The Risk Management and NEPA (National Environmental Policy Act) Department of Sandia National Laboratories/New Mexico (SNL/NM) recognized the need for hazard and environmental data analysis and management to support the line managers' need to know, understand, manage and document the hazards inherent in their facilities and activities. The Integrated Safety, Environmental, & Emergency Management System (ISEEMS) was developed in response to this need.

SNL needed a process that would quickly and easily determine if a facility or project activity contained only standard industrial hazards and therefore requires minimal safety documentation, or if non-standard industrial hazards existed which would require more extensive analysis and documentation. Many facilities and project activities at SNL would benefit from the quick screening process used in ISEEMS. In addition, a process was needed that would expedite the NEPA process. ISEEMS takes advantage of the fact that there is some information needed for the NEPA process that is also needed for the safety documentation process. The ISEEMS process (Figure 1) enables SNL to identify and manage hazards and environmental concerns at a level of effort commensurate with the hazards themselves by adopting a necessary and sufficient (graded) approach to compliance. All hazard-related information contained within ISEEMS is location-based and can be displayed using on-line maps and building floor plans. This visual representation provides for quick assimilation and analysis.

The NEPA process requires collecting and organizing information as well as a system to track the status of NEPA documentation for a proposed facility or project activity. The Environmental Checklist/Action Description Memorandum (ECL/ADM) module within ISEEMS provides documentation necessary to determine one of the following: prior NEPA coverage; categorical exclusion; or information to support development of an Environmental Assessment (EA) or Environmental Impact Statement (EIS). This module provides a friendly and intuitive user interface for completing the complex ECL/ADM document. The user has detailed "help" for each item along with samples that can be "cut-and-pasted" into the user's ECL/ADM.

The Preliminary Hazard Screening (PHS) module of ISEEMS determines the facility or project activity hazard classification and facility designation (Figure 2). The facility designations used by ISEEMS are: Non-nuclear, Nuclear, or Accelerator. ISEEMS categorizes non-nuclear facility or project activities into one of the following hazard classifications: Office; Standard Industrial Hazard (SIH); and Low, Moderate, or High non-standard industrial hazard. The level of rigor required for ES&H documentation is determined by the hazard classification and the facility designation. An Office or SIH classification requires a PHS, Low requires a Hazard Analysis (HA), Moderate requires a Safety Assessment (SA), High or Nuclear requires a Safety Analysis Report (SAR), and Accelerator requires a Safety Assessment Document (SAD).

ISEEMS combines a geographic information system (GIS), database management system (DBMS), and report generator into one application. ISEEMS integrates two commercially available products (Emergency Information System [EIS] from EIS International and Access from Microsoft) with Sandia-specific custom coding. Through ISEEMS, users have the capability of analyzing data from disparate corporate data bases according to regulatory guidance. The results of the analysis are then displayed in a graphic and narrative summary. The graphical output is unique hazard icons displayed upon the facility map in the hazard's representative location. The power of ISEEMS lies in the geo-referenced icon. The icon is tied to relational database structures containing relevant data and allows immediate, visual integration of hazard information across geographic boundaries resulting in significant information compression. Additionally, a user can model a chemical release plume (using ALOHA) and plot the plume on the same map. This information is very useful in emergency response planning and in managing actual emergencies.

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At Sandia, ISEEMS runs on the Sandia Internal Restricted Network (IRN). This allows users from all over the laboratories to execute ISEEMS in a network environment and to enter, edit, or obtain hazard or environmental information on a facility or project activity. The ISEEMS program runs in an MS-Windows environment on standard (desktop or laptop) PC hardware. The system can be run in a stand-alone mode that is ideal in an emergency response situation since the current databases can be downloaded to a laptop and used in an Emergency Mobile Command Post to assist in the emergency response decision making process.

ISEEMS is based on the following information and guidance sources:

- DOE Order 5481.1b Safety Analysis and Review System
- DOE Order 5480.23 Nuclear Safety Analysis Reports
- DOE Order 5480.25 Safety of Accelerator Facilities
- DOE Order 5480.19 Conduct of Operations Requirements for DOE Facilities
- DOE Order 5500.3a Planning and Preparedness for Operational Emergencies
- 29 CFR 1910 Occupational Safety and Health
- 40 CFR 1500-1508 Protection of Environment
- National Environmental Policy Act (NEPA)
- Current, Fire Hazard Analysis, Chemical, Radiological, and Sealed Source Inventories
- Equipment Inventories (e.g., Accelerators, X-ray generating devices).

The ISEEMS process and the ECL/ADM and PHS modules have been successfully implemented. A parallel project that uses the same files has been developed for the SNL/NM Emergency Operations Center (EOC) for their particular use. This modular development of ISEEMS provides the user with a useful initial tool without waiting for the complete process to be developed. Future development of ISEEMS will incorporate EA and EIS modules and HA, SA, and SAR modules. A qualitative risk analysis process developed at Sandia will also be added as an ISEEMS module.

The ISEEMS design paradigm incorporates the "Necessary and Sufficient" philosophy. A team of knowledgeable and qualified staff developed the necessary and sufficient set of requirements and standards appropriate to the hazard and facility classifications. The necessary and sufficient set of requirements and standards were then independently reviewed and approved by SNL ES&H professionals. ISEEMS was designed and implemented as a software application using the "approved necessary and sufficient set."

We are currently exploring the possibility of transporting ISEEMS to a "WEB-like" environment. SNL is fortunate to have a robust internal WEB that can be accessed by most of our users. WEB tools such as JAVA and Virtual Reality Markup Language (VRML) may make the conversion feasible. ISEEMS could then be run in a hardware-independent environment (i.e. PCs, Sun Workstations, or MACs) and still have all the functionality currently provided in an MS-Windows environment. Until then, we will implement other MS-Windows enhancements such as the use of ArcView as our primary GIS interface to allow the user the option of using vector-based maps.

ISEEMS replaces the previous fractional methods of hazard data collection, and is a solution to the general unavailability of hazard-related data to ES&H professionals, other corporate entities, and DOE. ISEEMS provides a rollup capability that shows the effects of accumulated hazards across several organizations or locations. ISEEMS answers the line managers' need for a software tool to Know, Understand, Manage, and Document their hazards.

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Figure 1 -- ISEEoMS Process

Figure 2 -- Preliminary Hazard Screening (PHS) Overview
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