

A Web-based Support Tool for Integrating ES&H Management
LA-UR 00-2107
Marilyn G. Barnes, Carrie D. Atencio, Richard L. Brehm, Kay Jackson
Los Alamos National Laboratory
P. O. Box 1663, Los Alamos, NM 87545
505-665-3638
gbarnes@lanl.gov

Identifying and managing Environment, Safety, and Health (ES&H) requirements presents the project manager with the challenge of being aware of current requirements; interpreting, understanding, and adequately planning to address those requirements; and assuring requirements are fulfilled as the project progresses. The Environment, Safety, and Health Identification (ESH-ID) Process, a web-based ES&H communication and review service, was designed and implemented at Los Alamos National Laboratory (LANL) to assist project managers in meeting that challenge. The ESH-ID process provides a rapid, consistent, and thorough ES&H review of highly diverse projects (see Appendix A) by providing an institutional venue for project data, associated requirements, and reviewer assistance in an on-line system easily accessed by any LANL employee.

Although the original version of the automated ESH-ID was implemented in 1994, significant process enhancements have been achieved in Version 4, brought on-line in September of 1999. Prior to Version 4, laptop computers were used to collect data, ES&H Areas of Concern were identified, and project data was posted to a review web site only. The ESH-ID Version 4 system allows customers to enter and edit project data at a web site customized for the individual user and provides for identification of project-specific LANL requirements as well as on-line assistance from SME reviewers. Additionally, customers may enter data and track closure of the ES&H issues and concerns identified in the project review using the ESH-ID closure web site.

The ESH-ID on-line system has three main web pages, "Create/Edit," "ESH-ID Index," and "ESH-ID Closure." Each main web page is further linked to other functions/options specific to that page. For ease of use, each web page is designed in the same format.

At the "Create/Edit" web page, the customer may enter information into a data collection instrument containing some 3,000 data fields designed to collect project information specific to LANL requirements. A series of computer screens arranged in a drill-down format leads the customer through the process of data collection accomplished almost exclusively in the form of check boxes and/or "Yes," "No," or "Unknown" responses. If a project does not involve information requested at a primary level screen, the customer need not visit the related sub screens. Until submission, only the customer and process administrators have access to the information in the customer's private web page. The customer can edit data at any time prior to submission.

After submission, process administrators check the data for completeness, clarity, and compatibility and implement the computer-assisted review process utilizing a customized database program to produce a listing of LANL requirements and appropriate SME reviewers. The results of the review are verified and posted to the "ESH-ID Index" web page. A team of SME reviewers, unique for every project, is selected and notified via email to access the ESH-ID web site and provide a requirements-based, on-line review. Additionally, automated email notifications are sent to other interested parties as indicated by project personnel. Anyone with access to the LANL intranet may visit the web site to view and/or review project data, associated requirements, and SME comments.

The results of the ESH-ID review are posted to the "ESH-ID Closure" web page. Project personnel retain the responsibility for satisfying the identified requirements and may use the ESH-ID Closure web site to enter and track actions taken to address ES&H requirements, issues, and/or concerns. As with the ESH-ID Index, the ESH-ID closure information is available to those having access to the LANL intranet.

Although the basic process design remains constant, elements within the system can be changed administratively without the need to alter programming code. New or changed LANL requirements are reviewed to identify the need for alterations in data collection and/or changes in requirement statements. When identified, a generic requirement statement along with a reason(s) for the requirement is drafted. The data fields triggering the requirement are identified or new data fields are created. For each new requirement, a reason for the requirement and a rule defining when the requirement applies must be formulated, at least one contact or reviewer must be assigned, and, optionally, a reference may be identified.

Process measurements conducted prior to the implementation of Version 4 indicated a perpetually sustained, high-level customer and SME satisfaction as well as a significant reduction in cost per project review. A 1995 survey of SME reviewers denoting time expended per project review prior to and after implementation of the ESH-ID process indicated an estimated annual reduction in cost of \$1,800,000--approximately \$7,000 per project review. Data collected from SME surveys indicated reviewers expended far less time reviewing each project. The reduction in project review time was attributed to better data collection, the application of a databased screening tool, and the elimination of a weekly meeting of all SMEs to discuss all projects. Although formal process measurements will not be conducted until mid 2000, current anecdotal information plus an increase in process usage suggests the acceptance of Version 4. Additionally, it is possible review time has been further reduced due to the inclusion of LANL requirements in the upgraded system.

