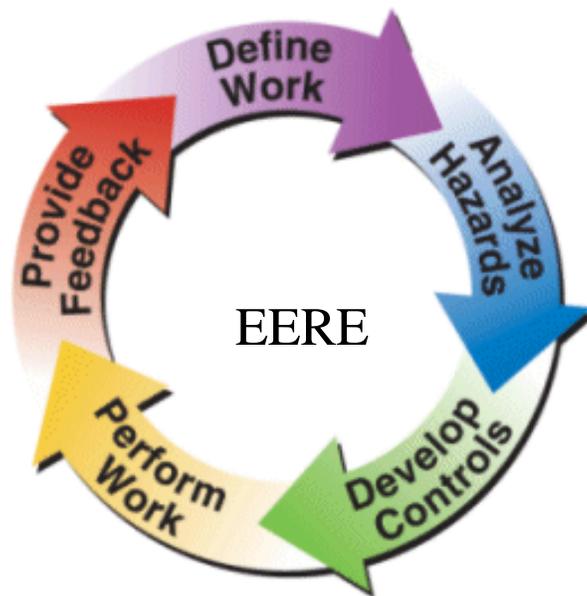

Office of Energy Efficiency and Renewable Energy

INTEGRATED SAFETY MANAGEMENT SYSTEM DESCRIPTION



May 2007

PREFACE

The Office of Energy Efficiency and Renewable Energy (EERE) Headquarters (HQ) and field elements are non-nuclear, non-defense, low-hazard, low-risk workplaces. The EERE-HQ and Golden Field Office (GO) environments, in terms of workplace safety, more closely resemble those of corporate offices. The laboratory for which EERE is Lead Program Secretarial Officer, the National Renewable Energy Laboratory (NREL), is primarily a bench-scale research and development laboratory, although some pilot scale research does occur and minor use of hazardous materials does occur.

The Office of Energy Efficiency and Renewable Energy controls and influences work planning, execution and safety by: overseeing contracts; formulating budgets; issuing policy, directives, and guidance; assigning clear roles and responsibilities to all staff; maintaining a highly-qualified and technically competent workforce; developing and administering programs and projects; maintaining communications; and, conducting oversight. Security-related safety elements in which EERE-HQ is involved are limited to physical and cyber security issues.

The basic division of responsibility and accountability in EERE is that HQ elements plan, direct and oversee the programs and field elements implement them (conduct or assign the actual work). Field elements consist of GO and NREL.

The Golden Field Office oversees the Project Management Center (PMC), a “virtual hub” for the project management of EERE’s programs. The PMC consists of the following field implementation organizations: the Golden Field Office, the National Energy Technology Laboratory, and the State Technologies Advancement Collaborative. The GO technical, administrative, financial management, environment, safety and health (ES&H), and legal responsibility for project execution, facility operation, and all site activities are carried out in accordance with DOE policy and guidance. All parts of the PMC use common project management and business practices

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Acronyms

ASEE	Assistant Secretary for Energy Efficiency and Renewable Energy
CPS	Corporate Planning System
DAS-BA	Deputy Assistant Secretary for Business Administration
DOE	Department of Energy
EERE	Office of Energy Efficiency and Renewable Energy
EMS	Environmental Management System
ES&H	Environment, Safety and Health
FEOSH	Federal Employee Occupational Safety and Health
FMEA	Failure mode and effects analysis
FRAM	Functions, Responsibilities and Authorities Manual
GO	Golden Field Office
HCA	Head of Contracting Authority
HQ	Headquarters
IDP	Individual Development Plans
ISM	Integrated Safety Management
ISMS	Integrated Safety Management System
M&O	Management and Operations (contractor)
MAP	Management Action Plan
NEPA	National Environmental Policy Act
NREL	National Renewable Energy Laboratory
OIBMS	Office of Information and Business Management Systems
OPBA	Office of Planning, Budget and Analysis
OPES	Office of Program Execution Support
PMC	Project Management Center
QA	Quality Assurance
QAP	Quality Assurance Program
SMS	Strategic Management System

EXECUTIVE SUMMARY

The Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) Integrated Safety Management System (ISMS) Description contains the EERE approach to safety management and is an essential element to EERE programs and offices getting “work done safely”. The EERE ISMS conforms to the safety management principles described in DOE P 450.4, *Safety Management System Policy* and the implementing requirements and guidance contained in DOE M 450.4-1, *Integrated Safety Management System Manual*, which serves as the source document for the EERE ISMS Description. It is important to note that the term “safety”, when used by EERE in the ISMS context and in this document, encompasses: quality assurance; public and worker safety and health; physical and cyber security; and, environmental management, including pollution prevention and waste minimization.

The Office of Energy Efficiency and Renewable Energy’s field elements consist of the Golden Field Office (GO) and the National Renewable Energy Laboratory (NREL). Headquarters (HQ) and field elements are non-nuclear, non-defense, low-hazard, low-risk workplaces. The EERE-HQ and GO environments, in terms of workplace safety, more closely resemble those of corporate offices. The NREL workplace is primarily a bench-scale research and development laboratory, although some pilot scale research and minor use of hazardous materials do occur. Headquarters and field elements utilize a graded approach to evaluate hazards or risks and uses appropriate controls for addressing those hazards and risks. The graded approach requirement is found throughout ISMS Directives and guidance as well as Order, 414.1C, *Quality Assurance*, and related guidance.

ISMS is a safety management system to systematically integrate safety into management and work practices at all levels. DOE P 450.4 requires the implementation of five core functions:

- Define Work;
- Analyze Hazards;
- Develop Controls;
- Perform Work; and,
- Provide Feedback

DOE Manual 450.4-1 requires that all organizations integrate the following into their ISMS:

- Quality Assurance Program (QAP);
- Environmental Management System (EMS); and,
- Other management processes and systems into their ISMS.

The EERE-HQ ISMS is fully integrated with the EERE QAP. The EERE QAP plan describes how EERE-HQ uses the graded approach in deliberate quality planning related to evaluating safety, as well as how quality assurance (QA) principles are applied in the five core ISMS functions listed above.

