

Los Alamos National Laboratory High Explosives Science and Technology Group

Business Overview

Basic Organizational Description: Los Alamos National Laboratory (LANL) is owned by the United States Department of Energy (DOE) and operated under contract by the University of California (UC). Established in 1943 as part of the Manhattan Project, LANL's original mission was to design, develop, and test nuclear weapons. As technologies, United States priorities, and the world community have changed, LANL's mission has broadened to enhancing global security by ensuring safety and confidence in the U.S. nuclear weapons stockpile, developing technical solutions to reduce the threat of weapons of mass destruction, and improving the environmental and nuclear materials legacy of the cold war. In addition, the Laboratory applies its scientific and engineering capabilities to assist the nation in addressing energy, environment, infrastructure, and biological security problems.

In FY99 LANL employed approximately 10,000 UC and contract workers divided among 45 division and program offices.

Overall LANL funding for FY99 was \$1.45 billion.

LANL's Dynamic Experimentation (DX) Division is a technically diverse organization employing 440 workers (roughly 5% of the LANL workforce) at numerous sites comprising approximately 22 square miles, fully half of LANL's land area. The division consists of eight groups, a test office, and the Division Office, as Figure 0-1 shows. DX Division's principal and historic programmatic activities are in the areas of nuclear weapons research, development and testing (RD&T) and RD&T in support of Department of Defense (DoD) programs. The division is actively engaged in an aggressive effort to expand its funding base and utilize its substantial and varied skills pools in other defense- and non-defense-related activities such as environmental monitoring and remediation research, industrial collaborations, and technology transfer opportunities.

The High Explosives Science and Technology Group, DX-2, is concerned with all aspects of

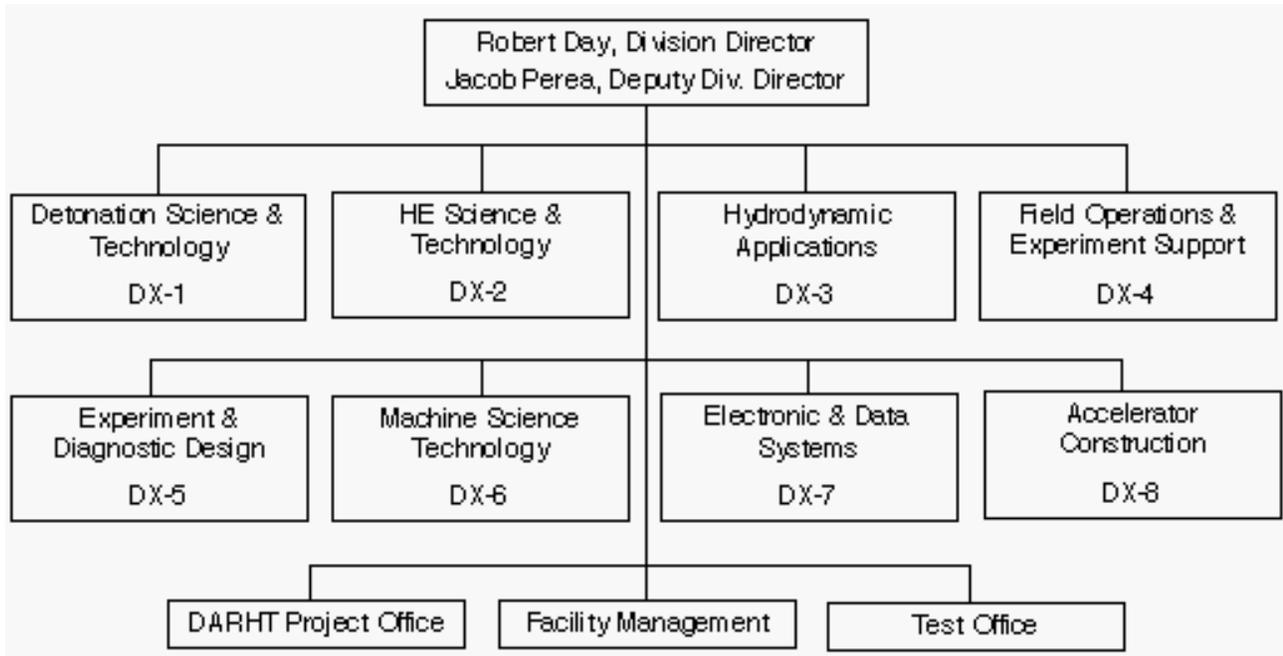


Figure 0-1. Organizational structure of DX Division.

high explosives (HE) from cradle to grave. These aspects include conceptualization, synthesis, formulation, sensitivity testing, analytical chemistry, characterization, and performance and remediation of HE.

DX-2 is composed of four core teams:

- HE Chemistry,
- HE Engineering,
- HE Materials, and
- HE Physics.

Figure 0-2 is an organizational diagram of the group.

DX-2's research activities support the following key programs:

- synthesis of high nitrogen energetic materials;
- novel formulation techniques for energetic materials;
- nuclear stockpile surveillance and monitoring;
- nuclear weapons safety;
- shock initiation of explosives;

- materials compatibility;
- burn rates of energetic materials;
- deflagration-to-detonation transition;
- physical characterization of explosives;
- damaged HE characterization;
- engineering scale-up of new and existing explosives synthesis;
- insensitive high explosives; and
- environmental remediation of energetic materials and explosive devices, including base hydrolysis and supercritical water oxidation.

For FY99, DX-2's budget was approximately \$14 million, with \$2 million of that total designated to support work in other parts of LANL. DX-2 funds are used for a combination of RD&T activities as well as aspects of explosives production work. DX-2's budget was approximately 20% of the entire DX Division budget and slightly less than 1% of LANL's overall spending.

DX-2's organizational culture is focused around the mission (see Figure 0-3) and vision (see Figure 0-4) of DX Division.

DX-2's staff is composed of 75 employees, including guest scientists and students. Employee skills and education include the areas of organic chemistry, inorganic chemistry, theoretical chemistry, physical chemistry, shock physics, theoretical physics, chemical engineering, mechanical engineering, computational fluid dynamics, and biology.

