standards and follow prescribed protocol (or establish protocol when necessary) regarding monitoring levels and permitted exposure limits.

The use of control measures by IH should ensure compliance with OSHA, DOE, and state regulations; reduce the possibility of occupational illness; help to limit exposure to chemical and physical hazards; and provide a workplace that is safe and conducive to productive work. Some examples of these controls are (1) engineering controls (e.g., review of designs of new facilities); (2) substitutions of less hazardous materials in areas or processes having hazardous materials; (3) use of protective equipment; and (4) administrative actions such as reassigning work areas or tasks, assigning fewer employees to perform high-risk tasks, and using a tracking/follow-up system with field verification and monitoring.

Periodic review and monitoring by IH should serve to evaluate exposures to chemical and physical stress, to identify trends that might lead to future health impact and new measures to prevent them, and to ensure that workers are informed of their exposures. The IH staff is responsible for conducting walk-through surveys; routine monitoring of chemical, physical, and biological hazards; and biological monitoring. In addition, staff members are responsible for construction-site reviews and internal audits.

Employee education ensures that employees are aware of operations that may pose health hazards to themselves and their co-workers. Education should also apprise employees of means available for exposure monitoring and inform them of both the results of such monitoring and the available measures for reducing exposures to acceptable levels.

The IH Section must work with Health Services to provide medical monitoring. After identifying workers who might be at risk (e.g., those who work with asbestos, other carcinogens, or other materials of interest from a biological monitoring standpoint), the Section must perform biological monitoring in conjunction with Health Services personnel.

The IH data management must document exposure conditions; provide epidemiological information, legal evidence, and readily usable data; supply sampling results to the field; and protect these data to ensure their retrievability.

**Status.** Significant improvements are required to ensure minimal compliance with the requirements outlined in 5480.10. Comprehensive IH surveys are not being performed routinely in divisions and other organizational units of the Laboratory. A system is also needed to ensure adequate review of all engineering or maintenance projects and facility additions or modifications. A thorough study is needed to ensure that all DOE mandatory standards are translated into standard practice procedures. Additional staff people must be added to meet these requirements. Responsibilities of these positions will be coordination of the comprehensive IH survey program, review of engineering and other project-planning documents, and reconciling IH standard practice procedures with DOE orders.

Additional resources will also be required in FY 1990 to develop a system to ensure that training is performed and documented for all IH program areas that are not currently covered by Technical Resources and Training, in addition to providing documented training for IH staff personnel. The expected increase in Industrial Hygiene training needs through FY 1991 will require an additional 0.5 person-year of effort to ensure compliance with DOE and federal regulations.

The ORNL biological monitoring program for chemicals (primarily urinalysis) needs to be significantly strengthened to provide an additional means of assuring that exposures are as low as reasonably achievable (ALARA).

Collecting and maintaining complete and accurate data is becoming more critical as we move toward a more compliance-based program. Systems will be continually developed and improved to store records more efficiently and to make the data more usable on a day-to-day basis. Significant resources will be required in FY 1990 for this purpose. Additional clerical support will be required to input data resulting from the extra sampling being conducted by field personnel in FY 1990, and additional clerical support will be needed by FY 1991 for day-to-day administration and correspondence in conjunction with new and upgraded program areas.

#### **3.2.1.2 Carcinogen Control**

**Requirements.** The objectives of the carcinogen control program are to limit occupational exposures to carcinogens to ALARA levels and to document and limit the use of carcinogens where practical. The IH staff must review site inventories to identify carcinogens listed in Title 29, Subpart Z and Appendix A, of the American Conference of Government Industrial Hygienists threshold limit values (ACGIH-TLV) to determine if carcinogens used at the site create a significant potential for occupational exposure and to ensure that controls to maintain exposures below any prescribed limits are in place. Safety plans, standard operating procedures, or protocols must be written and reviewed by IH staff before operations involving carcinogens are initiated. Areas where chemical carcinogens are used must be designated, and records of personnel exposure must be kept. Such areas must be posted with appropriate warning signs, engineering controls must be used to minimize exposures, and procedures for emergency action must be established. Investigations and reports of exposure occurrences must be completed by IH staff.

**Status.** Although sound work practices are generally followed in work involving the handling of chemical carcinogens, and adequate engineering controls are in place for many of the locations where carcinogens are used, there is not a formal program addressing the requirements of DOE 5480.10. Historically, carcinogen control efforts have relied on the high level of scientific expertise of principal research investigators at ORNL as a major factor in maintaining employee exposure at safe levels. Additionally, for 15 years, a carcinogen registry (OSHA carcinogens only) has been maintained, and procurement records for chemicals have routinely been reviewed.

A standard practice procedure for carcinogen control is being developed and is near completion. This procedure will include IARC, NTP, and ACGIH-TLV listings of chemical carcinogens; will upgrade the current capabilities for inventory; and will require that safety plans, standard operating procedures, and experimental protocols be prepared by carcinogen users and reviewed by IH for all applicable projects. Additional staffing will be required to enable the needed expansion of surveillance, upgrading of inventory capabilities, recordkeeping on potentially exposed personnel and controlled areas, and IH review.

### 3.2.1.3 Confined-Space Entry

**Requirements.** The objectives of the confined-space entry program are to reduce the associated risk, protect employees, and comply with all standards (ANSI Z117.1-1977). IH staff must develop and review periodically a written program, identify all confined spaces, and perform an initial risk assessment of such areas. Entry into such areas must be only after potential hazards have been identified. Employees who might be subject to working in confined spaces must be appropriately trained. Entry into confined spaces containing an atmosphere immediately dangerous to life or health may be made only in extreme emergencies by properly trained individuals.

**Status.** As an initial evaluation of all confined spaces, a formal plantwide survey and classification effort will be initiated in FY 1989 and should be completed in FY 1990. This activity, requiring approximately one person-year of effort, can be most efficiently performed by an outside contractor and will be handled as a project. Formalized training is also required for all employees involved in confined-space work.

### 3.2.1.4 Embryo-Fetus Protection

**Requirements.** The objectives of the Embryo-Fetus Protection Program are to (1) protect the health of the unborn, (2) identify and document health risks, (3) educate female workers, (4) evaluate pregnant workers' job assignments, (5) apply and enforce the program's restrictions, and (6) reduce potential health risks and prevent the introduction of any new health risks for the unborn. It is also recommended that all workplace hazards be identified and documented. A protective evaluation procedure should be developed and should include (1) a case-by-case evaluation of work assignments, (2) special monitoring, (3) a comparison of results with OSHA and DOE regulations, and (4) a comparison of evaluations and results with those of previous similar situations. The IH staff should also provide recommendations to supervision and the Health Division regarding a pregnant employee's workplace.

**Status.** An aggressive program aimed at protecting the health of the unborn child has been in place at ORNL for about 15 years. Although ORNL maintains a current list of teratogens and reproductive toxins, no officially recognized DOE or Energy Systems list is available. Such a list is needed. Capabilities are inadequate for inventory of chemicals having reproductive toxicity and for identifying potentially exposed employees. Given adequate resources, these improvements will be initiated in FY 1990.

### 3.2.1.5 Respiratory Protection

**Requirements.** The objective of the Respiratory Protection Program is to provide appropriate, clean, and adequately functioning respiratory protective equipment to each user, and to ensure that users are properly fit-tested and trained in its use. ANSI Z88-1980 and 29 CFR 1910.132 provide the guidance for this program. Activities necessary to meet the objective of the program are (1) annual evaluation of the program, (2) use of approved equipment issued by qualified personnel, (3) detailed annual fit-testing and training for users, (4) surveillance monitoring, (5) investigation of equipment malfunctions, and (6) assignment of a program coordinator. It is further recommended that annual training and fit-testing be performed simultaneously, that physicians be provided with information regarding work conditions and hazards, that a minimum number of employees be assigned to the areas requiring respiratory protection, and that standards for selecting respiratory equipment be formalized.

**Status.** The respiratory protection program has been in place for many years. Equipment is being upgraded in FY 1989 to expedite fit-testing and recordkeeping. Although most employees required to wear respiratory protective equipment have been fit-tested with the proper equipment, the fit-testing is not current. IH is working with the Health Division to set up annual fit-testing and medical evaluation, in accord with the ANSI standard. There are significant concerns associated with the compressed air system for supplying air-line respirators and suits; action is being taken to correct this concern in FY 1989. Additional staffing will be required in FY 1990 to administer the respirator issue program and perform other program upgrades.

#### **3.2.1.6 Hazardous Waste Site Operations**

**Requirements.** Objectives of the Hazardous Waste Site Operations Program are to (1) establish criteria for assessing and implementing employee protection; (2) use engineering controls, monitoring, site control, and personal protection equipment to protect personnel; (3) inform personnel of the hazards; and (4) comply with OSHA, EPA, DOE, and state requirements.

**Status.** ORNL does not currently have a comprehensive Hazardous Waste Site Operations Program. Because of increasing DOE pressure to demonstrate compliance with this regulation, a plan and program must be initiated in FY 1989. Approximately 0.5 industrial hygiene staff person in FY 1989 will be dedicated to coordinating IH activities associated with hazardous waste operations. By FY 1990, it is expected that the level of activities will be high enough to warrant an additional 0.5 person-year of effort. As activities in waste management increase at ORNL, the need for routine IH surveillance will increase as well. An additional technician will be required to cover this need in FY 1991.

#### **3.2.1.7 Quality Assurance**

**Requirements.** The primary objective of the Quality Assurance (QA) Program for the IH Section is to ensure the protection of Energy Systems employees from health hazards in the workplace. Requirements contained in ANSI/ASME-NQA-1, 1986 and DOE Order 5700.6 are used to guide quality-control activities; these include organization; documentation; design control; recognized, reported, and documented corrective actions; retention, maintenance, and retrievability of records; procurement control; proper inspection; and surveillance to verify compliance.

**Status.** The ORNL Industrial Hygiene Laboratory has been accredited by the American Industrial Hygiene Association since 1975, and the quality of analytical performances has been consistently demonstrated by satisfactory participation in the Proficiency Analytical Testing program since that time. We have in place a functional instrument calibration program with defined responsibilities for various program tasks. A more comprehensive QA effort is needed in the industrial hygiene area to demonstrate adherence to NQA-1. One method of accomplishing this goal would be a complete update of the multiplant *Industrial Hygiene Quality Assurance Manual*. In the absence of such a concerted effort, the ORNL Industrial Hygiene Section will initiate actions in FY 1989 to improve and develop QA documentation. An additional person will be required in FY 1990, once the documentation is in place, to ensure that it is maintained and audited on an appropriate frequency. The large amount of paperwork associated with procedural development, review, revision, and auditing will require additional clerical support in FY 1990 as well.

### 3.2.1.8 Emergency Response

**Requirements.** The primary objective of the Emergency Response Program is to assist DOE in emergency situations involving the possibility of personal injury or the release of toxic or other hazardous materials. Guidance is provided by DOE Order 5500. IH staff activities include (1) the preparation of emergency plans and procedures, (2) the acquisition and maintenance of necessary resources, (3) technical support, (4) the compilation of technical reference material, (5) compliance with DOE standards, (6) assistance with postincident reporting, (7) identification of potential emergency areas, (8) the provision of procedures for monitoring exposed persons, and (9) training of emergency personnel.

**Status.** Some support and guidance on health protection is provided in response to emergency drills and events and has been provided in facility assessments for emergency response planning. Involvement of the IH Section in emergency response activities is informal. There is a need for increased communication and coordination among the various groups involved in emergency response to more clearly define roles and responsibilities.

Training and preparation for emergency response are now conducted on an "as-needed" basis during "spare time." A more proactive approach needs to be pursued to ensure that the ORNL IH Section is prepared to respond adequately to emergencies and provide protection to ORNL employees and the public. Additional staffing will be required in FY 1990 to address this area. Because of a staged "ramping up" in this area for FY 1990-91, a staff member will be assigned full-time responsibility for this area by FY 1991.

### 3.2.1.9 Hazard Communication

**Requirements.** The objective of the Hazard Communication Program is to provide employees with information regarding hazardous substances that may be encountered in the workplace. The guidance for this program is contained in 29 CFR 1910.1200. Activities include (1) assessing hazard levels, (2) writing a comprehensive hazard communication program, (3) monitoring and auditing of hazardous materials handling, and (4) providing technical expertise to establish and maintain a training and information program.

**Status.** A written program is available to all employees. Files of Material Safety Data Sheets (MSDSs) are maintained at several locations. A computerized system for retrieving MSDSs is available for access and is being more fully developed. Labeling has been improved in many areas. The employee training program is in place and substantially complete, lacking specific training in only a few instances. Training needs to be performed periodically (defined as every 2 years) according to the regulation. The development of an inventory and tracking system for chemicals is in progress. The development of the Hazardous Materials Information System (HMIS) is being coordinated by the ORNL IH Section and is being funded by laboratory overhead through the Environmental and Safety Activities budget. Recent reviews and audits have demonstrated significant weaknesses in the Hazard Communication Program. A comprehensive upgrade of the program will probably be required in FY 1990. A thorough audit is needed to assess compliance with the Hazard Communication standard.

### 3.2.1.10 Hearing Conservation

**Requirements.** The objective of the Hearing Conservation Program is to recognize, assess, and prevent hearing changes that might be experienced by personnel because of exposure to

occupational noise. Guidance for this program is contained in 29 CFR 1910.95. Activities required of the IH staff include (1) administering the program when noise exposure levels equal or exceed an 8-hour, time-weighted average sound level of 85 dB(A); (2) identifying employees to be included in the program; (3) notifying an employee if an exposure occurs; (4) monitoring; (5) making a variety of protectors available; and (6) training employees.

**Status.** Improvements in the program are necessary for full compliance. Noise dosimetry needs to be performed to identify additional employees who qualify as "noise exposed." Noise monitoring records must be reorganized and transferred to the OHIS system, employee training materials need review, and some new materials should be purchased. ORNL is not on schedule for evaluation of standard threshold shifts that have been identified by the Health Division. Annual training and monitoring are also slightly behind schedule.

#### **3.2.1.11 Laser Safety**

**Requirements.** The objective of the Laser Safety Program is to protect employees from hazards associated with laser radiation in accordance with ANSI Z136.1-1980. Activities include (1) classifying all lasers and laser systems, (2) specifying appropriate controls, (3) educating authorized personnel, (4) providing medical surveillance, (5) evaluating associated hazards, (6) appointing a Laser Safety Officer, and (7) posting laser warning signs.

**Status.** A formal laser safety program has been in place at ORNL for several years. It is overseen by a laser safety committee and is administered through a formal procedure. Because of staffing limitations, the program is in need of improvements in the review of laser facilities, signs, inventory of laser equipment, and documentation of the program.

#### **3.2.1.12 Superfund Amendments Reauthorization Act (SARA) III Program**

**Requirements.** The objectives of the SARA III program are to notify state and local authorities regarding the types of hazardous chemicals located at the site, to establish planning and notification requirements for the protection of the public in case of release, and to ensure compliance with EPA, DOE, and state standards. Guidance for this program is contained in 40 CFR Part 300. Responsible organizations must (1) notify state emergency planners if "extremely hazardous" substances are on-site, (2) assist in emergency planning, (3) maintain a list of all hazardous chemicals, (4) prepare an annual chemical inventory, (5) assist the environmental organizations in listing releases of toxic chemicals, (6) maintain a computerized data base, and (7) use a chemical tracking system for implementation of SARA III and the OSHA Hazard Communication Standard.

**Status.** The implementation of the SARA Title III regulation, coordinated by the Environmental Monitoring and Compliance Section, has been successful. Ensuring continued compliance with SARA Title III will require improvements in the current hazardous materials inventory system. As noted in Sect. 3.2.1.9, a hazardous materials inventory and tracking system is being developed.

#### **3.2.1.13 Biohazards**

**Requirements.** The objectives of the Biohazards Program are to ensure safe work practices, to comply with applicable regulatory guidelines, to review biohazard work, to maintain necessary records, to report findings to management, to assist in the development of control measures, and to conduct appropriate sampling.

**Status.** The effectiveness of the program to control biological hazards at ORNL is evidenced by the absence of documented cases of laboratory-acquired or occupationally acquired infectious diseases. The oversight activities of the program's peer review are central to the program's success. Additional support is needed to track possible projects requiring the action of the Biohazards Review Committee. The *Biohazards Manual* needs to be reviewed and revised.

#### **3.2.1.14 Ventilation**

**Requirements.** It is the objective of the ventilation program to evaluate equipment used to control and collect toxic materials in the protection of the health and safety of all employees. The *Industrial Ventilation Manual* provides the guidance for this program. IH activities involved are the establishment of guidelines for the ventilation systems, the classification of all ventilation systems, teaching of proper survey methods, review of survey results, assisting with the design and procurement of ventilation systems, informing employees of proper ventilation requirements, developing and maintaining an inventory of all systems, and reviewing and updating the inventories biennially.

**Status.** A formalized program for evaluating and maintaining ventilation systems is in place at ORNL. New laboratory hoods should be classified routinely with respect to anticipated chemical use. Additional training efforts are needed to increase employee awareness of proper use of ventilation systems. Although ORNL has a ventilation system inspection program in place, a recent technical safety appraisal (TSA) at Y-12 identified this as a critical area. Some additional resources will be needed in FY 1990 to ensure that the program is thorough and well documented.

#### **3.2.1.15 Drinking Water**

**Requirements.** The program to protect drinking water has as its objective the protection of the potable water supply in compliance with applicable standards and the documentation of all required monitoring and investigation activities.

**Status.** A program for regular as well as special monitoring of the potable water system is in place. Follow-up action is taken when indicated by results of sample analyses. At present, some additional support is needed for sample collection and for more involvement in the identification and evaluation of potential cross-connection problems and possible contamination. Costs for the small addition in manpower and for comprehensive chemical analyses of water are estimated at \$40,000 per year beginning in FY 1988 and continuing.

#### **3.2.1.16 Ergonomics**

**Requirements.** The objective of the ergonomics review is to ensure maximum human efficiency and well-being by applying human biological sciences in conjunction with the engineering sciences. Activities include identifying employees who may be working in physically or psychologically demanding environments. They may also involve conducting periodic workplace evaluations to determine areas with potential ergonomic problems.

**Status.** Industrial Hygiene interacts closely with the medical staff on such issues. Some additional effort is needed to raise the level of employee awareness of ergonomics, and the program needs to be better documented.

### **3.2.1.17 Nonionizing Radiation**

**Requirements.** The program for protection from nonionizing radiation has as its objectives the prevention of harmful effects to employees who might be exposed to electromagnetic fields (10 kHz to 300 GHz) and compliance with radio frequency protection guides (ANSI C95.1-1982). The IH Section is required to (1) determine the in-plant location of such equipment, (2) perform measurements at these locations, and (3) compile an inventory of the locations of equipment or instruments that generate radio-frequency or other nonionizing radiation.

**Status.** Responsibilities for this surveillance are shared with the Radiation Protection Section. A need is the development of a standard practice procedure and a compilation of potential exposure sources. Currently, there is no systematic means of identifying sources of nonionizing radiation, routinely monitoring the sources, or controlling exposures. A program needs to be developed to identify and prevent exposures to potentially harmful levels of nonionizing radiation.

### **3.2.1.18 Sanitation**

**Requirements.** The objectives of the Sanitation Program are to minimize the risk of food-borne illnesses and the transmission of communicable diseases, to ensure compliance with applicable guidelines, and to maintain necessary records. Guidelines for this program are contained in 29 CFR 1910 and ANSI Z4.1-1979. Activities include inspecting food facilities, sampling and analyses, reporting findings to management, follow-up on corrective actions, and documenting inspections and corrective actions.

**Status.** Practices and procedures conforming to the referenced guidelines are followed. The absence of any known illnesses or incidents attributable to food contamination or unsanitary conditions may be considered evidence of good control.

### **3.2.1.19 Temperature Extremes**

**Requirements.** The objectives of the Temperature Extremes Program are to protect personnel from the stresses of temperature extremes, to comply with applicable guidelines, to document education regarding such stress, and to reduce current hazards and minimize the introduction of new hazards.

**Status.** Some environments and operations having the potential for producing significant heat stress conditions have been identified; limited measurements are made on a case-by-case basis, and results and recommendations for appropriate control measures are reported to supervision. Special bulletins on heat and cold stress have been issued to employees periodically as an educational vehicle. Training in heat stress is done for new or modified jobs on request as conditions indicate. Additional effort is needed to upgrade and document the program and to provide training for both heat and cold stress.

### **3.2.2 Project Review and Oversight**

**Requirements.** DOE and good practice requires the review of engineering documents and ORNL projects for potential health risks. After reviewing such documents and projects for potential IH concerns, the IH Section must (1) provide guidance to engineering and project planners on control

of potential health hazards, (2) assess health protection programs of Energy Systems contractors, (3) provide IH oversight of contractor activities, (4) provide oversight of remedial action projects and activities, and (5) perform compliance monitoring and surveillance on such projects as necessary.

The objective of project review and oversight is to (1) protect Energy Systems and contractor personnel from health hazards associated with project activities; (2) perform monitoring/surveillance as necessary to assure appropriateness of protective equipment; and (3) ensure that ongoing project activities are maintained in compliance with ORNL, Energy Systems, DOE, and federal regulations and policies, including but not limited to (a) DOE/OR-891, Construction Health and Safety Roles and Responsibilities, (b) DOE 5480.4, Environmental Protection, Safety, and Health Protection Standards, (c) 29 CFR 1910.1000, Occupational Health and Safety Standards, Subpart Z, (d) 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, (e) ORNL/M-116, Health, Safety, and Environmental Protection Procedure for Excavating Operations, and (f) DOE 5480.10, Contractor Industrial Hygiene Program.

**Status.** ORNL is not in full compliance with standards and orders addressing project review and oversight. Staffing increases will be required in FY 1990 and FY 1991 to approach compliance.

A system is needed to ensure adequate review of all engineering or maintenance projects and facility additions or modifications. Construction Engineering is requesting a major commitment of IH resources for initial and ongoing review of projects. In FY 1989, 0.5 person is committed, and it is expected that a full person will be needed by FY 1990.

### 3.2.3 Monitoring and Surveillance

**Requirements.** The backbone of any industrial hygiene program is evaluation of workplace exposures and timely correction of exposure concerns. OSHA and DOE require periodic monitoring to ensure that exposures are within regulated guidelines. Serious exposures can occur at levels not detectable by human senses. A comprehensive monitoring program must (1) perform representative monitoring and surveillance of personnel and tasks at ORNL; (2) document employee exposures to workplace chemical, physical, and biological hazards; (3) advise management, supervision, and workers of sampling results, as appropriate; (4) assure that mandatory monitoring is performed in a correct and timely manner; and (5) assure that employee exposure to workplace stresses are maintained ALARA through recommendations of engineering and administrative control methods.

The objectives of a monitoring and surveillance program are to (1) protect ORNL employees and guests from exposure to potentially hazardous levels of chemical, physical, and biological agents; (2) provide management with necessary data to design appropriate control measures; (3) provide exposure data for epidemiological investigation; (4) assess efficacy of control measures; (5) ensure employee compliance with ORNL IH standards; and (6) assure ORNL's compliance with Energy Systems and DOE and federal government regulations, policies, and orders, including but not limited to (a) DOE Order 5480.4, Environmental Protection, Safety, and Health Protection Standards, (b) DOE Order 5480.10, Contractor Industrial Hygiene Program, (c) 29 CFR 1910.1000, Air Contaminants, and (d) 29 CFR 1990, Identification, Classification, and Regulation of Potential Occupational Carcinogens.

**Status.** ORNL does not have an IH monitoring/surveillance program adequate to demonstrate that the health of employees and guests is being protected, to comply with appropriate orders and

regulations, or to conduct epidemiological investigations. Furthermore, ORNL is not in compliance with orders and regulations relating to routine monitoring. Funding increases in FY 1989 will improve compliance. Additional increases will be required in FY 1990 and FY 1991.

OSHA has issued a proposed regulation for IH monitoring and sampling which will require additional routine sampling. Also, more documentation will be required in the coming years to demonstrate the effectiveness of ALARA efforts and to protect the company and DOE from litigation.

DOE and OSHA require that employees be informed, in writing, of sampling results. Additional clerical support will be required in FY 1990 to type and transmit sampling reports. Requirements for documentation of exposure conditions will continue to become more stringent through FY 1991, requiring the addition of a technician.

#### **3.2.4 Sample Analysis**

**Requirements.** Sampling performed by the IH staff, as well as the analysis, must be done in accordance with acceptable procedures. The analysis must also be accurate, timely, and cost-effective. It is important for accuracy and for protection of the company that analyses be performed by a laboratory accredited by the American Industrial Hygiene Association. The IH laboratory is required to (1) perform in-house analyses of IH samples, (2) coordinate analysis of IH samples sent outside the section, (3) document IH analytical data, (4) oversee IH instrument calibration and maintenance, (5) provide methodology to field monitoring personnel, and (6) perform analyses of proficiency analytical testing samples for the National Institute of Occupational Safety and Health.

Additionally, the objectives of the IH laboratory are to (1) provide accurate, timely, cost-effective analyses, (2) ensure quality of analytical data, (3) ensure that IH instruments are properly maintained and calibrated, (4) maintain complete, retrievable records of all IH analytical data, and (5) ensure continued accreditation with the American Industrial Hygiene Association.

**Status.** The IH laboratory is providing excellent service. The recent increase in asbestos analyses has resulted in an immediate need for additional staffing. The number of asbestos samples needing to be analyzed will increase significantly over the next year, as will the number of gas chromatographic analyses required. An additional technician will be needed to keep up with the work load in FY 1990. It is further expected that the volume of asbestos and other samples will continue to increase through FY 1991 and that another technician will be required by FY 1991 as a result. In addition, recent reviews have focused on the lack of a comprehensive biological monitoring program for evaluating exposures to chemical hazards. Establishment of analytical capabilities for biological monitoring will require the addition of 2 staff members for procedure development, documentation, and routine analyses. Equipment costs in FY 1990 for this effort will be \$165,000.

#### **3.2.5 Asbestos Control**

**Requirements.** An asbestos control program must be in place at ORNL to (1) survey and sample areas for asbestos-containing materials (ACM), (2) monitor projects involving demolition/removal of ACM, (3) record and document results of airborne levels of asbestos fibers during activities involving ACMs, (4) train workers in proper methods of handling asbestos, (5) assure proper IH coverage and oversight of engineering subcontractor jobs, (6) advise

management of regulatory changes, and (7) provide management and supervision with guidance on compliance measures.

