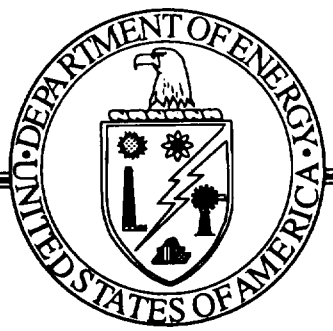
APPENDIX O

COMMENDABLE PRACTICES



APPENDIX O

COMMENDABLE PRACTICES

This appendix summarizes a number of commendable chemical safety activities and practices observed during the field verification phase of the Chemical Safety Vulnerability Review. These practices provide lessons learned that can be applied elsewhere in the DOE complex. Among the most notable of the practices observed were (1) development and implementation of management systems and other administrative controls or other management systems that have significantly reduced overall hazardous chemical inventories and (2) the maturation of industrial hygiene programs that more effectively address operations and nonroutine work controls involving hazardous chemicals. Other practices noted include efforts to identify and mitigate environmental releases of hazardous chemicals; increased awareness of the need to perform nonnuclear safety analyses; engineered safeguards and controls on chlorine and other toxic gas systems; substitution of less hazardous chemicals for more hazardous chemicals; and development of space management programs to address problems associated with hazardous chemical residuals in facilities.

For the purpose of this appendix, the list of commendable practices described below begins with those that are programmatic in nature and ends with those that meet more specific needs. In each case, a point of contact is designated to provide additional information.

Evaluating and Reducing Hazards During Life Cycle of Operations: Martin Marietta Energy Systems, Inc. (MMES), uses both corporate-wide and site-specific procedures to ensure that all stages of the life cycle of an operation are treated with an appropriate degree of rigor, while simultaneously providing flexibility for dealing with individual needs. This approach depends on the actual requirements imposed by corporate-wide procedures and on the care exercised in assessing vulnerabilities associated with specific activities. There are substantial differences in the actual implementation of systems and procedures important to chemical safety that can be traced to fundamental differences between the guidance provided by the sponsoring program offices at DOE Headquarters. Nonetheless, it should be noted that MMES has adopted good practices by specifically requiring that "efforts to ensure the safety of . . . operations shall be applied in all stages of the life cycle of these operations" (Y70-811, "Safety of Operations," dated March 1, 1993). In recent years, a substantial effort has been made to apply this philosophy to processes used for evaluating and reducing hazards. (Contact: Paul Stumb; Organization: MMES)

Facilities Space Management Program: When facilities at Sandia National Laboratories, New Mexico (SNL/NM), are no longer needed for an existing program, user organizations have a strong financial incentive (i.e., space charges) to make these facilities available to other organizations. To effect a transfer, thereby avoiding space charges, the user must work through the Facilities Center to have the facility evaluated for residual hazards. If hazards are present, the user must take remedial actions before the Facilities Center will accept the facility. By performing such evaluations before space ownership is transferred, SNL/NM seeks to avoid the potential exposure of employees who are moving to new work areas, to decrease physical hazards in workplaces, to expedite the remediation of contaminated areas, and to track the presence of chemical and radiological residues. At SNL/NM, environmental, safety, and health (ES&H) space evaluations are performed by the Industrial Hygiene/Toxicology,

Safety Engineering, and Radiation Protection organizations before transfer of ownership is approved. The space transfer process is part of the Facilities Space Management Program. When a request for transfer of ownership is received by the Facilities organization, the request is routed through an ES&H space transfer coordinator in the Industrial Hygiene Department. The coordinator provides copies of the request to the Industrial Hygiene/Toxicology, Radiation Protection, and Safety Engineering organizations. Subsequently, each organization inspects the space for potential hazards. If problems are detected, the space owner is responsible for correcting them before transfer of ownership is approved. Information gathered on past and current processes and chemical use can support initial efforts to compile data on potential chemical residues for those areas that undergo ES&H evaluation. (Contact: Kirk Hodge; Organization: SNL/NM)