Facilities operated by DX-2 include buildings housing traditional chemistry laboratories as well as individual process buildings designed for particular operations such as formulation, testing, or machining of explosive compounds.

Federal regulatory agencies with oversight for various LANL operations (and thus DX-2 operations) include EPA, DOE, OSHA, and the NRC. The New Mexico Environment

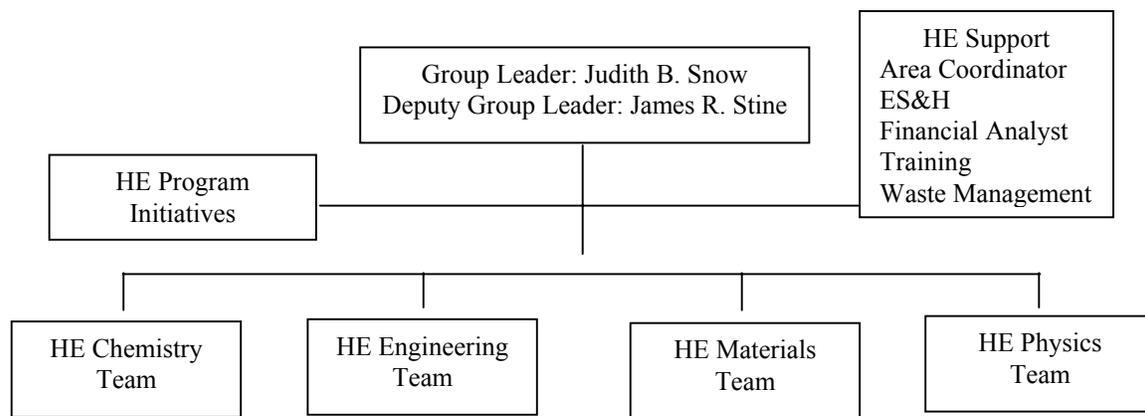


Figure 0-2. DX-2 group organizational structure.

The Dynamic Experimentation Division researches, engineers, and conducts experiments on high explosives and dynamic processes. The Division's weapons performance testing, science, engineering, and production projects support LANL's national and global

Figure 0-3. The DX Division mission.

By the year 2000, DX Division will be recognized for its leadership in science and technology focused on energetic materials and dynamic processes. The Division's weapons safety, reliability, and performance programs will continue to ensure global security.

DX's stable and growing funding allows us to conduct a full range of challenging

Figure 0-4. The DX Division vision.

Department (NMED) also oversees and regulates LANL activities. Most DX-2 waste is regulated under

- the Resource Conservation and Recovery Act (RCRA),
- the Toxic Substances Control Act (TSCA), and
- the National Pollutant Discharge Elimination System.

In addition to regulatory expectations, LANL operations—including DX Division, and DX-2 performance—are shaped and evaluated by contractual requirements negotiated by DOE, UC, and LANL. These requirements, revised annually, are contained in Appendix F of the operating contract and provide a broad range of specific goals, measures, and evaluation criteria. Appendix F serves as a key method of determining both customer expectations and organizational performance. Both DOE and UC evaluate DX Division based on the quality of the organization's science and technology. In addition, DOE and UC evaluate overall LANL performance—to which DX Division and DX-2 contribute—on other environmental components of Appendix F. Items 2.1 and 3.1 provide a more comprehensive explanation of the Appendix F process.

Customer and Interested Party Requirements: Group DX-2 has one primary customer, DOE,

and a secondary customer, DoD. DOE funding accounts for the majority of DX-2 work; DoD pays for approximately 15% of the group's activities. DX-2 evaluates the requirements and satisfaction of these primary customers through the Appendix F process, through program reviews, and through discussions regarding funding for new or continuing projects.

DX-2 employees also constitute a stakeholder segment. Employee requirements are that DX-2 provide a safe and healthy work environment. DX-2 determines employee expectations and satisfaction primarily through LANL's annual Employee Checkpoint Survey (see Item 3.1) and the Upward Appraisal process (see Item 5.2).

Additionally, DX-2 has identified a broad group of stakeholders that include regulatory agencies and the general public. DX-2 determines requirements and satisfaction levels for these customers through a variety of measures including LANL's quarterly surveys of public opinion (see Item 3.1). Figure 0-5 summarizes the customer segments and their broad requirements.

In addition to the measures discussed above, DX-2 uses LANL's Integrated Safety Management (ISM) Program to structure division operations. ISM implementation is a major emphasis at LANL and includes—in addition to worker safety and health—environmental protection, pollution prevention, and waste minimization. In its broadest definition, ISM serves as a basis for the institution's environmental management system (see Item 1.1). LANL's Performance Management System (see Item 5.1) helps leaders establish clear performance expectations

Customer Segment	Key Requirements	Determined By
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<p>Major Funding Organizations</p> <ul style="list-style-type: none"> • DOE • DoD • Others 	<ul style="list-style-type: none"> • high-quality science and engineering • programs relevant to national needs and agency missions • high performance in the construction and operation of major research facilities • high-quality programmatic performance and planning • ability to help LANL meet key environmental goals 	<ul style="list-style-type: none"> • Appendix F technical & scientific evaluations • Appendix F administrative & operational evaluations • Technical Coordinating Group (TCG) reviews • Programmatic reviews • Peer-reviewed publications • Scientific presentations
<p>DX-2 Employees</p>	<ul style="list-style-type: none"> • Provide a safe and healthy work environment 	<ul style="list-style-type: none"> • Appendix F • Employee Checkpoint Survey • Upward Appraisals • LANL goals
<p>Stakeholders</p>	<ul style="list-style-type: none"> • Help LANL meet key environmental goals 	<ul style="list-style-type: none"> • Appendix F • Regulatory requirements • Public opinion survey

Figure 0-5. DX-2 key customer segments and requirements.

for employees and ensure those expectations are aligned with organizational goals and values.

Supplier and P2-Partnering Relationships: Most opportunities to interact with vendors on the basis of environmental concerns are limited. In addition, LANL financial policies require that most product/service purchases be coordinated through LANL's Business Operations (BUS) Division. BUS Division also evaluates the overall performance of suppliers. Purchase of routine products, such as office supplies, are approved by LANL and conform to any applicable environmental provisions, such as recycled content.

