

Foreword

THE U.S. DEPARTMENT OF ENERGY (DOE) recognizes that true excellence can be encouraged and guided, but not standardized. For this reason, on January 26, 1994, the Department initiated the DOE Voluntary Protection Program (DOE-VPP) to encourage and recognize excellence in occupational safety and health protection. This program closely parallels the Occupational Safety and Health Administration's (OSHA's) Voluntary Protection Programs (VPP). Since their creation by OSHA in 1982, the VPP programs have established the credibility of cooperative action among government, industry, and labor to achieve excellence in worker health and safety.

DOE-VPP outlines areas where DOE contractors and subcontractors can surpass mere compliance with DOE orders and OSHA standards. The program encourages the "stretch for excellence" through systematic approaches involving everyone in the contractor or subcontractor workforce at DOE sites. DOE-VPP emphasizes creative solutions through cooperative efforts by managers, employees, and DOE.

DOE-VPP consists of three programs, with names and functions similar to those in OSHA's VPP. These programs are STAR, MERIT, and DEMONSTRATION. The STAR program is the core of DOE-VPP. The program is aimed at truly outstanding protectors of employee safety and health. The MERIT program is a steppingstone for contractors and subcontractors that have good safety and health programs but need time and DOE guidance to achieve STAR status. The DEMONSTRATION program is expected to be used rarely; it exists to allow DOE to recognize achievements in unusual situations about which DOE needs to learn more before determining approval requirements for the STAR program.

Requirements for DOE-VPP participation are based on comprehensive management systems. Employees are actively involved in assessing, preventing, and controlling the potential health and safety hazards at the site. DOE-VPP is designed to apply to all contractors in the DOE complex and encompasses production facilities, research and development operations, and various subcontractors and support organizations.

DOE contractors are not required to apply for participation in the DOE-VPP. In keeping with OSHA's VPP philosophy, *participation is strictly voluntary*. Additionally, any participant may withdraw from the program at any time.

Contractors interested in participating in DOE-VPP evaluate how well their safety and health programs implement the DOE-VPP requirements contained in *U.S. Department of Energy Voluntary Protection Program, Part I: Program Elements*. They may decide to submit an application, using *Part III: Application Guidelines*.

The steps of the application review process described in *Part II: Procedures Manual* involve the area office, operations office, and program office to independently assess the application's completeness and the applicant's qualifications for DOE-VPP recognition. Comments from the review are resolved before the application is submitted to the Office of Worker Health and Safety (EH-5).

DOE-VPP staff members may augment the application's information by requesting additional information, visiting the applicant's site, consulting the program office, talking to the applicant's OSHA VPP outreach partner, or getting input from the applicant's DOE-VPP customer representative.

If the DOE-VPP staff approves the application, an onsite review is scheduled as described in *Part II: Procedures Manual*. Team members are selected, based on one of more of the following criteria:

- Is the candidate a subject-matter expert appropriate to the site's activities and complexity?
- Does the candidate possess prior VPP experience (DOE and/or OSHA)?
- Does the candidate bring union representation to the team?
- Is the candidate a safety or health professional from outside of EH?
- Is the candidate free of any apparent conflict of interest?

The onsite review team interviews employees and management, reviews documents, and makes obser-

uations during facility walkthroughs to evaluate the applicant's implementation of DOE-VPP criteria found in *Part IV: Onsite Review Handbook*.

During daily team meetings, review team members assess findings, address issues, and seek additional input. At the review's conclusion, the team presents its recommendation for the level of DOE-VPP recognition to the contractor.

The team prepares an *Onsite Review Report*, containing the recommendation for recognition, and submits it to the Assistant Secretary for Environment, Safety and Health (EH-1) for approval. The contractor is notified of the Assistant Secretary's decision, and, if approved, the DOE-VPP headquarters office (EH-51, Office of Occupational Safety and Health Policy) makes arrangements to present the DOE-VPP flag, as set forth in *Part II* and *Part IV*.

This report—the second DOE-VPP onsite review team report—summarizes the team's findings from the evaluation of AlliedSignal activities at the Kansas City Division (KCD) during the week of September 18 through 22, 1995. It is a milestone in the Department's efforts to encourage the empowerment of employees, and in efforts to change the safety culture in DOE from compliance-driven *reactivity* to continuous-improvement-driven *proactivity*.

The purpose of this report is to provide the Assistant Secretary for Environment, Safety and Health with an assessment against the DOE-VPP criteria, together with other information necessary to make the final decision regarding the disposition of AlliedSignal KCD's application efforts for DOE-VPP. Included are synopses of team member findings, and the team's final recommendation for the site's DOE-VPP recognition. ■

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Abbreviations and Acronyms

ACGIH —American Conference of Governmental Industrial Hygienists	LWDI —lost-workday incidence
AIHA —American Industrial Hygienists Association	MMIS —Maintenance Management Information System [at KCD]
ART —accident review team [at KCD]	MPS —Management Policy Statement [at KCD]
AT&T —American Telephone and Telegraph	OSH —occupational safety and health
BLS —Bureau of Labor Statistics [of the U.S. Department of Labor]	OSHA —Occupational Safety and Health Administration [of the U.S. Department of Labor]
CFR —Code of Federal Regulations	PHA —Preliminary Hazard Analysis
CIH —Certified Industrial Hygienist	PMP —Performance Management Process [at KCD]
CIP —Continuous Improvement Process [at KCD]	PPE —personal protective equipment
CPR —cardiopulmonary resuscitation	RCAR —Root Cause Analysis and Corrective Action Report
CSP —Certified Safety Professional	RI —recordable injury
DOE —[U.S.] Department of Energy	RII —recordable injury incidence
DOELAP —Department of Energy Laboratory Accreditation Program	RWA —radiation work authorization
DOE-VPP —U.S. Department of Energy's Voluntary Protection Program	S&H —safety and health
ESAP —Environmental Self-Assessment Program	SIC —standard industrial classification
ES&H —environment, safety, and health	VPP —OSHA's Voluntary Protection Program
HASP —health and safety plan	
HazMat —hazardous materials	
HazWOPER —Hazardous Waste Operations and Emergency Response	
ICS —Incident Command System	
ISO —International Organization for Standardization	
ISO 9001 —Quality Systems—Model for Quality Assurance in Design, Development, Production, Installation, and Servicing (Second Edition)	
JHA —Job Hazard Analysis	
JSA —Job Safety Analysis	
KCD —Kansas City Division [of AlliedSignal]	
LWD —lost workday	

Executive Summary

THIS REPORT SUMMARIZES the Department of Energy Voluntary Protection Program (DOE-VPP) review team's findings from the five-day onsite evaluation of the AlliedSignal Kansas City Division (KCD), conducted September 18–22, 1995. The site was evaluated against the program requirements contained in *U.S. Department of Energy Voluntary Protection Program, Part I: Program Elements* to determine its success in implementing the five tenets of DOE-VPP.

AlliedSignal KCD

The Kansas City Plant is a U.S. Department of Energy facility operated and managed under a contract by AlliedSignal, Inc. The plant's operations involve more than 80 fundamental production processes, primarily involving the fabrication and assembly of electronic circuit boards. In 1993, DOE officially designated this plant to be the consolidated site for manufacturing non-nuclear components for the Department's nuclear weapons complex.

Onsite Review Team

The onsite review team was composed of 11 individuals, representing a diverse cross-section of the Department. Members included managers and safety and health professionals from DOE Headquarters and the Ohio Field Office; a bargaining-unit representative; an individual from the Occupational Safety and Health Administration (OSHA); and consultants who had been instrumental in the development of OSHA's VPP and DOE-VPP. Team members are experienced with VPP principles, possess safety and health backgrounds, have management experience, and—with the exception of two—had prior experience conducting a VPP onsite evaluation.

The review team concluded that KCD met or surpassed all DOE-VPP requirements, with the exception of 12 minor findings and 5 recommendations. KCD was assigned to resolve the findings within 90 days. During a follow-up visit in January 1996, the team verified that all actions were completed.

Evaluation Summary

The team determined that KCD is a truly outstanding protector of employee safety and health. The team's conclusions for each of the five DOE-VPP tenets are summarized as follows:

● **Management Leadership**—KCD's visible management commitment to provide "world class" safety to its

employees satisfies the requirements for this tenet. This was confirmed during interviews with employees at all levels.