Chemical Management System: The most notable improvements to chemical safety observed during the field verification visits were those related to the overall reduction of hazardous chemical inventories. All sites visited had expended significant effort to identify their excess hazardous chemicals and to reuse, dispose of, or sell these materials. Some sites have adopted "just-in-time" procurement practices to maintain inventories of hazardous chemicals at minimum levels. This approach has reduced the need for large inventories. Sites have chosen to substitute nonhazardous chemicals in processes previously requiring hazardous chemicals, thereby minimizing the risks associated with hazardous chemicals. These efforts to identify and reduce inventories and to maintain minimum quantities of hazardous chemicals have led to the adoption of "near-real-time" inventory controls at some sites. Although there was little evidence across the DOE complex that these revised chemical inventory data are being used as the basis for emergency management implementation planning, those sites already implementing proactive inventory controls recognize the importance of taking this next step.

A model chemical inventory control program was identified at Pacific Northwest Laboratory (PNL) at the Hanford Site. The Chemical Management System (CMS) is a computer-based chemical inventory system developed at PNL to inventory chemicals, provide hazard information about chemicals, and minimize chemical waste. CMS has been in use since November 1991. The system was designated as an outstanding model by the Office of Safety and Quality Assurance's worker protection pilot initiative. PNL is actively working with Brookhaven National Laboratory (BNL) to establish a comparable system; the National Renewable Energy Laboratory, Lawrence Berkeley Laboratory, and others have requested PNL's assistance in developing similar programs; and Argonne National Laboratory–West (ANL-W) has adapted basic concepts from CMS to improve its use of material safety data sheets. (Contact: Glenn R. Hoenes; Organization: PNL)

ANL-W has an exemplary chemical hygiene program that meets and exceeds the requirements of the Occupational Safety and Health Administration's (OSHA) Laboratory Standard (29 CFR 1910.1450), the OSHA Hazard Communication (HAZCOM) Standard (29 CFR 1910.1200), and DOE 5480.10, "Contractor Industrial Hygiene Program." Chemical hygiene personnel have taken a proactive approach to the implementation of this program. The storage, labeling, and administrative controls for chemicals are excellent. In particular, the methodology for chemical segregation of normal laboratory chemicals, carcinogens, organics, and other materials is commendable. Using this approach, chemical hygiene personnel at ANL-W have reduced the inventory of high-risk chemicals such as ethers,

benzene, and other organics. The performance-based training program provided to Analytical Laboratory personnel is current and complete. (Contact: Mary Adamic; Organization: ANL-W)

Building 559 at RFP has an exemplary chemical management system that uses a facility-specific, accurate, real-time data base coupled with a facility-designated chemical control officer to provide complete inventory information on all hazardous chemical wastes. The system includes computerized tracking of chemicals (via unique bar-codes) from pre-purchase approval through storage, use, and final disposition. (Contact: William A. Adams, Organization: EG&G Rocky Flats, Inc.)

A comprehensive, online, computerized, Laboratory-wide chemical tracking system (Chem Track) and material safety data sheet system is in the initial stages of implementation at LLNL. Bar-coded labeling will facilitate the tracking of current chemical purchases and existing individual chemical containers throughout the Laboratory. ChemTrack will also facilitate compliance with regulatory requirements. A new system, the Facility Management Information System (FAMIS), is being developed, which will allow a graphic display of every laboratory and facility within the Chemistry and Materials Science Directorate (with the potential for extending this capability sitewide). Linking FAMIS with ChemTrack would enable an almost instant display of ChemTrack inventory data at any selected geographical location at LLNL and would, thus, provide valuable safety-related information to anyone coping with an emergency situation at that location. (Contact: Rex Beach, Organization: LLNL)

Hazardous Waste Labeling System: TA-54 at the Los Alamos National Laboratory (LANL) developed a hazardous waste labeling system that uses one label to meet all Resource Conservation and Recovery Act, American National Standards Institute, U.S. Department of Transportation, and Clean Air Act requirements. The label is also bar-coded for hazardous waste inventory and chemical tracking purposes. The one-label system ensures that all pertinent information is placed on containers and facilitates segregation of hazardous waste materials. (Contact: Jeffery E. Schinkel; Organization: LANL)