Competitive Situation: Within the LANL organization, there are no direct competitors who can perform DX-2's primary work functions. Other internal LANL units, however, may be considered competitors for both programmatic funding and funding for specific projects. In addition, there are other entities within the DOE Complex, such as Lawrence Livermore National Laboratory (LLNL), who compete with DX-2 for customer dollars. The group is thus required to find ways to both justify operating expenses and improve operating processes to make maximum use of available funding.

Because both DOE and UC use the Appendix F measures to evaluate performance at all three research and development laboratories managed by UC—LANL, LLNL, and Lawrence Berkeley National Laboratory (LBNL)—the annual evaluations provide a means of comparing performance levels among the three institutions. Although not all Appendix F measures are applicable to all three laboratories, the side-by-side evaluation each year does provide interesting relative information. Thus, as evaluated by key customers through Appendix F, both LBNL and LLNL can be generally considered competitors.

Strategic Context: Both DX Division and DX-2 are seeking to expand funding bases and develop new markets for services such as environmental monitoring and remediation research, industrial collaborations, and technology transfer.

Through a strategic cooperative venture with the LANL Environmental Stewardship Office (ESO), DX-2 has begun to systematically assess its environmental performance and seek ways to employ new technology and new ways of process management to improve its operational efficiency. Continued participation in the New Mexico Green Zia

Environmental Excellence Program provides another opportunity for the group to analyze and continuously improve its environmental performance.

1. Leadership

1.1 Organizational Leadership

The leadership system that supports environmental excellence in DX-2 begins with the director of LANL who, in 1998, issued a vision for LANL that included zero environmental incidents. Figure 1-1 shows the "six zeros" which constitute LANL's highest-level goals. A comprehensive, proactive, ethics-based system cascades down from these leadership goals.

DX-2 group management includes a group leader, a deputy group leader and team leaders for HE Chemistry, HE Engineering, HE Materials, and HE Physics. DX-2's management system is based on frequent and open communication. Group managers meet informally with employees on a weekly and sometimes daily basis and meet monthly with the entire organization for formal sessions. Formal meetings frequently focus on expectations and progress toward goals. The sessions include discussion of environmental issues, safety, and waste minimization. In addition, group and team leaders review action plans for all projects, including process improvement efforts, to ensure work is being completed as scheduled and budgeted or to determine necessary adjustments to the plans.

An integrating framework that DX-2 and LANL overall use as an environmental management system is ISM. The broad definition of "safety" encompasses all aspects of environment, safety, and health—including pollution prevention and waste minimization. The term "integrated" is used to indicate that the

Zero Environmental Incidents

Zero Ethics Incidents

Zero People Mistreatment Incidents

Zero Security and Safeguards Violations

Figure 1-1. LANL's "six zeros" goals. safety management system is a normal and natural element of the performance of work; safety isn't a workplace addition, it is how we do business. ISM supports LANL's goal "to accomplish its mission cost-effectively while striving for an injury-free workplace, minimizing waste streams and avoiding adverse impacts to the environment from its operations." ISM implementation is a major emphasis at LANL, and senior leaders formally review progress toward full implementation on a quarterly basis.

Group managers also conduct regular management walkarounds. These informal reviews allow leaders to observe working conditions throughout their areas of responsibility, to talk informally with employees, and to note potential areas for improvement. LANL has created nine categories of guidance cards, including environmental protection, that provide suggestions on the types of observations managers should make during walkarounds. In 1999, DX-2 managers performed 101 documented walkarounds. In addition to conducting documented management walkarounds each month, the group leader and the deputy group leader walk DX-2 spaces virtually every day.

DX-2 has embraced the philosophy contained in the Green Zia Environmental Excellence Program and in 1999 submitted an application for the Green Zia Awards Program. Some portions of the group have already received training in use of the Green Zia tools to

Zero Injuries or Illness on the Job

Zero Injuries or Illness off the Job



evaluate and improve process performance, and feedback from the 1999 application proved very informative. Through submission of a 2000 Green Zia application, DX-2 leaders are communicating to group members the ongoing importance of pollution prevention and environmental excellence. During the coming year, DX-2 managers will further deploy understanding and use of the Green Zia Program throughout the organization.

Group managers both set an example and encourage staff to achieve excellence. Both the group leader and the deputy have attended LANL's Leadership Institute. One DX-2 staff member has attended LANL's High-Performance Institute, and two other group members are LANL "fact finders" for the institutional complaint resolution process.

DX-2 has on staff an Environment, Safety, and Health Officer whose duties are to coordinate activities in these areas and to bring relevant issues to the attention of group managers. The ESH Officer and the DX-2 waste management coordinators also make presentations to employees and serve as the point of contact for environmental, waste-minimization, and pollution-prevention issues.

Information regarding organizational goals and current progress cascades to individual employees through the management structure. In addition to the monthly group meetings already mentioned, DX-2 leaders meet much more frequently with teams and individual employees on an informal basis. Both the

group leader and deputy group leader observe an open-door policy that allows employees easy access. In addition to meetings, DX-2 uses a variety of methods, including one-on-one interactions and email, to keep employees informed of issues related to the group and maintains a web site with a wide range of available information for employees, customers, and stakeholders. DX-2 employees also have access to the LANL "ISM Safety Web," a web-based file of electronic information on subjects ranging from safe work practices to lessons learned (see Figure 1-2).

DX-2's strategic perspective is incorporated in the DX Division strategic plan, as are the group's environmental and waste-management goals. DX-2 senior leaders provide the input for the portions of the division-level plan that directly impact the group. DX-2 does not have a group-specific strategic plan at this time but expects to develop one this year. The group also has representatives on the Integrated Safety Plan Grass Roots Committee, which is responsible for providing employee input for the ISM implementation strategy. As previously mentioned, ISM includes a strong focus on environmental protection, pollution prevention, and waste minimization.