Top-level management leadership and visibility in the safety and health program are evident. Managers are held accountable for their safety and health responsibilities. All division directors interviewed were aware of the current injury rates for their respective departments and were actively involved in efforts to lower the rates. They are required to present the injury-case findings at the monthly scheduled meetings of the Environmental, Safety and Health (ES&H) Committee, comprising both labor and management leaders.

Management commitment to safety and health embodying the total quality management philosophy is demonstrated by KCD's open-door policy. An example is the "Comments, Please" telephone line, routinely used by associates to communicate their concerns or recommendations directly to the president and general management. Responses to these concerns are approved at the general-management level.

● **Employee Involvement**—Employee participation through the team approach, involving employees at all levels in resolving safety and health issues, clearly demonstrated that KCD meets the requirements for this tenet.

The ES&H Executive Committee, chaired by KCD's president, includes other executive staff and union leaders. This committee oversees policy formulation for the safety and health program, and is a prime example of employee involvement in the structure of the safety and health program at KCD.

Employee involvement was found throughout the site's safety and health program. All employees interviewed about reporting hazard concerns answered readily and could point to a fairly recent experience in their work areas in which fellow associate had reported a suspected hazard and received a quick response or made the correction themselves. Divisional safety committees focus on employee awareness, conducting safety meetings, and helping employees get their concerns resolved. Departmental safety committees perform safety inspections and deal with safety concerns.

In addition to these more traditional employee participation activities, KCD has other ongoing committees, in which hourly employees deal with specific areas of safety concerns, such as electrical safety or materials handling. Employees participate in hazard resolution. For example, the Back Strain Team, comprising

management and hourly employees, received two awards for its efforts in reducing ergonomically related injuries. This team reduced the back-injury rates in its department by 80 percent in a period of four years by reengineering their workstations.

③ **Worksite Analysis**—KCD has a thorough and comprehensive worksite-analysis program which meets the requirements of the seven subelements of this tenet.

- **Pre-use, pre-startup analysis**—Each time equipment, materials, processes, or facilities are purchased or significantly modified, they are analyzed for hazards prior to use.
- **Comprehensive surveys**—Comprehensive surveys for safety and health hazards are performed by both the industrial hygiene and safety departments.
- **Routine hazard assessments**—Several self-inspection systems are used to ensure that the entire site is covered at least quarterly.
- **Routine hazard analyses**—Routine hazard analyses involve two main programs: preliminary hazard analysis and job hazard analysis.
- **Employee reports of hazards**—Employees are encouraged to submit safety and health concerns without fear of reprisal. They can report their concerns either directly to their supervisors, union leadership, or to the ES&H Division. Alternatively, an employee can use one of several telephone hotlines, remaining anonymous.
- **Accident investigations**—The accident-investigation system uses a team approach to identify the root cause and minimize recurrence. The process clearly defines reporting and evaluation requirements and responsibilities for near-miss incidents, first aid, OSHA recordable injuries/illnesses, and property/vehicle-damage accidents.
- **Trend analysis**—Injury and illness data, inspection findings, and employee reports of hazards are trended and used to help identify problems with management systems and improve programs.

④ **Hazard Prevention and Control**—The team determined that hazards identified by worksite analyses are effectively controlled, as required by this tenet. Prior to use in the plant, new chemicals are assessed for substitution or safe use. The use of engineering controls was clearly evident throughout the facility. Local ventilation systems adequately control exposures to airborne hazardous chemicals. The milling and machining area uses robotics to control hazards associated with machining operations.

The personal protective equipment (PPE) program provides for PPE use in appropriate situations. The program includes controls to ensure that the equipment is used properly.

The preventive maintenance program provides ongoing monitoring of predictive/preventive maintenance for workplace equipment. Employees interviewed indicated that KCD's preventive maintenance program keeps equipment in safe, working order.

KCD's emergency plan, hazard assessment, process descriptions, and work instructions define the responsibilities and lines of authority for emergency organizations and response personnel, as well as the detailed procedures, pertinent information, and training needed to respond to emergencies that might occur.

A full-service medical facility provides proactive "wellness" activities for prevention of illnesses and injuries and a variety of services designed to prevent occupational injuries and illnesses. The medical staff consists of three full-time physicians, six nurses, a radiological technologist, a medical-records technologist, and two staff members to provide administrative support.

⑤ **Safety and Health Training**—Interviews confirmed that KCD's safety and health training program ensures that employees at all levels are aware of their safety and health responsibilities and the procedures to work safely.

Employees are invited to evaluate the training program and to provide input into the courses that are developed. Their input proved particularly useful when the department developed an aggressive ergonomics program that focuses on both production-area hazards and those found at office workstations. In part because of company downsizing, employees and subject matter experts are increasingly used to conduct the training.

Training records are tracked via a computerized/centralized database. The database tracks training requirements for each person, based on job responsibilities and current training status. The system is also used as a "tickler" to remind the training department when individuals need certain classes. The computerized program was begun in 1989; the latest revision was put in place in mid-1995.

Contractor training is overseen by the contract administrator for the particular subcontractor. Contracts stipulate that each contract employee undergo the required training before starting to perform work.

Recommendation

BASED ON the information acquired during the onsite visit, the review team unanimously voted to recommend the AlliedSignal Kansas City Division for official designation as a STAR site. ■

I. Introduction

THE ALLIEDSIGNAL, INC., Kansas City Division (KCD) DOE-VPP onsite review was conducted from September 18 through 22, 1995. The site was evaluated against the program requirements contained in *U.S. Department of Energy Voluntary Protection Program, Part I: Program Elements* to determine its success in implementing the five tenets of DOE-VPP. The onsite review team consisted of 11 members, including the DOE-VPP program manager. The names of the team members and their individual responsibilities can be found at the end of this report.

The Kansas City Plant is a U.S. Department of Energy (DOE) facility operated, under a contract, by AlliedSignal Corporation. The facility has been in operation since 1949. In 1993, DOE officially designated this plant to be the consolidated site for manufacturing non-nuclear components for the Department's nuclear weapons complex. The following year, KCD opened its 258,000-square-foot Technology Transfer Center.

The Kansas City Division is located on a 136-acre site within the city limits of Kansas City, Missouri. The plant's operations involve more than 80 fundamental production processes, mainly contained in one building. The plant covers approximately 3.2 million square feet in area. Currently, AlliedSignal KCD employs about 3,300 "associates."

NOTE: The term "associate" is used at KCD to refer to an employee. The two terms are used interchangeably in this document.

The mission of KCD is sixfold:

- support continued viability of the nuclear weapons defense capability;
- conduct business in accordance with the highest ethical standards, in concert with DOE's vision, mission, and core values;
- partner with the National Laboratories, other federal agencies, academia, and industry to ensure perpetual renewal of the national technology base;
- share expertise, experience, and technology with industry to enhance U.S. economic competitiveness;

- provide a workplace that is safe, healthful, and environmentally clean; and
- advance the social and economic well-being of the community.

AlliedSignal KCD began investigating participation in the VPP program prior to 1993, the year DOE published its draft criteria.

Prior to submitting their DOE-VPP application, KCD participated in the DOE-VPP's outreach program and was partnered with an OSHA-VPP Star site, AT&T-Oklahoma City Works. The two organizations are similar in many respects, including workforce size, type of work (manufacture of electrical components), and union representation. The geographical proximity of the two plants was a positive factor in the match-up.

Participation in the outreach program allowed AlliedSignal KCD to benchmark its safety and health programs with AT&T's and to better position itself to apply for and attain DOE-VPP status.

This onsite review was the second DOE-VPP review conducted by the Department. The primary purpose of the review was to assess KCD's implementation of systems and programs to meet DOE-VPP criteria. The team also verified the information in KCD's application by reviewing additional onsite documentation, and by conducting more than 114 formal and informal interviews of AlliedSignal KCD associates, both managerial and nonmanagerial. ■

II. Quantifiable Program Results

A. AlliedSignal KCD Rates

THE TEAM REVIEWED the OSHA Log and Summary of Occupational Injuries and Illnesses (OSHA 200 log) for the current year (1995) and three preceding calendar years. The recordable injury incidence (RII) rate and the lost-work-day incidence (LWDI) rate for injuries were calculated for KCD, using the following standard formulas:

$$I \text{ Rate} = \frac{\text{No. of RIs [Col(1) + Col(2) + Col(6)]} \times 200,000}{\text{No. of employee-hours worked}}$$

$$LWDI \text{ Rate} = \frac{\text{No. of LWD cases [Col(2)]} \times 200,000}{\text{No. of employee-hours worked}}$$

The following table presents the calculated AlliedSignal KCD injury rates and associated data for the preceding three calendar years and the three-year average. Rates are calculated using injury data only, and compared to the latest injury rates published by the Bureau of Labor Statistics (BLS) for SIC code 367—electronic components and accessories.