Headquarters does not have a formal EMS as DOE Program Offices have not yet been identified as appropriate facilities. The Secretary of Energy has identified NREL as an appropriate facility

and they do have a fully implemented EMS that is integrated into their ISMS. Although EERE-HQ does not have a formal EMS, many EMS elements are integrated into the ISMS.

The management system that EERE utilizes to accomplish its mission is the Strategic Management System (SMS), the four phases of which are: planning; budget formulation; program implementation; and, program analysis and evaluation. Many ISM components are already integrated into this management system, some formally, others informally. Headquarters is in the process of determining where and how to more formally integrate ISM components into the SMS.

The basic division of responsibility and accountability in EERE is that HQ elements plan, direct and oversee the programs, and field elements implement them (conduct or assign the actual work). The Golden Field Office oversees the Project Management Center (PMC), a “virtual hub” for the project management of EERE’s programs. The PMC consists of the following field implementation organizations: the Golden Field Office, the National Energy Technology Laboratory and the State Technologies Advancement Collaborative. The GO technical, administrative, financial management, environment safety and health (ES&H), and legal responsibility for project execution, facility operation, and all site activities are carried out in accordance with DOE policy and guidance. All parts of the PMC use common project management and business practices.

1.0 PURPOSE AND OBJECTIVES

The objective of ISM is to integrate safety into work planning so as to ensure that work is performed in a safe and environmentally sound manner. As described in DOE Policy 450.4, *“The Department and Contractors must systematically integrate safety into management and work practices at all levels so that missions are accomplished while protecting the public, the worker, and the environment. This is to be accomplished through effective integration of safety management into all facets of work planning and execution. In other words, the overall management of safety functions and activities becomes an integral part of mission accomplishment.”* It is important to note that the term “safety”, when used by EERE-HQ in the ISMS context and in this document, encompasses: quality assurance; public and worker safety and health; physical and cyber security; and, environmental management, including pollution prevention and waste minimization. It is EERE’s policy to fully incorporate environmental management considerations, including pollution prevention, into all work planning and execution.

Prepared in accordance with M 450.4-1, this document describes the comprehensive and integrated methodologies employed by the EERE Federal workforce to implement its safety management systems in accordance with DOE ISM directives as applied to EERE activities and facilities. Important companion documents are the EERE Safety Management Functions, Responsibilities, and Authorities Manual (EERE FRAM) dated May 2000 and the EERE Quality Assurance Plan.

The EERE ISMS complements and is integrated with the GO ISMS and the NREL ISMS (see figure 1). Together they comprise a multi-layered system of checks and balances that ensure all work performed at NREL overseen by DOE-GO and EERE is conducted in a manner that protects worker health and safety, the public and the environment.

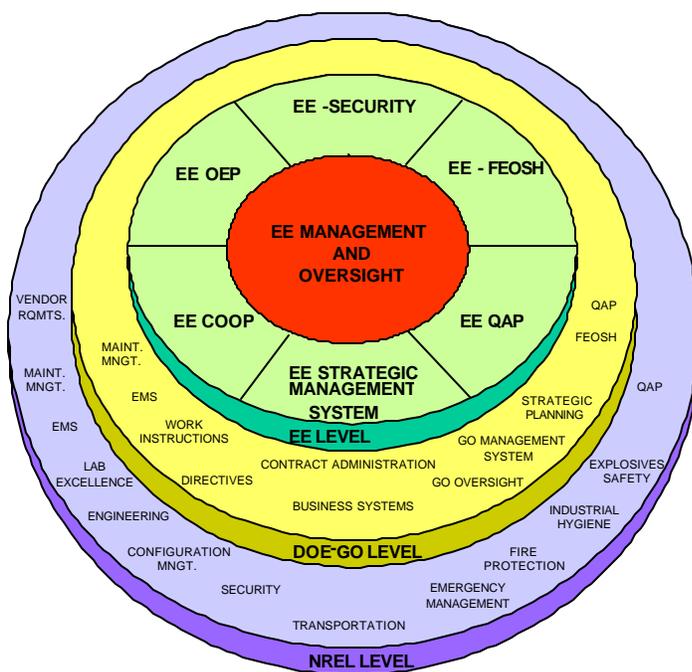
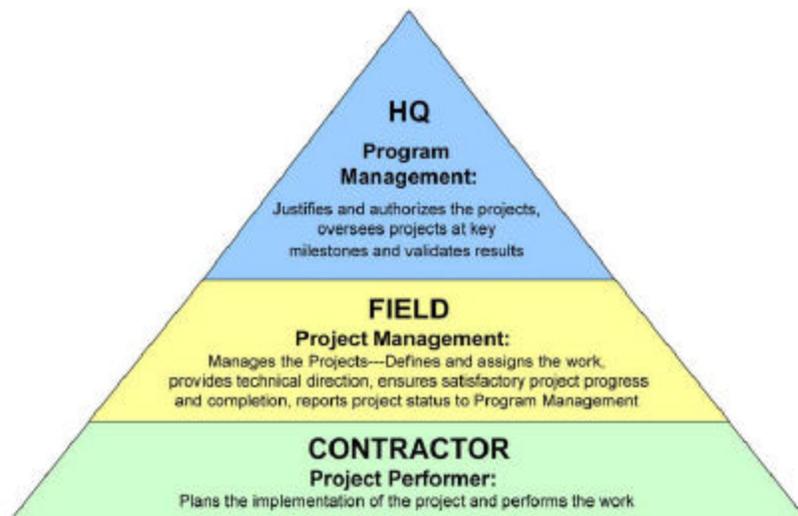


Figure 1. EE, DOE/GO and NREL Safety Management Systems Integration.

2.0 Overview of the EERE ISMS

The Office of Energy Efficiency and Renewable Energy controls and influences work planning, execution and safety by: overseeing contracts; formulating budgets; issuing policy, directives, and guidance; assigning clear roles and responsibilities to all staff; maintaining a highly-qualified and technically competent workforce; developing and administering programs and projects; maintaining communications; and, conducting oversight.