1.2 Community Leadership

Because of the nature of DX-2's work there is limited interaction with the public and the local



Figure 1-2. LANL's ISM Safety Web.

community related to environmental issues. LANL has designated organizations, such as the Community Relations and Public Affairs Offices, to routinely handle interactions with the public. Presentations, discussions, and workshops specifically focused on environmental issues are typically coordinated through LANL's ESH Division or the Environmental Science and Waste Technology (E) Division. Other community interactions take place through the integrated outreach and educational programs of LANL.

DX-2 personnel do participate in LANL-sponsored community outreach activities. For example, four DX-2 employees, including the group leader, gave "Expanding Your Horizons" workshops for northern New Mexico middle-school and high-school girls. DX-2 also has both a silver- and a bronze-level winner of the LANL Foundation Scholarships. DX-2 also sponsors a pilot program that provides opportunities for community teachers and student to participate

in summer scientific research activities at DX-2 facilities.

DX-2 makes a conscious effort to "buy green" whenever possible. LANL as a whole follows DOE and Executive Orders in this regard, and LANL performance in affirmative procurement is evaluated against one of the measures in Appendix F. LANL's accounting system allows DX-2 managers to monitor in real time the percentage of purchases that include recycled content. Figure 7-3 in Item 7.1 shows DX-2's performance in supporting purchase of "green" products.

2. Planning for Environmental Excellence

2.1 Strategic Planning for Environmental Improvement

LANL has developed and uses as a guiding blueprint a strategic plan for the next five

years. The current LANL strategic plan (available online to both the public and LANL employees) sets out major programmatic objectives and strategies. It also identifies environmental objectives related to most LANL major goals. In addition, a major objective of demonstrating operational excellence in all activities specifically calls out the following strategies:

- achieve measurable improvements in safety and environmental stewardship through full implementation of the ISM Program throughout LANL.
- manage wastes and hazardous legacy materials effectively and accept the challenge of minimizing the generation of hazardous wastes in the future, with a long-term direction toward zero emissions.

Each year LANL produces an institutional plan, a five-year perspective on Laboratory operations. This document (available online to the public and to employees) identifies strategic requirements for LANL organizational units, including DX Division; summarizes strategic, tactical, and programmatic plans; and helps ensure the integration of LANL activities with DOE priorities.

In partnership with DOE, UC has developed specific overall performance goals, contained in Appendix F of the operating contract, that emphasize results most important to DOE on an annual basis. Each year both UC and DOE evaluate the expertise of all LANL technical divisions, including DX Division, on the basis of their excellence in science and technology. Each year LANL also renegotiates with UC and DOE a set of specific performance measures in ten administrative and operational functional areas, one of which is environmental restoration and waste management (see Item 3.1). DX Division and DX-2 environmental performance goals are

linked to LANL's Appendix F goals through the Hazard Control Procedures (HCPs) and Standard Operating Procedures (SOPs). The HCPs and SOPs provide a formality of operation and ensure the measurability of performance.

Based on LANL strategic directions and DOE requirements, DX Division then develops its own strategic plan that includes a strategic vision for DX-2. The DX Division strategic plan includes specific division goals that respond to the LANL environmental strategies cited above. Division level planning requires the development of procedures and subsidiary action plans to ensure safety of employees and to ensure that environmental goals are met. Figure 2-1 gives an overview of the DX strategic planning process, which includes input from each of the following:

- Past performance, as documented through such activities as management walkarounds (see Item 1.1), as well as results from process improvement efforts (see Item 6.2)
- Item 4.1 describes the general measures from Appendix F that influence DX Division focus. Category 7 presents results that are considered in division planning.
- DX Division and DX-2 also include employee feedback gathered through LANL's annual Employee Checkpoint Survey and the LANL Upward Appraisal Program (see Items 3.1 and 5.2).
- Item 3.3 outlines the DX Division advisory committee that provides additional data on best practices and industry standards.

DX-2 planners have traditionally included such issues as worker health and safety in long-range plans. For example, the division routinely plans for ongoing review of employee ergonomic safety.

Participation in the New Mexico Green Zia Environmental Excellence Program, with

accompanying development of appropriate measures and performance indicators, is allowing DX-2 to begin incorporating focus on pollution prevention and waste minimization into long-range plans. The group has recently begun using the Green Zia tools. In the coming year, DX-2 will encourage the use of Green Zia

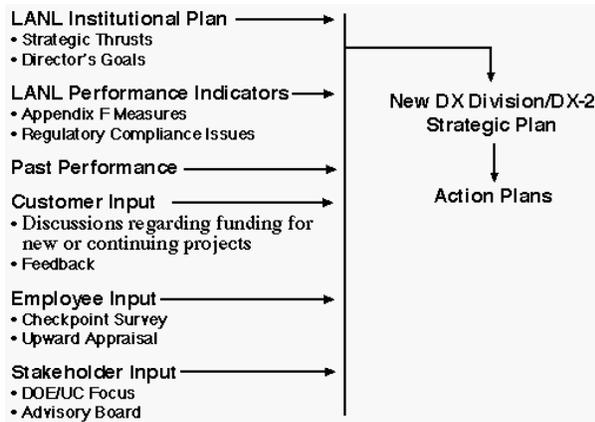


Figure 2-1. The DX strategic planning process.

tools to evaluate the environmental performance of additional processes and to formulate related action plans for performance improvement.

2.2 Action Planning

In combination with the leadership system previously described, the DX Division strategic planning effort then sets the stage for development and execution of tactical action plans for DX-2. Currently, DX-2 develops action plans on a case-by-case basis.

Every year DX-2 validates its key functions and initiatives and then establishes short-term goals, measures, and success indicators. The group's action plans align with division objectives and are complementary to the plans of other DX groups. The same information used to develop overall DX Division strategic plans (see Fig. 2-1) is available to DX-2. In

addition, the group includes information or feedback specific to its function in creating action plans. Figure 2-2 gives an overview of the process for developing action plans.