Injury Rates at Allied Signal—Kansas City Division
SIC Code 367—Electronic Components and Accessories

Calendar Year	LWD Injury Cases	RI Cases	Employee-Hours Worked	LWDI Rate	RII Rate
1992	27	95	9,119,265	0.59	2.08
1993	18	60	8,246,425	0.44	1.46
1994	11	37	6,828,393	0.32	1.08
3-Year Average Rates				0.46	1.59
BLS 1993 National Average for SIC Code 367:				2.2	5.1

As the preceding table shows, KCD meets the requirement for the 3-year-average LWDI and RII to be at or below the most recent average for its specific industry. The continuing downward trend in the rates is notable. The data entered on the OSHA 200 log support the information submitted in the application and contained in the associated injury and illness documents, including first-aid logs and DOE accident/incident reports.

The person responsible for maintaining the log is knowledgeable in OSHA recordkeeping requirements. Whether an incident is recordable is determined by the accident review team (ART), comprising members from the safety, industrial hygiene, and medical care departments. The ART functions in accordance with a KCD work instruction, which requires members to communicate any change in the status of recordable injuries/illnesses to the division accident/incident investigation coordinator. A review of the records confirmed that recordability determinations are assigned conservatively and may, in fact, lead to a slight overstatement of KCD's recordable injuries.

Interviews with associates confirmed that the data on the log and the supporting documentation are accurate.

B. Subcontractor Rates

For the following table, rates were calculated for all combined subcontractor operations to serve as an indicator of AlliedSignal KCD's management of its contractors' safety and health programs. Because KCD's contractors perform varied construction and maintenance activities, their rates were compared with those for SIC code 17, special trade contractors.

Injury Rates of KCD's Contractors
SIC Code 17—Special Trade Contractors

Calendar Year	LWD Injury Cases	RI Cases	Employee-Hours Worked	LWDI Rate	RII Rate
1992	3	3	201,272	2.98	2.98
1993	6	9	330,881	3.0	5.44
1994	2	10	313,871	1.27	6.37
3-Year Average Rates				2.6	5.2
BLS 1993 National Average for SIC Code 17:				5.8	12.5

The calculated three-year average rates for KCD's contractors are below the average for SIC code 17 for 1993 (the latest published information available). They are a positive indicator of KCD's able management of its contractors in safety and health. ■

III. Management Leadership

THE DOE-VPP REQUIREMENTS for excellence in management leadership were met by KCD's demonstration of top-level management commitment to occupational safety and health and the DOE-VPP. Management's commitment was confirmed by team members' observations of operations and site conditions, as well as by interviews with associates. The following subsections address the specific areas of leadership listed in the requirements.

A. Commitment

Management commitment to safety and health is clearly established by a management policy statement (MPS). The requirement to communicate the policy to employees at all levels was verified in the course of interviews. While the MPS was too long for employees to recall in detail, many employees expressed pride that safety is the first priority at KCD. At the recommendation of the onsite review team, AlliedSignal KCD is planning to simplify and reissue the policy statement and communicate it to all employees.

The overall goal for KCD's safety and health (S&H) program is stated as the intention to be "world-class in safety." This goal is also well-communicated and echoed by employees at all levels. The objectives to achieve the site's goal are derived from the program evaluation process and are incorporated in the accountability system, as described in detail in section E, "Line Accountability."

KCD's five-year strategic planning process that began in 1990 led to continuous improvements in safety. The plan is updated annually.

B. Written Program

All critical elements of a written safety and health program, including management leadership, employee involvement, worksite analysis, hazard prevention and control, and safety and health training, were verified to be included in KCD's written safety and health program documents. The distribution of KCD's ES&H program manuals to area reference center locations is controlled by KCD's administrative procedures. Revisions to these manuals are distributed

only to listed "custodians" within KCD. These individuals are responsible for making the controlled copies available and updating them by adding, removing, or substituting pages promptly when changes are issued.

The team verified that all aspects of the safety and health program are appropriate to the size of the worksite, the complexity of the hazards, and the nature of the industry. The ES&H program manuals cover functional areas such as hoisting and rigging, lockout/tagout, and accident/incident investigation procedures.

C. Responsibility

At KCD, line managers are primarily responsible for implementing safety and health programs. A management policy statement clearly assigns safety and health responsibility to line managers, supervisors, and associate employees.

Managers who were interviewed understood that they are responsible not only for going beyond mere compliance, but also for becoming proactive in safety and health. For example, all directors interviewed were aware of injury rates for their respective departments and had been indirectly involved in finding the causes of the accidents. They felt that it was their responsibility to be on top of safety- and health-related issues. In some instances, they had been personally involved in selecting personal protective equipment. One director studied the use of metal-mesh protective gloves to determine whether such gloves would impose an additional hazard before deciding whether to allow them.

The safety and industrial hygiene departments develop programmatic S&H guidance documents and procedures that are to be implemented by the line managers. Interviews with all levels of management and associates clearly indicated that safety and health is the responsibility of line managers; S&H professionals are used strictly as resources.

D. Authority and Resources

Evidence gathered by the team clearly demonstrates that KCD managers have sufficient resources to carry out their safety and health program responsibilities.

KCD evaluates the S&H budget each year, revising it to ensure that safety and health programs are properly funded. In interviews, top-level managers indicated that the individual departments have their own operating budgets to carry out their safety and health responsibilities.

Many employees interviewed by the team mentioned that safety and health receives first priority at KCD. Almost all employees interviewed volunteered that they have the authority to stop or refuse work that they deem unsafe or unhealthful. No instances were discovered in which inadequate authority or resources had been provided for assigned responsibilities.

E. Line Accountability

The site meets the requirement for holding managers and supervisors at all levels responsible for meeting their assigned responsibilities by virtue of a system known as the Performance Management Process (PMP). Overall, the performance management process demonstrates a viable means for evaluating a management-level employee's performance in safety and health. Other employees are covered under an existing union bargaining agreement. They are held accountable for adhering to all safety and health rules.

The PMP uses a graded approach to evaluate accountability and performance, in that managers/supervisors whose employees work in jobs placing them at greater risk to occupational injury/illnesses have more ES&H objectives in their performance elements. Reviews of several actual performance evaluations demonstrated that an ES&H-related component was a part of most evaluations. As a result, some evaluations were considerably more subjective than others.

The ES&H objectives did vary somewhat in their specificity. To minimize the role of subjectivity, KCD is aligning the performance measurement process more closely with the annual safety and health program evaluation. An effective and thorough program evaluation will identify areas needing programmatic improvement. Such identifications result in meaningful action items, with specific completion dates, that are assigned to a responsible individual for follow-

through. The assigned items are then tracked month-by-month until completed.

The performance evaluation form contains two sections that are used in evaluating an individual's performance. In the first section, the individual's performance is rated against both common and jointly negotiated objectives (agreed-upon between the immediate supervisor/manager and employee). In the second section, the evaluator rates specific "success attributes and behaviors." These same attributes are embodied in the facility's total quality management program. ES&H-related performance objectives are described in a companion document, *Nonfinancial Objectives*.

In some cases, however, it is not easy to determine whether the ES&H performance element is being accorded appropriate weighting in the evaluation of both middle and first-line management. A significant difference underlies the way a rating is derived from the nonfinancial objectives for upper management (director-level and above) on the one hand, and for middle management, first-line management, and professional staff members on the other. Upper-level management summary ratings are based on a computation: each performance objective (typically, one of six) is assigned a numerical value, or weight. The ES&H performance component is weighted equally with the other objectives.

For middle management, first-line management, and professional staff, there is no numerical weighting system. The weighting of a particular objective is assigned at the discretion of the rating official.

Currently, the facility's process for assigning and tracking action items stemming from the annual self-assessments has been accomplished, to a large extent, by using a method referred to as the continuous improvement process (CIP). KCD indicated that the CIP for tracking ES&H action items from the program evaluation will be phased out soon in order to introduce further refinements. In its place, the facility has begun to capture and track action items as part of a specific ES&H "strategy" incorporated into the site's strategic plan. (There are six strategies, of which ES&H is one.) This change, when fully implemented, should place even more importance and visibility on the annual program evaluation. It will also improve the method by which specific action items are assigned to responsible individuals, resulting in greater personal accountability.