The objectives of such a program are to (1) maintain exposure to asbestos to ALARA for ORNL employees, guests, and contractors; (2) develop and maintain operations and a maintenance program for the timely review, identification, and correction of potential asbestos hazards; (3) ensure that workers involved in the removal, handling, and disposal of asbestos are aware of the hazards and protective measures; (4) develop and maintain appropriate documentation of asbestos work and exposures; and (5) ensure compliance with (a) 29 CFR 1926.58, OSHA Asbestos Regulations for the Construction Industry, (b) 40 CFR 61, Subpart M, National Emissions Standards for Hazardous Air Pollutants, (c) 29 CFR 1910.1001, OSHA General Industry Standards, (d) 40 CFR Part 763, Asbestos Abatement Projects; Worker Protection, (e) GAO draft report, Stronger Oversight of Asbestos Control Needed at Hanford Tank Farms, and (f) DOE-ORO 1988 Industrial Hygiene Functional Appraisal.

**Status.** ORNL is not in full compliance with asbestos regulations, as was noted in a recent DOE-ORO review. Additional staff to be added this fiscal year will aid in compliance. The program will need further improvements over the next two years.

### 3.2.6 Asbestos Inventory

**Requirements.** ORNL is required to protect employees from exposure to asbestos by ensuring that exposures are ALARA. The large amount of asbestos present in ORNL facilities in varying degrees of deterioration can result in incidental exposure. DOE has recommended that a facility-wide inventory be conducted to determine the location, quantity, and condition of asbestos.

ORNL is required and committed to (1) conduct a Laboratory-wide survey for ACM; (2) develop a comprehensive, detailed inventory of ACM, including quantity, condition, and locations; (3) set priorities for asbestos abatement; and (4) develop and implement plans for asbestos abatement.

The objectives of this program are to (1) protect ORNL employees from health hazards associated with incidental exposure to asbestos in their work environment, (2) protect Energy Systems and DOE from legal action resulting from workplace exposures to asbestos, (3) ensure compliance with 29 CFR 1926.58, OSHA Asbestos Regulations for the Construction Industry, and (4) ensure compliance with 40 CFR 61, Subpart M, National Emissions Standards for Hazardous Air Pollutants (NESHAP).

**Status.** Funding has been identified for initiating the inventory this fiscal year. Additional funding will be required in FY 1990 and 1991 to complete the inventory.

### 3.2.7 Asbestos Abatement

**Requirements.** ORNL is required to provide protection for employees from incidental exposure to airborne asbestos. As a result of the widespread use of ACM at ORNL over the last 40 years, asbestos is in poor condition in many locations. To prevent exposure and maintain operation of the Laboratory, the ACM must be repaired or removed.

**Status.** Funding has not been identified for asbestos abatement in FY 1989. When the inventory is initiated this year, high-priority needs for abatement will be identified, and funding will need to be made available. Several funding options are being explored for FY 1990 and beyond. Capital projects may be initiated within the next few months to assist in the funding of major asbestos efforts.

### 3.3 SUMMARY OF PROGRAM NEEDS

The Industrial Hygiene Program at ORNL has a number of significant needs to be met in order to come into full compliance with all applicable DOE orders and other standards as outlined below.

- Comprehensive IH surveys need to be performed routinely in all divisions and organizational units of the Laboratory.
- A system needs to be developed to ensure adequate review of all engineering and maintenance projects and facility additions and modifications.
- A thorough review is needed to ensure that all DOE mandatory standards are translated into standard practice procedures.
- A review of IH training is needed for areas not currently being coordinated by the Technical Resources and Training group.
- The biological monitoring program needs to be expanded significantly to provide an additional means of assessing potential exposures.
- Additional support needs to be given to further development and implementation of the Occupational Health Information System (OHIS).
- A carcinogen control program needs to be developed and implemented to ensure full compliance with DOE 5480.10. The program will involve development of a carcinogen inventory, workplace exposure assessments, posting, and written safety plans for use of carcinogens.
- The confined-space entry program needs to be upgraded to meet the requirements of the revised ANSI standard. An initial Laboratory-wide classification of confined spaces must be performed to determine potential hazards.
- The embryo-fetus protection program needs to be upgraded to ensure the identification and evaluation of potential exposures and employees at risk.
- The respiratory protection program will require some additional resources for new quantitative fit-test equipment, data handling improvements, and upgrading the frequency of fit-testing from 18 months to 12 months.
- A program needs to be initiated in FY 1989 and fully developed in FY 1990 to ensure full compliance with the Hazardous Waste Site Operations and Emergency Response regulation. A full-time professional will be necessary to provide oversight of subcontractor activities beginning in FY 1990.
- Additional resources will be needed in FY 1990 and subsequent years to develop and maintain documentation associated with demonstrating compliance.
- ORNL IH needs to take a more proactive approach toward emergency response.
- A system for the tracking and inventory of hazardous chemicals must be developed and made fully operational during FY 1990. This system will involve a continuing cost to each Energy Systems facility.
- The hearing conservation program needs to be upgraded to comply with OSHA regulations.

- Additional resources need to be dedicated to the ventilation control program to ensure that it is adequately controlled and documented.
- A program needs to be developed to ensure that sources of nonionizing radiation are identified, evaluated, and controlled in a systematic manner.
- The monitoring and surveillance program needs significant upgrading to provide data required to assess potential exposures and comply with DOE orders and OSHA regulations.
- Additional staff members will be required in FY 1990 and beyond to perform chemical analyses in conjunction with the increased monitoring efforts.
- Further improvements will be required in the asbestos control program over the next few years to comply with OSHA regulations.
- A plantwide survey of all buildings for asbestos-containing materials (ACM) is needed and will begin in FY 1989. A full-scale asbestos removal program should be performed in conjunction with the survey. Additional staff members will be required to provide surveillance during the inventory and removal operations.

Funding increases in IH for FY 1989 emphasize the need for and management commitment to upgrading the health protection programs at ORNL. Additional funding commitments must be made to ensure that IH programs effectively protect the health of ORNL employees and fully comply with applicable regulations.

### **3.4 PROGRAM DATA AND FUNDING SUMMARY**

This section consists of a program schedule and program data sheets that describe the activities within this functional area. Table 3.1 summarizes overall funding by funding type.

1. Program Category		2. Reporting Period 5/01/89 through 5/31/89																			
3. Project Title <b>INDUSTRIAL HYGIENE DISCIPLINE</b> IWP NO : ACTIVITY NO :		4. Program Representative				Funding Type:															
		5. Project Engineer				Funding Year:															
6. Project Number WBS	7. Subproject Title	8. Fiscal Year and Months																			
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	ASBESTOS CONTROL O/M SURVEY				9																
	ASBESTOS CONTROL PLANTWIDE REMOVAL																				9
	ASBESTOS CONTROL IH SURVEILLANCE																				9
	CONFINED SPACE ENTRY				9																
	EMBRYO-FETUS PROTECTION				9																
	RESPIRATORY PROTECTION TEST BOOTH								9												
	RESPIRATORY PROTECTION MERGING DATA INTO GHIS				9																
	SARA III								9												
SHADING INDICATES STATUS AND COMPLETION																					
ACTIVITY SCHEDULE																					
12 ← MONTH																					
← FORECAST																					
SYMBOL MILESTONE LEVEL		▽ 0 □ 1 ◇ 2 ☆ 3 ✕ 4																			
Comments:																					

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: COMPLIANCE AND HEALTH PROTECTION

CONTACT: D. T. DUNCAN

PROGRAM CATEGORY: INDUSTRIAL HYGIENE

PLANT: ORNL

PROJECT NO: 2.01

STATUTORY REQ: OSHA/DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.2.01

SCOPE: This activity provides for development and maintenance of programs to protect the health ORNL employees from chemical, physical, and biological hazards. Programs included in this activity are carcinogen control, confined space entry, embryo-fetus protection, QA, hearing conservation, respiratory protection, ventilation, walk-thru surveys, hazard communication, laser safety, biohazards, heat stress, etc.

JUSTIFICATION: ORNL is required by DOE to protect the health of employees and ensure compliance with applicable DOE orders and federal regulations. In order to meet this requirement, resources must be committed to perform ongoing reviews of regulations, assess of the status of compliance, and develop and implement programs to ensure compliance. Beyond statutory compliance, Martin Marietta Energy Systems, Inc. is also dedicated to the reduction of workplace exposure to chemical and physical stresses to As Low as Reasonably Achievable.

FACILITIES: Facilities associated with this activity include offices for staff, respirator fitting, respirator training, respirator equipment storage, and respirator issue.

STATUS/COMMENTS: Funding increases in FY 1989 will allow increasing the staff for this effort but will not allow full compliance. Additional increases in FY 1990 and 1991 will bring this activity toward full staffing under current guidelines. However, compliance requirements are increasing.

FUNDING YEARS: 88-95				TEC (\$x1000): 6493									BEYOND	
SER CODE	BA/BO	FUNDING		PRIOR	FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95
		TYPE	TOTAL											
S	BO	EXP	6493	0	196	443	816	970	1017	1017	1017	1017	1017	0
TOTAL:			6493	0	196	443	816	970	1017	1017	1017	1017	1017	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: PROJECT REVIEW AND OVERSIGHT

CONTACT: D. T. DUNCAN

PROGRAM CATEGORY: INDUSTRIAL HYGIENE

PLANT: ORNL

PROJECT NO: 2.02

STATUTORY REQ:

FMP NO:

ENG. PROJ. NO:

EPMP NO: 2.2.02

SCOPE: This activity provides for the review of engineering documents and ORNL projects for potential health risks. It involves providing guidance to project planners on control of potential health hazards, assessing health protection programs of contractors, providing review and oversight of contractor activities, and performing compliance monitoring on such projects, as necessary.

JUSTIFICATION: ORNL is responsible for overseeing the health aspects of internal projects and contractor activities. Proper review and planning is essential to ensure protection and reduce the likelihood of costly delays resulting from health related incidents. OSHA regulations require detailed planning and oversight of hazardous waste operations. DOE/OR-891 requires ORNL to actively oversee the health protection programs of on-site contractors. DOE 5480.10 requires reviews of projects for health concerns prior to initiation.

FACILITIES: Facilities required for this activity are staff offices.

STATUS/COMMENTS: ORNL is not in full compliance with standards and orders addressing this activity. Staffing increases will be required in FY 90 and 91 to approach compliance.

FUNDING YEARS: 88-95			TEC (\$x1000): 2171										BEYOND
B&E CODE	BA/BQ	FUNDING	TOTAL	PRIOR	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95
		TYPE		FY-88									
S	BO	EXP	2171	0	90	162	260	319	335	335	335	335	0
TOTAL:			2171	0	90	162	260	319	335	335	335	335	0

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: MONITORING AND SURVEILLANCE

CONTACT: D. T. DUNCAN

PROGRAM CATEGORY: INDUSTRIAL HYGIENE

PLANT: ORNL

PROJECT NO: 2.03

STATUTORY REQ: DOE/OSHA

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.2.03

SCOPE: This activity provides for the monitoring and surveillance of potential exposures to chemical and physical hazards, documentation of such hazards, and the transmittal of monitoring results to supervision and employees in a timely manner. It further provides for timely recognition and correction of potentially serious exposures.

JUSTIFICATION: The backbone of any industrial hygiene program is evaluation of workplace exposures and timely correction of exposure concerns. OSHA and DOE require periodic monitoring to ensure that exposures are within regulated guidelines. Serious exposures can occur at levels not detectable by human senses. A comprehensive monitoring program must be in place to evaluate such exposures. Such documentation is also required to protect the company and DOE from litigation and to perform retrospective health studies.

FACILITIES: Sampling equipment storage and calibration facilities are required.

STATUS/COMMENTS: ORNL is not in compliance with orders and regulations relating to routine monitoring. Funding increases in FY 1989 will improve compliance. Additional increases will be required in FY 1990 and 1991.

FUNDING YEARS: 88-95			TEC (\$x1000): 3795											
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND FY-95
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95		
S	BO	EXP	3795	0	77	164	408	606	635	635	635	635	0	
TOTAL:			3795	0	77	164	408	606	635	635	635	635	0	

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: ASBESTOS CONTROL

CONTACT: D. T. DUNCAN

PROGRAM CATEGORY: INDUSTRIAL HYGIENE

PLANT: ORNL

PROJECT NO: 2.04

STATUTORY REQ: OSHA/DOE/GAO

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.2.04

SCOPE: This activity provides for the monitoring of projects involving the demolition and removal of asbestos-containing materials (ACM), recording and documenting monitoring results, training workers in proper methods for handling ACM, providing oversight of subcontractor jobs involving ACM, providing advise and guidance to ORNL management on regulatory changes and compliance measures.

JUSTIFICATION: ORNL is required to fully comply with OSHA asbestos regulation in addition to special requirements noted in the GAO review of the DOE Hanford facility. Such requires maintaining asbestos exposures to ALARA, developing and maintaining an asbestos operations and maintenance program for timely review, identification, and correction of potential hazards, providing training to workers involved in asbestos removal, and developing and maintaining documentation of asbestos work and exposures.

FACILITIES: Facilities are required for storage and calibration of asbestos sampling equipment.

STATUS/COMMENTS: ORNL is not in full compliance with asbestos regulations as was noted in a recent DOE-ORO review. Additional staff to be added this fiscal year will aid in compliance. The program will need further improvements over the next two years.

FUNDING YEARS: 88-95			TEC (\$K1000): 2296										BEYOND	
R&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										FY-95
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95		
S	BO	EXP	2296	0	107	190	297	326	344	344	344	344	0	
		TOTAL:	2296	0	107	190	297	326	344	344	344	344	0	

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5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: SAMPLE ANALYSIS

CONTACT: D. T. DUNCAN

PROGRAM CATEGORY: INDUSTRIAL HYGIENE

PLANT: ORNL

PROJECT NO: 2.05

STATUTORY REQ: OSHA/DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.2.05

SCOPE: This activity provides for the analysis of samples collected in conjunction with the monitoring and surveillance program and asbestos control program. It involves the in-house analyses of asbestos and solvent samples, coordination of outside analyses, documentation of analytical data, providing field sampling methods, and overseeing participation in the Proficiency Analytical Testing (QA) program.

JUSTIFICATION: Sampling performed by the industrial hygiene staff must be done in accordance with acceptable procedures as well as the analysis. The analysis must also be accurate, timely, and cost-effective. It is important for accuracy and for protection of the company that analyses be performed by a laboratory which is accredited with the American Industrial Hygiene Association. The ORNL industrial hygiene lab consistently provides analytical results which meet all of the above criteria.

FACILITIES: Facilities are required for GC analysis, asbestos bulk identification and counting, mass-spectrometry, wet analysis, sample preparation, and data retention.

STATUS/COMMENTS: The lab is providing excellent service. The recent increase in asbestos analyses has resulted in an immediate need for additional staffing. As other sampling is increased this FY and beyond, additional technicians will be required to match the work-load.

FUNDING YEARS: 88-95			TEC (\$K1000): 4900										
SER CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR									BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	
S	BO	CE	165	0	0	0	165	0	0	0	0	0	0
S	BO	EXP	4735	0	0	0	785	750	800	800	800	800	0
TOTAL:			4900	0	0	0	950	750	800	800	800	800	0

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: ASBESTOS INVENTORY

CONTACT: D. T. DUNCAN

PROGRAM CATEGORY: INDUSTRIAL HYGIENE

PLANT: ORNL

PROJECT NO: 2.06

STATUTORY REQ: DOE/OSHA

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.2.06

SCOPE: This project provides for a laboratory-wide survey to determine the location, quantity, and condition of asbestos-containing materials (ACM). It will also involve setting priorities for abatement of ACM, label ACM which could result in inadvertent exposure, and develop preliminary plans for abatement.

JUSTIFICATION: ORNL is required to protect employees from exposure to asbestos by ensuring that exposures are As Low as Reasonable Achievable (ALARA). A large amount of asbestos is present in ORNL facilities in varying degrees of deterioration which can result in incidental exposure. DOE has recommended that a facility-wide inventory be conducted to determine the location, quantity, and condition of asbestos.

FACILITIES: No special facilities are required for this project.

STATUS/COMMENTS: Funding has been identified for initiating the inventory this FY. Additional funding will be required in future years to complete the inventory.

FUNDING YEARS: 89-92			TEC (\$K1000): 2659										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR									
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
S	BO	EXP	2659	0	0	389	970	1100	200	0	0	0	0
TOTAL:			2659	0	0	389	970	1100	200	0	0	0	0

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: ASBESTOS ABATEMENT

CONTACT: D. T. DUNCAN

PROGRAM CATEGORY: INDUSTRIAL HYGIENE

PLANT: ORNL

PROJECT NO: 2.07

STATUTORY REQ: OSHA

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.2.07

SCOPE: This project provides for the repair or removal of asbestos-containing materials (ACM) at ORNL. It is associated with the asbestos inventory project which will determine abatement priorities and plans.

JUSTIFICATION: ORNL is required to provide protection for employees from incidental exposure to airborne asbestos. Due to the wide-spread use of ACM at ORNL over the last 40 years, asbestos is in poor condition in many locations. To prevent exposure and maintain operation of the lab, the ACM must be repaired or removed. Some areas are in violation of MESHAP, as interpreted by the state of Tennessee.

FACILITIES: No special facilities are required.

STATUS/COMMENTS: Funding has not been identified for asbestos abatement. When the inventory is initiated this year, high priority needs for abatement will be identified and funding will need to be made available.

FUNDING YEARS: 90-95			TEC (\$x1000): 8500											
B&R CODE	EA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
S	BC	EXP	8500	0	0	0	1000	1500	1500	1500	1500	1500	0	
TOTAL:			8500	0	0	0	1000	1500	1500	1500	1500	1500	0	

**Table 3.1. Funding summary for Industrial Hygiene Program**

Funding type	Funding (\$ × 1000)								Total
	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	
Exp	610	1,668	4,436	5,471	4,731	4,531	4,531	4,531	30,509
GPP									
GPE									
LI									
Total capital									
Total (types)	610	1,668	4,436	5,471	4,731	4,531	4,531	4,531	30,509



## **4. OCCUPATIONAL MEDICINE LONG-RANGE PLAN**

### **4.1 MISSION AND OBJECTIVES**

The mission of the ORNL Health Division is to help achieve and maintain the highest physical and emotional health of all employees so that optimal job performance is obtained with minimal stress, thereby reducing absenteeism, enhancing productivity, and prolonging the employee's productive years. The Health Division achieves this mission by

- performing physical examinations and other tests to ensure the employment of a medically appropriate and healthy work force;
- ensuring the placement of employees in work that they can perform without undue hazard to themselves, others, the plant and facilities, or the general environment;
- assisting management in providing workers a safe workplace;
- providing medical monitoring and surveillance of the health of all employees;
- maintaining employees' health by applying effective preventive medical measures;
- ensuring proper medical management of individuals who show evidence of adverse health changes (includes documenting the worker's history of exposure to both occupational and nonoccupational hazards);
- working to ensure the early detection, treatment, and rehabilitation of ill and injured employees; and
- encouraging employees to educate themselves in health and safety by providing professional guidance and counseling.

### **4.2 PROGRAM REQUIREMENTS AND STATUS**

#### **4.2.1 Occupational Health Protection Program**

##### **4.2.1.1 Health assessments**

Preemployment health evaluations are conducted on applicants to assist in the selection of the most appropriate individual. Preplacement examinations are performed to determine the health status and physical fitness of an individual for a specific job assignment to prevent a health hazard or risk to the individual or others. Periodic health examinations are performed to provide continuing updated reassessments of the health status and fitness of employees. The employees are advised of the findings of these examinations so that they may undertake to change any diet or lifestyle habits that adversely affect their health. When an employee's physical or mental health changes in a way that might affect the employee's performance or judgment, the Health Division imposes work

restrictions and makes recommendations to supervision regarding appropriate action and correction. Return-to-work health examinations are conducted to ensure that the employee may return to work without undue health hazards. The Health Division is involved in that segment of rehabilitation that encourages the earliest return to work compatible with no adverse effects of doing so. This evaluation is conducted on employees sustaining either occupational or nonoccupational injury or illness. Termination health examinations are performed to determine the health status of the individual at the time of termination or retirement.

Special examinations are given to those whose work involves potentially hazardous materials or environments. For example, special attention is given to members of the laboratory protection forces, reactor operators, and employees who work with or service laser equipment. These examinations are performed to detect any possible early adverse health effects so that preventive or corrective measures may be taken. Department of Transportation standards have been adopted for drivers of vehicles carrying hazardous materials; therefore, these drivers are given special examinations, thus increasing the number of mandatory health evaluations performed by the Health Division.

The Health Division evaluates whether or not an employee is medically fit to wear respiratory protective devices. The anticipated enforcement of ANSI Z88 Standards by DOE-ORO, which decreases the interval of required evaluations of wearers of respiratory protective devices from 18 to 12 months, will increase the number of these medical evaluations by 50%.

A professional staff of physicians, a physician's assistant, nurses, and technologists perform these examinations. A medical laboratory and X-ray facilities are maintained, along with equipment for audiometric testing, visual acuity testing, pulmonary function testing, and electrocardiography. Current X-ray equipment has been modified to reduce X-ray exposure. Recently, more consideration has been given to correlating the employee's health to the job task because of the increasing complexity and/or sensitive nature of the work at the Laboratory and because of increased regulatory activities. This consideration has increased the need for additional documentation and reporting.

#### **4.2.1.2 Health care services**

Good health is achieved by the reduction and preferably by the elimination of health risk factors, whether they be the result of off-the-job lifestyles and habits or on-the-job exposures to potentially hazardous materials or injurious work practices. Correction of adverse lifestyle practices and habits is accomplished through patient education, counseling, and, when appropriate, referral to a qualified health care expert.

Early detection of disease is accomplished by the Health Division through periodic testing and screening for disease so that therapeutic measures can be quickly initiated. Diagnosis and treatment of occupational injury or disease are conducted promptly, with an emphasis on rehabilitation and return to work at the earliest possible time compatible with job safety and employee health.

On-site physiotherapy is provided by the nursing staff who have received training and by periodic evaluation from the chief physiotherapist of the Methodist Medical Center. Services provided include cervical traction, whirlpool, hydrocollator for cold or hot applications, ultrasound, range-of-motion exercises, and rehabilitative evaluation and programming. The presence of these physiotherapies at the workplace serves to improve rehabilitation, to ensure safe early return to work, and to lessen the time spent away from work to secure these treatments elsewhere.

Unfortunately, space to conduct these therapies is limited, and no full-time physiotherapist or technician is on-site. Problem cases are referred to an extended facility at the Y-12 Plant.

On-site diagnosis and limited treatment of nonoccupational injury and illness are provided to preserve health and to reduce time away from work for health-related problems. Immunizations are also provided, in keeping with the practice of preventive medicine.

The Health Division provides medical consultation to female employees who are planning a pregnancy or who are pregnant, and provides advice for minimizing workplace-related risk to both the mother and fetus. Testing procedures are provided to confirm pregnancy as early as possible. Medical judgments are made based on a composite of exposure potential and physical data regarding the job-related risk to the employee and fetus. In this regard, as well as in other situations, the Health Division interfaces with the Industrial Hygiene Department and the Radiation Protection Department to determine the employee's potential exposure to hazardous chemicals and radiation.

The number of individuals for which the Health Division is responsible has increased. Not only has there been an increase in the number of ORNL employees but also a substantial increase in the number of visitors, students, and other nonemployees on-site. The Health Division provides periodic health assessments and other health-related services to 661 DOE and 500 Oak Ridge Associated Universities (ORAU) employees. The efficiency of the Health Division has been increased through office automation, automated data entry, and computerization.

#### **4.2.1.3 Emergency health care services**

Emergency medical care is available on-site for prompt response to both occupational and nonoccupational illnesses and injuries. An on-site decontamination facility is maintained to provide initial decontamination of the exposed individual, to minimize the extent of the injury, to contain the degree or extent of contamination, and to minimize off-site contamination. The DOE Medical Services Audit of June 1986 recommended that an engineering study be made of the Health Division to enlarge or redesign facilities in order to provide more space and improve patient flow, especially in planning for disaster management.

#### **4.2.1.4 Administrative services**

The Health Division provides assistance to management and supervision in identifying and ameliorating health and safety hazards. To identify possible adverse health effects in the workplace, the Health Division has in the past been involved in several epidemiological studies and is currently collecting data important for additional studies. The division consults with management on making appropriate accommodations to disabled applicants and employees in order to enhance productivity without causing undue risk to the disabled individual. Medical evaluation and follow-up after absence due to illness guides proper reentry into the work situation.

The Health Division provides medical support, assistance, and advice for operational emergency preparedness planning and response to incidents involving facilities and personnel. As a member of the emergency response team the division participates in exercises and training programs involving emergency response; it also provides medical support and expertise to command post exercises, and interacts with local and off-site backup medical and hospital services.

The division provides training seminars for supervisors in recognizing substance abuse. It also trains emergency medical technicians, fire and security personnel, and emergency squad members in cardiopulmonary resuscitation.

#### **4.2.2 Wellness Programs**

The Health Division currently has several programs to help the employee achieve and maintain optimal physical and mental health. Coronary heart disease risk (as determined by controllable factors) is carefully monitored and reported to the patient. Dietary counseling is offered to help lower blood cholesterol. A special Hypertension Clinic educates patients about their blood pressure and encourages their compliance with treatment. Seminars are conducted periodically to assist employees in their attempts to quit smoking. Retirement seminars offer employees medical advice on achieving a healthy, rewarding life after employment.

Psychological counseling is provided for employees with emotional or mental problems that are work-related or that might affect performance. These employees may be self-referred, referred by supervision because of a change in work performance or attitude, or referred by the occupational physician who has the advantage of knowing about the employee's health status, mental status, and occupational stresses. Approximately 10% of these cases involve substance abuse. An increase in employee assistance activity throughout Energy Systems is being planned, and \$167,000 has been designated for this purpose. An additional \$13,000 has been designated for a "Breathe-Free" Clinic to assist employees in their efforts to quit smoking. The Health Division will be responsible for all internal programs and will also coordinate external programs to the needs of the Laboratory. Currently, a part-time clinical psychologist staffs the Employee Assistance Program (EAP). Increased EAP activity will require additional professional staffing.

Mammography as a cancer-screening procedure has recently been offered to women, in accordance with guidelines of the American Cancer Society.

Missing from an otherwise comprehensive health-awareness, preventive medicine program is a regulated, supervised exercise program. The Wellness Program at ORNL is directed only at employees; employees' families are not included.

#### **4.2.3 Human Reliability Programs**

Through its preliminary and preplacement examination programs and special periodic examinations, the Health Division constantly evaluates the physical and mental fitness of an employee to perform the tasks that have been assigned. DOE orders such as Personnel Security Assurance Program (PSAP), Fitness For Duty (FFD), Personal Assurance Program (PAP), and Drug-Free Workplace (DFW), as they relate to both federal and contractor programs, when implemented, will establish more formal programs and processes to ensure the employment and retention of individuals whose conditions do not impair their judgment or reliability or make them a security risk or unable to perform assigned duties in a safe or reliable manner.

Making health evaluations of hazardous materials workers and nonreactor nuclear workers mandatory and more frequent will also increase the work load of the Health Division in performing periodic health assessments.