The basic division of responsibility and accountability in EERE is that HQ elements plan, direct and oversee the programs, and field elements implement them (conduct or assign the actual work). Part of EERE-HQ program planning and oversight entails establishing projects (discrete activities with definitive beginnings and endings). Headquarters or field elements (GO, by way of the PMC) then plan the projects and direct and oversee project implementation and other program operations and activities conducted by Federal laboratories and other governmental and non-governmental entities, including contractors, industry partners, interagency partners, etc.



The Assistant Secretary for EERE (ASEE) is the Lead Program Secretarial Officer responsible for NREL. The ASEE has delegated the responsibility for the oversight of NREL and its management and operations (M&O) contractor to GO.

In accordance with O 226.1, *Implementation of DOE Oversight Policy*, GO has an oversight plan, the GO Operational Surveillance Program, which includes ES&H, facilities and security elements. This Program is very prescriptive about conducting program reviews and, on occasion, they are conducted in concert with an NREL self-assessment activity. Everything is documented and formalized. The Golden Field Office announces the assessment, develops lines of inquiry, reviews documentation, conducts interviews, conducts field work observations, and develops a report that is sent to the NREL Director with a copy to EERE-HQ. The report identifies concerns (systematic failures), findings (individual non-compliance issues),

observations (areas for improvement from a best management practice approach) and noteworthy observations (areas exceeding mandatory requirements). The National Renewable Energy Laboratory is required to respond to the report with a corrective action plan, if needed, and GO tracks all actions to closure and verifies completion. The Golden Field Office is currently studying the Surveillance Program in order to develop a similar, or to integrate, a cyber security independent assessment process.

Headquarters provides oversight to ensure the EERE mission is being accomplished in a responsible, safe manner.

The work accomplished by EERE-HQ staff is primarily administrative in nature. The EERE-HQ ISMS defined in this document applies to all EERE-HQ employees, but the initial focus is on those employees with programmatic or ES&H and QA responsibilities associated with work performed in the field since that is where the majority of the EERE workplace safety risk resides.

The EERE-HQ staff is responsible for a myriad of programmatic and budgetary activities, but the most important ISMS-related element for EERE-HQ is the full integration of safety into four phases of the EERE SMS.

The EERE ISMS process defines the way safety is integrated into all applicable EERE activities. Both the EERE ISMS and the QA Program provide key mechanisms that establish rigor and discipline for EERE operations. Line management responsibility for safety is well manifested and EERE's organizational structure provides for clear delineation of roles, responsibilities, reporting and interfacing relationships.

The EERE's ISM program seeks to ensure that EERE-HQ, GO and NREL systematically integrate safety into management and work practice at all levels. To achieve this, EERE is integrating the ISM seven guiding principles and five core safety management functions. Headquarters implementation of the principles and functions can be found in section 5.0.

2.1 Guiding Principles

The DOE *Safety Management System Policy*, DOE P 450.4, establishes seven guiding principles to provide overall direction and guidance for instituting ISM. The Office of Energy Efficiency and Renewable Energy has integrated these principles into its ISMS. The guiding principles described in DOE M 450.4-1 are listed below.

1. Line Management Responsibility for Safety
2. Clear Roles and Responsibilities
3. Commensurate with Responsibilities
4. Balanced Priorities

5. Identification of ES&H Standards and Requirements
6. Hazard Controls Tailored to Work Being Performed
7. Operations Authorization

2.2 Core Functions

The five core safety management functions provide the necessary structure for work that could potentially affect the public, the worker and the environment. Within EERE, the functions are applied as a continuous cycle with the degree of rigor appropriate (the graded approach) to address the activity and hazards involved. The five functions are:

1. Define the Scope of Work
2. Analyze the Hazards
3. Develop and Implement Hazard Controls
4. Perform Work Within Controls
5. Provide Feedback and Continuous Improvement

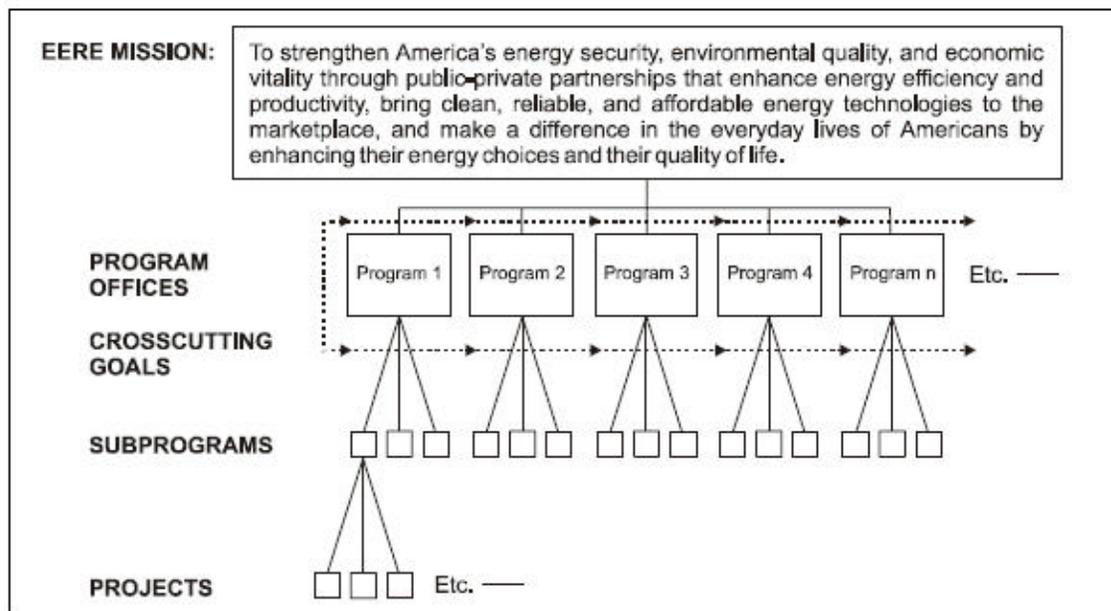
3.0 Management Expectations

The management of EERE expects that all work sponsored/funded by their organization is conducted safely. Performance expectations are established through a management system, the SMS. The Golden Field Office is responsible for setting, monitoring and providing feedback on work conducted at NREL, as well as for managing the PMC, the “virtual hub” for project management of EERE’s program.