Focus on environmental performance is routine for DX-2, and many of the existing action plans include specific reference to pollution prevention or waste minimization. Managers and employees also recognize that inefficiency leads to waste, so there is an ongoing effort to improve operations. Item 6.2 describes the

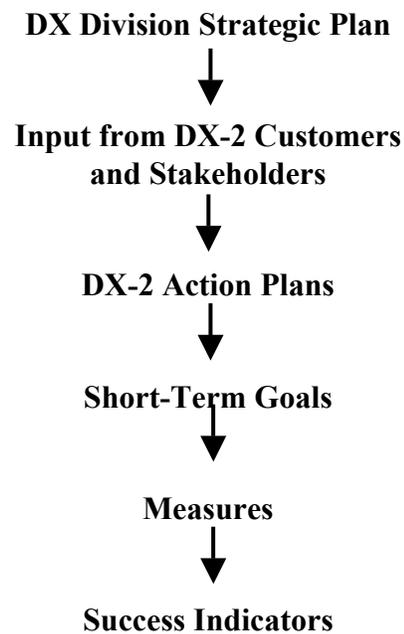


Figure 2-2. DX-2 action planning process.

method by which key division processes are analyzed and improved. These improvement efforts include action plans, which are regularly reported to management and tracked for successful completion.

Involvement in the Green Zia Environmental Excellence Program and related pilot projects has led to an increased awareness of environmental concerns across the organization. The group's waste management coordinators and the ESH Officer collect

baseline data related to resource usage and waste generation that can provide a starting point for new efforts.

Additionally, DX Division annually develops an implementation strategy for ISM, focusing on how to involve all employees in making this program a routine part of all operations. This divisionwide plan establishes performance goals for all groups, including DX-2. In combination with the leadership and planning systems previously described, these efforts help build a systematic process for development and execution of action plans.

2.2 Integration and Implementation

Strategic and action plans are integrated, documented, and tracked by the DX Division management team. Senior division leaders formally review the plans to ensure the division is making appropriate progress and report this progress through a variety of meetings. Quarterly Appendix F reviews document DX Division performance, as does the final year-end assessment. DX Division's contribution to overall LANL Appendix F environmental goals is also reviewed and documented quarterly and in a written annual assessment.

At the group level, DX-2 leaders are responsible for ensuring that group action plans mesh with division goals and expectations. Because both the DX-2 group leader and deputy group leader serve on the DX Division management team, they provide a natural conduit for information to flow both upward to the division office and downward to DX-2 employees. Information is communicated to group employees both in frequent informal discussions and in the more structured monthly group meetings. The DX-2 action planning process allows managers to closely tie both strategic and tactical activities to budget submissions and to

plan for most effective movement of DX-2 staff to meet requirements. Reviews at the division level allow managers to track resource allocations and to make any necessary adjustments to either funding or human resource allocations.

Finally, development of clear strategic plans at the division level and of aligned action plans at the group level allows for full integration of performance requirements for each individual DX-2 employee. As discussed in Item 5.1, objectives for each employee are designed to ensure that the organizational objectives are met and that the employee has a clear view of how his or her work requirements contribute to the success of the entire organization.

3. Customer, Market, and Stakeholder Focus

3.1 Customer Involvement

Just as frequent and open communication marks DX-2's internal management practices, so does it characterize interactions with customers and stakeholders. The group is highly conscious of the need to fully involve all affected parties in seeking to improve the efficiency of work and demonstrating a sustainability ethic in daily operations.

Group DX-2 has one primary customer, the US Department of Energy. The group also does a small amount of work for DoD, other government agencies, and industry. DOE is directly involved in developing environmental performance measures and formulating goals for all of LANL, including DX-2. The performance measures found in Appendix F of UC's operating contract provide clear expectations, increase accountability, and improve customer relations by addressing performance issues that concern DOE.

Appendix F contains an evaluation of science and technology and also approximately one hundred specific performance measures and associated goals in ten functional areas related to administration and operations. Over twenty-four of those measures fall within the functional area of environmental restoration and waste minimization. Many more measures directly related to environmental excellence fall within the functional area of environment, safety, and health. Although none of the Appendix F measures relate exclusively to DX-2, the group's performance does contribute to these environmental measures that show overall LANL environmental achievement. DX-2's performance also contributes to the overall science and technology evaluation of DX Division.

The negotiation steps for Appendix F administration and operations measures, the process to set priorities, the improvement steps, and the resulting evaluations (see Fig. 3-1) all help focus DX-2 resources on key business processes and improve operational quality. Appendix F requires an annual self-assessment and evaluation by both UC and DOE, but LANL senior leaders also meet quarterly with UC and DOE representatives to discuss current progress against goals and to identify any issues. The regular and frequent interaction helps prevent surprises, mitigate problems, and create a cooperative rather than an adversarial atmosphere. In support of the Appendix F evaluations, DX Division conducts quarterly self-assessments that contain an evaluation of environmental performance and routine waste minimization

efforts. This assessment is documented, archived and transmitted to LANL management.

DX-2 considers employees to also be key stakeholders. The group relies on LANL's annual Employee Checkpoint Survey. The survey monitors employee perspectives and contains standard types of questions in general categories including safety, productivity, and customer focus. In addition to providing overall results for LANL, the structure of the survey allows group managers to perform comparisons with other operational divisions within LANL and also with other companies. For the past four years DX-2 has also participated in LANL's annual Upward Appraisal Program (see Item 5.2), which allows employees to provide direct feedback to managers regarding the supervisors' behavior and ability in areas such as environment, safety and health; communication; and accountability. Group managers review the information from both these instruments and use it to help establish goals and corrective actions. Finally, frequent management walkarounds and an open-door policy provide opportunities for managers and employees to interact informally and to jointly review safety and environmental issues.