To provide the best service possible, process administrators do not rely exclusively on the web-based system but continually work one-on-one with customers, maintain personal contact with both SME reviewers and on-site ES&H teams, and provide formal as well as informal system training. SME reviewers have provided valuable input in development of the requirements database and continue to participate in updating the system. On-site ES&H teams provide a vital link between customers and project administrators alleviating the need to build a large, centralized customer service component. In addition, on-site teams are now beginning to use the ESH-ID tool as an internal assessment tool by modifying contacts to utilize on-site team members as SME reviewers. Basically, the management approach has been to build and balance the human element of the system in support of the electronic element.

The system has been implemented using Microsoft Active Server Pages 2.0 (ASP) running on Microsoft Internet Information Server (IIS). The database is Oracle and resides on a separate UNIX server. The hardware configuration is 500 MHz Pentium processor, 128 MB memory, and 20 GB hard drive. Since the database does not reside on the ESH-ID server, the actual physical space required for just the ASP files is less than 5 MB. The client browser can be Netscape Navigator 4.0+ or Microsoft Explorer 4.0+. The scripting languages used to create the ESH-ID are VBScript, HTML, and JavaScript. VBScript is used to create all server-side scripts. ASP interprets VBScript to dynamically create HTML files. JavaScript is used in client-side scripting, and Microsoft Visual InterDev is used to create and maintain all scripts.

The ESH-ID system could be helpful to any facility with the need to identify ES&H issues and to integrate the review and management of those issues. However, it is important to note the system has been customized to LANL, and it is suggested careful consideration be given to the time and effort required to implement the system at another facility in terms of the information required from the

customer and the requirements that drive the system. Determining and documenting the new information, rules, reasons, requirements, reviewers, and references may take several months, depending upon the resources available. A trained, non-programmer administrator should be able to enter all of the new data within one to six weeks, depending upon the number of changes and overall size of the new ESH-ID. It took one person approximately four to six weeks to enter all of the data required for the existing ESH-ID, which has approximately 3,000 questions and 800 reasons, 1,100 requirements, and 100 references. Because the simultaneous programming and data entry efforts resulted in modifications to the data, the actual time is difficult to determine. It took significantly longer than six weeks to review the necessary documents (Administrative Requirements, Laboratory Implementing Requirements, Notices, Department of Energy Orders, etc.) to determine what information the system would contain. Once the system is set up, a non-programmer administrator of the system can make changes to the questions, rules, reasons, requirements, etc. as requirements at the site change.

Appendix A

The diversity of the ESH-ID process is demonstrated by the following AOC for which the process is used as a review mechanism:

- **Environmental**
 - Air Emissions (radiological and non-radiological)
 - Archaeological/Historical Preservation
 - Biological/Ecological Surveys
 - Dredge and Fill Permits
 - Environmental Restoration
 - Excavation
 - Federal Insecticide, Fungicide & Rodent Control Act
 - Floodplain/Wetland Conservation
 - National Environmental Policy Act (NEPA)
 - National Pollutant Discharge Elimination System (NPDES)
 - Natural Resources
 - New Mexico Special Wastes
 - New Mexico Water Quality Control
 - Pollution Prevention
 - Pre-operational Site Surveys
 - Resource Conservation and Recovery Act (RCRA)
 - Septic System Permits
 - Solid Waste Management Units/Potential Release Sites (SWMUs/PRSs)
 - Spill Prevention and Countermeasures (SPCC)
 - Threatened/Endangered Species
 - Toxic Substances Control Act (TOSCA)
 - Underground Storage Tanks
 - Waste Management
 - Waste Minimization
 - Waste Stream Management
 - Safe Drinking Water Act

- **Safety and Health**
 - Chemical Hazards & Toxic Materials
 - Explosives Safety
 - Industrial Hygiene
 - Nuclear Criticality Safety
 - Occupational Medicine
 - Operational Safety
 - Radiological Safety
 - Safety Analysis
 - Unreviewed Safety Question Determination (USQ)

- **Facility Planning**
 - Construction Project Management
 - Emergency Preparedness
 - Facility Safety Planning

- Fire Protection
- Emergency Management
- Occupying or Vacating Work Space
- Excess Space and Surplus Facilities
- Facility Siting
- Physical Security