3.1 The Strategic Management System

To accomplish its mission, EERE, like any organization, must divide its work into manageable “segments.” All of the work done in EERE can be represented by a work breakdown structure; a pyramid where the top level is the EERE mission and the succeeding lower levels are the EERE Programs and Projects. Most EERE Programs are further subdivided by the program manager into subprograms. Headquarters must ensure that all of the work needed to accomplish its mission has been assigned to, and is being pursued by, individual programs, or is being addressed collectively across programs as “crosscut” goals and objectives. If all programs are successful in meeting their goals and objectives (including their expected contribution to crosscut goals) then, by definition, EERE should be successful in accomplishing its mission.

Below the program level is the project level. Projects may include discrete research and development activities, technology demonstrations or deployment initiatives.

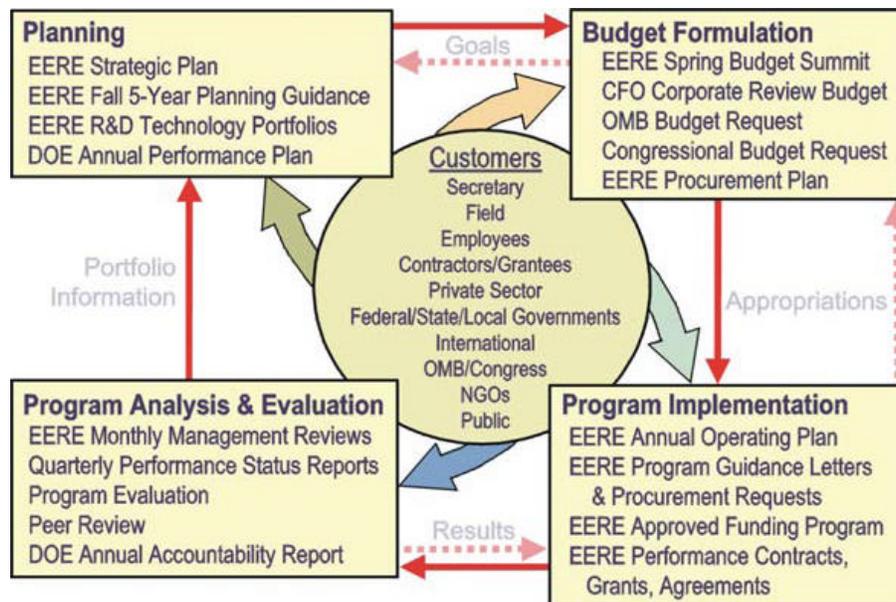


The SMS provides an integrated corporate approach toward planning, budget formulation, program implementation, and program evaluation across the entire organization. It defines each of the four program management phases in terms of a scheduled series of products and their linkage to other products and phases (their interdependencies). This helps to properly align the program and business management activities and provides critical information at the right time

for key decision-making. By adopting a clearly defined, integrated, and systematic approach for its management activities, EERE will improve the effectiveness, efficiency, and quality of its programs.

The figure below shows the four phases and the general closed loop flow for one EERE program cycle.

SMS Links EERE Processes, Products, and Customers



All of the SMS procedures, processes and tools have been designed to address the interdependence of the parts as well as the parts themselves. If SMS is properly used, each of EERE’s goals and objectives and each of EERE program’s multi-year program plans and annual operating plans will feed into the budget. The plans and budgets will then direct the implementing activities. The analysis and evaluation will focus on the desired outcomes as well as feed into the next planning cycle. The SMS is part of the EERE-HQ program management team’s basic tool kit. It is the roadmap and calendar for planning and implementing the program.

3.1.1 EERE Corporate Planning System

To aid the SMS, EERE-HQ has developed and is refining an automated management information and employee work aid system called the Corporate Planning System (CPS) which helps manage, monitor, and develop congressional budget requests, spend plans, budgets, project data, research and development portfolios, and other key work processes and products. It also supports the development of multi-year program planning, annual operations planning, and automated financial and work authorization document preparation and transmission. The system allows the user to: create and manage portfolios in real time; tie projects and milestones to fiscal year budgets; track contract information for the organizations and individuals; and, allows field personnel to review and modify portfolio information. The system stores a range of necessary data and information, such as DOE investments, carryover, and cost-share; Government

Performance Results Act energy benefits; total project development time; and, technical progress. Other information, such as quarterly and final reports, can be uploaded and addressed through the system. The goal is to provide a seamless operational and managerial link between all EERE program and project-level activities and to define and manage operational roles and responsibilities among Program Managers, Technology Managers, Budget Analysts and Project Managers in the field.

3.2 Integration of Safety into the Strategic Management System

As stated earlier in this document, the EERE-HQ work place resembles that of a corporate office and as such, the safety aspects of its operational work activities are relatively minor. However, EERE-HQ is aware that many of its non-operational work activities are important for assuring safety during the conduct of field element operational work activities. These activities include defining work scopes, allocating resources, conducting assessments and integrating feedback sources to identify areas needing improvement. The four management elements (planning, budget formulation, implementation, and analysis and evaluation) of the EERE SMS address each of these activities across all programs and organizational units. The PMC performs all of this work once a solicitation has been issued.

Currently, the Office of Information and Business Management Systems is reviewing the entire SMS and CPS to determine how additional safety elements can be explicitly and electronically integrated into each of the four program management elements. For example in the planning phase, how can/should safety be addressed in acquisition, multi-year and annual operating plans? For HQ procurement actions (work to be directed at HQ) EERE-HQ programs complete a paper copy of the EERE National Environmental Policy Act (NEPA) Review and Determination form to determine the level of NEPA review required for the action. The form is retained in the contract file. Headquarters is looking into including this as an electronic form in CPS, as well as a safety consideration form.

The EERE Hydrogen, Fuel Cells & Infrastructure Technologies Program requires that all proposals for hydrogen-related solicitations include a preliminary safety plan or in some cases, a summary. All funded projects must complete a more detailed safety plan before experiments and operations commence and must keep that plan current as part of the project. This plan or summary is used as a criterion for the selection and continuation of supported projects. Headquarters is currently evaluating, based on application of the graded approach to ISM, if other EERE Programs should adopt a similar approach to proposal and project selection.

