

## A HEALTH AND RESEARCH ORGANIZATION TO MEET COMPLEX NEEDS OF DEVELOPING ENERGY TECHNOLOGIES

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### INTRODUCTION

The rapid development of technology, particularly in the area of energy research and development, brings with it increasingly more complex and sophisticated health and safety problems. The complex safety requirements also bring the need for greater interaction between health and safety disciplines that have historically functioned quite independently. The Lawrence Livermore Laboratory employs approximately 7000 people in various areas of energy technology development and nuclear research.

All of the LLL safety functions (except the Medical Department) are assigned to the Hazards Control Department. This department has responsibility for radiation safety, industrial hygiene, industrial safety, fire safety, and explosive safety. The safety program is managed through a system of program oriented field teams. Each team has a leader and a cadre of health and safety technicians. The resources necessary to make the field teams functional are provided from the health and safety discipline areas listed above. For example, the field team responsible for the general area of chemistry would have representatives from industrial hygiene, radiation safety, fire safety, etc. assigned to work together, insuring a multidisciplinary approach to solution of safety problems in that area

We, as many other moderate or large size laboratories, have found that operational safety questions frequently arise that cannot be answered or solved through available data, techniques or instrumentation. These questions can only be resolved through in-house cost effective safety technology development. At LLL, this development is done through a single division within the Hazards Control Department, that responds to health and safety technology problems in radiation science, fire science, industrial hygiene, and general safety.

### SPECIAL PROJECTS DIVISION

The Special Projects Division was formed because it was recognized early in the formation of the Hazards Control Department that development of health and safety technology was sufficiently important to require a separate dedicated effort. Special Projects is a 27-person safety technology development organization representing approximately 10% of the Hazards Control Department work force. The primary mission of the Division is to provide health and safety technology development required by the operational safety program at the Laboratory. Division responsibilities include:

- Development of equipment or instrumentation
- Development of techniques for health and safety
- Studies to provide information needed by management or operational safety professionals

- Measurements of safety related parameters of Laboratory facilities, equipment, or materials
- Calculations or calculational studies.

The Special Projects Division is organized into three functional groups - Radiation Science, Safety Science, and Fire Science. These groups share common office and laboratory spaces, and interact with each other on a regular basis. This organization factors multi-disciplinary attention to general safety problems; i.e., a skill generally required for one class of health and safety discipline is available for solutions to problems that occur in others. For example, aerosol physics and filtration are areas that present problems for each of the three of the groups in our Division. Rather than hiring an aerosol physicist for each group, we are able to share the talents of one or two individuals who meet our technological needs. This is also true in areas such as instrumentation, chemistry, computer science, and others. Table 1 shows the current skills inventory in the Special Projects Division. This inventory meets the current needs of our Department and Laboratory. It is intended as an example, and may not apply to other facilities.

Table 1.

SPECIAL PROJECTS SKILLS INVENTORY

Combustion Science	X-Ray Fluorescence Analysis
Analytical Chemistry	Radiation Spectrometry
Risk Analysis	Health Physics Instrumentation
Industrial Hygiene	Industrial Hygiene Instrumentation
Aerosol Physics	Radiation Physics
Health Physics	
Solid State Dosimetry	

The Radiation Science Group (RSG) develops instrumentation and techniques for radiation protection and measurement. The group provides technical support to the Radiation Safety Program at the Laboratory, particularly in the areas of personnel dosimetry development, applied health physics, calibration and standards development, and the Laboratory environmental monitoring program. Expertise developed in radiation safety technology is often valuable to other Laboratory programs. Consequently, this group provides radiation instrumentation/measurement support to particular programmatic efforts at the Laboratory.

The Safety Science Group (SSG) is responsible for solution of problems in the fields of occupational health and general safety. The SSG obtains data and develops specialized equipment to support safety discipline needs in respiratory protection, work place monitoring, improved air cleaning and monitoring techniques, and evaluation of protective clothing. Recently the SSG has undertaken the additional responsibility of technical support to the Laboratory Waste Disposal and Decontamination facility efforts.

The Fire Science Group (FSG) develops solutions to problems faced by the Fire Safety Program at LLL. The FSG also uses its expertise to answer fire safety related questions for the Department of Energy, in general. The technical scope includes: materials testing for small-scale flammability tests to full-scale enclosure fires, development of unique modes and mechanisms for fire extinguishants; tests and analysis of fire detection concepts of hardware, analysis of physical and chemical properties of smoke aerosols; studies of fire retardant application to natural and synthetic materials; and parametric analysis of the interaction between fire management systems and the fire hazards potential of experimental facilities. The FSG maintains a full-scale fire test enclosure that is equipped to simulate fires in laboratory environments with typical fuels that might be found in the laboratory. It also has a fine chemical analytical laboratory including a sophisticated gas chromatograph-mass spectrometer for analysis of fire decomposition products.

#### PROJECT DEVELOPMENT

A key to the success of an organization such as the Special Projects Division is the need for close, working interaction with the operational health and safety staff of the department. Special Projects personnel are encouraged to interact with their operational counterparts daily in a candid and personal way. Some of the best technology development in the safety field comes from such interaction. A project may be conceived either by a Special Projects Senior Investigator, an operational client or both. Once formulated, projects must be approved by the client and Special Projects Division Leaders. Projects are reviewed formally once each quarter through a system of status reports. The progress of each project is monitored by the Steering Committee. The Steering Committee is composed of the Special Projects Group Leader, the Special Projects Division Leader, and the Division Leader and Group Leader in the counterpart Operational Health and Safety Division in Hazards Control. These steering committees meet regularly to review the status of ongoing projects. It is important for successful completion of a project that the senior investigator and client review the project frequently.

Depending on the complexity and time requirements on any given project, a Senior Investigator, who is generally a safety professional with an advanced degree, will have from one to four projects assigned at a given time. A Senior Investigator may also be called upon occasionally to provide programmatic support to research and develop problems arising from outside the Hazards Control Department, although that is not part of their prime mission.

#### PROJECT EXAMPLES

A major strength of the Special Projects Division is its multidisciplinary structure - the ability to combine a wide spectrum of skills to achieve successful project completion. Examples of the potential for interdisciplinary accomplishment include testing the fire resistance of neutron shielded storage containers; on-line

measurement of toxic metal concentrations in Laboratory sewage effluent using special X-ray fluorescence and radiation detection techniques; and collaboration between the Safety Science and the Fire Science Groups to develop filtration and sampling techniques for dense smokes.

Other examples such as these could be cited to demonstrate the interaction between the disciplines, but perhaps the greatest benefit to the Laboratory is derived from non-specific daily interactions and discussions both within the Division and the Department. Without the unified structure that the Special Projects Division enjoys, interdisciplinary communications would be much less frequent and productive. An additional advantage to the organization and the Department is the ability to share resources among groups rather than having to duplicate resources. Single high quality laboratories for testing, analysis, dosimetry, etc. provide a maximum flexibility at a minimum cost.

### SUMMARY

At the Lawrence Livermore Laboratory, a unique safety technology organization has been established that is especially geared to respond to interdisciplinary health and safety questions in response to rapidly growing energy technology problems. This concept can be adopted by smaller organizations at a more modest cost, and still maintains the efficiency, flexibility, and technical rigor that are needed more and more in support of any industry health and safety problem. The separation of the technology development role from the operational safety organization allows the operational safety specialists to spend more time upgrading the occupational health and safety program but yet provides the opportunity for interchange with health and safety technology development specialists. In fact, a personnel assignment flow between an operational health and safety organization and a special technology development organization provides a mechanism for upgrading the overall safety capability and program provided by a given industrial or major laboratory.

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