#### **4.2.4 Occupational Health Information System**

The Health Division will participate in a computerized health sciences information system which allows integration of the data from occupational medicine, industrial hygiene, health physics, and safety. The collection and integration of health-related data are invaluable for conducting both short- and long-term epidemiological health studies. The Health Division has begun its interface with the Martin Marietta Energy Systems Occupational Health Information System (OHIS). A

large amount of patient-oriented and health-care-related data has been collected and entered into the current Massachusetts General Hospital Utility Multi-Programming System (MUMPS) computerized data system; however, additional data entry will be made necessary by the new integrated computer system and its expanded database. The current MUMPS system is operational and allows immediate retrieval of patient-oriented medical data and industrial hygiene exposure data. In addition, data entry into the current system is largely automated. Until the OHIS program is fully operational and can provide the services offered by the MUMPS program, both programs will be operated in tandem. During this transition period, the Health Division will have to acquire and install compatible terminals, personal computers, hardware, and software. There will have to be a training program for both user and data-entry personnel.

### 4.3 SUMMARY OF PROGRAM NEEDS

To provide appropriate work space for necessary services, the current facilities must be modified. A recent feasibility study to modify the current ORNL medical facility cited inadequate emergency access and inappropriate facility layout for proper response to multipatient emergency situations; insufficient capability for handling high-level contamination cases; insufficient rest-room and treatment facilities; and insufficient space for maintaining X-ray record files and charts and holding staff conferences. The feasibility study recommends modification of approximately 2000 ft<sup>2</sup> of existing space. An additional 2000 ft<sup>2</sup> would be gained by the construction of a one-story structure east of the building housing the current facilities, with provisions for emergency entry. This new structure would contain the needed emergency triage decontamination and treatment facility. The preliminary job design and proposal and administrative and safety documentation will require \$60,000 for FY 1989. Construction costs have been budgeted at \$670,000. Decontamination and triage-facility equipment is estimated to cost \$30,000 in FY 1991.

The technology of current X-ray equipment is now outmoded, and additional modification to equal current standards is no longer possible. Therefore, new equipment is being selected. Installation should be completed in FY 1989 at an estimated cost of \$65,000.

Increased requirements for medical surveillance and new approaches to disease detection, along with rapid advances in medical technology, will necessitate the addition of new testing procedures and methods. Second-generation hardware and software for the Dimension analyzers is already available. Modern management of blood lipid problems may require lipoprotein electrophoresis or other advanced procedures. A preferred method of handling potentially hazardous body fluids may be remote robotic control. New data-handling capabilities are available. All mechanical devices eventually fatigue and fail over time. This will require ultimate replacement of audiometers, electrocardiogram devices, blood cell counting devices, and the automated blood chemistry analyzers. Replacement of current hematologic equipment is anticipated to cost \$75,000 by FY 1992, and capital outlay for new equipment is estimated to be \$50,000 by FY 1993.

The division's chart storage and retrieval system, a dual Kardex Lektriever 110 installed in 1979, is in constant use and is now requiring frequent repair. It is estimated that this system will need replacing by 1990 at a cost of \$20,000.

The MUMPS computerized medical data system has been in operation for 9 years. Two magnetic disk drives are needed to maintain the system in reliable working condition. Purchase and installation of the disk drives is in progress and should be completed in FY 1989. The cost of interfacing with the OHIS is uncertain; however, the system will include approximately 12 video display terminals, 10 printers, one personal computer, and the expense of adding and renting

broadband communication capabilities. When the medical portion of OHIS becomes functional, a data entry/clerical person will be added to the staff.

Mammography was recently added to the periodic physical examination at a cost of \$70 to \$75 per examination. The estimated annual cost to the Health Division is \$40,000. This program is expected to be a very positive addition to the occupational medicine program both in its improvement of health and its value to public relations.

#### **4.4 PROGRAM DATA AND FUNDING SUMMARY**

This section consists of a program schedule and program data sheets that describe the activities within this functional area. Table 4.1 summarizes overall funding by funding type.

1. Program Category		2. Reporting Period 5/01/89 through 5/31/89	
3. Project Title <b>OCCUPATIONAL MEDICINE DISCIPLINE</b>		4. Program Representative	
FWP NO :		Funding Type:	
ACTIVITY NO :		5. Project Engineer	
		Funding Year:	

6. Project Number WBS	7. Subproject Title	8. Fiscal Year and Months															
		FY-1989				FY-1990				FY-1991				FY-1992			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	DECONTAMINATION AND TRIAGE FACILITY																
	UPGRADE OF X-RAY EQUIPMENT																
	REPLACEMENT OF ELECTRONIC FILING SYSTEM																
	COMPUTER MANAGEMENT INFORMATION SYSTEM (MUMPS)																
	DECONTAMINATION AND TRIAGE FACILITY EQUIPMENT																
	REPLACEMENT AND UPGRADE OF MEDICAL LABORATORY EQUIPMENT																

<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p>	<p>SYMBOL MILESTONE LEVEL</p> <p>0 1 2 3 4</p> <p> </p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: CURRENT PROGRAM OPERATION

CONTACT: A. S. GARRETT, M.D. PROGRAM CATEGORY: OCCUPATIONAL MEDICINE

PLANT: ORNL

PROJECT NO: 3.01

STATUTORY REQ: DOE/ERDA

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.3.01

SCOPE: (1) perform physical examinations and other tests to ensure the employment of a healthy work force; (2) ensure the placement of employees in work that they can perform without undue hazard to themselves, others, the plant and facilities, or the general environment; (3) provide medical monitoring and surveillance of the health of all employees; (4) work to ensure the early detection, treatment, and rehabilitation of the ill and injured employees.

JUSTIFICATION: To help achieve and maintain the highest physical and emotional health of all employees so that optimal job performance is obtained with minimal stress, thereby reducing absenteeism, enhancing productivity, and prolonging the employee's productive years.

FACILITIES: Health Division, Building 4500-N

STATUS/COMMENTS:

48

FUNDING YEARS: 90			TEC (\$K1000): 11658										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
H	BO	CE	20	0	0	0	20	0	0	0	0	0	0
H	BO	EXP	11638	1301	1421	1486	1486	1486	1486	1486	1486	0	0
TOTAL:			11658	1301	1421	1486	1506	1486	1486	1486	1486	0	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/27/89

ACTIVITY/PROJECT: EMPLOYEE ASSISTANCE PROGRAM

CONTACT: ROBERT LEVEY, Ph.D

PROGRAM CATEGORY: OCCUPATIONAL MEDICINE

PLANT: ORNL

PROJECT NO: 3.02

STATUTORY REQ: MMES POLICY

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.3.02

SCOPE: provide appropriate counseling for employees with emotional concerns that are work-related or that might affect work performance; help employees with personal problems and performance difficulties; help employees obtain timely, quality, cost-effective assistance through linkage to community resources; help managers deal more effectively with employee problems; help resolve supervisor conflict and person-job fit; assess alcohol and drug abuse problems.

JUSTIFICATION: As many as 15 percent of the work population may at any given time be unable to do their jobs satisfactorily because of mental and substance abuse problems. Of this group who may present, about 10 percent have significant problems with alcohol and other drug abuse patterns. The remaining employees within this group typically present with problems with spouse, children, supervision, anxiety, depression, and/or transient situational reactions, etc. There may be workplace problems that include conflicts related to supervision, performance evaluations, harassment problems, reorganization and status loss, bypass in promotion, work overload, role conflicts, lack of job challenge due to underutilization of skills, threat of job loss, skill obsolescence, improper ergonomics, copying styles, etc.

FACILITIES: Health Division, Building 4500-N

STATUS/COMMENTS: An increase in EAP activity throughout Energy Systems is being planned. \$167,000 has been designated. \$13,000 has been designated for a "Brethe-Free" Clinic to assist employees to quit smoking. At present a part-time clinical psychologist staffs the EAP program. There will be a need for additional professional staffing.

FUNDING YEARS: 89			TEC (\$x1000): 180											
B&E CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95	
H	BO	EXP	180	0	0	180	0	0	0	0	0	0	0	0
TOTAL:			180	0	0	180	0	0	0	0	0	0	0	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: DECONTAMINATION AND TRIAGE FACILITY

CONTACT: A. S. GARRETT, M.D. PROGRAM CATEGORY: OCCUPATIONAL MEDICINE

PLANT: ORNL

PROJECT NO: 3.03

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.3.03

SCOPE: Provide a full program of occupational health protection, health care service, and emergency medical response desired by management, expected by employees, and mandated by regulatory agencies.

JUSTIFICATION: To correct... (1) inadequate emergency access and inappropriate facility layout for proper response to multi-patient emergency situations; (2) insufficient space and inappropriate layout for handling contamination cases; (3) insufficient provisions for privacy in nurses treatment and rest ward areas; (4) insufficient space for maintenance of X-ray record files; (5) insufficient space for charts analysis and staff conferences; (6) overall space constraints limiting supply storage and administrative efficiency.

FACILITIES: Health Division, Building 4500-M

STATUS/COMMENTS: Reconfiguration of the existing medical department and 2400 sq. ft. of new construction is being planned for the development of a multi-purpose decontamination and triage facility. The preliminary job design and proposal and administrative and safety documentation will require \$60,000 for FY89. \$670,000 has been designated for construction. Decontamination and triage facility equipment is estimated to be \$30,000 in FY91.

FUNDING YEARS: 89				TEC (\$x1000): 760										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
H	BO	GPP	670	0	0	0	670	0	0	0	0	0	0	0
H	BO	CE	30	0	0	0	0	30	0	0	0	0	0	0
H	BO	EXP	60	0	0	60	0	0	0	0	0	0	0	0
TOTAL:			760	0	0	60	670	30	0	0	0	0	0	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: MEDICAL LABORATORY EQUIPMENT

CONTACT: CARL BURTIS, PH.D.

PROGRAM CATEGORY: OCCUPATIONAL MEDICINE

PLANT: ORNL

PROJECT NO: 3.04

STATUTORY REQ: DOE/ERDA

FMP NO:

ENG. PROJ. NO:

EFMP NO: 2.3.04

SCOPE: Replace and upgrade medical laboratory equipment. Increased requirements for medical surveillance and new approaches of disease detection along with rapid advances in medical technology will necessitate the addition of new testing procedures and methods. Second generation of hardware and software for the Dimension analyzers is already available. Modern management of blood lipid problems may require lipoprotein eletrophoresis or other advanced procedures.

JUSTIFICATION: (1) provide laboratory testing and analysis support for the occupational health care and protection services; (2) maintain competence in medical laboratory technology; (3) stay abreast of advances in medical surveillance and diagnostic testing; (4) provide medical laboratory procedures as safe as possible for patient and laboratory personnel.

FACILITIES: Health Division, Building 4500-M

STATUS/COMMENTS:

FUNDING YEARS: 92		TEC (\$x1000): 125												
BER CODE	BA/BQ	FUNDING TYPE	TOTAL	PRIOR										BEYOND FY-95
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95		
H	BO	CE	125	0	0	0	0	0	75	50	0	0	0	
TOTAL:			125	0	0	0	0	0	75	50	0	0	0	

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: X-RAY EQUIPMENT

CONTACT: THOMAS L. TUCK, JR., PROGRAM CATEGORY: OCCUPATIONAL HEALTH

PLANT: ORNL

PROJECT NO: 3.05

STATUTORY REQ: DOE/ERDA

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.3.05

SCOPE: Upgrade X-ray equipment to provide basic radiographic support for routine periodic health assessments, worker health surveillance, and medical diagnosis.

JUSTIFICATION: The technology of current equipment is now outmoded and additional modification to equal current standards is no longer possible.

FACILITIES: Health Division, Building 4500-N

STATUS/COMMENTS: The new equipment is being selected. Installation should be completed in FY-89

FUNDING YEARS: 89			TEC (\$x1000): 65											
B&R CODE	BA/BO	FUNDING	TOTAL	PRIOR	BEYOND									
		TYPE		FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
H	BO	CE	65	0	0	65	0	0	0	0	0	0	0	
		TOTAL:	65	0	0	65	0	0	0	0	0	0	0	

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: COMPUTER MEDICAL INFORMATION MANAGEMENT SYSTEM

CONTACT: JANE B. CORDTS

PROGRAM CATEGORY: OCCUPATIONAL MEDICINE

PLANT: ORNL

PROJECT NO: 3.06

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.3.06

SCOPE: (1) purchase and installation of two magnetic disc drives; (2) participate in the Martin Marietta Energy Systems Occupational Health Information System (a computerized health sciences information system which allows intergration of the data from occupational medicine, industrial hygiene, health physics, and safety.)

JUSTIFICATION: To maintain in reliable working condition the hardware driving the Massachusetts General Hospital Utility Multi-Programming System (MUMPS) computerized data system (the current patient-oriented health care delivery data entry and retrieval system.

FACILITIES: Health Division Building 4500-M

STATUS/COMMENTS: Purchase and installation of the disc drives is in progress and should be completed in FY-89.

<u>FUNDING YEARS:</u> 89			<u>TEC (\$x1000):</u> 25											
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
H	BO	CE	25	0	0	25	0	0	0	0	0	0	0	0
<u>TOTAL:</u>			25	0	0	25	0	0	0	0	0	0	0	0

**Table 4.1. Funding summary for Occupational Medicine Program**

Funding type	Funding (\$ × 1000)								Total
	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	
Exp	1,421	1,726	1,486	1,486	1,486	1,486	1,486	1,486	12,063
GPP			670						670
GPE		90	20	30	75	50			265
LI									
Total capital		90	690	30	75	50			935
Total (types)	1,421	1,816	2,176	1,516	1,561	1,536	1,486	1,486	12,998

## **5. INDUSTRIAL SAFETY LONG-RANGE PLAN**

### **5.1 MISSION AND OBJECTIVES**

The primary mission of the ORNL Industrial Safety Program is to prevent accidental injury or damage to personnel and property on the ORNL site. This is accomplished, in part, through compliance with applicable Department of Energy (DOE), Occupational Safety and Health Administration (OSHA), local, state, and federal regulations in the conduct of all ORNL activities. The program is administered through an organized approach that has the active and visible support, participation, and accountability of line management. A well-developed industrial safety program provides management with the necessary resources (technical support, leadership, manpower, training, and equipment) to adequately plan, organize, administer, and audit accident prevention and compliance activities. ORNL's current program has been modeled after successful programs throughout general industry, applying modern accident-prevention principles tailored to meet the special conditions at ORNL.

The general objectives of the ORNL Industrial Safety Program are to assist management to

- ensure that all activities are conducted with the lowest reasonable risk of personal injury, illness, or property loss;
- ensure that all activities are conducted in compliance with applicable DOE, OSHA, local, state, and federal regulations;
- ensure that facilities and equipment are designed, procured, built, and maintained in compliance with applicable health and safety codes and standards;
- maintain a high level of safety awareness and motivate employees to practice safety both on and off the job;
- ensure that effective personal protective equipment is available to employees;
- ensure that employees and other personnel at ORNL are properly trained to perform their work safely; and
- evaluate the overall effectiveness of the industrial safety program and provide feedback to appropriate management.

### **5.2 PROGRAM REQUIREMENTS AND STATUS**

#### **5.2.1 Facility Design Review**

The Industrial Safety Department has an established program of design review to ensure that all new facilities, modifications and additions to existing facilities, and procedures comply with DOE standards. This effort involves the annual review of thousands of documents to ensure that

appropriate safety requirements are included in any endeavor from the earliest stages, so that costly design or procedural changes can be avoided or minimized. Adequate staffing and direct interface with the Engineering Organization is essential to address this program need. The department has developed a plan (with Engineering) to ensure that all safety recommendations are incorporated before a certified-for-construction document can be issued.

### **5.2.2 Equipment and Process Review**

New or modified equipment or processes are reviewed and approved to ensure that they meet applicable standards and are safe for intended use. Periodic inspection and maintenance programs are necessary and must be documented to meet applicable code requirements, a demonstrated need based on equipment performance, and acceptable levels of safety.

Currently, safety summaries are reviewed by the Safety Department staff for safety considerations on new or modified equipment or processes. The Quality Department and the Plant and Equipment Division are responsible for inspection, certification, and testing of most types of equipment at ORNL (e.g., portable and fixed ladders, cranes, hoists, and other lifting equipment, and compressed gas cylinders). Many of the inspection schedules are based on consensus standards, whereas others are based on historical equipment performance or manufacturer's requirements. Inspection results are documented, and reports recommending equipment repairs are sent to appropriate supervisors. The Safety Department audits the inspection, certification, and testing programs to ensure compliance with applicable codes.

Efforts continue to strengthen important segments of the ORNL Industrial Safety Program. A plan was developed with the Quality Department to identify and inspect all fixed ladders at the ORNL site. The portable-ladder inspection program of the Plant and Equipment Division was implemented in FY 1988. A safety standard for the inspection and testing of compressed-gas regulators is being developed and will be issued by the Quality Department in FY 1989.

### **5.2.3 Safety Work Permit Program**

Many unique and potentially hazardous jobs must be performed in support of ORNL's mission. The need for a special hazardous work permit system is crucial. The goal of this permit system is to ensure thorough hazard evaluation and adequate protection for employees performing work that creates the potential for unusual hazards.

ORNL Safety Standard IS-6.1 defines the policy for issuing safety work permits in instances where protection must be provided or when special or unusual hazards may exist. Supervision overseeing hazardous work is responsible for evaluating the safety and health hazards of the work, ensuring that protective measures are in place for workers, and confirming that a safety work permit has been issued before work begins. The Safety Department has developed a training course for all supervisory employees who will issue or receive safety work permits. This course will be offered to these supervisors in FY 1989. A generalized training program for employees who work with the permit will also be developed using a video program to overview the permit system. These programs will be developed and offered in FY 1989-90.

### **5.2.4 Safety Policies and Procedures**

Safety procedures are written to meet DOE orders and federal, state, local, or Energy Systems standards, or to ensure consistent, documented handling of hazards in the workplace. These

procedures are reviewed regularly and updated as required. All procedures and revisions are approved by appropriate line management and functional groups. Safety responsibilities and standards are communicated to all employees.

The many policies and procedures that govern ORNL's safety program are contained in the *ORNL Safety Manual*. The Industrial Safety Department staff works to ensure not only the timely revision of existing procedures but also the development of new procedures to meet changing requirements. Some of the safety standards in this manual need to be updated; hence, standards that are more than 5 years old will be updated by the safety staff during FY 1989.

Guidelines for Division Safety Officers (DSOs) and Radiation Control Officers (RCOs) are contained in the DSO/RCO manual. Some of the information in this manual is outdated and will be revised in FY 1989.

### **5.2.5 Consultation and Guidance to Management**

A well-developed Industrial Safety Program assists management in planning, organizing, monitoring, and documenting accident-prevention activities as well as compliance efforts and results. The Industrial Safety staff provides assistance to all levels of management and supervision in problem solving and decision making regarding the implementation of DOE, OSHA, Energy Systems, and ORNL industrial safety requirements. Assistance is provided to Laboratory management in making an accurate appraisal of the effectiveness of the safety program and the quality of the safety performance. The Industrial Safety Department collects, assembles, and records accident and injury statistical data.

These functions are achieved through cultivating a close working relationship between the Safety Department and each ORNL division. ORNL safety staff members are given specific division assignments and are charged with the responsibility of assisting division management in implementing that division's safety action plan and safety program.

Continuing these activities will require additional staff training in the areas of construction safety, electrical safety, hazardous materials safety, chemical laboratory safety, and risk assessment. Also, an additional staff member will be needed to enable the Industrial Safety Department to more efficiently meet Energy Systems and DOE-ORO requirements. An action plan for staff training in FY 1989 has been prepared and is based on specific training needs of individual safety staff members.

### **5.2.6 Safety Inspections and Audits**

A variety of safety inspections and audit programs are required to ensure that operating deficiencies and hazards are identified and that appropriate corrective actions are initiated and completed. All facilities must be inspected to ensure compliance with federal, state, and local regulations and the established operating procedures.

All divisions perform safety and housekeeping inspections at least quarterly. DSOs document deficiencies found and corrective actions taken. The Safety Department periodically audits documentation of corrective action. Each division is rated semiannually and annually using a uniform rating system, and division management is informed of the results. The follow-up system for tracking outstanding deficiencies found during inspections needs improvement. The Safety Department staff will work with the DSOs in divisions needing improvement during FY 1989 to ensure that corrective actions taken are properly documented. The safety staff will perform independent internal inspections of selected Laboratory areas at least annually.

ORNL also has a Laboratory Appearance Program that provides an ongoing review of facilities to help ensure a clean, orderly, and safe working environment. The program includes annual inspections, Laboratory-wide walkthroughs, and high-level management visibility and participation.

### **5.2.7 Housekeeping**

Housekeeping and appearance are basic elements of the Industrial Safety Program at ORNL. Poor housekeeping can affect accident prevention both directly (slip/trip hazards, fire hazards, etc.) and indirectly (employee morale). The objective of the housekeeping program is to maintain the highest practical levels of good housekeeping, general appearance, and safety through the involvement and commitment of every employee.

Housekeeping receives special attention during quarterly division inspections by division directors and division safety committees. Inspection reports are submitted by the Division Safety Officer, and the corrective action taken is documented. Housekeeping is also included in annual Laboratory Appearance Committee inspections and audits. Findings are reported to responsible area supervision, and inspection results and corrective action reports are submitted to the Laboratory Director.

The lack of direct accountability for common-use areas (e.g., hallways, attics, and loading docks) poses a unique problem. To alleviate housekeeping problems in these areas, members of the safety staff will (1) increase their walkthrough inspections of division areas, (2) report deficiencies found to appropriate DSOs, and (3) audit to ensure deficiencies are corrected in a reasonable period of time.

### **5.2.8 Accident Investigations**

An accident investigation program is required to ensure that root causes of accidents are identified and corrective actions are initiated and completed promptly to prevent recurrence. The detail and depth of the investigation is determined by the seriousness of the real or potential injury or property damage. DOE Order 5484.1 details the requirements for Types A, B, and C investigations.

On-site investigations are made of all accidents that result in serious or disabling injuries or property damage, and all near-miss incidents that are considered to be potentially serious. After the incident is documented, responsibility for correction of procedures or unsafe conditions is assigned. The Safety Department assists in the investigations and audits to ensure that the corrective actions have been carried out. Currently, all of the professional safety staff members have been certified as DOE Accident/Incident Investigators.

Supervisory personnel, who often chair or participate in accident or incident investigations, are not sufficiently familiar with investigation techniques and objectives. Consequently, a safety training course for supervisors being developed in CY 1989 will include accident and incident investigations.

### **5.2.9 Safety Training**

For work to be performed and supervised with acceptable levels of safety and standards compliance, formalized training programs must be in place for both employees and supervision. These programs should provide general orientation to new and reassigned employees and job-specific training at least annually for some employees (reactor operators, electricians, etc.). Training

must also be documented. In addition, supervisors responsible for employee and property protection should receive periodic training.

All employees or transfers from other installations are required to attend a safety orientation program as they are processed through the Personnel Division. The program consists of training in the areas of (1) ORNL safety policies, (2) ORNL facilities and services, (3) personal protective equipment and clothing, and (4) pertinent information relative to accident prevention. A member of the Safety Department staff speaks at this orientation and answers safety-related questions. Further, all new employees or transfers are given a second period of safety training by their supervisors after they have been assigned to a division. This training is more specific to the safety requirements of the particular division and work site.

Employees are provided training by all health and safety disciplines periodically as dictated by standards, procedures, site assignments, and job conditions or assignments. Also offered are defensive driving classes, which are taught by a Safety Department staff member certified by the National Safety Council.

To more fully meet the safety training requirements at ORNL, a safety training program for supervisors will be developed and implemented for selected supervisors in CY 1989.

Additionally, a procedure will be written in CY 1989 specifying the method to be used at ORNL to orient and train all badged consultants, guests, and facility users. This procedure will ensure that consultants, guests, and facility users receive basic safety orientation and site-specific training before work activities commence.

#### **5.2.10 Personal Protective Equipment**

The Laboratory must make available to all employees a selection of personal protective equipment that will adequately, comfortably, and economically protect them from workplace hazards; and the requirements for this equipment must be evaluated and enforced. Safety-related clothing and equipment stocked in ORNL is currently approved by members of the Industrial Safety Department. The use of special-order or limited-use items is controlled by procedures and authorized signature lists. Some classes of direct purchase items are controlled by similar administrative checks.

ORNL has a program in place to evaluate and approve all personal protective equipment and clothing stocked and used at the Laboratory and to assist supervision in determining the proper use, storage, and care of this equipment. Supervisors are charged with ensuring that their workers receive the necessary personal protective equipment for their job assignments and that they use it properly.

A new Energy Systems subcontract agreement for the purchase of personal protective equipment and safety supplies is currently being formulated by a committee composed of representatives from the safety departments of the three Oak Ridge installations and will be implemented in CY 1989. Under this agreement, the subcontractor will stock only safety equipment and supplies approved by the three safety departments. All safety equipment used by ORNL employees will be purchased through the subcontractor.

#### **5.2.11 Recordkeeping**

A recordkeeping system is required to maintain official records on ORNL injuries and illnesses (including an OSHA Log for Recordable Injuries and Illnesses), motor vehicle accident, and

property damage to comply with Energy Systems and DOE recordkeeping and reporting requirements. The Industrial Safety Department must classify all injuries and illnesses in accordance with DOE 76-45/7A and submit reports as required in DOE Order 5484.1.

The Industrial Safety Department keeps the OSHA log and submits monthly, quarterly, and annual reports to Energy Systems and DOE as required. DOE Form 5484.X is submitted to DOE Oak Ridge Operations (ORO) on all recordable injury, illness, or death cases; property damage incidents with \$1000 or more in damage; and vehicle accidents with \$500 or more damage. On-the-job injury and illness data are currently computerized on the PDP-10 system. In CY 1989, this data will be stored in the Occupational Health Information Management System (OHIS) to provide centralized electronic data storage and retrieval capabilities for the Corporation.

#### **5.2.12 Safety Performance Measurement and Analysis**

ORNL maintains a system that both measures the overall safety performance of the Laboratory and also analyzes the data and feeds back information to the appropriate levels of management so that performance can be improved.

The Industrial Safety Department conducts semiannual and annual evaluations of all divisions to assess safety performance in a number of different program areas: injury and illness rates, housekeeping, enforcement of safety rules and procedures, inspections made and corrective actions taken, safety meeting subjects and attendance rates, safety program direction and communication, training and orientation, safety achievements, and level of activity of the division safety committee. Management personnel are supplied with feedback on a monthly, semiannual, and annual basis. These data are analyzed to detect areas for improvement in the safety program, and corrective actions are taken to improve safety performance. The safety performance appraisal form was revised in FY 1988 to reflect added emphasis on off-the-job injuries and management support for the safety program.