Under the improved system, accountability for each strategy is assigned at the general-management level. From there, the implementing tactics are assigned to “chartering leaders,” who form work teams for accomplishing related activities. If a task’s scope is not large enough to require a team, the task is assigned to a responsible individual. All associates receive training in total quality leadership and are provided a clear line of vision to the site’s goals and strategies. The process thus requires that some responsibility be shouldered by every worker, either individually or as a team member, for moving the strategic plan forward. Accountability and progress against strategies, tactics, and related activities are monitored monthly as part of the regular meetings of the continuous improvement steering committee. Any problems affecting tactics or actions are addressed by the group, and corrective action is taken, as needed.

In a practice consistent with STAR quality, KCD is ensuring that all areas noted for improvement in the annual evaluation ultimately translate into clearly defined and individually assigned action items, which are measurable and establish accountability. This latest refinement to the planning process should also enhance the PMP by ensuring that ES&H-related objectives are specific across-the-board and that all management employees are held accountable to the appropriate degree.

F. Visible Management Involvement

Top-level management at KCD was verified to be involved in safety and health at a level consistent with DOE-VPP requirements.

Top-level managers participate in a monthly inspection program, Auditing for Safety. As part of this program, KCD ES&H staff developed a method to enhance employee awareness of management’s participation in safety and health. While conducting an audit, a manager who observes an employee engaging in safe behavior awards him or her a business-size card on-the-spot. The card entitles the employee to enter a lottery-style reward program. This program was initiated during September 1994; the reward component was added during November 1995.

Other examples of top-level management visibility in the safety and health program are demonstrated through their involvement in two activities:

- the ES&H Executive Committee, composed of top-level management and bargaining-unit leaders, who meet monthly; and
- a “3999 Comments, Please!” telephone line, used by associates to communicate their concerns or recommendations directly to general management.

G. Site Orientation

KCD’s programs for orienting and holding accountable persons working in contractor-controlled spaces, including visitors, meet the DOE-VPP requirements. The program used at KCD to orient visitors and contractors to KCD’s security, health and safety, and emergency procedures was adopted in its entirety by AT&T-Oklahoma City Works, KCD’s outreach partner.

H. Subcontractor Programs

The construction subcontractor safety program is clearly documented and fully implemented to meet the DOE-VPP requirements. Construction safety and health provisions are specified in the contract. The team verified, through document reviews, that a bidding contractor’s safety and health performance is strongly taken into account in the selection process. Construction contractors must submit their OSHA 200 log injury and illness data, along with their experience modification rates, for the preceding three years. KCD has prequalified more than 130 subcontractors, based on their injury/illness and experience modification rates.

For example, the team verified that in the selection of contractors for “clean room” and asbestos-removal jobs, KCD considered their safety performance prior to their selection. Contractors selected for the job all had injury rates below the BLS-published rates for their SIC codes and no OSHA citations.

If a contractor’s rate of illness or injury exceeds the BLS average for its SIC code, KCD closely reviews the data to determine the root cause and works with the contractor to establish a plan to reduce the level.

In addition to submitting OSHA 200 logs for the preceding three years, construction contractors must submit a written health and safety plan (HASP). Plans are subjected to an in-depth review by KCD’s construction division and ES&H division, and must be approved before the contractor may begin working

onsite. If the plan is found deficient, it is returned to the construction company for revision and resubmittal. Once approved, the HASP is also communicated to all subcontractors working under the general contractor. The HASPs reviewed were found to be complete and to contain the required information.

The construction division and the ES&H division oversee the construction contractors' work activity. The safety and health inspections are conducted daily and documented; corrective action is immediate. Contractors are held accountable for poor safety and health performance. Contractors are issued citations for conditions posing "imminent danger" and serious violations. If poor performance continues, the contractor can be dismissed. The team noted two instances where contractors had been terminated because of their poor safety and health performance and the number of citations they received while at KCD.

Injury and illness data for construction contractors are tracked by the construction division. The injury rates for all KCD contractors are below the industry average for SIC code 17. (For details, see the table, "Injury Rates of KCD's Contractors," in section II.B, "Subcontractor Rates.")

During the onsite review, a walkthrough was conducted of randomly selected active construction sites. At the time of this evaluation there were about 20 active construction sites, with some 250 construction personnel. In general, work conditions were good. Construction superintendents, foremen, and employees were interviewed. Management employees of construction contractors expressed the belief that their company's safety and health performance was an important factor in their selection. They indicated that KCD construction personnel actively inspect their site daily. They further noted that the contractors also conduct daily worksite safety inspections, conduct weekly "toolbox" talks, and had posted safety and health notices as required. These practices were validated through documentation reviewed.

I. Safety and Health Program Evaluation

The onsite team reviewed the most recent program evaluation report and determined that it systematically evaluated how well KCD was implementing the DOE-VPP program elements. Considerable analysis had gone into the evaluation, which documented—in forthright language—the areas for improvement in KCD's safety and health programs.

To continuously improve its safety and health programs, KCD routinely conducts self-assessments. Since 1990, a continuous-improvement steering committee has coordinated and updated continuous-improvement initiatives, including numerous items concerning safety and health.

The system used in drafting the safety and health program evaluation report is a collective, iterative endeavor. The first draft is typically prepared by a small cadre of S&H professionals, together with other site VPP Steering Committee members. This draft, in turn, is reviewed by one or two other committee members and revised before it goes to the entire committee for final review, revision, and ultimate approval. Accordingly, the results of the current report were drafted by KCD's industrial hygiene supervisor, and jointly reviewed by the VPP committee.

At the time of the onsite review, some of the results and recommendations for continuous improvements from the program evaluation had already been incorporated into existing action plans. The remainder were in the process of being addressed as part of KCD's strategic planning process. To maintain the goal of providing world-class safety for KCD employees, the action items (objectives) are reviewed and updated yearly. As noted earlier in section E, "Line Accountability," action items are then tracked to verify their completion, and assigned individuals or teams are held accountable for the completion of these items through the performance management process. ■

IV. Employee Involvement

THE RELATIONSHIP between hourly employees and their supervisors or team leaders has developed into a strong partnership in the effort to keep KCD a safe place to work. Interviews and document reviews confirmed that employees at all levels are involved in the structure and operation of the safety and health program and in decisions that affect worker health and safety.

Management was very helpful in giving team members access to employees for interviews, both formal and informal. In the course of this review, the team interviewed more than 80 hourly employees. While the employees' concern for the future of the U.S. Department of Energy and KCD was clear, their pride in the safety of their place of employment was just as evident.

While it may not be feasible for the safety and health program to become entirely employee "owned," KCD is moving in that direction. All employees interviewed about reporting hazard concerns answered readily and could point to a fairly recent experience in their work areas in which they had reported a suspected hazard and received a quick response or made the correction themselves.

Employees know what their roles are in emergencies; all said they had practiced those roles. They are knowledgeable about the potential hazards of their work and the proper ways to protect themselves.

Many employees could thoroughly explain their committees and/or representatives, their functions, and their achievements. Every employee who was interviewed understood hazard notification and correction.

Actual employee participation pervades the organization on all shifts. This participation includes a variety of activities. The ES&H (environmental, safety and health) Executive Committee is chaired by the KCD president. It includes her executive staff and the union leadership. This group oversees implementation of the safety and health program. There are also divisional safety committees. These focus mainly on employee awareness; for example, the committee members conduct quarterly or monthly safety meetings and help employees get their concerns resolved.

In some departments, there are also safety committees that perform safety inspections and deal with safety concerns. In other departments, this role is carried out by an hourly or nonexempt salaried employee.

Even the administrative areas have very active safety committees that perform quarterly area inspections and address ergonomic issues or concerns.

In addition to these more traditional employee participation activities, KCD has other ongoing committees, in which hourly employees deal with specific areas of safety concern, such as electrical safety or materials handling. One of the more interesting methods of employee participation is the HazWOPER training. Totally union operated, it is located at the union hall and led by hourly instructors.

Most employees interviewed could cite concrete instances where a safety problem had been resolved through one or more methods of employee participation. In one instance, associates identified a collision hazard at an exit into a busy corridor. The associates then proposed a solution to the problem, which was implemented: A yellow warning light was installed, to be activated upon opening of the exit door, minimizing potential collisions.