4.0 EERE Program Office ISMS Roles and Responsibilities

The Secretarial Office level responsibilities for ISMS implementation are specified in DOE M450.4-1, Integrated Safety Management System Manual (11-1-06). These responsibilities are to:

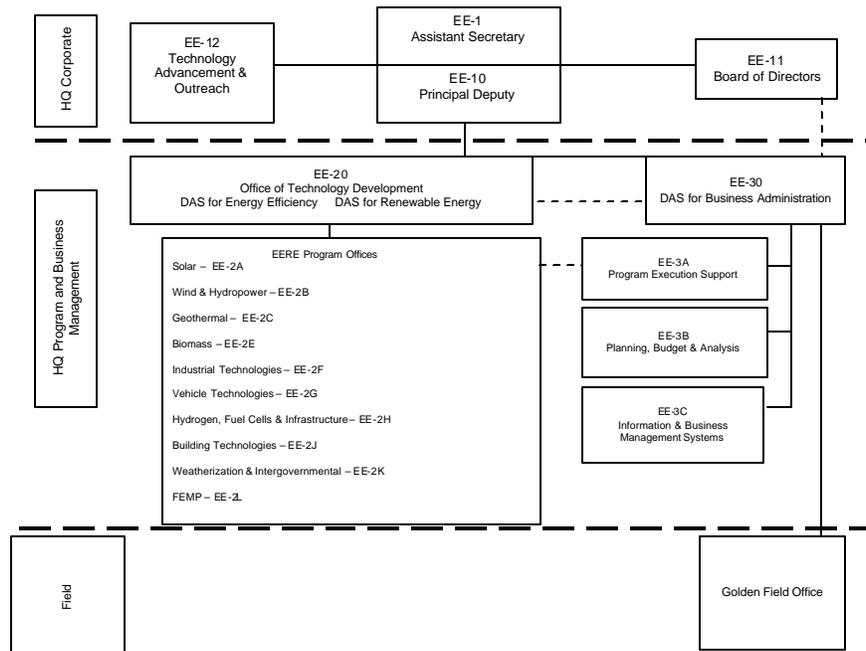
1. Develop, approve, maintain, and implement an EERE ISMS Description that is complete, accurate, and up-to-date and provided to the Under Secretary of Energy for information.
2. Integrate EMS and QAP into the EERE-HQ ISMS, pursuant to DOE O 450.1, Environmental Protection Program, and DOE O 414.1C, Quality Assurance.
3. Conduct line oversight of the implementation of the ISMS at field/site offices assigned to EERE, consistent with the requirements of DOE O 226.1, Implementation of Department of Energy Oversight Policy.
4. Perform an annual ISMS effectiveness review, and using the results of this review, make an annual declaration of the status of ISM implementation within EERE to the Under Secretary of Energy.
5. Approve annual safety performance objectives, measures, and commitments and provide to the Under Secretary of Energy.
6. Provide direction to field offices for annual ISM effectiveness reviews, annual ISM declarations, and annual performance, objectives, measures and commitments.
7. Designate an ISM Champion to support ISM implementation activities as directed.
8. Use results from annual ISM reviews and declarations to drive ownership and improvement by providing clear, timely, and accurate feedback, including identifying new goals and directions for improvement in the following year.

Line management is responsible for the safe performance of work, regardless of its location. For EERE, line management responsibility starts with the Secretary of Energy, the Deputy Secretary, and the Under Secretary of Energy, who is the Central Technical Authority for EERE. Line management responsibility flows to the ASEE, then to Deputy Assistant Secretaries and Program Managers, with program management responsibilities that are executed in the field. From the ASEE, line management responsibility for work at NREL flows to the Deputy Assistant Secretary for Business Administration (DAS-BA), then to the GO Manager and then to the NREL M&O contractor.

The GO Manager reports to the DAS-BA who has three offices to assist in their work:

- The Office of Program Execution Support (OPES);
- The Office of Planning, Budget and Analysis (OPBA); and,
- The Office of Information and Business Management Systems (OIBMS)

Energy Efficiency and Renewable Energy



The primary offices within EERE with line management responsibilities and hence, most involved and impacted by the implementation of ISMS are these Offices. The following summarizes the primary programmatic and ISM responsibilities for EERE offices.

- OIBMS facilitates the development of the EERE ISMS and related documents and the completion of related activities.
- OIBMS provides technical support to other EERE offices in the areas of: occupational safety; environmental compliance; hazardous materials management; hazard and accident analysis; technical safety requirements; emergency preparedness; and, quality assurance.
- OIBMS manages the process involved in reviewing annual requests for funding of new construction (facilities and additions) and new capital equipment required for the accomplishment of assigned missions consistent with DOE policies and practices, with particular emphasis on safety, environmental acceptability, and operational efficiency to meet DOE mission requirements.
- OIBMS provides technical and program guidance for the safety and environmental analyses and processes to assure facility operations and activities in assigned areas of responsibility are in conformance with applicable laws, regulations, DOE orders, and standards.
- OIBMS is responsible for the cyber security program for EERE information systems.
- OPES is responsible for the EERE-HQ physical security program.

- OPBA responsible for assisting OIBMS and the Program Managers in fully integrating ISM principles into the SMS.

Please note that for a comprehensive listing of EERE office responsibilities and authorities, see the EERE FRAM.