#### **5.2.13 Off-the-Job Safety Program**

An off-the-job safety program is necessary to prevent personal injury to ORNL staff and to lessen the associated economic and production losses to the Laboratory. Efforts at the Laboratory to prevent off-the-job injuries include the use of promotional literature, bulletins, safety contests, posters, and audiovisual materials for division safety meetings. Employees and their families receive a copy of the National Safety Council magazine *Family Safety and Health*. Each division is required to have an off-the-job safety program and action plan each year. The Industrial Safety Department maintains formal off-the-job safety performance records and analyzes the data for factors that can be addressed by the Safety Department or division management.

Despite these efforts, the rate of injuries to ORNL employees while away from work are not decreasing. Hence, efforts to reduce these away-from-work injuries are ongoing.

#### **5.2.14 Construction Safety**

Activity among DOE prime and Energy Systems construction contractors has been extremely high in recent years. Since this activity level is expected to continue, ensuring accident prevention and standards compliance among these personnel is a demanding aspect of the ORNL Industrial Safety Program. Significant parts of the program include the orientation and training of contractor

personnel, construction site inspections for auditing standards compliance, and ensuring the safety of ORNL employees in and around the unique hazards created by construction activities.

The Safety Department reviews project plans in the design stage and makes recommendations to ensure that work is performed in conformance with appropriate safety and health requirements. Effective lines of communication are established and maintained to ensure Safety's participation in all preconstruction meetings. During the construction phase, work activities are monitored for safety and to confirm that proper work permits have been obtained and are being followed. Inspections of construction sites are made daily and documented. Feedback on deficiencies needing corrective action is given to appropriate construction supervisors and engineers.

Safety audits have shown that some contractors are not consistently wearing the required protective safety equipment while on the job site. The Safety Department plans to continue to audit all construction sites on a daily basis to ensure compliance with the protective equipment requirement.

#### **5.2.15 Security Force Safety**

ORNL's safeguards and security activities present unique industrial safety program requirements. The prevention of injuries during force-on-force exercises, in the handling of a variety of weapons, and during other specialized training demands special safety attention.

Security personnel who handle weapons must qualify at the Energy Systems Central Training Facility. The training practices and safety precautions covered at this facility are reviewed and approved by the Energy Systems Central Training Facility Steering Committee. Force-on-force and other special security training exercises are reviewed by the ORNL Industrial Safety Department. The potential for serious injury or fatality demands that all weapons training and other specialized training continue to receive a high degree of review and approval by the Industrial Safety Department.

#### **5.2.16 Traffic and Fleet Vehicle Safety**

Because of the size of the ORNL reservation and the large number of vehicles (approximately 500 ORNL, contractor, vendor, and visitor vehicles each day), the prevention of motor vehicle accidents and the enforcement of government vehicle safety requirements are significant components of the industrial safety program. Specifically, the program seeks to ensure that Laboratory roadways and parking areas are designed and maintained in compliance with uniform traffic codes and sound engineering practices. Fleet vehicles must be maintained in safe operating condition, and drivers must be trained and controlled to practice safe defensive driving.

The design and maintenance of roadways in and around the Laboratory is currently administered by the Plant and Equipment Division. A traffic engineer has been retained by Energy Systems to advise on changes and improvements in roadways and parking lots. Fleet vehicle maintenance is handled by the ORNL garage, with preventive maintenance on a scheduled recall basis and incidental or safety-related maintenance performed as requested by the vehicle's owner.

Additional parking lots were added to provide sufficient parking spaces for the number of vehicles being driven to ORNL. The North Lot was extended to add additional parking spaces, and new parking lots were added in the 6000 and 1000 areas. Bethel Valley Road was realigned from the main entrance to First Street to improve traffic flow and the appearance of the entryway.

Government vehicle operators are required to hold a valid Tennessee drivers license. The National Safety Council's Defensive Driving Program has been offered extensively in past years and will be offered as requested in the future. Currently, ORNL security personnel are being used to enforce regulations through ticketing, which then initiates progressive discipline at the discretion of division management.

#### **5.2.17 Promotion and Communication**

Promoting safety is an essential element in the Industrial Safety Program. A mixture of promotional programs and safety activities is necessary to encourage safe behavior and to present safety messages in an interesting but informative way. The methods used to promote and communicate safety at ORNL include safety meetings, incentive awards, safety bulletins, promotional campaigns, poster displays, audiovisuals, library materials, and the safety suggestion system.

A safety meeting program is used to ensure communication, to promote safety and health concerns, and to present information through required-attendance meetings that are planned, reviewed, scheduled, and conducted by division safety committees or division safety officers. All divisions have at least one meeting each quarter. Safety bulletins are issued to ensure dissemination of pertinent safety-related information to plant management, supervision, and employees.

The Safety Department also has a Resource Center that contains audiovisual material and equipment, safety periodicals, ANSI and DOE standards, and publications for use by employees, safety and health professionals, and DSOs.

Other safety-promotion activities include an incentive award program to encourage a reduction in the number of injuries involving days away from work and a seat-belt-usage campaign to increase both on- and off-the-job usage rates. Through the safety suggestion system, employees are encouraged to make suggestions to improve the safety program or to report unsafe conditions.

There are some deficiencies in the current safety programs at ORNL. Seat-belt-usage rates have declined a few percentage points since the 92% high in June 1987. There is a continuing need for new audiovisual material for division safety meetings, and safety meeting attendance rates in some divisions are less than 100%. To enhance these programs, additional efforts will be made in these areas. An instant reward system and monthly seat-belt surveys will be used to encourage increased seat-belt use. More videotapes will be purchased for division safety meetings; and through the division safety evaluation system and interactions with DSOs and division directors, the Safety Department staff will emphasize the importance of safety meeting attendance by all employees.

#### **5.2.18 Safety Committees**

The ORNL Central Safety and Health Committee was established to improve the administrative system for maintaining a high level of safety awareness and accident prevention among all personnel of the Laboratory; to ensure that the safety responsibilities of supervisors are communicated, understood, and fulfilled at all levels of the organization; and to ensure that the Laboratory continues to maintain a safety program consistent with the Energy Systems safety policy and within DOE standards and guides. This committee, which meets each month, is chaired by the Associate Laboratory Director for Support and Services and consists of other Associate Directors (and/or their representatives), division directors, safety and health discipline representatives, and appointed officials.

A joint Labor/Management Safety Committee was organized under the contract between Energy Systems, ORNL, and the Atomic Trades and Labor Council of the AFL-CIO. This committee meets monthly to consider safety problems and make recommendations to the company. The committee is composed of seven members: three selected by the union, three by the company, and one from the Safety Department.

The Laboratory Traffic Safety Committee was formed to evaluate and make recommendations on traffic safety problems and suggestions. This committee meets as needed and consists of representatives from the Safety Department, the Engineering Organization, Laboratory Protection, Plant and Equipment, and a research division.

Each ORNL division has a division safety committee (appointed by the division director) that oversees the division's safety program, participates in safety inspections and program activities, and promotes safety awareness.

### 5.3 SUMMARY OF PROGRAM NEEDS

Continuing efforts are necessary on all levels to maintain an effective Laboratory-wide industrial safety program. However, special emphasis areas have been identified to potentially reduce employee injury rates:

- Training—A safety training program for supervisors and a generalized training program for employees working with safety work permits need to be developed and implemented.
- Space—Current office space for the safety staff is inadequate for members to perform effectively.
- Seat-belt usage—Seat-belt usage is a proven factor in eliminating or reducing personal injury in vehicular accidents. Additional effort is necessary to achieve greater usage of seat belts by all employees both on and off the job.
- Off-the-job safety—The rate and severity of injuries to ORNL employees while away from work are high, especially when compared to on-the-job lost workday case incidence rates. Efforts to reduce these away-from-work disabling injuries are ongoing.
- Construction safety—An ORNL construction safety program has been in place for many years. Work-site audits reveal the need for improving both subcontractor and prime contractor compliance with ORNL and OSHA safety regulations.

In addition to these major areas of emphasis, the following issues are significant to the continuing success of the ORNL safety program:

- Review and appraisal of nuclear facilities—DOE Order 5480.5 requires each contractor to perform independent internal reviews of all nuclear facilities at least annually. Complete implementation of this order will require a significant additional resource commitment.
- Job Safety Preplanning—A review of employee accidents and injuries reveals that many could have been avoided if the job site, equipment, and procedures had been more thoroughly reviewed for safety considerations before implementation. Improvements in job-safety preplanning should result in the reduction of accidents.

Resources in addition to the current operating budget that are necessary to fulfill requirements of all program elements include one additional staff member and a funding-level increase to facilitate new initiatives in the special emphasis areas previously described.

#### **5.4 PROGRAM DATA AND FUNDING SUMMARY**

This section consists of program data sheets and schedules that describe the activities within this functional area. Table 5.1 summarizes overall funding by funding type.

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: INDUSTRIAL SAFETY PROGRAM

CONTACT: J. S. BROWN

PROGRAM CATEGORY: INDUSTRIAL SAFETY

PLANT: ORNL

PROJECT NO: 4.01

STATUTORY REQ: DOE, OSHA

FMP NO:

ENG. PROJ. NO:

EPMP NO: 2.4.01

SCOPE: This data sheet covers the expense funding necessary to support program activities, including facility design review, equipment and process review, safety work permit review, safety procedures, consultation and guidance to management, safety inspections and audits, accident investigations, record keeping, and other essential safety related activities.

JUSTIFICATION: This activity provides the expense, operating, and equipment support necessary to provide an integrated strategy and implementation for an effective safety program at ORNL which ensures compliance with DOE Orders and OSHA regulations.

FACILITIES:

STATUS/COMMENTS: Base program continuing

<u>FUNDING YEARS:</u> 88-?			<u>TEC (\$x1000):</u> 5261										
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
S	BO	EXP	5261	413	420	501	561	561	561	561	561	561	561
<u>TOTAL:</u>			5261	413	420	501	561	561	561	561	561	561	561





ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: SAFETY AWARD PROGRAM

CONTACT: J. S. BROWN

PROGRAM CATEGORY: INDUSTRIAL SAFETY

PLANT: ORNL

PROJECT NO: 4.02

STATUTORY REQ: DOE

FMP NO:

ENG. PROJ. NO:

EPMP NO: 2.4.02

SCOPE: This data sheet covers the expense funding necessary to support an incentive award program to encourage a reduction in the number of on-the-job injuries involving days away from work.

JUSTIFICATION: This activity provides the expense and operations support necessary to provide the implementation for an effective Incentive Award Program at ORNL which ensures compliance with the contract between DOE and Martin Marietta Energy System, Inc.

FACILITIES:

STATUS/COMMENTS: Program continuing

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<u>FUNDING YEARS:</u> 88-?			<u>TEC (\$x1000):</u> 1574										
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
S	BO	EXP	1574	98	158	108	160	175	175	175	175	175	175
		<u>TOTAL:</u>	<u>1574</u>	<u>98</u>	<u>158</u>	<u>108</u>	<u>160</u>	<u>175</u>	<u>175</u>	<u>175</u>	<u>175</u>	<u>175</u>	<u>175</u>



ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: OFF-THE-JOB SAFETY INCENTIVE PROGRAM

CONTACT: J. S. BROWN

PROGRAM CATEGORY: INDUSTRIAL SAFETY

PLANT: ORNL

PROJECT NO: 4.04

STATUTORY REQ:

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.4.04

SCOPE: This data sheet covers the expense funding necessary to support an incentive award program to encourage a reduction in the number of off-the-job injuries involving days away from work.

JUSTIFICATION:

FACILITIES:

STATUS/COMMENTS:

FUNDING YEARS: 88-?				TEC (\$K1000): 124										
SER CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
S	80	EXP	124	11	11	0	12	15	15	15	15	15	15	15
TOTAL:			124	11	11	0	12	15	15	15	15	15	15	15

**Table 5.1. Funding summary for Industrial Safety Program**

Funding type	Funding (\$ × 1000)								Total
	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	
Exp	591	611	735	753	753	753	753	753	5,702
GPP									
GPE									
LI									
Total capital									
Total (types)	591	611	735	753	753	753	753	753	5,702



## 6. NUCLEAR CRITICALITY SAFETY LONG-RANGE PLAN

### 6.1 MISSION AND OBJECTIVES

The mission of nuclear criticality safety at ORNL is to ensure that facilities having significant quantities of fissile materials are sited, designed, constructed, modified, operated, maintained, and decommissioned in accordance with federal regulations (DOE Order 5480.5, and 5480.3 as it pertains to criticality safety) and codes such that the probability of a nuclear criticality accident is acceptably low.

The ORNL Nuclear Criticality Safety Program's objectives include

- carrying out a safety analysis and review process with a formal documented system for the identification and control of risks through safety analyses and operating limit specifications;
- applying administrative and procedural controls that delineate clear lines of responsibility and methods for safe operation under normal and emergency conditions, and a system of configuration control that requires independent safety review and approval of all changes required for facility safety;
- administering a documented training program for nuclear facility personnel;
- maintaining computational capabilities for performing nuclear criticality safety analyses; and
- performing audits of facilities to include notification, investigation, and reporting of occurrences and utilization of a follow-up system to ensure remedial action.

The program is managed for the Laboratory by the Office of Operational Safety, which is technically and administratively assisted by the Laboratory Criticality Safety Officer. Administrative and technical oversight and review are provided by the Laboratory Director's Criticality Review Committee.

### 6.2 PROGRAM REQUIREMENTS AND STATUS

#### 6.2.1 Administrative and Procedural Program Definition

The administrative and procedural controls for the program are provided in the *ORNL Health Physics Manual*, Procedure 2.4, which identifies the safety analysis and review functions and relationships among the fissile material Operating Organization, the Office of Operational Safety, the Laboratory Criticality Safety Officer, and the Laboratory Criticality Review Committee. The procedure, updated in 1987, is current.

#### 6.2.2 Procedures Development and Review

ORNL uses many procedures to ensure criticality safety while addressing regulatory requirements. In some instances, the evolution of these procedures has resulted in their becoming

fragmented and disjointed. An example includes the calibration, installation, testing, and maintenance of the criticality accident alarm systems. Different organizations perform the necessary functions, but the continuity and coordination of these functions do not come under the purview of a single procedure or organization. These types of circumstances need to be reviewed to ensure that important activities are performed and documented. Functions that would benefit from such revisions are

- the calibration, installation, testing, and maintenance of criticality accident alarm systems;
- criticality safety audit and reporting programs for the Radiation Control Officers, the Laboratory Criticality Safety Officer, the Laboratory Criticality Review Committee, and the Laboratory Criticality Safety Consultant; and
- periodic detailed reviews of operating procedures relative to approved criticality safety limits.

Approximately 0.15 person-years will be required to develop, review, and approve these procedures. Expected completion is toward the end of CY 1990.

The numerous fissile material operating procedures at ORNL have been referenced or paraphrased to respond to requests for nuclear criticality safety approvals. Reviews of these procedures should be conducted by the Laboratory Criticality Safety Officer to ensure continued compliance with nuclear criticality safety approval limits. This review process will be incorporated into the Laboratory Criticality Safety Officer audit procedure. This effort will require approximately 0.15 person-years per year until the end of 1989. Subsequent efforts will require approximately 0.15 person-years per year.

### **6.2.3 Management Oversight and Planning Activities**

A management initiative established the need for an Energy Systems Five-Plant Criticality Review Committee to address criticality safety issues on a corporate basis. Participation in committee activities by ORNL involves approximately 0.15 person-years per year for preparing reports, attending meetings, and conducting facility audits.

### **6.2.4 Independent Review and Appraisal Program**

ORNL is currently in compliance with the requirement to maintain an internal safety review system under the charter of the Laboratory Director's Criticality Review Committee. Continued compliance requires the annual support of 0.2 person-years per year and approximately 0.1 person-years every 3 years to comply with the triennial management review of the Laboratory Criticality Safety Program.

### **6.2.5 Personnel Selection and Training**

The program for personnel selection, training, and retraining of all individuals who operate and supervise facilities having significant quantities of fissile materials is a line management responsibility; the Laboratory Criticality Safety Officer is responsible for providing training assistance to line management.

A formalized basic nuclear criticality safety training program is provided by the Criticality Safety Officer, who also administers tests and records the results. Typically, specific operational training is provided by line management with the use of operational flow sheets and criticality safety analyses and approvals.

A lecture training program, utilizing comprehensive technical resources, is provided by the Laboratory Criticality Safety Officer to operating organizations' Radiation Control Officers (RCOs). The purpose of the program is to provide nuclear criticality safety training that is commensurate with the RCO safety responsibilities. The criticality safety training programs administered by the Laboratory Criticality Safety Officer are judged by the DOE-ORO to be adequate but in need of "pass/fail" testing criteria. Further test developments are under way to include the required pass/fail test criteria by the end of CY 1988. The restructuring of the tests and establishment of pass/fail criteria will require approximately 0.05 person-years during 1989. The continued deliverance, review, and update of the training program will require approximately 0.10 person-years per year commitment. The criteria for personnel selection is the responsibility of line management and Employment. The program for maintenance personnel is similar to that for operating personnel. The resources required for operating personnel training are the same as those for maintenance personnel.

#### **6.2.6 Audits and Reports**

Process and operational audits of nuclear criticality safety are routinely conducted at ORNL by operating management, Laboratory management, corporate management, DOE and ORO auditors, and others. The audits are conducted under the auspices of statutory requirements or needs. Additionally, results of audits and responses to audits require the preparation of reports and subsequent actions. To date, ORNL has complied with these requirements. The continued support for such audits requires approximately 0.05 person-years per year.

The Laboratory Director's Criticality Review Committee has instructed the Laboratory Criticality Safety Officer to conduct audits on fissile material process operations with an increasing frequency in support of sound safety practices and as an extension of their audit functions. The continuance of the audit function will require approximately 0.05 person-years per year.

#### **6.2.7 Safety Analyses and Review Process**

The *ORNL Health Physics Manual*, Procedure 2.4, delineates clear lines of responsibility for responding to requests for analyses and approvals of operations and reviews of process analyses before an operation is begun. The procedure requires setting forth concise, approved limitations that are commensurate with potential risks and safe operations. The analysis employs the double contingency principle in identifying parameters that would require control to prevent accidental criticality. Analyses include written descriptions of equipment and facilities, chemical and physical forms of fissile materials in each step of operations, maximum quantities at each step, spacings relative to other fissile materials, methods of processing, procedures, and any necessary monitoring.

Although the procedure was updated in 1987 and is current in most respects, most existing nuclear criticality safety approvals (NSRs) are not current with the prescribed format and degree of documentation. A program of redocumentation of safety analyses was begun in 1987 and will continue until about the end of CY 1990. This effort will require approximately 0.5 person-years per year and \$15K per year for calculations until completion of the program.

Procedurally, the Office of Operational Safety, the Laboratory Criticality Safety Officer, and the Laboratory Criticality Review Committee are available for consultation to Laboratory organizations requiring assistance in packaging for off-site transport of fissile materials. There are no specific requirements for transportation or package design personnel to obtain nuclear criticality

safety approvals. However, there are requirements of fissile material operating organizations for the on-site packaging, handling, storage, and transportation of fissile materials. The applicable procedure was updated in 1987 and is current.

### **6.2.8 Nuclear Criticality Safety Computational Continuance and Development Needs**

Nuclear criticality safety analyses require the use of experimental values or experimentally validated computational tools developed for their analytical application to specific operational situations. The computational tools and codes available today have evolved from having only one-dimensional capabilities to having fairly sophisticated three-dimensional geometry capabilities. Even today, however, these current computational capabilities require the application of undefined excess margins of safety, which, in turn, increase costs of operations. Further developments of geometry options, calculated physics parameters, and optimizations of computer programs are needed. These needs are becoming more acute with the evolving regulatory expectations for defining degrees of subcriticality and margins of safety/risk. Additionally, to ensure continued computational capabilities, code maintenance, software/data quality assurance, training of users, and code validations with documented regions of applicability, it is necessary to provide fiscal and supportive resources to code developers.

ORNL remains in compliance with statutory requirements by applying undefined excess conservatism to safety analyses. Because code development is an Energy Systems need, "fair share contributions" have been developed to provide an initial funding of \$40K in FY 1989 with increasing funding up to \$152K in FY 1992 and beyond. The ORNL "contributions" are to begin at \$10K in FY 1990 and increase to \$20K in FY 1993 and beyond. Additionally, continuing professional support by ORNL (for specific validations at ORNL) will amount to approximately 0.1 person-years per year plus \$3K for validation calculations and staff support in FY 1990, increasing to \$34K in FY 1993 and beyond.

### **6.2.9 Critical Experiments Measurements**

Experimental or experimentally validated calculational methods are required for the derivation of nuclear criticality safety limits and associated uncertainties. Numerous future ORNL programs for fissile material system designs and consultations, process demonstrations, operations, storage, and transportation involve fissile materials in unusual combinations with nonfissile materials for which no integral criticality experiments exist. Examples of expected future needs include the following:

- Advanced Neutron Source (ANS) reactor project involving D<sub>2</sub>O with high-density fuel, likely to be highly enriched uranium, with silicon, aluminum, and oxygen;
- Atomic Vapor Laser Isotope Separation (AVLIS) experimental data for validation of computations of 5% enriched uranium as heterogeneous and homogenous carbon-uranium-water systems of varying proportions to simulate collector-plate operations, refurbishment, grinding and oxidation processes, oxide storage and shipment, massive 200-kg metal billet storage and shipment, and UF<sub>6</sub>HF mixtures to simulate product conversion processes;
- Monitored Retrievable Storage (MRS) Facility for fuel rod consolidation and burnup credit for spent fuel;

- Interspersed moderation of tightly and loosely coupled arrays of fissile materials having varying degrees of internal moderation;
- Materials used in the transportation and packaging of fissile materials;
- Effects of Pyrex glass-fissile-solution containment subcriticality margins; and
- Effects of homogeneous materials neutron-scattering kernels on computational results.

Currently, the only available means to provide safety assurance of computational results for the above systems is through the performance of extensive sensitivity and uncertainty studies which are, in themselves, computations. These techniques provide theoretical estimates of computational variances without identifying the specific causes of errors or how the errors may compound or compensate in actual applications.

Without appropriate integral experimental criticality measurements relevant to the systems mentioned above, ORNL will not be able to provide experimental evidence of validated calculational methods specific to their applications. Nuclear criticality safety analyses performed without such validations are subject to sound theoretical claims of nonvalidation, especially in the case of systems having neutron energy spectra and materials that are unusual relative to existing integral measurements.

Initiating these critical experiments involves the identification and scheduling of experiments and the follow-through of experiments and documentation. Validation computations and documentation require 0.3 person-years per year and \$40K per year for computations into the foreseeable future. The initial experimental program planning and scheduling will require an expenditure of about \$25K in 1990. Fiscal support to address the identified issues begins at about \$104K in FY 1990 and increases to \$412K in FY 1995, with an annual outlay of \$412K thereafter.

Programmatic support of these experiments could provide an alternative to Laboratory fiscal and staff support if the issues are identified during the program budgeting process and soon enough to provide for experimental preparations and data analysis.

#### **6.2.10 Subcritical Measurements Experiments**

A cumulative margin of safety is required to provide allowance for experimental and computational uncertainties. The program objective is to provide fiscal and supportive resources to ensure the continuing development of a subcritical measurement technique for emergency and routine applications. Emergency applications will include the safety assessment of off-normal conditions of fissile material processes. Routine applications will include the measurement of actual neutron behavior in multiplying systems for the purpose of benchmarking and validating calculational methods used to define subcriticality and margins of safety and risk.

Virtually all nuclear criticality safety analyses performed within Energy Systems facilities are predicated on computational codes developed for computing critical systems. Degrees of subcriticality and margins of safety for actual systems involving fissile materials are predicated upon computational sensitivity studies that are assumed to experience the same biases and uncertainties that computed critical systems demonstrate. To date, very limited circumstances exist at Energy Systems facilities provide definitive allowances for cumulative margins of safety in experimental and computational uncertainties as required. Although nuclear criticality safety analyses and safety analysis reports produced to date have been acceptable, Energy Systems

facilities are not in strict compliance with the literal, practical, and theoretical bases of DOE Order 5480.5, 12.d&e.

The most definitive technique for identifying and determining computational biases and uncertainties of near critical to far subcritical systems for the purpose of defining margins of safety is the <sup>252</sup>Cf Source Driven Neutron Noise Analysis method.

Approximately 0.1 person-years per year is required from ORNL E&HP for participating in the identification of subcritical measurements to be performed. Approximately \$3K in FY 1990 (increasing to \$40K in FY 1993) is needed for computational comparisons between measurements and calculations for the purpose of defining computational biases and uncertainties as applied to margins of safety.

ORNL's Instrumentation and Controls Division currently has the only available expertise to continue development of this subcritical measurements technique. Operating funds will be required to meet the objectives. No single Energy Systems facility can readily justify the cost of the development and applications efforts. Because the development of subcritical measurement capabilities is an Energy Systems need, Energy Systems installations will provide an initial funding of \$60K in FY 1989, with increasing funding up to \$110K in FY 1992 and \$120K beyond FY 1992. The ORNL contributions are to begin at \$10K in FY 1990 and increase to \$20K in FY 1993, with an expected annual support of \$22K per year thereafter.

### 6.3 SUMMARY OF PROGRAM NEEDS

The normal administrative and procedural aspects of the ORNL Nuclear Criticality Safety program are supported by the program needs and resources of the following elements, which provide the necessary staff and expenses. No additional resources are required for this element.

- Procedural development and maintenance is required to address a deficiency identified by DOE/ORO and to avoid future criticism of program documentation. The expense for addressing this need requires about \$13.1K per year for staff, with an initial expense of about \$17.5K in FY 1990.
- Continued support of the Energy Systems Management Oversight and Planning activities. Five Plant Criticality Committee activities require about \$13.1K per year.
- Continued staff support of the DOE-required Independent Review and Appraisal program is somewhat variable. A management review of the ORNL Criticality Safety Program every third year requires about \$8.7K. Additionally, the ORNL Director's Criticality Review Committee requires an annual manpower support of about \$17.5K.
- The continuing development and maintenance of the ORNL Criticality Safety Training program requires ongoing expense support of about \$10K per year.
- The performance of and response to audit activities and the preparation of subsequent reports for the Audits and Reports program element requires about \$6.1K per year.
- The continuance of the Safety Analyses and Review Process element for providing thorough and updated nuclear criticality safety documentation of Laboratory operations requires ongoing support of about \$58.7K per year.
- For Energy Systems facilities to maintain crucial nuclear criticality safety computational capabilities and to meet future computational needs in a cost-effective manner, a mutual support

program by all Energy Systems facilities is required. A "fair share" contribution by ORNL, plus staff support, is \$24K in FY 1990, increasing to about \$71K in FY 1993.