DX-2 stakeholders internal to LANL include DX Division, the group's parent entity, and ESH Division, which oversees DOE Order and CFR compliance. To monitor external public perception, LANL has since 1990 conducted a quarterly survey of public opinion. The resulting reports profile New Mexico residents'

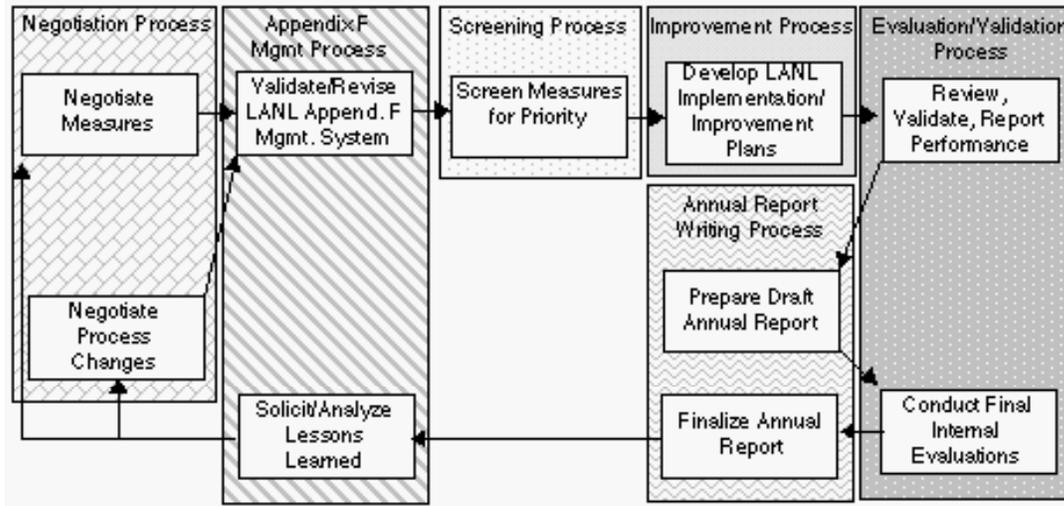


Fig. 3-1. Appendix F Process (18-month continuous cycle.)

views and identifies results from specific geographic areas around the state. In addition to asking about general perceptions of LANL, the survey specifically asks respondents their opinion of LANL’s environmental responsibility. DX-2’s environmental performance is included in this larger evaluation.

DX-2 uses its web site to communicate with customers, stakeholders, and suppliers. By using text as well as frequently updated statistics, DX-2 keeps all parties well informed of current and projected progress.

3.2 Supplier Involvement

Most opportunities for DX-2 to interact with vendors on the basis of environmental concerns are limited. LANL financial policies require that most product/service purchases be coordinated through LANL's BUS Division. BUS Division also evaluates the overall performance of suppliers.

Within its limited sphere of interaction with suppliers, DX-2 does, however, employ several environmental considerations. For example, the group now ensures that all new computers are equipped with Energy Star, an energy saver function that turns off the

monitor's screen when the computer is not in use. The division also is making a determined effort to ensure that purchased office products, including paper, contain recycled content. The use of electronic messaging and a comprehensive web site also promote the minimization of paper usage. The division also promotes saving of wastes and expense associated with unnecessary travel by championing teleconferencing and distance learning.

3.3 Others Involvement

DX-2's primary method of communicating and involving other interested parties is through participation in the New Mexico Green Zia Environmental Excellence Program. For the group, this is the second year of participation. The Green Zia Program is a state-wide initiative designed to encourage businesses to focus on pollution prevention as a economic business advantage. Established by the 1998 New Mexico legislature, the Green Zia Program is administered by the New Mexico Environmental Alliance, a partnership of state, local, and federal agencies; academia; business and industry; and environmental advocacy groups. The basic premise of the program is that waste is the result of

inefficiency and by reducing waste a company can increase its profits. The environmental benefit is clear: waste that is never created does not pollute. Participation in the program gives DX-2 an annual third-party, independent evaluation of successes and opportunities for improvement in environmental performance.

Finally, DX Division has established an external advisory committee to help the division assure that it is aligned with customer and stakeholder expectations. The review committee critically evaluates division activities on a yearly basis. Interaction with the division review committee is accomplished through yearly multi-day briefings, part of which involve DX-2. The review committee evaluates performance based on several key criteria, including programmatic performance and planning.

DX-2 has two on-site permanently assigned waste management coordinators and an ESH officer who are involved in the daily activities of the group. They provide guidance to group leaders on environmental and health and safety issues related to short-term operations and long-term plans.

4. Information Analysis

4.1 Information Collection and Management

DX-2's major environmental impact is waste water that potentially could be slightly contaminated with HE. The water results from washing laboratory glassware after triple rinsing. This water is designated as a RCRA hazardous waste. DX-2 carefully monitors its production of such waste as well as the impact any process improvements have on this waste stream. LANL's E Division maintains extensive databases related to environmental information for LANL as an institution and for individual divisions and groups, including

DX-2. This data includes measurement of progress toward goals for waste minimization for various waste type.

The Appendix F Process (see Item 3.1) is a key performance indicator of contractual requirements and also a measure of customer satisfaction. Managers monitor progress related to project and performance goals and use that information to develop and/or modify operational plans and to identify areas for improvement. Many of the Appendix F measures evaluate total LANL performance in environmental arenas. Because the measures include all aspects of LANL operations, DX-2's performance contributes to the ultimate evaluation score. Results presented in Category 7 show that overall LANL scores for Appendix F related to environmental issues have improved over the past three years, indicating increasing DOE approval of performance in this area.

DX-2 has identified the following LANL-wide environmental performance measures as being directly applicable to the group and closely monitors performance levels:

- management walkarounds (see Item 1.1);
- injury/illness prevention;
- utilities/energy conservation (this item includes three separate and distinct measures);
- supplier performance;
- source reduction and pollution prevention (this measure includes sanitary waste reduction, recycling, and affirmative procurement).

LANL senior leaders also monitor progress toward full implementation of ISM (see Item 1.1). The ISM Project Office has established a detailed implementation schedule and monitors all portions of LANL, including DX-2, to ensure that milestones are achieved and that performance goals are met. A DOE audit

of ISM in the fall of 1999 indicated that implementation is on track and that LANL efforts in this area are fully satisfactory.

In addition to monitoring its relative contribution to overall LANL institutional performance as measured by Appendix F, DX-2 also tracks information gathered through participation in LANL institutional programs. For example, managers review results from LANL's public opinion survey and also analyze information from the annual Employee Checkpoint Survey and Upward Appraisal.