Emergency Response Nomograph For Toxic Chemical Spills: A new nomograph to determine evacuation distance requirements for toxic chemical spills is being developed at Westinghouse Idaho Nuclear Company (WINCO) for the Idaho Chemical Processing Plant (ICPP). This nomograph will provide for a rapid determination of distance affected by a chemical spill and is expected to improve emergency response to chemical incidents by personnel on the backshifts without relying on sophisticated computer models. (Contact: Gerald Gibeault; Organization: WINCO)

ES&H Management Assurance Notebooks: Each manager at SNL/NM prepares a Management Assurance Notebook (MAN) to serve as a standard means for organizing and communicating ways to meet ES&H responsibilities. The notebook is the manager's primary repository of ES&H information. The notebook has value during internal and external audits, reviews and assessments, and when transferring management responsibilities by clearly defining ES&H responsibilities within the organization. Each level of management has a slightly different version of the MAN, tailored to meet specific responsibilities and needs. As management level increases, the focus of the MAN shifts from details to summaries and

metrics. Each notebook is a "living document" and is updated annually or when major personnel changes occur. (Contact: Ralph Bonner; Organization: SNL/NM)

Contract Initiative to Ensure Adequate Hazard Communications: At BNL, a construction safety engineer (on his own initiative) incorporated the following clause in all contracts for which he has responsibility: "Workers shall be able to comprehend work and safety instructions in English or a supervisor who can translate shall be provided and be present at all times." When enforced, this clause provides some measure of assurance that non-English-speaking personnel will be aware of safety requirements and workplace hazards. On several occasions, this construction safety engineer has suspended work by invoking the contract clause that requires a bilingual person to be on the work site at all times. In another instance, a group of about 15 subcontractor personnel attended the New Employee Safety Orientation Course before starting asbestos abatement activities on site. Only one member of the group spoke English, and that person translated the course into the native language of the group. (Contact: Mary White; Organization: BNL)

Applying Graded Approach to Hazards Analysis: BNL uses a graded approach, based on the level of hazard, to review facilities and operations. Although minor, low-hazard operations may be reviewed by individual departments, those BNL operations with increasing hazard levels receive correspondingly more rigorous safety and health review and independent laboratory process review. ES&H standards and other key BNL site documents state that most safety-related work at BNL is organized according to a graded approach. Numerous documents require that the level of quality, formality, safety analysis, and equipment requirements be determined through an analysis of the risks posed by the prospective operations. The standards and manuals go further and provide helpful details on how to implement a graded approach. BNL-O&M-I-010, *Operations and Maintenance Manual*, delegates responsibility for establishing the BNL Conduct of Operations and Maintenance Management programs and for the administration of these programs to the Associate Director for Management and Physical Plant. (Contact: John DiNicola; Organization: BNL)

Chemical Salvage Program: Westinghouse Savannah River Company (WSRC) initiated a chemical salvage program to dispose of or find uses for chemicals that are no longer in use at the Savannah River Site (SRS). Similar programs can be found elsewhere on site. WSRC is proactively combining all such activities and extending them to the entire site through a recently established Chemical Commodities Group. The Chemical Commodities Group will be used to address issues associated with procurement, storage, reuse, and disposal of chemicals. (Contact: Vic Reynolds; Organization: WSRC)

The Chemical Exchange Warehouse (CHEW) at LLNL is currently being implemented to enhance use and control of chemicals and reduce quantities of hazardous wastes. The CHEW allows for the reapplication of excess chemicals in lieu of classification as hazardous wastes. (Contact: Rex Beach, Organization: LLNL)

Sharing Chemical Safety Program Information: To reduce cost and use the insights acquired from other successful programs, WSRC shares information with the Westinghouse Hanford Company (WHC) in many program areas related to chemical safety. For example, WHC sends operators to WSRC for hands-on training on similar wastewater treatment systems. (Contact: Saleem Salaymeh; Organization: WSRC)