- Without individual DOE program support for critical experiments to define nuclear properties of future program systems (for the purpose of benchmarking computational capabilities), ORNL will need to provide fiscal support for these experiments to validate computational codes used for nuclear criticality safety to determine margins of operational safety. To address expected ORNL program needs will require support for staff, experiments, and computations of about \$104K in FY 1991, escalating to about \$412K by FY 1994. An initial expenditure of \$25K in FY 1990 is required to provide programmatic planning and scheduling of future experiments.
- For Energy Systems facilities to comply with DOE regulatory requirements, cumulative margins of safety must provide for experimental and computational uncertainties associated with operations control parameters. To provide measures for such margins of safety requires the capability to benchmark the validity of calculations applied to nuclear criticality safety analyses of normal and off-normal operations with fissile materials at ORNL. Addressing the need in a cost-effective manner for all Energy Systems facilities requires a mutual support program by each Energy Systems facility. The ORNL contribution, plus staff and computational support, is \$27K in FY 1990, increasing to about \$71K by FY 1994.

#### **6.4 PROGRAM DATA AND FUNDING SUMMARY**

This section consists of program data sheets and schedules that describe the activities within this functional area. Table 6.1 summarizes overall funding by funding type.

1. Program Category		2. Reporting Period 5/01/89 through 5/31/89													
3. Project Title NUCLEAR CRITICALITY SAFETY DISCIPLINE FWP NO : ACTIVITY NO :		4. Program Representative		Funding Type:											
		5. Project Engineer		Funding Year:											
6. Project Number WBS	7. Subproject Title	8. Fiscal Year and Months													
		FY-1989				FY-1990				FY-1991					
		1	2	3	4	1	2	3	4	1	2	3	4		
	PROCEDURES DEVELOPMENT AND REVIEW				9										
	PERSONNEL SELECTION AND TRAINING				9										
	SAFETY ANALYSES AND REVIEW PROCESS													9	

<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p>	<p>SYMBOL MILESTONE LEVEL</p> <p>0 1 2 3 4</p> <p> </p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: PROGRAM OPERATION

CONTACT: C. M. HOPPER

PROGRAM CATEGORY: NUCLEAR CRITICALITY SAFETY

PLANT: ORNL

PROJECT NO: 5.01

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.5.01

SCOPE: Achieve and maintain program compliance with regulatory obligations.

JUSTIFICATION:

FACILITIES: This program influences the safety analyses and operations of facilities involving greater than exempt quantities of fissile materials in individual Material Balance Areas.

STATUS/COMMENTS: Delayed budget commitments of proposed activity maintains Laboratory Criticality Safety Program at a less than adequate status for compliance with regard to safety analysis documentation.

FUNDING YEARS: 88-?

TEC (\$M1000): 1289

B&R CODE	BA/BO	FUNDING TYPE	TOTAL	TEC (\$M1000): 1289									BEYOND FY-95
				PRIOR FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	
S	BO	EXP	1289	117	107	132	129	139	129	129	129	139	139
TOTAL:			1289	117	107	132	129	139	129	129	129	139	139

1. Program Category <b>NUCLEAR CRITICALITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89																							
3. Project Title <b>PROGRAM OPERATION</b> FWP NO : ACTIVITY NO :		4. Program Representative C. M. HOPPER		Funding Type:																					
		5. Project Engineer		Funding Year:																					
6. Project Number WBS 5.01	7. Subproject Title	8. Fiscal Year and Months																							
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	ADMINISTRATIVE AND PROCEDURAL PROGRAM DEFINITION	[Gantt bar: shaded from month 1 of FY-1989 to month 4 of FY-1989]																							
	PROCEDURES DEVELOPMENT AND REVIEW	[Gantt bar: shaded from month 3 of FY-1989 to month 9 of FY-1990, with a triangle symbol at month 9]																							
	MANAGEMENT OVERSIGHT AND PLANNING ACTIVITIES	[Gantt bar: shaded from month 1 of FY-1989 to month 4 of FY-1989]																							
	INDEPENDENT REVIEW AND APPRAISAL PROGRAM	[Gantt bar: shaded from month 1 of FY-1989 to month 4 of FY-1989]																							
	PERSONNEL SELECTION AND TRAINING	[Gantt bar: shaded from month 3 of FY-1989 to month 9 of FY-1990, with a triangle symbol at month 9]																							
	AUDITS AND REPORTS	[Gantt bar: shaded from month 1 of FY-1989 to month 4 of FY-1989]																							
	SAFETY ANALYSES AND REVIEW PROCESS	[Gantt bar: shaded from month 3 of FY-1989 to month 9 of FY-1992, with a triangle symbol at month 9]																							

SHADING INDICATES STATUS AND COMPLETION

ACTIVITY SCHEDULE

12 ← MONTH

← FORECAST

SYMBOL MILESTONE LEVEL

▽ □ ◇ ☆ X

0 1 2 3 4

Comments:

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: COMPUTATIONAL CAPABILITITES CONTINUANCE AND DEVELOPMENT

CONTACT: C. M. HOPPER

PROGRAM CATEGORY: NUCLEAR CRITICALITY SAFETY

PLANT: ORNL

PROJECT NO: 5.02

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.5.02

SCOPE: Maintain required computational capabilities (computer programs, cross-sections, machine compatibility, validations) and minimal code developments.

JUSTIFICATION: Computational capabilities continuance and development is an Energy Systems need, therefore, "fair share contributions" have been developed to provide an initial funding of \$40,000 in FY 1990 with increasing funding up to \$152,000 in FY 1993 and beyond. The ORNL "contributions" are to begin at \$10,000 in FY 1990 and increase to \$20,000 in FY 1993 and beyond. Professional support from ORNL will amount to about 0.1 person-yrs per year plus \$3,000 for validation calculations and staff support in FY 1990, increasing to \$34,000 in FY 1993 and beyond.

FACILITIES: This program influences the content and quality of safety analyses of facilities involving greater than exempt quantities of fissile materials in operations or transportation.

STATUS/COMMENTS: The quality and bases of current Laboratory nuclear criticality safety analyses are rapidly falling behind new and developing regulatory expectations.

11-6

FUNDING YEARS: 89-95				TEC (\$x1000): 427										
B&R CODE	BA/BO	FUNDING		PRIOR										BEYOND
		TYPE	TOTAL	FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
S	BO	EXP	427	0	0	0	26	45	64	73	73	73	73	
TOTAL:			427	0	0	0	26	45	64	73	73	73	73	

1. Program Category <b>NUCLEAR CRITICALITY SAFETY</b>				2. Reporting Period 5/01/89 through 5/31/89																							
3. Project Title <b>COMPUTATIONAL CAPABILITIES CONTINUANCE AND DEVELOPMENT</b>				4. Program Representative C. M. HOPPER				Funding Type: EXP																			
FWP NO : ACTIVITY NO :				5. Project Engineer				Funding Year:																			
6. Project Number WBS 5.02	7. Subproject Title  COMPUTATIONAL CAPABILITIES CONTINUANCE AND DEVELOPMENT	8. Fiscal Year and Months																									
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994					
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		

<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p> <p>12 ← MONTH</p> <p>← FORECAST</p> <p>SYMBOL MILESTONE LEVEL</p> <p>▽ □ ◇ ☆ X</p> <p>0 1 2 3 4</p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: CRITICAL EXPERIMENTS

CONTACT: C. M. HOPPER

PROGRAM CATEGORY: NUCLEAR CRITICALITY SAFETY

PLANT: ORNL

PROJECT NO: 5.03

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.5.03

SCOPE: Provide critical experimental data in a timely fashion to avoid programmatic delays resulting from inadequately validated computational techniques used for safety analyses.

JUSTIFICATION:

6-13

FACILITIES: This program influences the content and quality of safety analyses of facilities involving greater than exempt quantities of fissile materials in operations or transportation.

STATUS/COMMENTS: The quality and bases of current Laboratory nuclear criticality safety analyses are rapidly falling behind new and developing regulatory expectations.

FUNDING YEARS: 89-95			TEC (\$x1000): 2137										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR									
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
S	BO	EXP	2137	0	0	0	104	183	281	335	410	412	412
		TOTAL:	2137	0	0	0	104	183	281	335	410	412	412

1. Program Category <b>NUCLEAR CRITICALITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89																							
3. Project title <b>CRITICAL EXPERIMENTS MEASUREMENTS</b> FWP NO : ACTIVITY NO :		4. Program Representative C. M. HOPPER	Funding Type:																						
5. Project Engineer		Funding Year:																							
6. Project Number WBS 5 03	7. Subproject Title  CRITICAL EXPERIMENTS MEASUREMENTS	8. Fiscal Year and Months																							
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p> <p>12 ← MONTH</p> <p>← FORECAST</p> <p>SYMBOL MILESTONE LEVEL 0 1 2 3 4</p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: SUBCRITICAL MEASUREMENTS

CONTACT: C. M. HOPPER

PROGRAM CATEGORY: NUCLEAR CRITICALITY SAFETY

PLANT: ORNL

PROJECT NO: 5.04

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.5.04

SCOPE: Continued development and application of the Cf-252 Source Driven Noise Analysis Technique for application to computer code validation for subcritical systems and emergency response.

JUSTIFICATION:

FACILITIES: This program influences the content and quality of safety analyses of facilities involving greater than exempt quantities of fissile materials in operations or transportation.

STATUS/COMMENTS: The quality and bases of current Laboratory nuclear criticality safety analyses are rapidly falling behind developing regulatory expectations relative to defined margins of safety.

FUNDING YEARS: 90-?			TEC (\$x1000): 473											
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
S	BO	EXP	473	0	0	0	29	50	70	81	81	81	81	
TOTAL:			473	0	0	0	29	50	70	81	81	81	81	

1. Program Category <b>NUCLEAR CRITICALITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89																			
3. Project Title <b>SUBCRITICAL MEASUREMENTS EXPERIMENTS</b> FWP NO : ACTIVITY NO :		4. Program Representative C. M. HOPPER	Funding Type:																		
6. Project Number WBS 5 04		7. Subproject Title  SUBCRITICAL MEASUREMENTS EXPERIMENTS	5. Project Engineer Funding Year:																		
		8. Fiscal Year and Months																			
		FY-1989		FY-1990		FY-1991		FY-1992		FY-1993		FY-1994									
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p> <p>12 ← MONTH</p> <p>← FORECAST</p> <p>SYMBOL MILESTONE LEVEL</p> <p>▽ 0   □ 1   ◇ 2   ☆ 3   ⊗ 4</p>	<p>Comments:</p>
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**Table 6.1. Funding summary for Nuclear Criticality Safety Program**

Funding type	Funding (\$ × 1000)								Total
	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	
Exp	107	157	288	417	544	618	693	705	3,529
GPP									
GPE									
LI									
Total capital									
Total (types)	107	157	288	417	544	618	693	705	3,529



## **7. NUCLEAR FACILITY SAFETY LONG-RANGE PLAN**

### **7.1 MISSION AND OBJECTIVES**

The mission of the ORNL Nuclear Facility Safety Program is to ensure that the safety and health of employees and the public are adequately protected in the siting, design, construction, modification, operation, maintenance, and decommissioning of all reactors and nonreactor nuclear facilities. ORNL will not operate any nuclear facility without proper safety evaluations before and during operation to ensure an acceptably low risk. This assurance is provided by analyses and reviews that focus on adequate hardware and equipment, proper administrative controls, and properly trained facility personnel.

To accomplish this mission, the Office of Operational Safety provides a continuous level of oversight. The Operational Safety oversight group has two full-time secretaries, one half-time professional engineer, and eight full-time professional engineers and scientists, including the manager. Since approximately 2.4 engineers and 0.35 secretary from this staff are devoted to safety oversight addressed in other sections of this Plan, the remaining personnel (approximately 6.1 scientists and engineers and 1.65 secretaries) are involved in the program addressed in this section. In addition to the full-time staff, eight Laboratory Director's Review Committees, with five to twelve members each, provide resources for appraisals of nuclear facility safety in both technical and operational areas. A strength of the facility safety program is the recognition that line managers have the ultimate responsibility for the safe operation of their facilities. Senior Laboratory management recognizes this responsibility and provides oversight through a regular series of status reports.

### **7.2 PROGRAM REQUIREMENTS AND STATUS**

#### **7.2.1 Safety Analysis and Review Program**

To ensure that the hazards and risks of operating each nuclear facility have been identified and are acceptably low, as required by DOE Order 5481.1B, ORNL has a formal safety analysis and review program that includes hazard identification, impact and risk analysis, identification of hazard-control measures, comparison with DOE design criteria, and authorization for operation.

Although ORNL provided DOE with Safety Analysis Reports for all operating reactors when they began operation and has provided the same reports for all nonreactor nuclear facilities, as defined in DOE Order 5480.5, these documents do not comply with September 1986 revisions in the DOE orders or with DOE Order 6430.1A, effective in February 1988. ORNL developed plans and requested funds to upgrade the safety analysis documents to meet the September 1986 requirements over a 5-year period at a cost (1987 basis) of approximately \$3 million for the 22 nonreactor nuclear facilities and \$6,250,000 for the reactors. The Laboratory worked with other Energy Systems sites, with DOE-ORO contractors, and with DOE-ORO to develop the policies and plans required by the changes in DOE Orders 5480.5 and 5480.6. On the basis of these plans, as

well as additional document upgrades required by technical safety appraisals and changes required by DOE Order 6430.1A, ORNL is currently revising the estimates upward to \$14.2 million over the next 5 years for the reactors and to \$5,469,000 over the next 6 years for the nonreactor facilities. In the sixth year and beyond, the budget must remain high so that it can be revised and updated.

ORNL and Energy Systems Engineering have the core of an effective team for preparing and reviewing safety analysis documents. In addition to the personnel and costs for the actual preparation of the documents, more personnel are required in Operational Safety and in the operating divisions for effective oversight and management of the program. ORNL now has a very effective program for operational-readiness reviews of nuclear facilities and is currently upgrading the program of periodic operational safety reviews of nuclear facilities by using formal appraisal criteria and by selectively using outside experts.

### **7.2.2 Operational Safety Appraisal and Review Program**

To comply with the requirements for operations-independent reviews and operational safety oversight stipulated by DOE Orders 5480.5, 5480.6, and 5482.1, ORNL maintains the technical staff of the Office of Operational Safety and eight Laboratory Director's Review Committees (ten counting the Transportation Safety Committee and the Criticality Review Committee) composed of technical and operational experts in the areas being reviewed. The scientists and engineers in Operational Safety provide continuing oversight of all nuclear facilities, and they and the Director's Review Committees conduct annual comprehensive reviews of operational safety at all facilities.

Although the appraisal and review program has contributed to ORNL's record of nearly 30 years without a significant accident at a nuclear facility, improvements are needed in the documentation at the level that is required by the three applicable DOE orders. To strengthen the program, Operational Safety recently increased the professional staff for reactor oversight and radiochemical facility oversight. Formal appraisal criteria were developed and are currently being used for reviews of the reactor and radiochemical processing facilities. Planned improvements also include increased participation in facility reviews by other ORNL health and safety groups. Participation by outside experts has been implemented for reactor reviews and selected radiochemical facility reviews. Documentation was improved in FY 1988 by beginning a computer-based tracking system, but further development is needed. Retention of microfiche copies of all formal reports of facility reviews is just beginning. All of the elements of the improved program will be implemented by the end of 1989.

### **7.2.3 Configuration Control Program**

The objective of configuration control is to ensure that changes in safety equipment and safety-related structures, systems, or components do not result in a decrease in the safety of nuclear facilities. To implement the requirements of DOE Order 5481.1B, ORNL has a configuration-control program consisting of formal identification of changes, review of changes and effects, authorization of changes, and documentation of changes in procedures, documents, and as-built drawings.

Configuration changes at ORNL reactors have complied with a formal program for several years, and ORNL is extending the formal program to all nuclear facilities. Operational Safety is issuing revised ORNL Standard Practice Procedures to address this requirement. Some operating

divisions must revise and update their configuration-control procedures in response to the changed ORNL procedures. Some formal tracking and documentation deficiencies will be eliminated by the additional Operational Safety staff previously mentioned; however, full implementation to comply with DOE orders, including 6430.1A, will require a full-time configuration manager in the Office of Operational Safety and configuration managers in the operating divisions. All of the improvements are scheduled for implementation by the end of fiscal year 1990.

#### **7.2.4 Nuclear Facility Worker Training Program**

The objectives of the training program are to ensure that all operations are conducted safely by qualified facility workers and to educate workers not only in the hazards and risks of the operations but also in the methods of controlling those hazards and limiting the risks to themselves and others. Nuclear facility workers include operators, supervisors, maintenance employees, and other support personnel. ORNL has developed a training program designed to comply with DOE Orders 5480.5 and 5480.6 for nonreactor-nuclear workers and reactor workers, respectively. As part of realizing the program objectives, ORNL is developing more comprehensive training programs for general Laboratory employees and Laboratory visitors.

Currently, the entire training program is being improved. The position for training oversight in Operational Safety was upgraded to half-time in 1987. In 1987 and 1988, several training staff members were added to the Environmental and Health Protection Division as a resource for all ORNL, and they are currently working to develop and implement programs for generic safety training of nuclear facility workers and basic safety training of general employees and visitors. Most ORNL nuclear facilities now have formal training programs and are approaching compliance with current requirements of the DOE orders, but a few others need improvement in documenting training. This deficiency will be addressed and remedied by January 1, 1990.

A reevaluation of the long-range plan for training will be necessary when requirements imposed by the draft DOE order on training accreditation are fully determined, and the following schedule may be revised. A training laboratory and simulation devices for training will be acquired by October 1991 to increase the effectiveness of training radiochemical operators and maintenance personnel, and some simulation devices may also be required for reactor training. Record maintenance and other clerical services to ensure training oversight will require adding approximately a half-time person in Operational Safety and one to two people in other ORNL organizations. In one area—the training of support personnel in the Plant and Equipment Division and personnel in the Fire Department and in the Laboratory Security Department—not only additional resources but also possible management-labor negotiations will be required. This segment of the training program will be upgraded over a 2-year period beginning in October 1989.

#### **7.2.5 Unusual Occurrence Reporting Program**

The objectives of the Unusual Occurrence Reporting (UOR) Program required by DOE Order 5000.3 and secondarily by DOE Order 5481.1B are twofold: to establish a formal mechanism for ensuring awareness of significant technical, operational, and safety problems, and to achieve through this mechanism the improvements in operations that can result from knowledge of problems and responses at other nuclear facility sites. ORNL has a formal program for reporting unusual occurrences. The UOR Coordinator in Operational Safety works with operating divisions to ensure that the divisions prepare accurate and timely reports of incidents, and that the UORs are

presented to ORNL management for submission to DOE-ORO. After informal reporting and discussion, ORNL and DOE-ORO management may conclude that no formal report is required for some inconsequential incidents. The UOR Coordinator tracks incomplete actions on initial reports and audits the responses of operating divisions to ensure follow-up actions and submission of final UORs. Periodic summaries are provided to DOE. UORs from other nuclear facility sites are reviewed and distributed to ORNL operating divisions.

The UOR Program at ORNL is in full compliance with DOE orders, except in some areas of follow-up investigation of incidents, and this is currently being remedied. During 1988, ORNL will develop a Standard Practice Procedure for reporting unusual occurrences and begin investigating them more fully. The UOR Coordinator will ensure implementation of this procedure. No additional resources are required.

### **7.2.6 Nuclear Facility Upgrade Program**

The objective of upgrading ORNL nuclear facilities are to ensure either compliance with required DOE facility-design criteria or a waiver of compliance when the risk of compromising safety can be shown to be sufficiently small. Compliance is mandated by DOE Orders 5480.5, 5480.6, and 6430.1A, and requirements are given in DOE/TIC-11603 Rev. 1. Design deficiencies are identified formally through the previously mentioned Safety Analysis and Review Program and Operational Safety Appraisal and Review Program. Because most ORNL nuclear facilities were constructed before the current design criteria were developed, ORNL and DOE are working to identify funds to upgrade or to retire facilities with significant deficiencies. Some of these facilities are 40 years old and show signs of aging. ORNL Operational Safety provides oversight of the upgrade to assure management that all elements of this Nuclear Facility Safety Program are followed and that the facility can be operated safely.

Major facility design deficiencies have been identified; however, except for the HFIR and Building 7920, facilities have not been compared, item by item, with the current design criteria. This comparison is planned as part of the expanded Safety Analysis and Review Program when funded. Major deficiencies in nonreactor facilities are being upgraded from operating funds and General Plant Projects at an annual level of \$1 million to \$2 million, but this level is not sufficient to bring operating facilities into design compliance within 5 to 10 years. ORNL and DOE-ORO are attempting to develop a plan that will provide funding for the upgrade of facilities that have previously received a level of funding adequate only for operation and vital repairs. ORNL will identify and request long-term funding at a level that best balances cost effectiveness and urgency for compliance, in order to upgrade inadequate (but repairable) nonreactor nuclear facilities. By the end of 1992, ORNL will also request construction of replacement facilities that are necessary to continue operating a safe, viable nuclear program at a level projected to meet national goals. The addition of five to six people in Operational Safety in the operating divisions will be required to study, review, manage, and oversee the program. In addition to the staff for management and oversight, approximately \$5 million per year for nonreactor facilities will be required for the first 5 years, with larger amounts after the program is mature. The reactor upgrade is estimated to require at least \$12 million in additional funds.

### **7.2.7 Facility Decontamination and Decommissioning Program**

The objective of the ORNL Facility Decontamination and Decommissioning (D&D) Program is to place inadequate facilities and surplus facilities in conditions that do not pose present or future

hazards to workers or the public, in compliance with DOE Orders 5480.2, 5480.5, 5480.6, 5480.11, and 5820.2A. When these facilities are identified, plans for disposal of the facilities are approved by ORNL management after review by Operational Safety and other safety and health personnel. The facility is decontaminated and then either demolished, placed under protective surveillance, or upgraded for re-use. The D&D Program is reviewed periodically as part of the Operational Safety Appraisal and Review Program.

For the longer term, ORNL will develop and present plans, schedules, and funding requests for decommissioning surplus facilities. This plan will be completed by the end of FY 1989. In addition to the current staff and budget of 4 program people and approximately \$1 million for maintenance and surveillance and 3.5 program people and approximately \$1.5 million for facility decontamination, all of which are covered under the Environmental Upgrade Long-Range Plan, a 0.5 full-time person will be needed each year for review and oversight.

### **7.3 SUMMARY OF PROGRAM NEEDS AND RESOURCES**

To accomplish the mission addressed in this section, ORNL Operational Safety currently has a staffing level of approximately 6.1 scientists and engineers, including the manager, and 1.65 secretaries (with approval for an additional professional staff member) to manage the Safety Analysis and Review Program. The annual operating budget for this program was approximately \$600,000 in FY 1988 and over \$800,000 in 1989. To achieve full compliance with the elements of the program, as presented in this plan, will require 1.5 more professional staff members, in addition to the one currently approved and one additional secretary or clerk. An additional annual budget for the Office of Operational Safety of approximately \$400,000 is needed. The additional funding would include salaries for staff and compensation for review staff both within and outside ORNL. Additional office space, document storage space, and some small equipment will also be required.

Other ORNL organizations will also require additional funding and staffing to comply fully with the outlined program. Some requirements are one-time or short-term: approximately \$475,000 is needed for training equipment. Additional continuing staff increases previously identified include approximately 2.25 people for Safety Analysis and Review, 0.5 for Operational Safety Review and Appraisal, 5 or 6 for Nuclear Facility Upgrade, and 8 to 10 for fully implementing Nuclear Facility Worker Training. Funding at a level of at least \$5 million annually for nonreactor facilities and \$2 million to \$3 million annually for reactors is needed for Nuclear Facility Upgrade in order to bring ORNL facilities into compliance within a reasonable period.

### **7.4 PROGRAM DATA AND FUNDING SUMMARY**

This section consists of program data sheets and schedules that describe the activities within this functional area. Table 7.1 summarizes overall funding by funding type.

1. Program Category		2. Reporting Period 5/01/89 through 5/31/89																							
3. Project Title <b>NUCLEAR FACILITY SAFETY DISCIPLINE</b> FWP NO : ACTIVITY NO :		4. Program Representative				Funding Type:																			
		5. Project Engineer				Funding Year:																			
6. Project Number WBS	7. Subproject Title	8. Fiscal Year and Months																							
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	SAFETY ANALYSIS AND REVIEW UPGRADE SAFETY ANALYSIS DOCUMENTS (NONREACTOR)	[Gantt bar spanning FY-1989 months 1-4 and FY-1990 months 1-9]																							
	SAFETY ANALYSIS AND REVIEW UPGRADE SAFETY ANALYSIS DOCUMENTS (REACTOR)	[Gantt bar spanning FY-1989 months 1-4 and FY-1990 months 1-12]																							
	OPERATIONAL SAFETY APPRAISAL AND REVIEW INCREASE OTHER ESH PARTICIPATION	[Gantt bar spanning FY-1989 months 1-4 and FY-1990 months 1-9]																							
	OPERATIONAL SAFETY APPRAISAL AND REVIEW UPGRADE RECORD MAINTENANCE	[Gantt bar spanning FY-1989 months 1-3]																							
	OPERATIONAL SAFETY APPRAISAL AND REVIEW MICROFILM PAST REVIEW REPORTS AND KEEP CURRENT	[Gantt bar spanning FY-1989 months 1-4 and FY-1990 months 1-3]																							
	NUCLEAR FACILITY WORKER TRAINING UPGRADE AND IMPLEMENT CONTINUING PROGRAM	[Gantt bar spanning FY-1989 months 1-4 and FY-1990 months 1-9]																							
	NUCLEAR FACILITY UPGRADE PROGRAM	[Gantt bar spanning FY-1989 months 1-4 and FY-1990 months 1-9]																							
	DECONTAMINATION AND DECOMMISSIONING PROGRAM DEVELOP AND IMPLEMENT COMPREHENSIVE D & D PLAN	[Gantt bar spanning FY-1989 months 1-4 and FY-1990 months 1-9]																							

<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p> <p>12 ← MONTH</p> <p>← FORECAST</p>	<p>SYMBOL</p> <p>MILESTONE LEVEL 0 1 2 3 4</p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: SAFETY ANALYSIS AND REVIEW PROGRAM

CONTACT: H. B. PIPER

PROGRAM CATEGORY: NUCLEAR FACILITY SAFETY

PLANT: ORNL

PROJECT NO: 6.01

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: FS-1

EPMP NO: 2.6.01

SCOPE: Upgrade safety analysis documentation for ORNL reactors to comply with new DOE-ORO guidelines and new requirements of DOE orders distributed after 1986. Perform analyses; and do probabilistic risk assessments as required. Increase OOS staff by 0.3 FTE scientist or engineer.

JUSTIFICATION: DOE Orders require safety documentation and review to ensure that risks are recognized and accepted. Current documents do not have the required technical rigor in either comparison against standards or analysis of all identified hazards. PRA's are required for Class A reactors, high-hazard facilities, and selected moderate-hazard facilities. A full-time Safety Documentation Manager, with management and support, is needed in the Safety Documentation Manager, with management and support, is needed in the OOS. Approximately one-fourth of a reviewer trained in nuclear engineering, health physics, and risk analysis is required from the present OOS staff.