Employee involvement activity is encouraged by total quality activities that include safety and health aspects. For example, in the early nineties, the shipping and receiving department had high back-injury rates. To reduce these rates, KCD chartered a joint team, composed of a plant physician, several engineers, supervisors, and hourly associates. The team members examined back-injury reduction programs in the commercial industrial sector. After studying the team's findings, KCD introduced improved equipment, such as hydraulic tilt tables, lifting devices, and ergonomically designed tools. As a result, back injuries declined by 80 percent in four years. ■

V. Worksite Analysis

KCD HAS IN PLACE a thorough and comprehensive worksite-analysis program which identifies and corrects hazards. Through interviews, document reviews, and site walkarounds, the team verified that the system meets the requirements of the seven subelements of this tenet, as follows.

A. Pre-Use, Pre-Startup Analysis

At KCD, anytime equipment, materials, processes, or facilities are purchased or significantly modified, they are analyzed for hazards prior to use, meeting the requirements for this subelement. The cornerstone to these evaluation efforts is the preliminary hazard analysis (PHA) program.

The PHA program is a systematic review process that establishes the requirement for a formal ES&H review of changes that have the potential to affect the safety or health of employees. The review examines such activities as the following:

- equipment and facility modifications prior to construction/installation activities,
- a new process, or a change to an existing process, and
- new business or work for other projects.

This coordinated review is used to identify corrective actions that must be in place before operations can begin.

The reviews conducted under the PHA program include the following types:

- project specification reviews,
- prestart/restart reviews,
- beneficial-occupancy inspections,
- hazardous-material reviews,
- new and modified equipment analyses, and
- job hazard analyses.

A review of documentation relating to pre-use, pre-startup analysis revealed it to be comprehensive and timely. Between March and September 1995, more than 300 PHAs had been performed for activities ranging from new equipment purchases to facility

modification. Before it can be used, any new equipment received onsite must go through a PHA that is signed off by the ES&H organization. The analysis considers the planned uses for the equipment, and feeds into the routine hazard analysis/job hazard analysis (JHA) system for recording items with risk rankings exceeding a certain level. At the time of the onsite review, the program had been in place for about two years.

B. Comprehensive Surveys

Comprehensive surveys for safety and health hazards are performed by both the industrial hygiene (IH) and safety departments.

During walkthroughs of the KCD facility, there were no observations of employee exposure to any particular safety or health hazards. With respect to chemical agents and other airborne contaminants, the potential for hazardous exposures appeared to be minimal due to process orientation, material usage, material types, work practices, and engineering controls.

Health-hazard surveys have been performed plantwide for noise, asbestos, and a wide variety of chemical agents. Comprehensive safety surveys are performed annually by the safety department. Other comprehensive surveys have been performed to identify confined spaces and inadequate machine guarding. A review of monitoring data maintained by the IH department indicated extensive efforts to quantify worker exposures to chemical agents in process and laboratory areas. All exposure records that were reviewed indicated proper comparison of exposure levels of contaminants to OSHA Permissible Exposure Limits, ACGIH Threshold Limit Values, or other limits. No instances of overexposure to chemical agents were found during the review. Generally, because of the type of work performed at KCD (electronics fabrication and assembly) and the relatively brief duration of activities, potential chemical exposures are short-term or intermittent.

As a further precaution, chemical monitoring is performed during maintenance and repair activities—two areas often overlooked as potential sources of significant chemical exposure. The chemical

monitoring program indicated sufficient maturity to establish confidence in estimating ranges of potential exposure for established activities. Monitoring results are updated on a program schedule with sufficient frequency to provide good protection for workers. Chemical analysis has been performed by AIHA-accredited laboratories.

The KCD industrial hygiene department is highly capable of performing chemical monitoring (direct and indirect), as indicated by a review of available equipment. All equipment was well-maintained and had been placed on adequate calibration schedules. A review of calibration records indicated a sufficient level of detail to support chemical exposure assessment.

Procedures are in place to provide review of associated exposure records by medical personnel, when appropriate. The medical staff has recently been incorporated into the safety and health hazard survey effort, especially in the site's effort to improve workstation ergonomics.

C. Routine Hazard Assessments (Self-Inspections)

Several self-inspection systems are in place to ensure that the entire site is covered at least quarterly, meeting DOE-VPP requirements.

At the time of the onsite review, the main self-inspection program in place at KCD was being improved. The older program is being replaced by the environmental self-assessment program (ESAP). Both systems rely on checklists, but ESAP specifies what to look for and explains why the items appear on the checklist. Both systems are comprehensive and allow the baseline assessment to be modified or customized based on the specific hazards of the work area. The main advantages of the new system will be easier record maintenance and a more user-friendly form. Generally, supervisors assign these inspections to be performed by employees in the work area.

Other routine hazard assessment programs include Auditing for Safety and an independent annual ES&H inspection program coordinated by a safety engineer and including all ES&H representation. As discussed earlier under "Visible Management Involvement" (section III.F), Auditing for Safety aims to raise the safety consciousness of program directors by providing hazard recognition training, and scheduling the directors to conduct monthly safety walkarounds.

These directors provide positive reinforcement to employees "caught in the act" of performing safely by handing out recognition cards.

A review of documentation found that these self-inspection programs have been in place for as long as nine years, covering the entire worksite each quarter.

D. Routine Hazard Analyses

Routine hazard analyses at KCD involve two main programs: the preliminary hazard analysis (PHA) program and the job hazard analysis (JHA) program. The PHA program (described in section V.A, "Pre-Use, Pre-Startup Analysis"), and the JHA program, are very effective in uncovering hazards and meet the requirements for routine examination and analysis of worksite safety.

Job hazard analyses are performed in accordance with the requirements expressed in the *KCP ES&H Program Manual*. A JHA is conducted in four steps:

- ① Select the jobs to be analyzed;
- ② break down the job into steps, activities, or phases;
- ③ identify the hazards; and
- ④ develop safe job instructions.

JHAs are updated annually and anytime a job procedure is changed.

JHAs reviewed by the team were complete and thorough. The JHA program requires both supervisor and worker input during development; during an annual review; and during any review with a new or transferred worker. Interviewed employees and supervisors were familiar with JHAs and the hazards associated with their work activities.

E. Employee Reports of Hazards

Consistent with DOE-VPP requirements, employees interviewed indicated that they were strongly encouraged by all lines of management to express and report any safety and health concerns at any time, without fear of reprisal. Employees are empowered to stop any unsafe work activity at any time.

Employees can report safety and health concerns in many different ways. They can report a concern directly to their supervisor, union leadership, the

ES&H division, or an individual council member. If the employee wishes to remain anonymous, he or she can use one of several telephone hotlines. The review team found documented evidence that the six systems are in place for reporting hazards or S&H concerns:

- ① Contacting any ES&H department member, ES&H representative, or line manager.
- ② Reporting a safety or health concern to the ES&H concern line (x3181).
- ③ Reporting a safety or health concern to the "3999 Comments, Please!" telephone number. All calls, including anonymous ones, are responded to and reports generated.
- ④ Following administrative procedure 645, which establishes the KCD procedures for addressing imminent-danger noncompliance issues and restart procedures.
- ⑤ Using Emergency Response (x3600) or the SPIL hotline (x7745, or S-P-I-L). These numbers are answered 24 hours a day. Emergency-response actions are taken immediately.
- ⑥ Filling out a safety and health concern form and dropping it into any of several special dropboxes across the site. The employee has the option of remaining anonymous.

A database system for tracking reported hazards has been in place for six years. All valid hazards are investigated, formally tracked on a monthly basis, trended, and reported at ES&H executive committee meetings for review and discussion.

Documents reviewed by team members verified that KCD staff typically respond within five workdays to nonimminent hazards. The documents further verified that recognized hazards were adequately eliminated or controlled. If a safety or health concern cannot be readily resolved, KCD issues a controlled work order and tracks it to completion.

Employees interviewed said they were very satisfied with the hazard reporting systems available to them and that management was very responsive in correcting hazards.

F. Accident Investigations

Team members' review of KCD's written accident and incident reports, and interviews with associates and contractors who had been directly involved in an accident, the investigation, and corrective actions confirmed that KCD's accident-investigation system meets or surpasses DOE-VPP requirements.

KCD's accident/incident investigation process description thoroughly defines reporting and evaluation requirements and responsibilities for near-miss incidents, first aid, OSHA recordable injuries/illnesses, and property/vehicle damage accidents. The process's format, which meets the criteria required for KCD's ISO 9001¹ certification, clearly identifies each step in the investigation process and the person responsible for carrying it out. The form also provides clear references to work instructions or other process descriptions associated with a particular step.