5.0 EERE Implementation of ISM

DOE P 450.4 establishes seven guiding principles to provide overall direction and guidance for instituting ISM. DOE M 450.4-1 identifies four supplemental safety culture elements to supplement the original seven ISM guiding principles to help an organization to develop the appropriate context for effective implementation of ISM systems. Headquarters implements these seven guiding principles and four supplemental principles in the following manner:

5.1 Implementation of the ISM Guiding Principles

1. Line Management Responsibility for Safety. The Office of Energy Efficiency and Renewable Energy line management is directly responsible and accountable for the protection of employees, the public, and the environment. Everyone is responsible and accountable for the safe conduct of his or her activities. Line management is responsible for ensuring operations are conducted in an environmentally responsible and compliant manner. Headquarters implements this guiding principle via the EERE FRAM.
2. Clear Roles and Responsibilities. There are clear roles and lines of responsibility, authority, and accountability at all levels of the EERE organization to ensure protection of employees, the public, and the environment. Headquarters implements this guiding principle via the EERE FRAM.
3. Competence Commensurate with Responsibilities. All EERE employees must have the experience, knowledge, skills, and abilities needed to perform their work safely and competently. Systems must be in place to establish and continuously maintain these capabilities. Headquarters implements this guiding principle via its hiring practices and through its training program. All EERE personnel maintain competencies commensurate with their responsibilities, and all EERE personnel involved in program or project management utilize the EERE Program Management Virtual University. This is an online tool kit that allows the EERE user to identify his/her program management training needs and identify and select training opportunities to address those needs.
4. Balanced Priorities. Headquarters allocates resources to address ES&H and infrastructure maintenance, and participates in and conducts oversight of the work prioritization processes. No work will be funded unless it can be performed safely and environmental considerations are addressed. Headquarters implements this guiding principle via its SMS including: formal budget development and execution guidance; technical guidance letters to field element managers responsible for the day-to-day execution of EERE programs and projects; and, by the approval of annual programmatic and performance goals, measures and commitments.
5. Identification of ES&H Standards and Requirements. The Office of Energy Efficiency and Renewable Energy conducts systematic reviews of contract requirements prior to contract award, and by maintaining the technical competence of its ES&H subject matter experts. Headquarters and GO management provide oversight of ES&H work planning and controls and integrate continuous feedback and improvement mechanisms into their

work. Headquarters implements this guiding principle through its oversight program. Headquarters also participates in the DOE Review and Comment system to comment on, and keep abreast of, DOE directives and regulations related to ES&H and QA.

6. Hazard Controls Tailored to Work Being Performed. Although this guiding principle has a focus on work execution in the field, EERE assists in its implementation through effective execution of its oversight program. A principal responsibility of EERE-HQ is to conduct oversight of its field elements to ensure the performance of work in a safe, reliable, and environmentally compliant manner.
7. Operations Authorization. For EERE facilities, approval authority for operations authorization resides with the field element (GO) manager, but EERE assists in the implementation of this guiding principle through effective execution of its oversight program.

SUPPLEMENTAL ISM PRINCIPLES

1. Individual Attitude and Responsibility for Safety – EERE promotes this principle through regular communication of Federal Employee Occupational Safety and Health (FEOSH) and Occupant Emergency Plan information to its Headquarters’ staff.
2. Operational Excellence – EERE supports this principle through oversight of GO in their approval of annual programmatic and ES&H and QA performance goals, measures and commitments for NREL.
3. Oversight for Performance Assurance – EERE supports this principle through implementation of its oversight program, including applicable components of the EERE SMS.
4. Organizational Learning for Performance Improvement – EERE supports this principle through its staffs’ participation in formal training and qualification programs (e.g., Program and Project Management Training Initiatives)

In accordance with DOE procedures, EERE employees have the right to decline to perform a task because of reasonable belief that, under the circumstances, the work poses an imminent, personal danger, as well as the authority, through their supervisors, to stop work when conditions are judged to be an imminent threat to health, safety, or the environment. Further, EERE employees have the right to express/report, without fear of reprisal or discrimination, any concerns related to workplace hazards and/or protections. Management will investigate and resolve such concerns in a timely manner, and will communicate these results to affected employees. Employee safety is further assured through the active participation of union representatives on the Headquarters Safety, Health and Security Committee, which meets regularly with cognizant DOE facilities management to identify, discuss and resolve issues.

5.2 Implementation of the Five Core Functions

The five core safety management functions provide the necessary structure for work that could potentially affect the public, the worker, and the environment. Within EERE, the five core functions are applied to address the activity and hazards involved. The EERE management implements these core functions through the SMS and the EERE-HQ oversight program.

The five functions are:

1. *Define the Scope of Work.* The EERE management defines the scope of work by allocating funds, setting expectations and goals, and negotiating contracts. This function is implemented through the SMS.
2. *Analyze the Hazards.* The EERE contractors analyze hazards. The EERE management conducts oversight of field and contractor performance. This and the following functions are implemented through the EERE oversight program.
3. *Develop and Implement Hazard Controls.* The EERE contractors develop and implement hazards controls. The EERE management conducts oversight of field and contractor performance.
4. *Perform Work Within Controls.* EERE conducts oversight of the field and contractors to ensure EERE contractors perform work within controls.
5. *Provide Feedback and Continuous Improvement.* The EERE management provides feedback and improvement through site offices oversight.

Of the five core functions, *Define the Scope of Work*, *Analyze the Hazards*, and *Provide Feedback and Continuous Improvement* represent the biggest opportunities for EERE staff and management involvement through EERE's approval of annual programmatic goals and its implementation of the EERE oversight program. *Develop and Implement Hazard Controls* and *Perform Work Within Controls* are core functions more applicable to implementation of ISM in the field since EERE's potentially hazardous work is performed at sites remote from HQ. The EERE-HQ oversight program contains adequate checks and balances to ensure GO is carrying out its oversight responsibility of NREL and its contractors.

Worker Involvement

The involvement of the EERE workforce is a key element in the implementation of the ISMS. Their active participation helps establish a quality culture that supports worker environment, safety and health at all levels within the organization. The EERE employees work in partnership with EERE managers and supervisors to ensure a workplace safe from recognized hazards, and to identify and resolve worker issues in a timely and satisfactory manner. The EERE management implements its responsibilities in accordance with applicable DOE and FEOSH program requirements.

5.3 Integration of Quality Assurance and Environmental Management System with Integrated Safety Management.

5.3.1 Integration of Quality Assurance with Integrated Safety Management

The Office of Energy Efficiency and Renewable Energy is committed to assuring the quality of its products and the safety of its operations. The EERE QAP describes how EERE manages its work in accordance with the criteria in DOE Order O 414.1C, “Quality Assurance” and explains the functions, responsibilities, and authorities necessary for achieving the integration of QA into ISM in EERE activities.