FACILITIES: HFIR, BSR, HPRR, TSF

STATUS/COMMENTS:

FUNDING YEARS: 88-?				TEC (\$x1000): 24350										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
H	BO	EXP	24350	700	5100	3300	3700	2700	2500	2000	1450	1450	1450	
TOTAL:			24350	700	5100	3300	3700	2700	2500	2000	1450	1450	1450	

1. Program Category <b>NUCLEAR FACILITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89																									
3. Project Title <b>SAFETY ANALYSIS AND REVIEW PROGRAM (REACTOR)</b>		4. Program Representative H. B. PIPER		Funding Type:																							
FWP NO : ACTIVITY NO :		5. Project Engineer		Funding Year:																							
6. Project Number WBS 6.01	7. Subproject Title  SAFETY ANALYSIS AND REVIEW PROGRAM (REACTOR) UPGRADE	8. Fiscal Year and Months																									
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994					
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		

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<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p> <p>12 ← MONTH</p> <p>← FORECAST</p> <p>SYMBOL MILESTONE LEVEL 0 1 2 3 4</p> <p>▽ □ ◇ ☆ ⊗</p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: SAFETY ANALYSIS AND REVIEW PROGRAM

CONTACT: H. B. PIPER

PROGRAM CATEGORY: NUCLEAR FACILITY SAFETY

PLANT: ORNL

PROJECT NO: 6.02

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: FS-2

EPMP NO: 2.6.02

SCOPE: Upgrade safety analysis documentation for ORNL nuclear facilities to comply with new DOE-ORO guidelines and new requirements of DOE orders distributed after 1986. Compare with 6430.1A design criteria; perform analyses; and do probabilistic risk assessments as required for 20 facilities. Increase OOS staff by one-half FTE scientist or engineer.

JUSTIFICATION: DOE Orders require safety documentation and review to ensure that risks are recognized and accepted. Current documents do not have the required rigor in either comparison against standards or analysis of all identified hazards. PRA's are required for high-hazards facilities and selected moderate-hazard facilities. A full-time Safety Documentation Manager, with management and support, is needed in the OOS. Approximately 3/4's of a reviewer trained in radiochemistry, health physics, and risk analysis is required from the present OOS staff. Appx. 2.25 additional safety analysis documentation managers are needed by operating organizations.

FACILITIES: 2026, 3025, 3-26C, 3029, 3030, 3031, 3033, 3033 Annex, 3038, 3039 Stack, 3047, 3517, 3525, 4501 Alpha Lab., 5505, 7025, 7920, 7930, LLW System, Process Waste System, and Solid Waste Operations.

STATUS/COMMENTS: No funds for upgrading some nonreactor-facility documents have been identified.

FUNDING YEARS: 88-?		TEC (\$K1000): 8997											
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR									
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
H	BO	EXP	8997	252	340	824	1206	1313	1313	1313	1145	646	645
		TOTAL:	8997	252	340	824	1206	1313	1313	1313	1145	646	645

1. Program Category <b>NUCLEAR FACILITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89						
3. Project Title <b>SAFETY ANALYSIS AND REVIEW PROGRAM (NONREACTOR NUCLEAR)</b>		4. Program Representative H. B. PIPER		Funding Type:				
FWP NO : ACTIVITY NO :		5. Project Engineer		Funding Year:				
6. Project Number WBS 6.02	7. Subproject Title  SAFETY ANALYSIS AND REVIEW PROGRAM (NONREACTOR NUCLEAR) UPGRADE	8. Fiscal Year and Months						
		FY-1989	FY-1990	FY-1991	FY-1992	FY-1993	FY-1994	
		1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	

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<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p> <p>12 ← MONTH</p> <p>← FORECAST</p> <p>SYMBOL MILESTONE LEVEL 0 1 2 3 4</p> <p>▽ □ ◇ ☆ ✕</p>	Comments:
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: OPERATIONAL SAFETY APPRAISAL AND REVIEW PROGRAM

CONTACT: H. B. PIPER

PROGRAM CATEGORY: NUCLEAR FACILITY SAFETY

PLANT: ORNL

PROJECT NO: 6.03

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: FS-3

EPMP NO: 2.6.03

SCOPE: Ensure the operations-independent reviews and continuing operational-safety oversight required by DOE Orders by conducting operational readiness reviews and annual comprehensive reviews of at all facilities. Formal appraisal criteria are used for reviews of facilities. Documentation is being improved by a computer-based tracking system.

JUSTIFICATION: The program has deficiencies in the comprehensive formal documentation that is required by the three applicable DOE Orders and in oversight and documentation of gloveboxes in laboratories that are not nuclear facilities.

FACILITIES: Reactors, nonreactor nuclear facilities, and laboratory operations in 4500S, 4500N, 4501, 4505.

STATUS/COMMENTS: Since the last update, OOS staff for the program has been increased by about 0.65 FTE; outside experts have been added for selected reviews; and formal appraisal criteria have been developed and are used.

FUNDING YEARS: 88-?			TEC (\$x1000): 6729										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR									
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
H	BO	EXP	6729	443	528	610	708	740	740	740	740	740	740
TOTAL:			6729	443	528	610	708	740	740	740	740	740	740

1. Program Category <b>NUCLEAR FACILITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89																							
3. Project Title <b>OPERATIONAL SAFETY APPRAISAL AND REVIEW PROGRAM</b> FWP NO : ACTIVITY NO :		4. Program Representative H. B. PIPER		Funding Type:																					
		5. Project Engineer		Funding Year:																					
6. Project Number WBS 6.03	7. Subproject Title	8. Fiscal Year and Months																							
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	OPERATIONAL SAFETY APPROVAL AND REVIEW PROGRAM UPGRADE								3																
	UPGRADE RECORD MAINTAINENCE			3																					
	PUT REPORT ON MICROFILM AND KEEP CURRENT								3																
SHADING INDICATES STATUS AND COMPLETION		12 ← MONTH		SYMBOL		MILESTONE LEVEL		▽ □ ◇ ☆ ✕		0		1		2		3		4		Comments:					
ACTIVITY SCHEDULE		← FORECAST																							

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: CONFIGURATION CONTROL PROGRAM (REACTOR)

CONTACT: H. B. PIPER

PROGRAM CATEGORY: NUCLEAR FACILITY SAFETY

PLANT: ORNL

PROJECT NO: 6.04

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: FS-4

EPMP NO: 2.6.04

SCOPE: Ensure that changes in safety equipment, safety-related structures, and safety-related systems or components do not result in a decrease in safety of nuclear reactors. The program comprises formal identification of changes, review of changes and effects, authorization of changes, and documentation of changes in procedures, documents, and as-built drawings.

JUSTIFICATION: 5480.6, the National Academy of Sciences Study, and the other DOE requirement make documentation, review, and control essential.

FACILITIES: All Reactors

STATUS/COMMENTS: ORNL procedures for configuration control have been developed, and tracking documentation has been upgraded since the last update. To ensure full implementation will require a half-time Reactor Configuration Control Manager, an addition of > 0.3 FTE, and > 0.05 additional secretarial/clerical support.

FUNDING YEARS: 88-?

TEC (\$x1000): 7283

B&R CODE	BA/BO	FUNDING TYPE	TOTAL	TEC (\$x1000)									
				PRIOR FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
H	BO	EXP	7283	654	654	695	726	759	759	759	759	759	759
TOTAL:			7283	654	654	695	726	759	759	759	759	759	759

1. Program Category <b>NUCLEAR FACILITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89																	
3. Project Title <b>CONFIGURATION CONTROL PROGRAM (REACTOR)</b> FWP NO : ACTIVITY NO :		4. Program Representative H. B. PIPER		Funding Type:															
6. Project Number WBS 6.04		7. Subproject Title  CONFIGURATION CONTROL PROGRAM (REACTOR)		5. Project Engineer		Funding Year:													
		8. Fiscal Year and Months																	
		FY-1989		FY-1990		FY-1991		FY-1992		FY-1993		FY-1994							
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
				2															

<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p> <p>12 ← MONTH</p> <p>← FORECAST</p> <p>SYMBOL MILESTONE LEVEL</p> <p>▽ □ ◇ ☆ X</p> <p>0 1 2 3 4</p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: CONFIGURATION CONTROL PROGRAM (NONREACTOR NUCLEAR)

CONTACT: H. B. PIPER

PROGRAM CATEGORY: NUCLEAR FACILITY SAFETY

PLANT: ORNL

PROJECT NO: 6.05

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: FS-5

EPMP NO: 2.6.05

SCOPE: Ensure that changes in safety equipment, safety-related structures, and safety-related systems or components do not result in a decrease in safety of nuclear facilities. The program comprised formal identification of changes, review of changes and effects, authorization of changes, and documentation of changes in procedures, documents, and as-built drawings.

JUSTIFICATION: The recently revised DOE Order 6430.1A adds formal requirements previously not required for existing nonreactor facilities. It and the other DOE Orders make documentation, review, and control essential.

FACILITIES: All Nonreactor Nuclear Facilities

STATUS/COMMENTS: ORNL procedures for configuration control have been developed, and tracking and documentation has been upgraded since the last update. To ensure full implementation will require a half-time Manager in the OOS, and addition of > 0.3 FTE, with > 0.05 additional secretarial/clerical support. Configuration Managers (3-4 FTE) in operating groups are needed.

FUNDING YEARS: 88-?			TEC (\$x1000): 4014											
BER CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
H	BO	EXP	4014	104	115	226	491	513	513	513	513	513	513	
TOTAL:			4014	104	115	226	491	513	513	513	513	513	513	

1. Program Category <b>NUCLEAR FACILITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89																							
3. Project Title <b>CONFIGURATION CONTROL PROGRAM (NONREACTOR NUCLEAR)</b>		4. Program Representative H. B. PIPER		Funding Type:																					
IWP NO : ACTIVITY NO :		5. Project Engineer		Funding Year:																					
6. Project Number WBS 6.05	7. Subproject Title	8. Fiscal Year and Months																							
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	CONFIGURATION CONTROL PROGRAM (NONREACTOR)	■																							
	INCREASE OOS NONREACTOR CONFIGURATION CONTROL MANAGER TO HALF FTE WITH ADDITIONAL SUPPORT ADD 3-4 FTE CONFIGURATION MANAGERS IN OPERATING GROUPS																								

SHADING INDICATES STATUS AND COMPLETION

ACTIVITY SCHEDULE

12 ← MONTH

FORECAST

SYMBOL MILESTONE LEVEL 0 1 2 3 4

Comments:

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: NUCLEAR FACILITY WORKER TRAINING PROGRAM (REACTOR)

CONTACT: H. B. PIPER

PROGRAM CATEGORY: NUCLEAR FACILITY SAFETY

PLANT: ORNL

PROJECT NO: 6.06

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: FS-6

EPMP NO: 2.6.06

SCOPE: Comply with DOE Orders 5480.6, for reactors by providing workers training to ensure that they understand not only the hazards and risks of the operations but also methods of controlling the hazards and limiting the risks to themselves and others. Additional requirements are currently unclear pending implementation of the draft order on accreditation.

JUSTIFICATION: The upgrades are needed to meet the minimum requirements of the DOE Orders. Further upgrades will be identified and added when the draft order becomes effective.

FACILITIES: Reactors and all ORNL for general employee training to ensure safety.

STATUS/COMMENTS: To meet requirements, measures include adding a training laboratory and simulation devices. OOS provides oversight and appraisal.

FUNDING YEARS: 88-?				TEC (\$M1000): 16178										
BER CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
H	BO	EXP	16178	500	1168	1688	1764	1843	1843	1843	1843	1843	1843	1843
		TOTAL:	16178	500	1168	1688	1764	1843	1843	1843	1843	1843	1843	1843

1. Program Category <b>NUCLEAR FACILITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89																			
3. Project Title <b>NUCLEAR FACILITY WORKER TRAINING PROGRAM (REACTOR)</b>		4. Program Representative H. B. PIPER		Funding Type:																	
FWP NO : ACTIVITY NO :		5. Project Engineer		Funding Year:																	
6. Project Number WBS 6.06	7. Subproject Title  NUCLEAR FACILITY WORKER TRAINING PROGRAM (REACTOR)	8. Fiscal Year and Months																			
		FY-1989			FY-1990			FY-1991			FY-1992			FY-1993			FY-1994				
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
				3																	

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<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p> <p>12 ← MONTH</p> <p>← FORECAST</p> <p>SYMBOL MILESTONE LEVEL</p> <p>▽ □ ◇ ☆ ⊗</p> <p>0 1 2 3 4</p>	Comments:
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: NUCLEAR FACILITY WORKER TRAINING PROGRAM (NONREACTOR)

CONTACT: H. B. PIPER

PROGRAM CATEGORY: NUCLEAR FACILITY SAFETY

PLANT: ORNL

PROJECT NO: 6.07

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: FS-7

EPMP NO: 2.6.07

SCOPE: Comply with DOE Orders 5480.5 for nonreactor-nuclear facilities, by providing workers training to ensure that they understand not only the hazards and risks of the operations but also methods of controlling the hazards and limiting the risks to themselves and others. Additional requirements are currently unclear pending implementation of the draft order on accreditation.

JUSTIFICATION: All of the upgrades ater needed to meet the minimum requirements of the DOE Orders. Further upgrades will be identified and added when the draft order becomes effective.

FACILITIES: Nonreactor-nuclear facilites and all ORNL for general employee training to ensure safety.

STATUS/COMMENTS: To meet requirements, ORNL may need to hire a Laboratory evaluation of training by an organization outside Energy Systems; adding a training laboratory and simulation devices; adding record-maintenance and clerical personnel; and adding at least 7-8 FTE in service groups. OOS provides oversight and appraisal.

<u>FUNDING YEARS:</u> 88-?		<u>TEC (\$x1000):</u> 15264											
<u>BER CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
H	BO	EXP	15264	255	879	1228	1536	2086	1856	1856	1856	1856	1856
<u>TOTAL:</u>			15264	255	879	1228	1536	2086	1856	1856	1856	1856	1856

1. Program Category <b>NUCLEAR FACILITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89	
3. Project Title <b>NUCLEAR FACILITY WORKER TRAINING PROGRAM (NONREACTOR NUCLEAR)</b>		4. Program Representative H. B. PIPER	Funding Type:
LWP NO : ACTIVITY NO :		5. Project Engineer	Funding Year:

6. Project Number WBS 6 07	7. Subproject Title	8. Fiscal Year and Months																											
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994							
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
	NUCLEAR FACILITY WORKER TRAINING PROGRAM (NONREACTOR)																												
	ADD CLERICAL HELP																												
	ADD CLASSROOM																												
	ADD TRAINING MANAGERS																												
	ADD SIMULATION DEVICES																												

<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p> <p>12 ← MONTH</p> <p>← FORECAST</p> <p>SYMBOL</p> <p>MILESTONE LEVEL 0 1 2 3 4</p> <p>▽ □ ◇ ☆ X</p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: UNUSUAL OCCURRENCE REPORTING PROGRAM

CONTACT: H. B. PIPER

PROGRAM CATEGORY: NUCLEAR FACILITY SAFETY

PLANT: ORNL

PROJECT NO: 6.08

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: FS-8

EPMP NO: 2.6.08

SCOPE: Establish a formal mechanism for ensuring awareness by ORNL and DOE-ORO management of significant technical, operational, and safety problems, and, through this mechanism, achieve the improvements in operations that can result from knowledge of problems and responses at other nuclear-facility sites. The program is in full compliance, but reports require improving.

JUSTIFICATION: Reporting at the current level is required by the DOE Orders. The improved reports are needed to help other sites and facilities.

FACILITIES: All reactors and nonreactor-nuclear facilities

STATUS/COMMENTS: ORNL is currently in compliance.

FUNDING YEARS: 88-?			TEC (\$X1000): 870										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
H	BO	EXP	870	64	81	85	88	92	92	92	92	92	92
TOTAL:			870	64	81	85	88	92	92	92	92	92	92

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: NUCLEAR FACILITY UPGRADE PROGRAM (REACTOR)

CONTACT: H. B. PIPER

PROGRAM CATEGORY: NUCLEAR FACILITY SAFETY

PLANT: ORNL

PROJECT NO: 6.09

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: FS-9

EPMP NO: 2.6.09

SCOPE: Ensure either compliance with required DOE facility-design criteria or a waiver of compliance when the risk of compromising safety can be shown to be sufficiently small. Design deficiencies are identified through the Safety Analysis and Review Program (FS-1) and the Operational Safety Appraisal and Review Program (FS-3).

JUSTIFICATION: ORNL reactors predate current design criteria and being improved to meet them. DOE requires meeting the criteria or justifying relief from them.

FACILITIES: HFIR, BSR, TSF, HPRR, CEF

STATUS/COMMENTS: Major design deficiencies of facilities have been identified, but upgrade work is not yet completed. Major deficiencies are currently being upgraded from operating funds and General Plant Projects (GPPs) at an annual level of \$1,000,000 to \$5,000,000, but a line item will be required to bring reactors into design compliance within a reasonable time.

FUNDING YEARS: 88-?

TEC (\$K1000): 19837

B&R CODE	EA/BO	FUNDING TYPE	TOTAL	PRIGR									BEYOND FY-95
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	
H	BO	LIP	7500	0	0	0	1300	2800	2400	1000	0	0	0
H	BO	EXP	12337	5520	2414	635	498	520	550	550	550	550	550
TOTAL:			19837	5520	2414	635	1798	3320	2950	1550	550	550	550

1. Program Category <b>NUCLEAR FACILITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89																									
3. Project Title <b>NUCLEAR FACILITY UPGRADE PROGRAM (REACTOR)</b>		4. Program Representative H. B. PIPER		Funding Type:																							
FW# NO: ACTIVITY NO:		5. Project Engineer		Funding Year:																							
6. Project Number WBS 6.09	7. Subproject Title  NUCLEAR FACILITY UPGRADE REACTOR	8. Fiscal Year and Months																									
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994					
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
		<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p> <p>12 ← MONTH</p> <p>← FORECAST</p> <p>SYMBOL MILESTONE LEVEL 0 1 2 3 4</p> <p>▽ □ ◇ ☆ X</p>																									
		Comments:																									

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: NUCLEAR FACILITY UPGRADE PROGRAM (NONREACTOR NUCLEAR)

CONTACT: M. B. PIPER

PROGRAM CATEGORY: NUCLEAR FACILITY SAFETY

PLANT: ORNL

PROJECT NO: 6.10

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: FS-10

EPMP NO: 2.6.10

SCOPE: Ensure either compliance with required DOE facility-design criteria or a waiver of compliance when the risk of compromising safety can be shown to be sufficiently small. Design deficiencies are identified through the Safety Analysis and Review Program (FS-2) and the Operational Safety Appraisal and Review Program (FS-3).

JUSTIFICATION: Most ORNL nuclear facilities predate current design criteria and have not been improved to meet them. 6430.1A requires meeting the criteria or justifying relief from them.

FACILITIES: 2026, 3025, 3026C, 3029, 3030, 3031, 3033, 3033 Annex, 3038, 3039 Stack, 3047, 3517, 3525, 4501 Alpha Lab., 5505, 7025, 7920, 7930

STATUS/COMMENTS: Major design deficiencies of facilities have been identified, but the facilities have not been compared, item by item, with the 6430.1A criteria. Major deficiencies are currently being upgraded from operating funds and GPPs.

FUNDING YEARS: 88-?			TEC (\$x1000): 93802										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR									BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95
S	BO	GPP	2780	0	1595	1185	0	0	0	0	0	0	0
S	BO	LIP	6000	0	0	0	0	0	0	0	6000	0	0
S	BO	EXP	85022	1304	1250	1405	6882	6727	6727	6727	14000	20000	20000
TOTAL:			93802	1304	2845	2590	6882	6727	6727	6727	20000	20000	20000

1. Program Category <b>NUCLEAR FACILITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89	
3. Project Title <b>NUCLEAR FACILITY UPGRADE PROGRAM (NONREACTOR NUCLEAR)</b>		4. Program Representative H. B. PIPER	
FWP NO : ACTIVITY NO :		5. Project Engineer	
		Funding Type:	
		Funding Year:	

6. Project Number WBS 6.10	7. Subproject Title	8. Fiscal Year and Months																											
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994							
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
	NUCLEAR FACILITY UPGRADE NONREACTOR																												

<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p>	<p>SYMBOL MILESTONE LEVEL</p> <p>▽ □ ◇ ☆ X</p> <p>0 1 2 3 4</p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET

5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: FACILITY DECONTAMINATION AND DECOMMISSIONING (REMEDIAL ACTION) PROGRAM

CONTACT: H. B. PIPER

PROGRAM CATEGORY: NUCLEAR FACILITY SAFETY

PLANT: ORNL

PROJECT NO: 6.11

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: FS-11

EPMP NO: 2.6.11

SCOPE: Place inadequate facilities and no-longer-needed facilities in conditions that do not pose present or future hazards to workers or the public, in compliance with DOE orders. Decontaminate facilities, and then either demolish, place under protective surveillance, or upgrade for re-use, as addressed in an approved plan.

JUSTIFICATION: Both the program and management oversight are required by the DOE orders. This program is currently undergoing review because of the revised 5320.2A.

FACILITIES: 3001, 3019 Analytical Cells, 3026D, 3042, 3505, 3517 cells, 4507, LITR, MSRE, HRE, retired waste tanks, retired solid waste storage areas

STATUS/COMMENTS: All program projects and budget requirements are addressed in the long-range plan for environment. The Remedial Action Program is reviewed periodically as part of FS-3, and projects and plans are reviewed as they are developed.

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FUNDING YEARS: 88-?			TEC (\$M1000): 281											
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
H	BO	EXP	281	5	6	6	36	38	38	38	38	38	38	38
TOTAL:			281	5	6	6	36	38	38	38	38	38	38	38

1. Program Category <b>NUCLEAR FACILITY SAFETY</b>		2. Reporting Period 5/01/89 through 5/31/89	
3. Project Title <b>FACILITY DECONTAMINATION AND DECOMMISSIONING (REMEDIAL)</b>		4. Program Representative H. B. PIPER	Funding Type:
FWP NO : ACTIVITY NO :		5. Project Engineer	Funding Year:

6. Project Number	7. Subproject Title	8. Fiscal Year and Months																							
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994			
WBS		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
6.11	FACILITY DECONTAMINATION AND DECOMMISSIONING OVERSIGHT																								

Comments:

SHADING INDICATES STATUS AND COMPLETION

ACTIVITY SCHEDULE

12 ← MONTH

← FORECAST

SYMBOL MILESTONE LEVEL

▽ □ ◇ ☆ X

0 1 2 3 4

**Table 7.1. Funding summary for Nuclear Facility Safety Program**

Funding type	Funding (\$ × 1000)								Total
	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	
Exp	12,535	10,702	17,635	17,331	16,931	16,431	22,986	28,487	143,038
GPP	1,595	1,185							2,780
GPE									
LI			1,300	2,800	2,400	1,000	6,000		13,500
Total capital	1,595	1,185	1,300	2,800	2,400	1,000	6,000		16,280
Total (types)	14,130	11,887	18,935	20,131	19,331	17,431	28,986	28,487	159,318

## **8. TRANSPORTATION SAFETY LONG-RANGE PLAN**

### **8.1 MISSION AND OBJECTIVES**

The objective of the ORNL Transportation Safety Program is to ensure that all hazardous material is safely transported both on- and off-site without endangering the welfare of the public and ORNL workers or damage to the environment. This is accomplished by ensuring that all hazardous material shipped is packaged and moved according to DOE and Energy Systems policies, as well as Department of Transportation (DOT) and other applicable federal regulations. An additional objective of the program is to ensure that if an accident should occur, danger and damage to both people and the environment will be ameliorated.

There are approximately 18 groups (involving over 500 people) that either transport or support the transportation of hazardous material. The position of ORNL Transportation Safety Oversight Manager was created, and the Laboratory Director's Transportation Committee was formed to ensure the accomplishment of the ORNL Transportation Safety Program.

### **8.2 PROGRAM REQUIREMENTS AND STATUS**

#### **8.2.1 Procedures**

The requirements in DOE orders and Energy Systems policies governing transportation are incorporated into ORNL Standard Practice Procedure SPP-65, "Off-site Transportation of Radioactive Materials, Hazardous Materials, and Hazardous Wastes," which governs the implementation procedure for the ORNL Transportation Safety Program and ensures that all people involved in transportation are aware of all pertinent DOE orders, Energy Systems policies, and other applicable regulations involving the transport of hazardous material. This procedure is updated periodically. A new Standard Practice Procedure will be written in the near future detailing requirements for movement of hazardous materials on-site and implementing DOE Order 5480.3.

An integral part of the procedures work is the development and implementation of Quality Assurance (QA) procedures covering the various aspects of the Transportation Program, that is, procurement of containers, packaging of material, and required documentation. A QA program has been developed. As part of the implementation of the program, a QA plan/assessment needs to be developed for each group involved in shipping material.

Safety documentation is required for each of the casks used to transport radioactive materials off-site. This documentation is referred to as a Safety Analysis Report for Packaging (SARP). SARPs provide comprehensive technical evaluation and review of the design covering thermal analysis; structural analysis; criticality; shielding; testing, operation, and maintenance procedures; and the QA Program.

ORNL owns six shipping casks for the off-site movement of radioactive material. Each one has a SARP and a certificate of compliance that expires within the next few years. Each cask must be

evaluated, either analytically or by testing, by the current criteria and approved for use by the DOE.

Once the preliminary scoping analysis has been completed, a decision must be made as to whether it is more economical to continue with an in-depth analysis or to buy or lease a new cask. The cost involved could average \$500,000 or more per cask.

### **8.2.2 Transportation Training**

DOT regulations require personnel who are involved in or responsible for the handling, packaging, or transport of hazardous materials to participate in transportation safety training. There are several levels and types of training necessary. This training must be documented and may range from informal safety meetings covering specifically the tasks at hand to extensive, formal classroom training conducted off-site.

A training "Needs Assessment" has been completed by an outside consultant for ORNL and is being used as the basis for the current Transportation Training Program being developed. The program will be completed in early FY 1989 with implementation to follow immediately.

### **8.2.3 Transportation Committee**

The ORNL Transportation Committee was formed in the 1960s by ORNL management to provide oversight and awareness of the Laboratory Transportation Program and to provide expert guidance to transportation managers. The Committee and the ORNL Transportation Oversight Manager perform periodic reviews of all major shippers, covering the complete transportation program every 2 years. Each Committee member devotes an average of 10% of his time to transportation-related activities.

### **8.2.4 On-site Program Development**

ORNL has contracted with Analysas, Inc., to develop an on-site transportation plan to bring the Laboratory into compliance with DOE requirements. It is estimated that the plan will be completed by the end of FY 1989 with implementation to follow immediately.