Other specific measures related to DX-2's performance in the areas of environment, safety, and health include the following:

- In addition to the group's contribution to overall LANL performance in injury/illness prevention, DX-2 managers specifically measure and track the group's own performance in this area.
- Group management recognizes that employee injuries and illness have a direct impact on productivity. Frequent management walkarounds also help assure that managers are aware of and can correct potentially dangerous or unhealthy situations.
- This year, for the second time, DX-2 will receive impartial evaluation and feedback on its environmental performance through participation in the New Mexico Green Zia Environmental Excellence Program. Senior leaders will begin tracking this measure and will use identified opportunities for improvement as initiation points for remedial actions.
- Process changes save not only physical resources but also result in time and cost savings. DX-2 monitors operational

process performance and improvements and tracks these savings in efficiency and effectiveness. For example, dishwashers reduce waste water and also minimize energy and water usage.

- Although DX-2 is included in overall LANL performance measures related to energy conservation, until recently there has been no way to directly measure the division's actual contribution. Metering changes implemented by facility managers from LANL's FWO Division may in the future allow a more direct measurement of DX-2's energy consumption along with more accurate evaluation of improvement efforts.

4.2 Analysis and Decision-Making

DX-2 managers systematically analyze data to develop the information necessary for wise decision-making. The DX Division management team, including managers from DX-2, formally reviews the strategic plan annually. Quarterly the division formally evaluates progress toward Appendix F goals. On a more informal basis, operational data is presented and analyzed at DX-2 management meetings. DX-2 managers review all the data identified in Item 4.1 on at least an annual basis, with the majority of information being evaluated much more frequently.

In addition to using operational data to identify opportunities for process and performance improvement, DX-2 is beginning to use the Green Zia improvement methodology and related improvement tools to analyze its key processes. Item 6.2 discusses the formal improvement process the group is using, and Item 7.1 presents some improvement results.

The Appendix F measures also provide LANL, including DX-2, with an opportunity

to compare performance levels with both LLNL and LBNL, the two other research and development laboratories managed by UC for DOE. Not all Appendix F measures are applicable to all three laboratories, and some adjustments are made for individual institutions. While the comparison process is not always precise and does not constitute formal benchmarking, the side-by-side evaluation each year does provide interesting relative information and leads to identification of best practices and areas for improvement.

5. Employee Participation

5.1 Employee Education and Skill Development

A major goal in DX-2 is that every employee understand his or her role in achieving organization and institutional goals. DX-2 managers work with each employee to cooperatively prepare individual development programs—both short-term and long-term—on an annual basis as part of LANL’s Performance Management System. This system, which Figure 5-1 shows, requires DX-2 managers to establish objectives which support the organizational echelons above them. Objectives for each employee are then designed to ensure that the organizational objectives are met and that the employee has a clear view of how his or her work requirements contribute to the success of the entire organization. The Performance Management System ensures clear two-way communication during the goal-setting phase of the process and provides a focus for ongoing discussion about work objectives and processes. Specific goals include

- aligning individual expected results with institutional goals,
- identifying and assessing individual performance results/accomplishments,

- evaluating performance of institutionally defined behaviors,
- describing how individuals helped to meet organizational objectives,

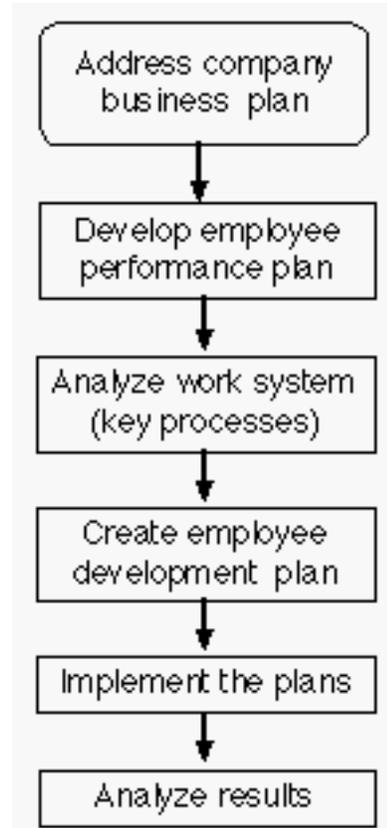


Figure 5-1. LANL's Performance Management System.

- linking performance to rewards or consequences,
- designing development plans to support improving performance in current jobs and/or increasing impact on the organization,
- enhancing employee/manager ownership of individual and organizational performance,
- improving two-way communication between supervisors and employees.

Once developmental goals have been established, employees may participate in appropriate training offered by LANL or other organizations. LANL's ESH Division offers over forty courses related to environmental

issues, from general safety training and first aid to courses on such specific topics as packaging and transporting hazardous materials. Training may be used to improve skills needed for current job performance or to develop new capabilities.

DX-2 employees may also participate in LANL's institutional career development program, which helps identify skills gaps and excesses. Using available information and training, employees can choose to enhance their existing skills or to further develop other skills that LANL needs now or for future programs.

Training programs are a key component to assuring actions by workers that reflect integrated plans. DX Division employs two training generalists from LANL's ESH Division who reside at DX-2 and who work with managers and employees to identify specific training requirements for work being performed, establish appropriate programs, enhance quality, and assure continuity between all aspects of training. Training on standardized practices such as hazardous material management or emergency operations is conducted on a Laboratorywide basis. Site- and task-specific training is also provided for DX-2 projects and facilities.

One new key element of the training program is inclusion of the Green Zia tools for environmental excellence. DX-2 has been one of the first organizations at LANL to pilot the use of these tools. Since January of 1999 DX-2 has been part of a pilot effort to integrate Green Zia goals and methods into LANL's institutional culture. Figure 5-2 shows how DX-2 will achieve this goal and how the group's efforts will contribute to LANL success.

5.2 Employee Involvement

A major emphasis in DX-2 is that every employee understand his or her role in achieving organization and institutional goals, including those related to environmental performance and pollution prevention. For example, the DX Division ISM implementation strategy emphasizes employee understanding and involvement. DX-2 leaders offer employees a wide variety of ways to have an influence on how the group conducts business.