Sitewide Wastewater Discharge Minimization Program: The Hanford Tri-Party Agreement (TPA) signed in 1987 identified 33 discharge "streams" to be controlled. A plan based on a two-phased approach was subsequently developed to minimize and treat these "streams" and to achieve stringent reductions in flow and contaminant concentrations. Over the past 4 years, WHC, PNL, and their subcontractors have cooperated to produce significant reductions in flow and pollutant concentrations. WHC and PNL have cooperated to reduce wastewater production in the 300 Area through a hierarchial approach of source reduction, segregation, recycling, and treatment and discharge. This program has reduced wastewater in the 300 Area from 1,500 gallons per minute in 1988-89 to a current level of about 125 gallons per minute. The program received a Federal Facilities Energy (Conservation) Efficiency award in 1993. (Contact: Doug Shoop; Organization: WHC)

Participation, Coordination, and Cooperation With Regulatory Agencies: DOE is sponsoring a regulatory oversight program in 14 states across the country, including New Mexico. States receive grants to provide direct oversight of environmental activities. The program is known as the "Agreement in Principle" and is fully implemented at SNL/NM via the Kirtland Area Office (KAO). The New Mexico Environmental Department has five individuals located at SNL/NM to provide DOE with direct independent oversight and monitoring of environmental activities. KAO reports that this program has helped to build additional credibility for the Department with regulatory agencies and the local community. DOE Headquarters judges the New Mexico oversight program, and in particular the program at SNL/NM, as the most effective program of its type in the DOE complex and attributes its success to the high level of coordination and communication between DOE, the State, and SNL/NM. (Contact: John Olav Johnson; Organization: KAO)

Chlorine and Toxic Gas Control Programs: Because of a near-miss chlorine release recently experienced at Idaho National Engineering Laboratory, field verification teams for the Chemical Safety Vulnerability Review were directed to focus particular attention on potential vulnerabilities associated with chlorine and other compressed gases. Some sites that previously used large amounts of chlorine in their water-treatment processes had either substituted less hazardous chemicals for chlorine (e.g., sodium hypochlorite) or had significantly reduced the use of chlorine and instituted more stringent administrative controls over its use. The most significant reduction of chlorine-related risk was noted at SRS, where sodium hypochlorite has replaced chlorine in the primary domestic water treatment process. The safe use of chlorine was also noted at LANL, K-25 Site, Rocky Flats Plant, and SNL/NM. The use of toxic gases in DOE processes and laboratories was also evaluated. Although such gases continue to be used in research and microelectronics production processes, all installations observed also used enclosed toxic gas cabinets, gas monitors, and alarms to safeguard workers. (Contact: Jeffery E. Schinkel; Organization: LANL)

Elimination of Chlorine Gas in Water Treatment Operations: WSRC has substituted sodium hypochlorite for chlorine gas in the treatment of water at the SRS. All chlorine gas cylinders have been removed from the Water Chlorination Facility, which has a capacity to store about 70 1-ton cylinders. All chlorine cylinders containing gas were returned to the supplier in June 1993. Empty 1-ton cylinders were cut up for scrap. Liquid sodium hypochlorite is received in 15-gallon carboys and is added to the raw water stream by a small electrically driven chemical pump. (Contact: Don Harrison; Organization: WSRC)

Work Control Program For Engineering And Maintenance: WINCO has implemented a highly effective work control program for engineering and maintenance work related to the ICPP. Specific programmatic elements pertinent to the Chemical Safety Vulnerability Review include the following:

- Providing general and facility-specific training to maintenance workers in chemical safety, based on the requirements of 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response";
- Defining quality assurance levels and associated safety classifications for all plant systems;
- Applying and verifying the application of the requirements mandated by quality level and safety classification of systems to system-related engineering and maintenance activities;
- Implementing a formal configuration management program, including "as-building" all critical and safety systems, piping and instrumentation diagrams, control diagrams, and power distribution drawings;
- Continuing to reduce the "as-built" drawing backlog by 50 percent every 2 years;
- Proceduralizing and tracking specific preventive and predictive maintenance, which has eliminated the backlog of electrical preventive maintenance and produced a preventive maintenance backlog for mechanical equipment of less than 0.5 percent;
- Establishing and tracking maintenance performance indicators, including backlog hours, skin contaminations and first-aid reportables, instrument calibrations, and calibration error occurrences;
- Holding both employees and managers fully accountable for safety performance;
- Minimizing and controlling inventories of hazardous chemicals used in maintenance (primarily solvents) and providing safety information to all maintenance workers; and
- Empowering employees at all levels for the entire work control process, including worker safety.