Headquarters effectively plans, budgets for, executes, and evaluates its activities such that work is done correctly and safely. It is EERE’s policy that quality, environmental, and safety requirements for products and services be clearly defined before work begins. Work processes are continuously monitored, assessed, and improved to achieve a rising standard of excellence in the quality and safety of EERE programs, projects, products, and services. The integration of following functions of QA with ISM is further described as:

Quality Assurance Program: The EERE QAP and ISMS describes the organization of EERE, its function and mission, and how the quality of its work is assured through implementation of the ten criteria outlined in O 414.1C. It also describes the inclusion of the ISM Functions into the EERE QAP.

Personnel Training and Qualification: The EERE QAP and ISMS use standard DOE and Office of Personnel Management processes to hire persons qualified to perform their jobs. All EERE-HQ employees are required to have Individual Development Plans (IDPs) that describe the further training and education needs for their work. These IDPs are tailored to the needs of the employee and the office in which the employee works. EERE follows the requirements and guidance associated with DOE Order 360.1B, Employee Training.

Quality Improvement: Each program office within EERE will establish and maintains its own methods of improving both the safety and the quality of its work. Product quality and safety are identified by EERE-HQ and communicated to EERE field elements. Feedback occurs through assessments of the EERE-HQ programs and other internal efforts to improve work. Results of these assessments are communicated to EERE management and are used to improve both safety and quality assurance.

5.3.2 Integration of Environmental Management System with Integrated Safety Management

Environmental Management Systems and ISM both strive for continual improvement through a “plan-do-check-act” cycle. This cycle calls for defining the scope and purpose of the system followed by a planning (plan) step to develop programs and procedures that must then be implemented (do). Once implemented, programs must be assessed (check) and any problems corrected (act) to improve the effectiveness of the management systems and to achieve improved ES&H performance. Under ISMS, the term “safety” also encompasses health and environment (DOE P 450.4). Therefore, the guiding principles and core functions in ISMS are as applicable to the protection of the environment and employee health as they are to safety.

DOE O 450.1, *Environmental Protection Program*, requires DOE sites to establish an EMS that is integrated into a DOE site's ISMS. The integration of an EMS into ISMS provides a unified strategy for the management of resources and the establishment and achievement of DOE's ES&H goals. Headquarters views the integration as an enhancement of ISMS that adds those EMS elements not previously included in the ISMS. Headquarters does not have a formal EMS as DOE Program Offices have not been yet identified as appropriate facilities, however, many EMS elements are integrated into the ISMS. The Secretary of Energy has identified EERE's NREL as an appropriate facility and they do have a fully implemented EMS that is integrated into their ISMS.

5.4 Communication and Training Plan

The goal of the EERE-HQ ISMS Communication and Training Plan is that all EERE-HQ employees are familiar with the EERE-HQ ISMS and are aware of their safety roles and responsibilities.

Upon issuance of the EERE-HQ ISMS description, and annually when the ISMS is re-verified, OIBMS will issue a EERE-wide electronic message (similar to a DOECAST) that will announce the EERE-HQ ISMS description, explain its purpose, provide a link to its location on the EERE intranet, provide a link to the FRAM, and provide supervisory and individual employee safety responsibilities.

Both the FRAM and the ISMS description will be living, electronic documents that will be kept updated and accessible to all EERE employees on the EERE intranet.

Additionally, both EERE Program and Project Management courses will be updated to include modules on the EERE-HQ ISMS description and FRAM.

6.0 Other Safety Related Initiatives

6.1 Hydrogen Safety Panel

Almost any new technology involves some risk. Risks involved in working with hydrogen can be minimized through adherence to standard design parameters for equipment and procedures. The Hydrogen, Fuel Cells & Infrastructure Technologies Program strives for complete system safety in all Program-supported activities. A safety plan, which is comprised of a failure mode and effects analysis (FMEA), a risk mitigation plan and a communication plan, is used as a criterion for the selection and continuation of supported projects. The three components of a safety plan include:

- The FMEA is a widely used tool in the safety and reliability engineering fields. The main objective of a FMEA is the analysis of every possible failure in a component or a process. The FMEA includes possible results of a failure and peripheral failures that can occur following a component failure. A complete FMEA typically resembles a tree structure and it can be completed in either a top-down or a bottom-up approach. Since specific components are typically not selected during the proposal stage of a project, the functional, or bottom-up approach, is often more suitable for preliminary plans. This method allows for the identification of failures on the subsystem level.
- The risk mitigation plan is used to minimize potential risks. A typical product of an FMEA is a list of potential hazards that require additional attention. The risk mitigation plan entails a prioritization of those hazards, possible resolutions for each hazard and a list of action items to mitigate those risks. As with the detailed FMEA, the risk mitigation plan is required for all selected projects.
- The communication plan outlines the reports that are made to the Program upon the occurrence of a safety incident. It indicates the severity of incidents that are reported, states the method of reporting and lists which entities will be notified. The communication plan is required for all selected projects.

A guidance document, *Guidance for Safety Aspects of Proposed Hydrogen Projects*, is provided to applicants with clarification on safety requirements for hydrogen-related solicitations from the DOE Hydrogen, Fuel Cells and Infrastructure Technologies Program. All proposals for hydrogen-related solicitations must include a preliminary safety plan or summary, and all funded projects must complete a more detailed safety plan before experiments and operations commence and must keep that plan current as part of the project.

From the Program level, EERE is working to develop and implement practices and procedures that will ensure safety in operating, handling and using hydrogen and hydrogen systems. In addition, DOE is working with domestic and international organizations to identify the current gaps in the standards development process; facilitate the creation and adoption of model building codes and equipment standards for hydrogen systems in commercial, residential, and transportation applications; and, provide technical resources to harmonize the development of international standards.

The Office also provides technically accurate and objective information to key target audiences involved in the use of hydrogen and fuel cells today. For safety and code officials, DOE provides information on the safe use of hydrogen fuel.