## **8.3 SUMMARY OF PROGRAM NEEDS**

1. QA procedures for transportation need to be completed----\$3K
2. On-site Transportation Program developed—\$143K, with \$100K annually thereafter for operating costs
3. Transportation Training Program development completed—\$30K
4. Implementation of training program—\$50K annually
5. SARP analysis performed through 1991----\$780K for 1989, \$560K for 1990, and \$100K for 1991
6. Base program—\$90K first year, \$94K each succeeding year

## **8.4 PROGRAM DATA AND FUNDING SUMMARY**

This section consists of a program data sheet and schedules that describe the activities within this functional area. Table 8.1 summarizes overall funding by funding type.

1. Program Category		2. Reporting Period 5/01/89 through 5/31/89			
3. Project Title <b>TRANSPORTATION SAFETY DISCIPLINE</b>		4. Program Representative		Funding Type:	
FWP NO : ACTIVITY NO :		5. Project Engineer		Funding Year:	
6. Project Number WBS	7. Subproject Title	8. Fiscal Year and Months FY-1989   FY-1990			
		O N D J F M A M J J A S   O N D J F M A M J J A S			
	EVALUATION OF SHIPPING CASKS AND ANALYSIS OF SARPs				
SHADING INDICATES STATUS AND COMPLETION		Comments:			
ACTIVITY SCHEDULE 		SYMBOL MILESTONE LEVEL 0 1 2 3 4 12 ← MONTH ← FORECAST			

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: PROGRAM OPERATION

CONTACT: K. E. MCCORMACK

PROGRAM CATEGORY: TRANSPORTATION SAFETY PROGRAM

PLANT: ORNL

PROJECT NO: 7.01

STATUTORY REQ:

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.7.01

SCOPE: Achieve and maintain the Transportation Safety Program compliance with regulatory requirements.

JUSTIFICATION: DOE Orders state that all shipments of hazardous materials, substances or wastes shall be in compliance with all applicable Federal, State and Local regulation.

FACILITIES: All facilities/groups which ship material cause material to be shipped or support the shipping of materials.

STATUS/COMMENTS: This is an on-going program.

<u>FUNDING YEARS:</u> 88-?			<u>TEC (\$K1000):</u> 3835										
<u>BER CODE</u>	<u>BA/BD</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
S	BC	EXP	3835	75	290	1046	804	344	244	244	244	244	300
		<u>TOTAL:</u>	<u>3835</u>	<u>75</u>	<u>290</u>	<u>1046</u>	<u>804</u>	<u>344</u>	<u>244</u>	<u>244</u>	<u>244</u>	<u>244</u>	<u>300</u>





**Table 8.1. Funding summary for Transportation Safety Program**

Funding type	Funding (\$ × 1000)								Total
	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	
Exp	290	1,046	804	344	244	244	244	244	3,460
GPP									
GPE									
LI									
Total capital									
Total (types)	290	1,046	804	344	244	244	244	244	3,460



## **9. FIRE PROTECTION LONG-RANGE PLAN**

### **9.1 MISSION AND OBJECTIVES**

The mission of the Fire Protection Program is to provide and maintain a fire prevention and protection program sufficient to attain the objectives of an "improved risk" level of fire protection as defined in DOE Order 5480.7 The primary objectives are to

- have no threats to the public health or welfare that result from fire,
- prevent undue hazards to employees from fire,
- have no unacceptable delays in vital Department of Energy programs as a result of fire,
- keep property damage at manageable levels.

### **9.2 PROGRAM REQUIREMENTS AND STATUS**

#### **9.2.1 Building Inspections and Surveys**

The objective is to provide an evaluation of selected facilities on a periodic basis in order to minimize potential hazards to life, equipment, programs, and property. Activities include facility appraisals and inspections, pre-emergency planning, and special evaluations.

Currently, there are multiple inspections and surveys required by DOE/ORO Fire Prevention and Protection (FP&P) Guides, and scheduled frequencies are being met, with the exception of building fire prevention inspections. Frequencies vary from monthly for major buildings to quarterly for minor buildings. One Fire Protection Inspector is currently assigned to building inspections. Innovative adjustments have been made; however, the inspection field staff has not been increased in the last 20 years. We are computerizing some elements of the program and reducing follow-up time requirements. Two additional inspectors have also been requested to help increase frequency of inspections.

#### **9.2.2 Automatic Sprinkler Systems**

The objective of this program element is to provide reliable, automatic suppression systems to selected plant facilities to minimize the threat to life or property in the event of a fire. Activities associated with this element include the selection, design, acceptance, and routine testing of the system. Additional duties include maintenance, procedure development, and personnel training.

Testing and maintenance frequencies defined in ORO FP&P guides are not being met because of the growth of Laboratory and its fire protection systems. Additional field staff is needed to maintain schedules. Factory Mutual Corporation (DOE/HQ contractor), ORO, and site fire protection engineers have identified protection deficiencies that will be corrected using all types of funding resources as defined in our Action Plans.

### **9.2.3 Fire Alarm Systems**

Alarm systems provide appropriate and reliable manual and automatic fire/emergency reporting systems for plant personnel and facilities. Routine activities include inspection, testing, and maintaining the system and its components. Special activities include design review, acceptance testing, special testing, system evaluation, and procedure development.

Current alarm systems are fully operational, but some ORO FP&P guide frequencies for testing are not being met because of the growth of the Laboratory and its fire protection systems. Alarm systems such as sprinklers are an integral part of building protective systems, and planned fire systems upgrades include alarm system improvements. High priority is continuously placed on system operability.

### **9.2.4 Water Supply Systems**

Water supply systems ensure an adequate and reliable water supply for suppressing and extinguishing fires. Special activities of this element include evaluation, design, acceptance of system modifications, and impairment control. Routine activities include maintenance, system analysis, and inspection/testing of the water supply, the pumping facilities, and the distribution piping/valves.

The existing plant water system has been determined to be in reliable working order. Valve inspection, hydrant flow tests, zone flow tests, maintenance, and impairment control are given high priority to ensure that adequate firefighting water supplies are available. Area development has indicated a need for additional water mains to maintain our system at a high level of readiness. Plans and funding have been approved for most of these areas.

### **9.2.5 Fire Extinguishers**

Appropriate portable fire extinguishers throughout the plant facilities ensure that incipient fires may be properly controlled/extinguished by plant personnel. The activities associated with this objective include proper selection and location, frequent inspections, and maintenance for each extinguisher. The frequency of some inspections has slipped because of Laboratory growth. Computerized bar code readers have been adopted to help maintain scheduled inspections.

### **9.2.6 Fixed Extinguishing Systems**

When conventional water suppression systems are not suitable, fixed extinguishing systems provide appropriate protection for special equipment/conditions. Activities include the selection, design, acceptance, and routine testing of the system. Additional duties include maintenance, procedure development, and personnel training.

Special extinguishing systems, such as Halon under computer room floors, receive the same high priority for operational readiness as sprinkler systems. All systems are fully operational, although some testing frequencies have slipped because of Laboratory growth. Fire Protection will continue to evaluate the need for special systems but will routinely rely on economically favorable sprinkler systems for protection.

### **9.2.7 Mobile Fire Apparatus**

Functional and reliable mobile fire apparatus must be available to respond at all times, and it must be fully equipped and operated by properly trained personnel. The activities associated with

this objective include the purchasing, operating, and routine inspection of vehicles. Additional areas are operator training, maintenance, and annual testing to verify compliance with standard operations.

Currently, fire protection personnel respond to fire emergencies with one fire pumper on day shift and two on off-shifts. This ensures that adequate, well-maintained, and reliable pumpers are on hand to combat fire. The first-line apparatus is a 1981, 1250-gal/min unit; the other two pumpers are 1966 and 1961 models. There is an immediate need to replace the 27-year-old model, and the 21-year-old model should be replaced as soon as funds are available. Funding has been approved for the purchase of one replacement apparatus. Delivery is expected in the fall of 1989.

#### **9.2.8 Mobile Emergency Apparatus**

A mobile emergency apparatus is necessary to respond to and effectively handle various emergency situations such as rescue, medical, and fire support. Activities include the purchase, operation, and routine inspection of the apparatus. Additional areas are operator training, maintenance, and annual testing to verify compliance with standard operations.

The current emergency/rescue 10,000-lb gross vehicle weight (GVW) truck is equipped with jaws-of-life rescue equipment, resuscitators, and multiple devices and appliances to handle a wide variety of emergency situations. This unit and other Fire Department vehicles are well maintained and equipped to effectively respond and assist in emergency control. The chassis of this vehicle should be replaced periodically to improve reliability.

#### **9.2.9 Fire Protection Engineering**

The objective of this program element is to provide and maintain a broad-scope fire prevention and protection program based on judgment, techniques, and practices of fire professionals for effective life and property conservation. Duties include providing consultation services, interpreting codes and standards, providing engineering concept support, performing in-depth facility surveys, reviewing plans for construction or building modification, procedure development, and equipment evaluation.

At present, there are two staff fire protection engineers; one is full-time, and the other has administrative responsibilities. This arrangement allows for effective fire engineering support, liaison, and evaluation of Laboratory plans, programs, and compliance efforts. Interpretation and application of national consensus standards and DOE orders are used in recommending the most economically feasible type of fire protection.

#### **9.2.10 Training**

Training programs provide and maintain a program of education, hands-on instruction, and professional development for fire professionals and plant employees. Activities include planning, scheduling, instructing, drill participation, certification, record maintenance, and program evaluation.

Fire professionals are trained through on-the-job scheduled and unscheduled drills and instruction. Off-site training for officers and men continues to be extensive and broad in scope, ranging from Fire Officership to Self-Contained Breathing Apparatus (SCBA) maintenance recertification. Training of plant employees includes all SCBA wearers, fire alarm extinguisher operators, fire module for reactor operator recertification, reactor entry and maintenance fire module, and fire safety education campaigns.

### **9.2.11 Building Physical Features**

Fire partitions, fire walls, and fire doors can help to limit single-event fire losses and provide paths of egress that meet the NFPA life safety code. Associated activities include the selection, design, location, inspection, and maintenance of all fire protection building physical features.

Fire separation of large or hazardous areas occurs in the design stage. Life Safety Code provisions are also incorporated into building design to provide "life safety towers" or rated fire wall assemblies around stairwells to help ensure protected means of egress. Heating, ventilation, and air conditioning ducts are fire division penetrations that require rated dampers. Other penetrations such as conduit or pipe require approved seals around the penetration. Every effort is made to maintain the integrity of all fire division walls. Routine inspections and repairs are performed.

### **9.2.12 Emergency Response**

The objective of emergency response is to provide an adequately trained, properly equipped staff to quickly respond to all emergencies. These activities include responding to fire alarms, emergency medical calls, telephone calls, automatic system alarms, mutual aid calls, and all other types of unforeseen emergencies.

Overall emergency efforts are the responsibility of the Laboratory Emergency Director (Laboratory Shift Supervisor on off-shifts). Fire, medical, and rescue operations are examples of emergencies that require response, control, and support efforts. Planning for natural disasters, hazardous materials incidents, automobile accidents, and most other types of emergencies is an important part of the program, and control/assistance forces and equipment are continually in a state of response readiness.

### **9.2.13 Routine Fire Department Activities**

The Fire Department provides the plant a fire protection program. Its activities include inspections, testing, fire watch, escorts, dispatching, pre-fire planning, equipment checks, response readiness maintenance, and other special activities.

The Fire Department has regularly scheduled shift and day operations work which is performed in support of the overall program. Routine scheduled work encompasses a broad range of service for others, including equipment operation, testing and maintenance, inspections, procedure development, and pre-fire planning. High priority is placed on emergency readiness.

### **9.2.14 Emergency Medical Services**

The objective of this program element is to provide a state-approved Emergency Medical Service program for the plant population. This activity includes training, certification of equipment, emergency medical response, and patient transportation.

The ORNL Fire Protection group does not routinely perform Emergency Medical Services. The ORNL Security Patrol has this responsibility. All Tennessee State Emergency Management Agency rules are followed. Two ambulances and certified Emergency Medical Technicians are on site.

### **9.2.15 Administration**

The administrative goal of the program is to plan, organize, control, coordinate, and direct all fire-related efforts in providing an effective fire prevention and protection program. These activities

include the implementation of corporate and plant policies/procedures, allocation of available resources, personnel relations, adoption or implementation of relevant orders and regulations, and special assignments. The fire protection administrative section at ORNL is well established and effectively oversees program objectives and activities.

### **9.3 SUMMARY OF PROGRAM NEEDS**

A line-item project to upgrade fire protection at an ORNL facility at the Y-12 Plant has been approved. Also, a Conceptual Design Report has been issued, and congressional approval has been granted for a planned fire protection upgrade for Building 4500N and the 6000 Area. A fire training/simulator and test facility to enhance firefighter training has been approved, and additional improvements to the facility are planned. Future plans call for replacement of an older fire pumper. A planned building will provide much-needed office space for Fire Department operations, and replacement of the emergency truck will enhance emergency response capability.

Future projects at HFIR include upgrading the cooling tower sprinkler system, converting the main building sprinkler system to a wet-pipe type and extending sprinklers into selected unprotected areas, installing electrical transformer protection, and installing early fire warning systems in the control rooms. Other older-type sprinkler systems will be revitalized to help ensure operability. Halon fire protection systems will be reviewed and replaced as applicable. Plans call for Central Station fire alarm receiving equipment to be upgraded and the upgrading of the HPRR fire pump to an approved type. Because of Laboratory growth, staffing increases are being considered to meet demanding DOE test and maintenance schedules. Further, it can be assumed that projects in the planning stage will require larger water supply mains as areas develop and demands increase.

### **9.4 PROGRAM DATA AND FUNDING SUMMARY**

This section consists of a program schedule and program data sheets that describe the activities within this functional area. Table 9.1 summarizes overall funding by funding type.

1. Program Category		2. Reporting Period 5/01/89 through 5/31/89	
3. Project Title <b>FIRE PROTECTION DISCIPLINE</b> FWP NO : ACTIVITY NO :		4. Program Representative R. L. ATCHLEY	Funding Type:
		5. Project Engineer	Funding Year:

6. Project Number WBS	7. Subproject Title	8. Fiscal Year and Months																							
		FY-1989				FY-1990				FY-1991				FY-1992				FY-1993				FY-1994			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	FIRE PROTECTION IMPROVEMENTS																								
	HFIR CONTROL ROOMS SMOKE DETECTION																								
	NEW FIRE PUMPERS (TWO)																								
	FIRE PROTECTION UPGRADE AT MAIN ORNL SITE																								
	HFIR COOLING TOWER PILOT-DELUGE SPRINKLER UPGRADE																								
	FIRE PROTECTION REVITALIZATION																								
	WASTE SOLIDIFICATION WASTER SUPPLY UPGRADE																								

<p>SHADING INDICATES STATUS AND COMPLETION</p> <p>ACTIVITY SCHEDULE</p>	<p>SYMBOL MILESTONE LEVEL</p> <p>0 1 2 3 4</p>	<p>Comments:</p>
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ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: UPGRADE FIRE PROTECTION ORNL 2 Y-12

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.01

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: 88-R-817

EPMP NO: 2.8.01

SCOPE: Will upgrade existing fire protection systems and/or facilities utilized by the Biology, Engineering Technology, Energy, Fusion Energy, and Operations Division located at the Y-12 Plant. The upgrade will include: installation of new sprinkler systems, detection and alarm systems, physical fire barriers, and other miscellaneous fire protection systems required to correct deficiencies involving 23 separate tasks.

JUSTIFICATION: The ORNL facilities at the Y-12 Plant have been cited by DOE consultants for inadequate protection of vital research facilities. This project will upgrade facilities to comply with DOE Order 5480.7 and national consensus standards to attain an improved risk level of fire protection.

FACILITIES: Buildings 9102-1, 9105, 9201-3, 9201-2, 9204-1, 9204-3, 9207, 9211A, 9104-1-2-3, 9208, 9210 and 9220.

STATUS/COMMENTS: Work in progress - projected completion September 1990.

FUNDING YEARS: 88-90			TEC (\$x1000): 1750											
B&R CODE	BA/BO	FUNDING	TOTAL	PRIOR	FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND
		TYPE		FY-88										FY-95
H	BO	LIP	1750	0	280	855	615	0	0	0	0	0	0	0
		TOTAL:	1750	0	280	855	615	0	0	0	0	0	0	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: FIRE TRAINING/SIMULATOR AND TEST FACILITY

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.02

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: W0# K 4479

EPMP NO: 2.8.02

SCOPE: Provide a facility at ORNL to train firefighting forces in a simulated smoke-and-heat conditioned environment.

JUSTIFICATION: Expansion of laboratory activities, addition of new laboratory personnel, and OSHA and National Fire Code requirements necessitate more hands-on, live fire training for firefighters. Conducting emergency drills and training of emergency response forces including professional firefighters. Emergency squad (back-up) members, and demonstrations for fire prevention and fire safety education campaigns will be accomplished here.

FACILITIES: Building 2648

STATUS/COMMENTS: Currently in construction design stage.

FUNDING YEARS: 88				TEC (\$M1000): 290									
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
X	BO	GPP	290	0	290	0	0	0	0	0	0	0	0
TOTAL:			290	0	290	0	0	0	0	0	0	0	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: HFIR CONTROL ROOMS SMOKE DETECTORS

CONTACT: ATCHLEY/HURT

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.03

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.03

SCOPE: Provide early fire warning in the form of smoke detectors for the main and auxiliary control rooms of the High Flux Isotopes Reactor.

JUSTIFICATION: Multiple review and appraisal groups have recommended a smoke detector system for the control rooms. Necessary to meet current standards for operating reactors.

FACILITIES: Building 7900

STATUS/COMMENTS: General Engineering currently developing plans for formal GPP requests for funding. Research Reactor Division is sponsor.

<u>FUNDING YEARS:</u> 90			<u>TEC (\$K1000):</u> 70											
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
H	BO	GPP	50	0	0	0	50	0	0	0	0	0	0	
H	BO	EXP	20	0	20	0	0	0	0	0	0	0	0	
<u>TOTAL:</u>			<u>70</u>	<u>0</u>	<u>20</u>	<u>0</u>	<u>50</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: NEW FIRE PUMPER

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.04

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.04

SCOPE: Replacement fire response apparatus for 1966 model which will be 28 years old.

JUSTIFICATION: Obsolescence problems include no replacement parts, higher maintenance costs, and unreliability of an emergency use apparatus.

FACILITIES: Emergency fire response to all ORNL properties.

STATUS/COMMENTS: One specific time frame cost.

FUNDING YEARS: 94			TEC (\$x1000): 225										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
K	BO	CE	225	0	0	0	0	0	0	0	225	0	0
		TOTAL:	225	0	0	0	0	0	0	0	225	0	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: FIRE PROTECTION UPGRADE

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.05

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO: 90-KG01-1

EPMP NO: 2.8.05

SCOPE: The project consists of fire protection and life safety improvement measures for Central Research and Administration Facility (Building 4500M) and the 6000 Area containing atomic physics facilities. Measures for 4500M include the addition of new and improvements to existing automatic fire suppression sprinklers, upgrading fire alarm systems and ventilation improvements in a chemical storage area. The 6000 Area measures include the installation of underground water supply loops.

JUSTIFICATION: To improve the fire loss risk by complying with outstanding recommendations made by DOE and DOE consultants to bring the facilities into compliance with the "improved risk" level of protection.

FACILITIES: Building 4500M and 6000 Area underground water supply.

STATUS/COMMENTS: The CDR has been issued and congressional approval obtained for the project as a 1990 LIP.

FUNDING YEARS: 93

TEC (\$M1000): 1710

B&R CODE	BA/BO	FUNDING TYPE	TOTAL	TEC (\$M1000):									
				PRIOR FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
H	BO	LIP	1520	0	0	500	880	0	0	140	0	0	0
H	BO	EXP	190	90	100	0	0	0	0	0	0	0	0
TOTAL:			1710	90	100	500	880	0	0	140	0	0	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
5/15/1989

LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: HFIR COOLING TOWER PILOT-DELUGE SPRINKLER UPGRADE

CONTACT: ATCHLEY/HURT

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.06

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.06

SCOPE: Replace existing obsolete dry-pipe sprinkler system with an approved type system.

JUSTIFICATION: Dry-pipe sprinkler systems in cooling towers do not meet present day standards. Deteriorated piping, obsolescence, and current DOE recommendations require upgrading the fire protection system to an approved type.

FACILITIES: Building 7902-3

STATUS/COMMENTS: Preliminary work requesting an engineering study and estimate has been done. A formal GPP request will be made upon receipt of cost data. Research Reactor Division is sponsor.

<u>FUNDING YEARS:</u> 90			<u>TEC (\$x1000):</u> 140										
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>									
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
H	BO	GPP	120	0	0	0	120	0	0	0	0	0	0
H	BO	EXP	20	0	0	20	0	0	0	0	0	0	0
<u>TOTAL:</u>			<u>140</u>	<u>0</u>	<u>0</u>	<u>20</u>	<u>120</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: WASTE SOLIDIFICATION WATER SUPPLY UPGRADE

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.07

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.07

SCOPE: Extend the 10-inch water main from Solid Waste Storage Area No. 5 southward and tie into the existing 6-inch line near Building 7860.

JUSTIFICATION: The 6-inch water supply originally run to the now discontinued hydrafracture site is not adequate to provide needed fire protection to a developing site. The new development includes Waste Solidification activities.

FACILITIES: 7860-30 Area

STATUS/COMMENTS: Proposed if site is chosen for development of ORNL waste solidification program and facilities.

FUNDING YEARS: 92				TEC (\$*1000): 350										
BER CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
H	BO	GPP	350	0	0	0	0	0	350	0	0	0	0	
TOTAL:			350	0	0	0	0	0	350	0	0	0	0	

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: CONVERT HALON AND DRY-PIPE FIRE PROTECTION SYSTEMS

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.08

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.08

SCOPE: Convert all Halon 1301 fire protection systems to a different type protection. Convert +40-year old dry-pipe sprinkler system to a wet-pipe type.

JUSTIFICATION: International agreements may prohibit the use of halogenated agents for fire suppression systems. It appears production of Halon 1301 may be stopped. The dry-pipe system is antiquated and serves an important receiving and distribution warehouse. Reliability is questionable and commodities may exceed fuel loading for current design basis for ordinary hazards. New wet-pipe would be designed for high hazard.

FACILITIES: Multiple areas with Halon protection. General Stores, Building 7001.

STATUS/COMMENTS: Final decisions on Halon protection. General Stores, Building 7001.

<u>FUNDING YEARS:</u> 93		<u>TEC (\$x1000):</u> 750												
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>	<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
M	BO	GPP	750	0	0	0	0	0	250	500	0	0	0	
		<u>TOTAL:</u>	<u>750</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>250</u>	<u>500</u>	<u>0</u>	<u>0</u>	<u>0</u>	

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: UPGRADE EMERGENCY RESPONSE VEHICLES AND EQUIPMENT

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.09

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.09

SCOPE: Replace aging Officers Emergency/Rescue vehicle. Purchase cargo van to carry required protective clothing for Emergency Squad. Replace Self-Contained Breathing Apparatus (SCBA), protective clothing, radios, fire extinguishers, maps, and expansion of emergency response capability with portable SCBA refilling unit, computer, etc.

JUSTIFICATION: Current Emergency/Rescue vehicle is a six year old model with high mileage. We presently do not have a vehicle to carry required clothing for "E" Squad to the scene of an emergency. Aging equipment replacement and new capabilities will be necessary to provide the Lab a sustained level of emergency response readiness.

FACILITIES:

STATUS/COMMENTS: Proposed and projected needs for emergency response.

FUNDING YEARS: 93			TEC (\$x1000): 280										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR									
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
H	BO	CE	95	0	0	0	0	15	30	50	0	0	0
H	BO	EXP	185	0	0	0	0	100	50	35	0	0	0
TOTAL:			280	0	0	0	0	115	80	85	0	0	0

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: FIRE TRAINING/SIMULATOR AND TEST FACILITY IMPROVEMENTS

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.10

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.10

SCOPE: Extend site water supplies and hydrants, install sprinkler and standpipe risers and the drainage system into the Non-rad waste lines.

JUSTIFICATION: Provide fire hydrants nearby, training on multiple types of fire protection systems common to ORNL and also use of Karosene type fuels for "live fire" training exercises. These improvements will compliment training needs required by DOE.

FACILITIES: Fire Training/Simulator and Test Facility, Building 2648.

STATUS/COMMENTS: Proposed to enhance training of emergency response forces.

<u>FUNDING YEARS:</u> 93			<u>TEC (\$x1000):</u> 120										
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
H	BO	GPP	120	0	0	0	0	0	0	120	0	0	0
<u>TOTAL:</u>			<u>120</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>120</u>	<u>0</u>	<u>0</u>	<u>0</u>

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: UPGRADE FIRE PROTECTION WATER SUPPLIES

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.11

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.11

SCOPE: Replace the non-approved fire pump and engine that supplies HPRR and DOSAR with an approved type - Extend the fire water main east from the 7000 Area - Extend the fire water main loop to CFRP (7600 Area) to provide a second water supply.

JUSTIFICATION: The obsolete pump and engine arrangement that supplies water to the Health Physics Research Reactor does not meet current DOE and national consensus standards for fire pumps. New development of the E. 7000 Area has outgrown the single hydrant and water line. The Consolidated Fuel Recycle Facilities (CFRP) are presently served by only one supply line which, if impaired, could impact important R & D work.

FACILITIES: HPRR Pump-house Building 7935 - East 7000 Area - CFRP Area.

STATUS/COMMENTS: Proposed for future consideration - DOE did not support the GPP request for extension of water lines to the E. 7000 Area in 1988.

FUNDING YEARS: 93				TEC (\$x1000): 1650										
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND FY-95
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95		
H	BO	GPP	400	0	0	0	0	0	400	0	0	0	0	
H	BO	LIP	1250	0	0	0	0	0	0	1250	0	0	0	
TOTAL:			1650	0	0	0	0	0	400	1250	0	0	0	

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: UPGRADE FIRE ALARM SYSTEMS

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.12

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.12

SCOPE: Upgrade Central Station fire alarm decoding equipment at fire headquarters - Replace obsolete fire alarm control panels in older large facilities - Install fire alarm control panels and evacuation signals in two older facilities.

JUSTIFICATION: Obsolescence and aging requires periodic upgrading to increase reliability and ensure replacement parts are available. Evacuation signals are desirable to alert building occupants of fire to enhance life safety.

FACILITIES: Central Station - Building 2500; Ten older facilities including Buildings 7920, 4500S, 4508, 7600, and 7601; Buildings 3001, 3550 do not have automatic evacuation signals.

STATUS/COMMENTS: Proposed

<u>FUNDING YEARS:</u> 91			<u>TEC (\$K1000):</u> 470											
<u>BER CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
K	BO	GPP	200	0	0	0	0	200	0	0	0	0	0	
K	BO	EXP	270	0	0	0	0	270	0	0	0	0	0	
<u>TOTAL:</u>			<u>470</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>470</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: SPRINKLER PROTECTION FOR HFIR ELECTRICAL TRANSFORMERS

CONTACT: ATCHLEY/HURT

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.13

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.13

SCOPE: Provide automatic sprinkler protection for HFIR electrical transformers.