The process works as follows:

- ① Associates must immediately report any occupational injury or illness to line management and medical care services (or, to physical security during times that medical coverage is not provided).
- ② Medical care services initiates treatment and notifies the accident investigation coordinator representing the injured associate's business unit.
- ③ The division coordinator assigns a trained investigator to form and lead an investigation team.
- ④ Recordability is determined by the accident review team, which notifies the division accident/incident coordinator.

This process must begin within 24 hours of the accident or incident. Interviews with associates confirmed that they are aware of their reporting responsibilities. During the onsite review, team members observed the accident/incident initial notification process firsthand when an incident requiring first aid occurred.

Accident investigators who are not safety professionals by occupation must complete four courses prior to serving on any investigative assignment: accident investigation, root cause analysis, office ergonomics, and KCD-specific training. At the time of the onsite review, KCD had 46 trained investigators. Interviews

¹ Quality Systems—Model for Quality Assurance in Design, Development, Production, Installation, and Servicing (Second Edition) of the International Organization for Standardization (ISO)

with accident investigators confirmed that the system is fully implemented as documented.

The investigation team for OSHA recordables consists of, at a minimum, the assigned investigator, the injured/ill associate, their supervisor, and a representative from the safety or industrial hygiene department. Any team investigating an adverse chemical reaction must include a representative from environmental compliance. Other persons may be added to the team by the lead investigator, as appropriate.

The team compiles a draft report and submits it to the division coordinator within 10 working days. The report is reviewed by the division accident investigation coordinator and the division director, then forwarded to the safety department. The report is also circulated for sign-off to everyone listed as responsible for completing an action.

All corrective actions are assigned a completion date. The division that "owns" the accident must ensure that corrective actions are documented and implemented. Many actions are tracked to completion using the maintenance management information system (MMIS), a KCD-specific system used plantwide to track work orders. Safety-related orders receive a priority ranking. Actions ranked "severe" are additionally tracked by the safety department.

All recordable accidents and their corrective actions are reviewed at the monthly ES&H executive committee meeting and subsequently published in the minutes. Safety representatives for all KCD areas are on the routing list for the minutes and use the information at safety meetings to share "lessons learned." The safety department also sends out Safety Alerts, as needed.

At the time of the onsite review, KCD was expanding its root-cause analysis and corrective-action report (RCAR) system to include ES&H items. The ES&H portion of the system tracks to completion all action items generated from internal and external audits, inspections and investigations, recordable injuries/illnesses, near misses, instances of property damage, and spills. The RCAR system is documented in a process description and a work instruction, which together describe the process for abating noncompliant conditions that may affect the environment, safety, or health of the facility, equipment, the associates, the product, or the public. The system will enhance

KCD's present tracking system and hazard-abatement capability.

KCD has an outstanding near-miss system integrated into its accident/incident investigation process. All associates are responsible for taking immediate corrective action to mitigate hazardous actions or conditions, then filling out a near-miss notification form. The forms are readily available throughout the plant. On the form, areas are provided for describing the near miss, identifying a possible cause, and describing corrective action taken.

The near-miss notification is turned in to the associate's supervisor, who is responsible for reviewing the area identified and assuring that similar problems don't exist. The supervisor contacts the division accident/incident coordinator, who may assign an accident/incident investigator to perform a root-cause analysis. The line manager initiates and follows up on all corrective actions. The coordinator reviews the notification for completeness and submits it to the safety department and the division director. The incident and analysis are logged, tracked, and trended by the safety department.

A review of the near-miss notifications confirmed that the forms are widely used throughout the plant. Color graphs of near-miss data for the work area's respective division were prominently displayed on the wall where notification forms were available. Interviewed employees were aware of the system, indicated they felt comfortable using it, and confirmed that conditions were corrected to preclude recurrence.

KCD has selected near misses as a performance indicator by which to measure the effectiveness of its ES&H program and identify programmatic deficiencies. Near misses are included in KCD's trending data and incorporated into the site's development of ES&H strategic goals, a process addressed in this report under section G, "Trend Analysis," immediately following.

Reports of recordable injuries/illness were clearly written, included pertinent data on the occurrence, and listed analyzed causes and actions and recommendations for preventing recurrence. Interviewed associates confirmed that operating processes had been changed in response to accidents or illnesses. Associates suffering ergonomic problems were consulted, became involved in the correction of the problems, and went on to take training classes in ergonomics. In an interview,

a contractor who had been injured on the job reported that he subsequently talked about his accident and lessons-learned at safety meetings for other contractors and KCD associates.

G. Trend Analysis

KCD's trending system collects and analyzes reported data on near misses, root causes, injuries/illnesses, first-aid cases, workers' compensation claims, and calls to the ES&H concern line, consistent with DOE-VPP requirements.

Trending data are published monthly in the *Safety Performance Report*, compared quarterly with data for other DOE contractors and subcontractors, and reviewed annually to develop elements of KCD's *Strategic Safety Plan*.

Each division receives a statistical breakdown describing how its associates are being injured. These data are compared across the plant, and either divisionwide or plantwide amelioration programs are developed, as appropriate. Each February, divisions must submit an approved action plan to the safety department in response to identified trends. Action plans are monitored and successes shared at ES&H Executive Committee meetings.

For example, the calendar-year '95 *Strategic Safety Plan* noted that divisions across the plant were experiencing increased injuries from material handling. In March, the cross-functional team for safe material handling was chartered to develop and facilitate implementation of a plantwide material-handling program. The team consists of one associate from each division who represent hourly, engineering, business, safety, and management personnel. The team is investigating material-handling programs in private companies, such as United Parcel Service; Hallmark Cards, Inc.; and AT&T-Oklahoma City Works (continuing the relationship begun through the DOE-VPP outreach program). The team's evaluation will cover JHAs, training, line management's expectations, external packaging requirements, and other related areas. The goal is to develop a process description and work instruction that will result in a lower number of injuries from material handling. The companies that had been contacted during the process asked KCD to apprise them of the results of the team's activities.

Each division prominently displays division-specific trending data, posting the data charts in areas easily accessible to associates. In manufacturing work areas, for example, multicolor accident/incident charts are posted on bulletin boards where near-miss notification forms and other safety-related data and forms are available. One chart tracks year-to-date near misses, arranging them by hazard category. A second chart tracks injuries-to-date by month, comparing them against the previous year's total. A third chart correlates the number of near misses reported divisionwide with the number of injuries.

Additional special analyses are performed on accident data and the results communicated at ES&H executive committee meetings and at associates' safety meetings. For example, an analysis of accidents by time of day and day of week resulted in safety meetings being changed to the start of the shift and highlighted times during the day for increased supervisory visibility.

The continued downward trend in KCD's recordable injuries and illnesses, the significant reduction in first-aid cases, the implemented linkage of trending data to goal development and programmatic improvement, and the ability to focus resources on high-risk operations and departments are all positive results of KCD's highly effective trending system. ■

VI. Hazard Prevention and Control

THE HAZARDS IDENTIFIED through KCD's worksite analysis process are eliminated or mitigated through effective implementation of controls. The following sections explain the methods of hazard prevention and control used by KCD in meeting the requirements for this program element.

A. Access to Certified Professionals

The KCD occupational safety and health (OSH) program is adequately staffed to provide the oversight and technical support necessary for the organization to conduct its operations safely and responsibly.

Many of the OSH professionals on-staff hold credentials such as certified industrial hygienist (CIH) and/or certified safety professional (CSP). Additional professional support to address OSH and radiation-protection issues is available from local/regional consultants under contract to KCD. As a corporate benefit, AlliedSignal also offers to assist employees seeking advanced educational degrees and specialized training in their career fields.

B. Methods of Hazard Control

KCD's approach to eliminating or mitigating hazards embraces the required hierarchy of controls discussed below.

Process or material substitution—New chemicals (hazardous materials) are reviewed by the ES&H division prior to use in the plant. The ES&H division has established a material safety data sheet (MSDS) committee responsible for this review in accordance with the KCD ES&H program manual. In this review, the committee determines whether the original material is acceptable or whether an alternate material is required.

Engineering controls—The use of engineering controls as the primary method of protecting associates was clearly evident throughout the facility. Virtually every process emitting mists, vapors, or other airborne contaminants was serviced by local exhaust ventilation. Numerous examples of the

engineering ventilation controls were observed in the plating, plastics, and model shops.