7.0 EERE Annual ISM Maintenance and Continuous Improvement Processes

7.1 ISMS Description Maintenance and Continuous Improvement

The EERE-HQ ISMS Description will be reviewed annually for improvement. The ISMS Description will be improved as a result of: ISM annual oversight; self-assessments; annual effectiveness reviews; annual declaration, annual performance objectives; measures; results from the lessons learned program; and, commitment process.

7.2 ISM Annual Oversight, Self-Assessments, Annual Effectiveness Reviews and Annual Declarations

7.2.1 Integrated Safety Management Annual Oversight and Self-Assessments

ISM annual oversight and self-assessments will be performed according to the EERE oversight program, required by DOE O 226.1. The EERE line management establishes oversight expectations through weekly conference calls between EERE-HQ and GO, application of the Management Action Plan (MAP), participation in the GO review of the NREL ISMS description, EERE-HQ program management participation in national lab evaluations for award fee determinations and site visits. The MAP is the EERE-HQ corporate-level Action Plan aimed at improving program efficiency and output.

Organizations perform self-assessments and management assessments as a part of the annual evaluation process in accordance with DOE O 414.1C. These assessments are used to identify, evaluate and prioritize management deficiencies, as well as noteworthy practices, and play a significant role in shaping and improving the ISM oversight process. Each EERE-HQ Program Office also performs an annual self-assessment of the EERE-HQ environmental program, which includes an assessment of their implementation of the NEPA, and pollution prevention requirements.

7.2.2 ISM Annual Effectiveness Reviews and Annual Declarations

Headquarters and GO/NREL will perform an annual ISM effectiveness review to develop their annual ISM declarations. The annual ISM review will encompass a review of the content and results of relevant self-assessments, line oversight, and the annual lower-level ISM reviews; and, a review of performance against the past year's safety performance objectives, measures, and commitments. Headquarters and GO/NREL will annually issue a declaration report of the status of implementation of ISM within that office, including applicable site and contractor operations.

The Office of Energy Efficiency and Renewable Energy will annually declare in the report whether ISM is effectively implemented. If not, corrective or compensatory actions will be defined, tracked and verified. Annual ISM declarations provide a detailed basis which includes the annual ISM reviews and pertinent feedback data from a variety of mechanisms. Areas for improving ISM implementation performance will be clearly identified to promote continuous improvement.

7.3 Integrated Safety Management Annual Safety Performance Objectives, Measures, and Commitments

The purpose of safety performance objectives, measures and commitments is to drive improvement in safety performance and ISMS effectiveness. Clear expectations for safety performance have been established by EERE-HQ in its FRAM and this ISM System Directive. The GO manager, as the Head of Contracting Authority (HCA) for the NREL M&O contract, is responsible for establishing measurable safety goals for NREL:

- As part of the M&O contract, annual performance objectives are developed by NREL and transmitted to GO through the One Year Plan. The objectives and measures are negotiated with GO and, once agreement is reached, the One Year Plan is then appended to the contract.
- In support of the objectives and measures documented in the One Year Plan are key tasks. These are proposed by NREL and negotiated with GO but they are not part of the M&O contract. The key tasks are designed to support the measures and objectives but are not totally dedicated for that purpose. They can be activities that NREL wants to pursue that are outside the agreed-upon measures and objectives.

Headquarters assures that senior management provides direction and support to achieve EERE goals and expectations. The GO manager is expected to notify the ASEE of all safety-related occurrences and events at NREL that have a significant impact on operations or facilities. Safety performance is on the agenda of the EERE-HQ management staff meetings with the GO Field Manager, and any significant safety issues (i.e. Occurrence Reporting and Processing System) reports are discussed. NREL provides updated information on a daily basis and GO (along with NREL) review investigation data to identify trends. If the trends or a specific event have a negative impact on operations or if corrective actions will require resource commitments beyond NREL capabilities (i.e. personnel and dollars), the situation is then documented and raised from GO to HQ for resolution and possible guidance. It should be noted that historically, these types of events or trends are extremely rare occasions, as NREL is a non-nuclear, non-defense, low-hazard, low-risk laboratory.

Additionally, OIBMS reviews the safety data at least on a quarterly basis to determine any potential negative trends. Scheduled ES&H meetings, lessons learned sharing and site visits are some of the methods used to share safety information and improvement across the EERE organization.

The Golden Field Office, as the HCA for the NREL M&O contract establishes performance objectives through contract requirements and communicates these to NREL, which has performance-based contracts where ES&H performance expectations are clearly defined within the contract. This also extends to subcontracts issued by NREL. The Contract Performance Evaluation and Measurement Plan describe the performance evaluation framework and process and GO monitors and evaluates performance against these criteria.

The Golden Field Office implements management systems that evaluate laboratory compliance with applicable requirements and pursue excellence through continuous improvement. Annually, NREL prepares a self-assessment based on the negotiated performance objectives and measures.

The Golden Field Office has performance monitors who are subject matter experts in specific areas (i.e. ES&H, QA, Public Affairs, Business systems, etc.) who constantly monitor contractor performance. A performance evaluation report is generated annually using the performance objectives and measures as the basis for this evaluation. Semi-annually, performance review meetings are held with NREL to discuss current evaluations of performance in the area of mission support and NREL leadership, and to make necessary adjustments in performance objectives or measures.

This report is utilized by GO to evaluate performance against expectations, including those for planned ISM oversight activities. The GO manager identifies the need for corrective actions or other measures designed to mitigate risks to EERE operations.

Headquarters Program Managers participate in the NREL contract Award Fee evaluation process only to evaluate the research performance objectives, however the conclusions of the evaluation are presented to the ASEE when finalized.

In addition to the above evaluations, GO and EERE-HQ Program Managers conduct rigorous annual evaluations of project performance in accordance with the Strategic Management System.

8.0 Conclusions

The EERE-HQ ISMS Description meets the requirements of DOE M 450.4-1 and fulfills the requirement that EERE develop a description of its ISMS. This System Description follows the format contained in applicable guidance found in Attachment 3 of the Manual, *Guidelines for Developing DOE ISM System Descriptions*. The level of rigor in the EERE-HQ ISM System Description is consistent with the hazards and complexity of the EERE-HQ activities, as they are non-defense, non-nuclear, low hazard and low risk in nature.