JUSTIFICATION: Transformers are currently unprotected and only passive fire walls separate the transformers.

FACILITIES: High Flux Isotopes Reactor, Building 7900.

STATUS/COMMENTS: Sponsored by Research Reactor Division - Will be evaluated by outside subcontractor conducting a complete Fire Hazards Analysis of HFIR in 1989.

<u>FUNDING YEARS:</u> 91			<u>TEC (\$x1000):</u> 70									
<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND</u>
<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>
H	BO	GPP	70	0	0	0	0	70	0	0	0	0
		<u>TOTAL:</u>	<u>70</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>70</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: UPGRADE HFIR SPRINKLER SYSTEM

CONTACT: ATCHLEY/HURT

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.14

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.14

SCOPE: Convert the existing pre-action sprinkler system to a wet-pipe type and extend the existing sprinkler protection into unprotected areas.

JUSTIFICATION: Compliance with recommendations of various review groups and to upgrade to present day approach to fire protection of reactor properties.

FACILITIES: High Flux Isotopes Reactor, Building 7900.

STATUS/COMMENTS: Sponsored by Research Reactor Division - Engineering Service Order has been written for study and estimate to seek funding.

<u>FUNDING YEARS:</u> 90			<u>TEC (\$x1000):</u> 150											
<u>BER CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
H	BO	GPP	150	0	0	0	150	0	0	0	0	0	0	
<u>TOTAL:</u>			150	0	0	0	150	0	0	0	0	0	0	

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: UPGRADE PRE-ACTION SPRINKLER SYSTEMS TO WET-PIPE TYPE

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.16

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.16

SCOPE: Convert existing fire protection pre-action sprinkler systems to wet-pipe in important research facilities.

JUSTIFICATION: Pre-Action Sprinkler systems have a higher failure rate due to multiple action(s) that must occur. Maintenance and testing costs are burdensome and rate-of-rise heat detectors have lost original "rate" settings due to aging.

FACILITIES: Includes 4500S, 4508 and 3525.

STATUS/COMMENTS: Proposed - does not qualify for GPP funding.

FUNDING YEARS: 90			TEC (\$K1000): 185											
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR										BEYOND
				FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
H	BO	EXP	185	0	0	0	185	0	0	0	0	0	0	0
TOTAL:			185	0	0	0	185	0	0	0	0	0	0	0

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: ADDITIONAL FIRE PROTECTION STAFFING

CONTACT: R. L. ATCHELY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.17

STATUTORY REQ: DOE

FWP NO:

EMG. PROJ. NO:

EPMP NO: 2.8.17

SCOPE: Hire 15 additional staff members to perform assigned tasks and meet the new National Fire Protection Association Standard 1500. Staffing additions are characterized as follows: 11 Fire Protection Inspectors, 1 Fire Service Instructor, 1 Safety Officer, 1 Senior Engineering Assistant, and 1 Fire Protection Engineer.

JUSTIFICATION: Lab growth, fire protection systems and devices increases, and more demanding DOE and national consensus standards requirements have exceeded staff availability for task performance within timeframe of rigorous frequencies. DOE has directed the Lab to comply with minimum manpower requirements.

FACILITIES: Lab-wide

STATUS/COMMENTS: Currently behind schedule defined in DOE-ORO Fire Prevention and Protection Guides.

<u>FUNDING YEARS:</u> 90			<u>TEC (\$x1000):</u> 4800											
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>	<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
H	BO	EXP	4800	0	0	0	800	800	800	800	800	800	800	0
		<u>TOTAL:</u>	<u>4800</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>800</u>	<u>0</u>						

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LAST UPDATE: 5/15/89

ACTIVITY/PROJECT: FIRE PROTECTION PROGRAMS

CONTACT: R. L. ATCHLEY

PROGRAM CATEGORY: FIRE PROTECTION

PLANT: ORNL

PROJECT NO: 8.18

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.8.18

SCOPE: This activity provides fire protection surveillance for all ORNL operating facilities and for on-going environmental upgrade and waste management programs.

JUSTIFICATION:

FACILITIES:

STATUS/COMMENTS:

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<u>FUNDING YEARS:</u> 88-?				<u>TEC (\$x1000):</u> 21639									
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
S	BO	EXP	21639	0	1300	1340	1407	1477	1551	1629	1710	1796	9429
		<u>TOTAL:</u>	<u>21639</u>	<u>0</u>	<u>1300</u>	<u>1340</u>	<u>1407</u>	<u>1477</u>	<u>1551</u>	<u>1629</u>	<u>1710</u>	<u>1796</u>	<u>9429</u>

**Table 9.1. Funding summary for Fire Protection Program**

Funding type	Funding (\$ × 1000)								Total
	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	
Exp	1,420	1,360	2,392	2,647	2,401	2,464	2,510	2,596	17,790
GPP	290		320	270	1,000	620			2,500
GPE				15	30	50	225		320
LI	280	1,355	1,495			1,390			4,520
Total capital	570	1,355	1,815	285	1,030	2,060	225		
Total (types)	1,990	2,715	4,207	2,932	3,431	4,524	2,735	2,596	25,130

## **10. EMERGENCY PREPAREDNESS LONG-RANGE PLAN**

### **10.1 MISSION AND OBJECTIVES**

The Laboratory's Emergency Preparedness Program has the mission of implementing policies and requirements for an emergency management system. This system will provide for the development, coordination, and direction of emergency planning, preparedness, response, and readiness assurance to deal with operational emergencies involving ORNL facilities.

The primary objectives are to ensure that

1. an overall emergency organizational structure is in place;
2. credible emergencies and the emergency plans and process to respond to them are identified and documented;
3. adequate resources are available for emergency preparedness, planning, emergency response, and required recovery activities; and
4. a system is in place to ensure the continued readiness of the Emergency Preparedness Program.

### **10.2 PROGRAM REQUIREMENTS AND STATUS**

#### **10.2.1 Emergency Manuals**

The emergency manuals contain emergency philosophy, organization, and procedures. The system at ORNL consists of an *ORNL Emergency Manual*, which covers the Laboratory as a whole, and local manuals, which are specific to a facility. Currently, the manuals are being reviewed annually. Revisions and updates are made in accordance with changes in DOE orders.

#### **10.2.2 Emergency Planning**

Emergency planning includes the assessment of credible emergencies at the different ORNL facilities and operations. Once the credible emergencies are identified and documented, they are factored into the training and exercise programs.

Emergency assessment is an ongoing commitment. Additional manpower is needed in the area of emergency assessment and planning.

#### **10.2.3 Emergency Response**

The Emergency Preparedness Program ensures that adequate resources are available to respond to emergency situations. Response personnel are trained and equipped to address all identified emergencies. Currently, ORNL has trained responders ranging from Shift Emergency Squad Personnel to Crisis Managers.

#### **10.2.4 Radiological Assistance Program**

The Radiological Assistance Program (RAP) provides monitoring and sampling equipment, communications capabilities, and trained personnel in the event of a radiological emergency in the southeastern United States. RAP teams participate in radiological emergencies and exercises with federal, state, and local responders annually. Improvements to RAP equipment, vehicles, and personnel training are planned for the future.

#### **10.2.5 Emergency Facilities**

During emergencies it is necessary to have adequate facilities from which to control and manage the situation. Currently, the Laboratory has an Emergency Operations Center (EOC) and a Laboratory Emergency Response Center (LERC). The EOC is staffed by the Crisis Management Team during emergencies. The EOC interacts with DOE/ORO to manage the emergency. The LERC serves as the office for the Laboratory Shift Supervisor (LSS) who is on duty 24 h/d. All classification notifications to DOE/ORO originate from the LSS. The LERC is equipped with computers for data acquisition and atmospheric dispersion modeling. Upgrades of the EOC are necessary to keep current with the DOE.

#### **10.2.6 Environmental Assessment Models**

Functional and reliable environmental assessment models must be available during emergencies to determine protective actions both on-site and off-site.

ORNL has both atmospheric and water release model capabilities. Both of these are relatively new and need to be updated and maintained in order to meet DOE requirements.

#### **10.2.7 Emergency Equipment**

In order to respond in a safe and efficient manner, appropriate emergency equipment such as vehicles, protective clothing, and instrumentation must be available.

Currently, most of the equipment needed is available or is on order. A new fire pumper is awaiting delivery. The spill response vehicle is on-site but needs to be outfitted with necessary equipment and supplies.

#### **10.2.8 Off-Site Activities**

Part of the emergency preparedness process includes interaction with off-site personnel. Plans and procedures must be developed and exercised. Systems for notifying the public are required.

Currently, ORNL is working with off-site personnel in the development of plans and a subsequent full-scale exercise. An assessment of off-site warning devices is planned.

#### **10.2.9 Training**

Training programs provide and maintain a level of readiness. All levels of employees receive some emergency preparedness training. Responders receive more intense training. Many drills and exercises are conducted annually to test all phases of the Emergency Preparedness Program. These drills range from complex reactor command post exercises to evacuations of Laboratory buildings.

**10.3 SUMMARY OF PROGRAM NEEDS**

Programmatic needs requiring special emphasis include additional staffing requirements, upgrading of the Radiological Assistance Program, EOC upgrades, installation of off-site warning devices, water and airborne release modeling, and spill response vehicle outfitting.

**10.4 PROGRAM DATA AND FUNDING SUMMARY**

This section consists of a program schedule and program data sheets that describe the activities within this functional area. Table 10.1 summarizes overall funding by funding type.

1. Program Category		2. Reporting Period 5/01/89 through 5/31/89	
3. Project Title EMERGENCY PREPAREDNESS DISCIPLINE FWP NO : ACTIVITY NO :		4. Program Representative	Funding Type:
6. Project Number		5. Project Engineer	Funding Year:
7. Subproject Title		8. Fiscal Year and Months	
WBS		FY-1989   FY-1990	
		O N D J F M A M J J A S   O N D J F M A M J J A S	
OFF-SITE EXERCISE			
SHADING INDICATES STATUS AND COMPLETION			
ACTIVITY SCHEDULE:			
SYMBOL MILESTONE LEVEL: ▽ 0 □ 1 ◇ 2 ☆ 3 ⊗ 4			
Comments:			

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: SPILL RESPONSE VEHICLE

CONTACT:

PROGRAM CATEGORY: EMERGENCY PREPAREDNESS

PLANT: ORNL

PROJECT NO: 9.01

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.9.01

SCOPE: An emergency response vehicle properly equipped will be available to respond to spills and releases of hazardous materials.

JUSTIFICATION: The ability to respond and mitigate an emergency situation is essential for the protection of on-site and off-site personnel. Without such capability the safety of all is diminished.

FACILITIES:

STATUS/COMMENTS:

-----

FUNDING YEARS: 88-?				TEC (\$K1000): 235										
BER CODE	BA/BO	FUNDING	TOTAL	PRIOR										BEYOND
		TYPE		FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
S	BO	CE	235	0	50	75	10	10	10	50	10	10	10	
TOTAL:			235	0	50	75	10	10	10	50	10	10	10	

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: DECONTAMINATION FACILITY

CONTACT: INMAN/GARRETT

PROGRAM CATEGORY: EMERGENCY PREPAREDNESS

PLANT: ORNL

PROJECT NO: 9.02

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.9.02

SCOPE: A new Decontamination Facility is required due to the proposed demolition of the building in which the present one is housed.

JUSTIFICATION: The Decontamination of injured and non-injured personnel is required. Without such a facility the capability of decontaminating personnel is greatly reduce.

FACILITIES:

STATUS/COMMENTS: Covered under occupational medicine

<u>FUNDING YEARS:</u> 89			<u>TEC (\$*1000):</u> 990											
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
S	BO	GPP	990	0	0	900	0	30	0	30	0	30	0	
<u>TOTAL:</u>			990	0	0	900	0	30	0	30	0	30	0	

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: OFF-SITE EXERCISE

CONTACT: D. J. INMAN

PROGRAM CATEGORY: EMERGENCY PREPAREDNESS

PLANT: ORNL

PROJECT NO: 9.03

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.9.03

SCOPE: A multi jurisdictional exercise will be conducted with DOE, Y-12, K-25, and off-site agencies.

JUSTIFICATION: In order to validate the on-site and off-site emergency plans, an exercise must be performed. Without funding the testing of emergency plans can not be performed and the safety of off-site personnel will be effected.

FACILITIES:

STATUS/COMMENTS:

<u>FUNDING YEARS:</u> 89			<u>TEC (\$x1000):</u> 120										
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
S	BO	EXP	120	0	0	20	0	0	50	0	0	50	0
<u>TOTAL:</u>			<u>120</u>	<u>0</u>	<u>0</u>	<u>20</u>	<u>0</u>	<u>0</u>	<u>50</u>	<u>0</u>	<u>0</u>	<u>50</u>	<u>0</u>

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: EMERGENCY OPERATIONS CENTER UPGRADES

CONTACT: D. J. INMAN

PROGRAM CATEGORY: EMERGENCY PREPAREDNESS

PLANT: ORNL

PROJECT NO: 9.04

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.9.04

SCOPE: The Emergency Operations Center is used for Crisis Managers to manage emergency situations. Upgrades are necessary to remain compatible with DOE/ORO EOC.

JUSTIFICATION: DOE/ORO is upgrading their EOC. DOE Orders and Standardization Procedures require certain equipment and capabilities. Without funding the ORNL EOC would not be compatible with DOE/ORO and the management of emergency situations would suffer.

FACILITIES:

STATUS/COMMENTS:

<u>FUNDING YEARS: 89-?</u>				<u>TEC (\$K1000):</u> 650										
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
S	BO	CE	650	0	0	250	100	50	50	50	50	50	50	
		<u>TOTAL:</u>	650	0	0	250	100	50	50	50	50	50	50	

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: PRODEDURES AND TRAINING

CONTACT: D. J. INMAN

PROGRAM CATEGORY: EMERGENCY PREPAREDNESS

PLANT: ORNL

PROJECT NO: 9.05

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.9.05

SCOPE: To provide implementing procedures and training for emergency situations.

JUSTIFICATION: DOE Order 5500 "Planning For Operational Emergencies" and other DOE orders require procedures and training in order to maintain a proficient response capability. Without funding, emergency responders would not be prepared to deal with emergencies and would put themselves and others in danger.

FACILITIES:

STATUS/COMMENTS:

<u>FUNDING YEARS:</u> 88		<u>TEC (\$x1000):</u> 100											
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
S	BO	EXP	100	10	10	10	10	10	10	10	10	10	10
<u>TOTAL:</u>			<u>100</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: CURRENT PROGRAM OPERATION

CONTACT: D. J. INMAN

PROGRAM CATEGORY: EMERGENCY PREPAREDNESS

PLANT: ORNL

PROJECT NO: 9.06

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.9.06

SCOPE: The emergency preparedness program establishes and maintains a program for the implementation of policies and requirements for an emergency management system.

JUSTIFICATION: DOE Orders 5500 "Planning For Operations Emergencies", 5500.1A "Emergency Management System" and other DOE Orders require that an emergency preparedness program be in place and that adequate resources shall be made available to support this activity. Without funding the safety of personnel (on-site and off-site) and facilities at ORNL would be greatly effected.

FACILITIES:

STATUS/COMMENTS: FY-89 5.3 FTE - FY-88 3.8 FTE

<u>FUNDING YEARS:</u> 88-?				<u>TEC (\$x1000):</u> 2633									
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>									
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
S	BO	EXP	2633	192	201	280	280	280	280	280	280	280	280
<u>TOTAL:</u>			<u>2633</u>	<u>192</u>	<u>201</u>	<u>280</u>							

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: OFF-SITE WARNING DEVICES

CONTACT: D. J. INMAN

PROGRAM CATEGORY: EMERGENCY PREPAREDNESS

PLANT: ORNL

PROJECT NO: 9.07

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.9.07

SCOPE: Warning devices are to be installed to notify the general public within the immediate notification area of impending danger.

JUSTIFICATION: It is necessary to warn the general public of impending danger from releases or emergency incidents originating at ORNL. Without funding the notification of the off-site public would suffer and the public would be in danger.

FACILITIES:

STATUS/COMMENTS:

FUNDING YEARS: 89-?			TEC (\$x1000): 340											
B&R CODE	BA/BO	FUNDING	TOTAL	PRIOR										
		TYPE		FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95	
S	BO	CE	340	0	0	20	200	20	20	20	20	20	20	20
TOTAL:			340	0	0	20	200	20	20	20	20	20	20	20

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: SURFACE WATER SPILL MODELING (WATER RELEASE MODEL)

CONTACT: F. C. KORNEGAY

PROGRAM CATEGORY: EMERGENCY PREPAREDNESS

PLANT: ORNL

PROJECT NO: 9.08

STATUTORY REQ: DOE

FMP NO:

ENG. PROJ. NO:

EPMP NO: 2.9.08

SCOPE: Provide an accurate, reliable, timely estimate of the transport of material from ORNL to the surface waters surrounding the site.

JUSTIFICATION: The surface water spill modeling capability provides information vital to ORNL decision makers in the event of a spill at ORNL. Without this capability, releases from ORNL cannot be accurately analyzed, and improper decisions may be made by ORNL management.

FACILITIES:

STATUS/COMMENTS:

FUNDING YEARS: 88-?				TEC (\$x1000): 294										
B&R CODE	BA/BO	FUNDING	TOTAL	PRIOR										BEYOND
		TYPE		FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-95	
S	BO	CE	294	0	82	42	25	25	30	30	30	30	0	
		TOTAL:	294	0	82	42	25	25	30	30	30	30	0	

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: ATMOSPHERIC MODELING

CONTACT: F. C. KORNEGAY

PROGRAM CATEGORY: EMERGENCY PREPAREDNESS

PLANT: ORNL

PROJECT NO: 9.09

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.9.09

SCOPE: Provide an accurate, reliable, timely estimate of the transport and diffusion of material released from ORNL to the atmosphere.

JUSTIFICATION: The atmospheric modeling capability provides information vital to ORNL decision makers in the event of an atmospheric release from ORNL. Without improvements to this capability, releases from ORNL will not be analyzed as accurately as needed, leading to improper decisions by ORNL management in the event of a release.

FACILITIES:

STATUS/COMMENTS:

<u>FUNDING YEARS: 89-93</u>				<u>TEC (\$*1000):</u> 150									
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
S	BO	CE	150	0	0	25	25	35	20	20	25	0	0
		<u>TOTAL:</u>	<u>150</u>	<u>0</u>	<u>0</u>	<u>25</u>	<u>25</u>	<u>35</u>	<u>20</u>	<u>20</u>	<u>25</u>	<u>0</u>	<u>0</u>

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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: RADIOLOGICAL ASSISTANCE PROGRAM

CONTACT: F. C. KORNEGAY

PROGRAM CATEGORY: EMERGENCY PREPAREDNESS

PLANT: ORNL

PROJECT NO: 9.10

STATUTORY REQ: DOE

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.9.10

SCOPE: Provide technical assistance in the event of a radiological emergency. RAP teams provides a self-contained sample collection and analysis for the initial 48-hours of an emergency.

JUSTIFICATION: The RAP program is part of the overall DOE mission. ORNL provides the central focus for RAP activities in DOE Region II, including technical expertise, equipment, and agency liaison. If the program is not funded at the requested levels, no trained personnel can be provided, nor can reliable equipment be dispatched to an emergency.

FACILITIES:

STATUS/COMMENTS:

<u>FUNDING YEARS:</u> 89-95			<u>TEC (\$x1000):</u> 1026											
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
S	BO	CE	1026	0	0	297	112	112	125	125	125	130	0	
		<u>TOTAL:</u>	<u>1026</u>	<u>0</u>	<u>0</u>	<u>297</u>	<u>112</u>	<u>112</u>	<u>125</u>	<u>125</u>	<u>125</u>	<u>130</u>	<u>0</u>	

**Table 10.1. Funding summary for Emergency Preparedness Program**

Funding type	Funding (\$ × 1000)								Total
	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	
Exp	211	330	631	312	363	314	315	366	2,842
GPP		900		30		30		30	990
GPE	132	709	472	252	255	295	260	240	2,615
LI									
Total capital	132	1,609	472	282	255	325	260	270	3,605
Total (types)	343	1,939	1,103	594	618	639	575	636	6,447



## **11. FUNDING SUMMARY AND CROSSCUT**

This section of the report is composed of one table. This table provides a funding summary by health and safety disciplines.

**Table 11.1. Needs assessment funding summary: base-program funding for safety and health disciplines at ORNL**

Discipline	Funding (\$ × 1000)							Total
	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	
Health Physics	7,599	8,384	8,888	8,965	15,807	8,378	8,853	66,874
Industrial Hygiene	1,668	4,436	5,471	4,731	4,531	4,531	4,531	29,899
Occupational Medicine	1,816	2,176	1,516	1,561	1,536	1,486	1,486	11,577
Industrial Safety	611	735	753	753	753	753	753	5,111
Nuclear Criticality Safety	157	288	417	544	618	693	705	3,422
Nuclear Facility Safety	11,887	18,935	20,131	19,331	17,431	28,986	28,487	145,188
Transportation Safety	1,046	804	344	244	244	244	244	3,170
Fire Protection	2,715	4,207	2,932	3,431	4,524	2,735	2,596	23,140
Emergency Preparedness	1,939	1,103	594	618	639	575	636	6,104
Total	29,438	41,068	41,046	40,178	46,083	48,381	48,291	294,485

## **12. OTHER HEALTH- AND SAFETY-RELATED PROJECTS**

The commitment of ORNL management to improve the health and safety of employees necessarily involves all organizations at the Laboratory. Some of the other projects intended to lead to such improvements are summarized on the attached data sheets, which also include a funding breakout. These projects and activities are promulgated and managed by the Plant and Equipment Division.

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: CARBON MONOXIDE MONITORS FOR BOILERS, BUILDING 2519

CONTACT: W. K. SIMON

PROGRAM CATEGORY: PLANT & EQUIPMENT

PLANT: ORNL

PROJECT NO: 10.01

STATUTORY REQ:

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.10.01

SCOPE: Installation of new flue Gas Monitoring Equipment.

JUSTIFICATION: Monitors will enable us to improve boiler efficiency by providing the information necessary to control boiler firing.

FACILITIES: 2519

STATUS/COMMENTS: Funded

FUNDING YEARS: 90		TEC (\$*1000): 65											
B&R CODE	BA/BO	FUNDING TYPE	TOTAL	PRIOR FY-88	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	BEYOND FY-95
PE	BO	EXP	65	0	0	0	65	0	0	0	0	0	0
TOTAL:			65	0	0	0	65	0	0	0	0	0	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: ASH SILO ELEVATOR

CONTACT: W. K. SIMON

PROGRAM CATEGORY: PLANT & EQUIPMENT

PLANT: ORNL

PROJECT NO: 10.02

STATUTORY REQ:

FMP NO:

ENG. PROJ. NO:

EPMP NO: 2.10.02

SCOPE: Purchase and install hydraulic elevator to be mounted on ash silo.

JUSTIFICATION: Maintenance and operating personnel must routinely climb the 72' access ladder on the side of the ash silo to service and maintain equipment located on the top.

FACILITIES: 2519

STATUS/COMMENTS: Study

<u>FUNDING YEARS:</u> 90			<u>TEC (\$K1000):</u> 100										
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
PE	BO	EXP	100	0	0	0	100	0	0	0	0	0	0
<u>TOTAL:</u>			100	0	0	0	100	0	0	0	0	0	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: NEW VENTILATION SYSTEM & GAS MONITORS AT SEWAGE TREATMENT PLANT

CONTACT: W. K. SIMON

PROGRAM CATEGORY: PLANT & EQUIPMENT

PLANT: ORNL

PROJECT NO: 10.03

STATUTORY REQ:

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.10.03

SCOPE: Purchase and install a new ventilation system, gas monitor, & remote alarms for Sewage Treatment Plant.

JUSTIFICATION: Current ventilation at STP is less than adequate and there are no alarms to warn operating of hazardous gas.

FACILITIES: 2521

STATUS/COMMENTS: Study

<u>FUNDING YEARS:</u> 90		<u>TEC (\$x1000):</u> 30												
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR</u>										<u>BEYOND</u>
				<u>FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>FY-95</u>	
PE	BO	EXP	30	0	0	0	30	0	0	0	0	0	0	0
<u>TOTAL:</u>			30	0	0	0	30	0	0	0	0	0	0	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: REPLACE WOODEN SUPPORT POLES ON OVERHEAD STEAM LINES

CONTACT: W. K. SIMON

PROGRAM CATEGORY: PLANT & EQUIPMENT

PLANT: ORNL

PROJECT NO: 10.04

STATUTORY REQ:

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.10.04

SCOPE: Replace decaying steam line supports with new structures.

JUSTIFICATION: Many of the overhead steam line support poles are approaching their 40th year of service and are unsafe.

FACILITIES: VARIOUS LOCATIONS

STATUS/COMMENTS: Study

<u>FUNDING YEARS:</u> 90		<u>TEC (\$K1000):</u> 125											
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
PE	BO	EXP	125	0	0	0	125	0	0	0	0	0	0
<u>TOTAL:</u>			125	0	0	0	125	0	0	0	0	0	0

ORNL HEALTH & SAFETY PROGRAM DATA SHEET  
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LAST UPDATE: 4/25/89

ACTIVITY/PROJECT: EMERGENCY GENERATOR REPLACEMENT

CONTACT: W. K. SIMON

PROGRAM CATEGORY: PLANT & EQUIPMENT

PLANT: ORNL

PROJECT NO: 10.05

STATUTORY REQ:

FWP NO:

ENG. PROJ. NO:

EPMP NO: 2.10.05

SCOPE: Project entails replacement of all emergency generators at ORNL and is an ongoing project.

JUSTIFICATION: Many emergency generators are old and are becoming increasingly unserviceable. Maintenance of electrical power to many systems is critical to the safety of the Laboratory and its personnel.

FACILITIES: VARIOUS

STATUS/COMMENTS: Ongoing process

<u>FUNDING YEARS:</u> 89-95				<u>TEC (\$M1000):</u> 161									
<u>B&amp;R CODE</u>	<u>BA/BO</u>	<u>FUNDING TYPE</u>	<u>TOTAL</u>	<u>PRIOR FY-88</u>	<u>FY-88</u>	<u>FY-89</u>	<u>FY-90</u>	<u>FY-91</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY-95</u>	<u>BEYOND FY-95</u>
PE	BO	EXP	161	0	0	20	21	22	23	24	25	26	0
		<u>TOTAL:</u>	<u>161</u>	<u>0</u>	<u>0</u>	<u>20</u>	<u>21</u>	<u>22</u>	<u>23</u>	<u>24</u>	<u>25</u>	<u>26</u>	<u>0</u>

**Table 12.1. Funding summary for Plant and Equipment (\$ × 1000)**

	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	Total
Expenses	20	341	22	23	24	25	26	481



## INTERNAL DISTRIBUTION

- |        |                   |          |                               |
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