An impressive preventive maintenance program was in place for keeping the ventilation systems in good working order. This program was incorporated into the quality-assurance programs that verified acceptable air-flow rates, including clear identification of multiple ranges and/or minimums.

Robots are used in the milling and machining area to minimize and/or eliminate many of the lifting (ergonomic) hazards routinely associated with machining operations. The majority of the robotic applications fully enclosed the actual machining and milling activity, thereby providing excellent employee protection from moving parts and flying particles. The enclosures also provide an added benefit of eliminating employee exposures to cutting-fluid aerosols.

Administrative controls—In all areas where associates could potentially be exposed to a chemical release, administrative methods of control were evident. These included informational postings to provide awareness. This was particularly true for methylene dianiline (MDA), lead, and known or suspected carcinogens. Additionally, under the review of the industrial hygiene department and engineering/production personnel, KCD demonstrated success in substituting less-hazardous chemicals in material processes to increase the level of protection provided to associates.

Personal protective equipment—Although the primary method of protecting associates at the facility is through engineering controls, personal protective equipment (PPE) is routinely used in a variety of common situations. A mechanism has been in place for several years that allows the OSH staff to track the purchase, use, maintenance, and disposal of all forms of PPE.

The one exception to this program was the use and maintenance of emergency respirators, which were controlled primarily by the fire protection engineering group. However, because of the comprehensive nature of the PPE program, the onsite review team recommended that the normal-use and emergency-use respirator programs be combined to ensure uniform administration.

To ensure that associates always receive the correct form of respiratory protection for the job, respirators are requested and issued in writing, with adequate oversight by the industrial hygiene department. This system, implemented by a written procedure, incorporates involvement from the IH department, the medical services department, and the applicable line organization. The oversight includes a review of the materials to be used, the conditions under which work is to be performed, and the location or area. Also, a determination is made concerning whether exposure will be continuous or intermittent. Respirator use is closely tracked by the industrial hygiene and medical care departments. No respirator may be issued for a period longer than one week. Respirator wearers receive required medical surveillance through the plant medical care department.

Associates interviewed during the evaluation demonstrated a high level of knowledge about the proper uses and limitations of respiratory protective equipment. In work areas where PPE was in use, associates were observed to wear the equipment properly and all PPE inspected was in excellent condition.

C. Positive Reinforcement

AlliedSignal KCD uses several different award methods to reward those who practice or promote outstanding safety. Each associate receives a pamphlet, *Kansas City Plant Rewards and Recognition Program*. The pamphlet explains how award recipients are selected, what awards are given, and who is responsible for selecting the recipient. Seven awards are available to associates:

- Special Recognition,
- Quality Improvement,
- Environment, Safety & Health,
- Cost Reduction (Safety Suggestions),
- Spontaneous Recognition,
- Service Star, and
- VIP Parking.

All of these awards are used by the company to encourage employees to participate in all safety- and health-related matters. These awards reward individuals who practice excellence in safety and health—for example, by participating on a total quality (TQ) team. In 1994, a total of 28 ES&H awards and 5 Special Recognition awards were issued to employees for their efforts and participation in safety and health ac-

tivities. For example, the Back Strain Team, consisting of both management and hourly employees, received one of the highest awards, for its efforts in reducing ergonomically related injuries. This team also won an award in a corporatwide competition.

The company is in the process of further enhancing its award programs. Employees indicated that they are encouraged to work safely and follow all the safety and health rules. Employees are allowed to stop an activity if it cannot be done safely.

D. Disciplinary System

KCD uses a discipline method to encourage employees to work in a safe manner. The disciplinary method ranges from verbal reprimand to termination; the more serious the infraction, the sterner the discipline. All associates are informed of the system by several means, including a section in the *Employee Handbook*, collective bargaining agreements, and Management Policy Statement 25, "Environment, Safety and Health Program." Bargaining-unit associates are covered by the language in their respective bargaining agreements.

Documents that the team reviewed—including the log of disciplinary actions taken—indicated that the disciplinary program is applied fairly and consistently to all employees.

E. Preventive Maintenance

The preventive maintenance program provides ongoing monitoring of predictive/preventive maintenance for workplace equipment. The program is incorporated into the maintenance management information system (MMIS). The MMIS tracks approximately 6,000 pieces of equipment. In developing the preventive maintenance schedule for each type of equipment, KCD drew on the manufacturer's recommendations, histories for similar equipment, the equipment's intended uses, the environment in which it must operate, opportunities for energy conservation, cost effectiveness, ES&H requirements, and input from the "customers" who use it.

Some 1,200 employees have been formally trained to fill out maintenance work requests. A work request is reviewed by the engineering department and input into the MMIS as a work order. The engineering department consults with the safety and industrial

hygiene departments on items related to safety and health. A risk priority is then assigned to each preventive maintenance order. The MMIS generates the preventive maintenance schedules, based on priority, 14 days in advance, sending the schedules to 26 preventive maintenance crews. The crews consist of pipefitters, electricians, millwrights, and other trade/craftworkers assigned to perform the preventive maintenance. After completing their work, the crews input the job status into the MMIS system located in that work area. If a maintenance item is not completed within the scheduling period, it will appear on the next schedule.

A walkdown of randomly selected backlogged maintenance items verified that only low-priority items, which posed no safety or health concerns, remained in the system. Employees interviewed indicated that KCD's preventive maintenance program is very efficient and invaluable in keeping equipment in sound working order. It was also noted that newly acquired equipment is evaluated prior to operation to establish a baseline schedule for preventive maintenance. The MMIS system is very user-friendly and can be used to track, trend, and perform cost analyses of predictive preventive maintenance.

F. Emergency Preparedness and Response

KCD's emergency plan, hazard assessment, process descriptions, and work instructions define the responsibilities and lines of authority for emergency organizations and response personnel, as well as the detailed procedures, pertinent information, and training needed to respond to emergencies that might occur at the site. KCD is prepared to respond to all anticipated emergencies, including terrorist activities, and natural disasters like tornado and flood. KCD also has procedures in place to respond to radiological emergencies.

Adequate training is provided to the members of the fire protection department, members of the HazMat team, and others involved in emergency preparedness. Training records are kept in a training and education database. The response information is readily accessible.

Emergencies of all types are reported to the patrol headquarters. Chemical spills are reported via the SPIL hotline. Established procedures are in place to determine and activate the appropriate response to

emergencies. A mobile incident command system (ICS) is set up to handle serious emergencies. The emergency response system is well-organized and well-equipped. It includes an emergency operations center.

A well-equipped, professionally trained fire department is onsite. At least three fire fighters are available during each shift. Hazardous spills are cleaned up by a well-trained HazMat team. Off-shift coverage for chemical spills is provided by the fire department. An environment, safety and health coordinator can be contacted at home or by mobile telephone, if the need arises. All members of the group and several production employees are trained in HazMat, first aid, and cardiopulmonary resuscitation (CPR).

All evacuation routes are clearly marked and posted throughout the plant. Emergencies are announced through a plantwide public-address system. The company is in the process of installing a separate emergency-notification system to be used exclusively for emergencies. Plantwide sheltering drills are conducted every other year. In addition, several mini evacuation drills and HazMat drills are conducted each year.

The company ensures that handicapped or disabled individuals will be assisted during any emergency by pre-designating at least two or three employees to serve as escorts. The escorts make sure that handicapped employees are assisted during an emergency or a drill.

Full-participation exercise drills are coordinated with several outside agencies (local, state, and federal) and involve extensive preparation. The plant conducted such drills in 1990, 1994, and 1995. In the future, these drills will be conducted every other year.

It is evident from the reviewed documentation and employee interviews that emergency drills are critiqued and improvements implemented, if needed. The records review and employee interviews both indicated that the emergency preparedness system has been operating effectively for the past several years.

G. Medical Programs

The KCD plant provides a full-service medical facility. The facility provides proactive "wellness" activities for prevention of illnesses and injuries and a variety of services designed to prevent occupational

injuries and illnesses. The medical program staff consists of three full-time physicians, six nurses, a radiological technologist, a medical-records technologist, and two staff members to provide administrative support.

Services available to supplement occupational health programs include:

- spirometry and pulmonary function testing,
- audiometric testing,
- routine and diagnostic x ray, and
- blood and urine analysis.

The medical staff's services are well-integrated with industrial hygiene programs for respiratory protection, lead, asbestos, bloodborne pathogens, noise control, ergonomics, and general assessment of chemical exposure.