WINCO maintenance and engineering programs embody the best practices of industry and are based on modern, innovative management methodologies. (Contact: Larry Chingbrow; Organization: WINCO)

Computer-Based Maintenance Control Reporting System: The Maintenance Control Reporting System (MCRS) is used to develop comprehensive work packages for a wide range of corrective and preventive maintenance at BNL. MCRS provides computer-generated information related to specific work orders, including (1) work procedures, (2) maintenance work orders, (3) replacement part serial numbers, (4) warehouse inventory for over 10,000 consumable replacement parts, and (5) cost-accounting information. MCRS was developed "in house" using a computer system consultant and off-the-shelf computer software.

MCRS is configured to provide contract maintenance services, maintain records, and issue billings for programmatic and scientific maintenance activities. (Contact: John DiNicola; Organization: BNL)

Removing Residual Chemicals From Unused Chemical Process Equipment: Planning, execution, and documentation for flushing chemical storage and processing systems at WINCO's Fluorinel Dissolution Process and Fuel Facility and the Fuel Processing Facility in Idaho exemplified proper removal of residual chemicals from processing equipment. Fluorinel fuel dissolving equipment was cleaned of process residues and flushed before being placed in standby status. Similar procedures were developed for the cleanout of solvent extraction and denitration equipment. (Contact: Thomas R. Byrnes; Organization: WINCO)

At ANL-W, two unused, obsolete Analytical Laboratory chemical systems (a low-level waste evaporator and a spent-acid collection system) have been flushed of all residual chemicals. These efforts were accomplished safely in accordance with specifically developed procedures for sampling residuals, characterizing samples, and flushing and rinsing equipment. The procedures conservatively addressed safety and health considerations associated with the work preformed. (Contact: Mary Adamic; Organization: ANL-W)

Documentation Of Facility Dismantling: The Light Initiated High Explosive Facility at SNL/NM was shut down about 2 years ago. After removal of the process equipment, both the equipment and the facility were thoroughly cleaned to remove all traces of explosives. The manner in which the facility was dismantled and cleaned was documented in reports and videos that demonstrate "before" and "after" conditions and show the techniques used for cleaning. The facility is now in a safe standby mode, awaiting a mission. The extensive documentation of the condition of this facility will provide valuable information to future users of the facility. (Contact: Floyd Mathews; Organization: SNL/NM)

Hazardous Material (Hazmat) Response Team Preparedness For Chemical Spills: Some facilities reviewed at LANL contain significant quantities of hazardous chemicals. Sufficient types and quantities of hazardous materials (HAZMAT) response equipment and spill materials are available to mitigate incidental, nonthreatening, easily containable spills. The responses required for a larger spill include evacuating the facility and making appropriate notifications. The HAZMAT Response Team is responsible for containing or mitigating HAZMAT situations. The HAZMAT Response Team is part of the Hazardous Materials and Response Group (ESH-10) and, based on its composition, is unique within the DOE complex. The team consists of dedicated, full-time personnel who are trained to the HAZMAT "specialist" level, most of whom have received several hundred hours of HAZMAT training. Professional personnel have either industrial hygiene or health physics backgrounds. The team has been equipped with a state-of-the-art HAZMAT vehicle, plus other vehicles and trailers containing personnel protective equipment, supplies, and the tools needed to mitigate HAZMAT situations. On request, the team provides HAZMAT response to LANL, surrounding communities, and the State of New Mexico. (Contact: Jeffery E. Schinkel; Organization: LANL)

Dispersion Model To Calculate and Display Plume Dispersions: Meteorological Information and Dose Assessment System (MIDAS), a computer software model, was recently installed at LANL to calculate and display plume dispersions for hazardous materials. As part

of the Laboratory's search for better modeling accuracy, MIDAS has been extensively modified to incorporate site-specific meteorological factors to account for the effects of the complicated local terrain on dispersion calculations performed for the LANL site. The Laboratory has the capability to perform hazardous chemical plume dispersion calculations by using a variety of approved computer models both in the Emergency Operations Center and in the field. (Contact: Jeffery E. Schinkel; Organization: LANL)