The medical facility is also integrated with the emergency preparedness and response program. The facility maintains general and advanced life-support systems for life-threatening emergencies and participates with security and offsite agencies for emergency-preparedness exercises anywhere on the KCD grounds.

Physicians and/or nursing staff are available for routine or emergency examinations or treatment of associates during the first and second work shifts.

The third-shift cadre comprises about 75 employees. Mechanisms are in place to provide routine medical program services (annual examinations, etc.) for these employees. While no medical personnel staff the facility during the third shift, all security personnel are trained in first aid/CPR, and KCD maintains agreements with local emergency medical service providers for response to the plant. Additionally, staff physicians are on-call.

Over the preceding year, the medical staff had become more closely involved with hazard analysis and comprehensive surveys, such as those assessing ergonomics/human factors.

H. Radiation Protection

KCD is a non-nuclear facility: it does not process radioactive materials or special nuclear material. However, potential sources of exposure to ionizing radiation can be found—for example, sealed sources and industrial x-ray equipment. Additionally, since the facility receives shipments of equipment from

facilities that do process or handle radioactive material, shipments are routinely surveyed to ensure that contaminated material does not enter the Kansas City facility. Two health-physics professionals administer the radiation protection program to coordinate personnel dosimetry, contamination control surveys, and equipment calibration.

The radiation protection program is on-schedule for compliance with 10 CFR 835, *Occupational Radiation Protection*. All radiological work is controlled by a written "radiation work authorization" (RWA) system. This written system provides an auditable form to document the type of work to be performed, posting requirements for the work area, radiological conditions and limits, training requirements, accountability and safety, and/or monitoring requirements specific to the type of work performed. Several RWAs were reviewed and found to be accurate, complete, and sufficiently detailed to provide clear guidance. Dosimetry results are processed by a DOELAP-accredited laboratory. A review of dosimetry records indicated that very few exposures were above zero during the past several years. Those exposures which *were* above zero were well below required exposure limits. Adequate procedures and controls were in place to provide excellent protection to all associates at the facility. ■

VII. Safety and Health Training

KCD HAS A COMPREHENSIVE safety and health training program that meets all DOE-VPP requirements. Interviews provided evidence that employees knew how to protect themselves and others from hazards of the job. Employees and supervisors alike could explain in detail what their responsibilities would be for different types of emergencies at the site.

Training courses are established according to a graded approach for evaluating risk. The subjects involving the greatest risk to health or safety carry the highest weight and are covered according to more rigorous training methodology and testing requirements.

The training department evaluates the effectiveness of training given. The department takes the graded approach and carries it over to the way it evaluates whether an employee is ready to face a particular hazard. That is to say, more hazardous topics require a certain passing percentage before the employee is allowed to perform the associated job duties solo.

Employees are invited to evaluate the training program and to provide input into the courses that are developed. Their input proved particularly useful when the department developed an aggressive ergonomics program focusing on both production-area hazards and those found at office workstations. In part because of company downsizing, employees and subject-matter experts are increasingly used to conduct the training.

In December 1994, KCD completed a safety leadership training program that all employees were required to attend. The program focused on stopping unsafe acts—whether one's own or those of a coworker. The program was driven by AlliedSignal headquarters. Participants learned how accidents affect families, and how to identify unsafe acts and unsafe conditions through examples and photos. The program was generated as a result of AlliedSignal, Inc.'s Safety Excellence program. DuPont, General Electric, and other industry-leader programs were considered during benchmarking and incorporated into this training program.

Training records are tracked via a computerized and centralized database. The database tracks training requirements for the person, based on the person's job

responsibilities and current training status. The system is also used as a "tickler" to remind the training department when people need certain classes. The computerized program was begun in 1989; the latest revision was put in place in mid-1995.

Both formal and informal training are tracked for each individual KCD employee. Contractor training is not handled by the KCD training group. Rather, it is overseen by the contract administrator for the particular subcontractor. Contracts stipulate that each contract employee undergo the required training before starting to perform work. ■

VIII. General Assessment

Safety and Health Conditions

THE TEAM CONDUCTED a number of walkarounds, both as a group and individually, and the consensus was that the site was exceptionally well maintained. Housekeeping was extraordinary in all areas. All work areas—including plating rooms, machine shops, and office areas—were well organized and clean.

Safety and Health Programs

Taken as a whole, the team found the KCD safety and health program to be very impressive. The program is comprehensive, innovative, and well communicated. The team's interviews confirmed that the AlliedSignal KCD site is achieving its goal of world-class performance in ES&H. ■

IX. Recommendation

IT IS THE UNANIMOUS RECOMMENDATION of the DOE-VPP onsite review team that the AlliedSignal Kansas City Division be accepted into the U.S. Department of Energy Voluntary Protection Program at the STAR level. ■

Appendix: DOE-VPP Onsite Review Team for AlliedSignal KCD

Name/Affiliation	Area(s) of Responsibility	Background
Sanjeeva Kanth DOE-HQ (EH-5)	<ul style="list-style-type: none"> Team leader Management leadership (commitment, responsibility, accountability, resources, planning, program evaluation, site orientation, and employee notification) 	<ul style="list-style-type: none"> DOE-VPP team 10 OSHA onsite reviews (9 as backup team leader) WIPP onsite review team leader 10 years' combined experience as a DOE safety & health manager, OSHA compliance officer, and safety engineer at OSHA headquarters
Nancy Hammond DOE-HQ (EH-5)	<ul style="list-style-type: none"> Backup team leader Rates review Accident/incident investigation Records review Trend analysis 	<ul style="list-style-type: none"> DOE-VPP team 3 OSHA onsite reviews 13 years' experience in industrial hygiene and safety, including chemical hygiene officer for a national laboratory and safety administrator/safety system analyst for the Boeing Company
Robert Carson COMPA Industries, Inc.	<ul style="list-style-type: none"> Pre-use/pre-startup analysis Self-inspection Routine hazard analysis Employee reports of hazards 	<ul style="list-style-type: none"> 1 OSHA onsite review WIPP onsite review team member 4 years' experience working with DOE-VPP to develop training and documentation
John Denton DOE (Ohio Field Office)	<ul style="list-style-type: none"> Contractors Preventive maintenance 	<ul style="list-style-type: none"> 1 OSHA onsite review 3 years with DOE as an occupational safety and health manager 14 years' experience as an OSHA compliance officer
Calvin Dudney ICF Kaiser Hanford	<ul style="list-style-type: none"> Employee involvement Safety committees 	<ul style="list-style-type: none"> Union member Construction craft liaison and craft point-of-contact for employee concerns and safety issues Active involvement in ICF Kaiser's DOE-VPP
Peggy Richardson Richardson Mgmt. Group	<ul style="list-style-type: none"> Employee involvement Management leadership 	<ul style="list-style-type: none"> Developer of VPP at OSHA Former Executive Director, VPP Participants' Association
Clark Roberts Battelle Pacific Northwest Laboratories (Health Division)	<ul style="list-style-type: none"> Comprehensive surveys Professional expertise Personal protective equipment Medical programs Radiation protection 	<ul style="list-style-type: none"> 2 OSHA onsite reviews Certified industrial hygienist (CIH) Consults with DOE contractors on DOE-VPP applications Former OSHA industrial hygiene manager
Raymond Rogers DOE-HQ (EH-5)	<ul style="list-style-type: none"> Safety and health training Pre-use/pre-startup analysis Self-inspection Routine hazard analysis Employee reporting of hazards 	<ul style="list-style-type: none"> DOE-VPP team 4 OSHA onsite reviews (2 as backup team leader) WIPP onsite review team member 4 years' experience working with DOE-VPP to develop training and documentation
Salem ("Srin") Srinivasan OSHA (Region VI)	<ul style="list-style-type: none"> Safety & health rules Emergency preparedness and response Records review 	<ul style="list-style-type: none"> 50 OSHA onsite reviews (5 as team leader, 20 as backup team leader, 1 as team leader trainer) 13 years' experience with OSHA 16 years with federal government
John Tseng DOE-HQ (EM-1)	<ul style="list-style-type: none"> Management leadership (responsibility, accountability, management training, and employee involvement) 	<ul style="list-style-type: none"> EM Senior Executive Service (SES)
Ron Elmer DOE-HQ (EH-5)	<ul style="list-style-type: none"> Team coordinator 	<ul style="list-style-type: none"> DOE-VPP team leader 1 OSHA onsite review WIPP onsite review team member Certified industrial hygienist 12 years' safety and health experience with the federal government; 9 years in private industry