To encourage communication, all managers observe an open-door policy. Employees may also provide comments and observations at group meetings. The annual Employee Checkpoint Survey and the Upward Appraisal Program provide ways for employees to give anonymous input. Employees may also discuss issues with the group's ESH Officer or the waste minimization staff. LANL's ESO has also established an electronic mechanism for soliciting employee input on pollution prevention. DX-2 employees, as well as any LANL employee, can send comments, observations, or questions to wastenot@lanl.gov. The message will be routed to the environmental expert best able to respond, the sender will be notified of any proposed action, and ESO will track the issue to resolution.

Senior leader ensure that the group's human resources are properly aligned to carry out

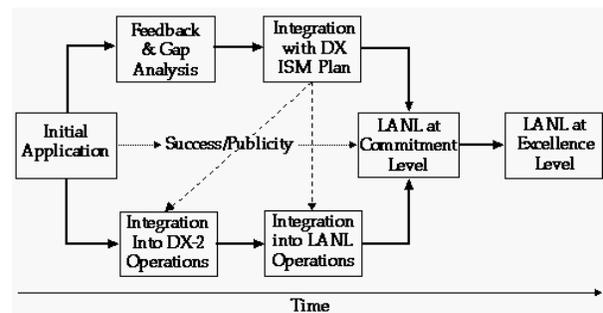


Figure 5-2. LANL's and DX-2's Green Zia plans. proposed action plans. The alignment process begins with the annual divisionwide strategic planning update. Leaders develop long-term priorities and projections and ensure that adequate resources are available. As projects evolve, leaders use monthly reviews of action plan progress to ensure that resources continue to be adequately aligned.

DX-2 leaders communicate environmental information in a variety of ways. In addition to the normal flow-down of reports through regular group meetings, managers devote specific attention to discussing Appendix F reviews, Employee Checkpoint Survey results, and Upward Appraisal feedback. The Upward Appraisal Program, in particular, sets specific expectations for managers to review feedback with subordinates and to develop action plans for improvement. Figure 5-3 shows the overall Upward Appraisal process; Figure 5-4 describes the process for using feedback.

Efforts to promote carpooling are an example of how DX-2 encourages employees to minimize the environmental impact of their work duties on the local community. The LANL daily *Newsbulletin* maintains an electronic "Commuter's Corner" where prospective carpoolers can advertise or look for ride-sharing opportunities.

5.3 Employee Satisfaction, Value and Well-Being

To assure an adequate safety envelope and compliance with laws and regulations, DX facilities must produce several operations plans. These include

- facility management plans,
- configuration management plans,

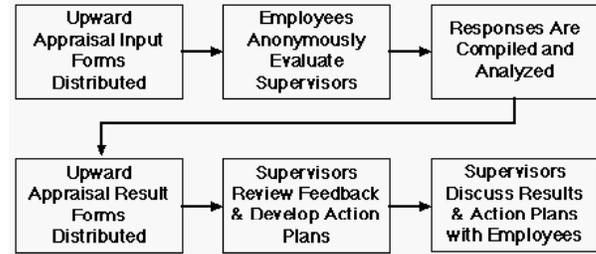


Figure 5-3. LANL's Upward Appraisal process.

BASIC PRINCIPLES OF USING THE FIVE STEP MODEL TO ACCEPT AND USE FEEDBACK	
FEEDBACK IS MOST HELPFUL WHEN YOU ...	WHY?
	If you are preparing your defense as you read, you can miss valuable points; be open to information and suspend mental responses or justifications.
	If patterns emerge they can help you prioritize areas for development. The stronger the trend, the more likely it is that the information is important.
	This "stop and think" step is extremely important so that you analyze trends or comments and put them into perspective prior to action planning and making your response known through discussion with others.
	Based on your reading and reflection, you can determine the areas in which you see the most need for development as a manager—and determine specifically how you will go about meeting those needs. Research shows that specific, written action plans or goals have a very high implementation rate compared to goals that are not concrete.
	If you thank your employees for their feedback and let them know in a meeting how you plan to respond, it will keep the door open for better communication all year. This is a good opportunity to ask for input into your action plans, which could strengthen them. Also, prepare to discuss results with your immediate manager, who is expected to use the results as part of your individual development plan and/or appraisal.

Figure 5-4. The five-step model for accepting and using Upward Appraisal feedback.

- facility safety plans,
- quality assurance plans,
- emergency action plans,
- training program description and job analysis, and
- maintenance implementation plans.

All of the above plans represent a process that is integral to assuring high-quality work being conducted on very hazardous material is accomplished with minimal risk to the worker, his/her peers, surrounding communities, and the environment.

LANL's major formal method for determining employee attitudes and the climate in the workplace is the annual Employee Checkpoint Survey, which has been used for the past five years. The survey contains standard types of questions in general categories including safety, productivity, and customer focus. A second major method is LANL's annual Upward Appraisal Program, which allows employees to provide direct feedback to managers regarding the supervisors' behavior and ability in areas such as environment, safety and health; communication; and accountability. DX-2 managers review the information from these instruments and use it to help establish goals and corrective actions.

There are also incentives to encourage staff to work smarter and utilize innovative approaches to accomplish their work. The Pollution Prevention Awards Program, sponsored by LANL's ESO, is open to all LANL employees and subcontractors. It is designed to encourage individuals and teams to develop plans, programs, or ideas for minimizing waste; conserving water, electricity or natural gas; reducing air or water pollution; or procuring products with recycled content. Recipients of the awards receive recognition and a cash grant from specially allocated congressional funds.

The Los Alamos Awards Program, administered by LANL institutionally but tailored for application at the division or program level, provides a link between the organization's mission and those employees or teams that achieve significant accomplishments toward that mission. DX-2

managers use the program to recognize exceptional contributions and noteworthy achievements by awarding their employees, either individually or as teams, cash awards ranging from \$250 to \$2000.

As part of the larger LANL community, DX-2 relies primarily on institutional programs to enhance employee support. LANL offers a comprehensive set of support initiatives along with feedback systems. Group employees are encouraged to use all LANL services that are appropriate and relevant to their individual needs.

To provide emotional support, LANL provides an Employee Assistance Program (EAP) whose main goal is to assist employees with personal problems that are affecting their job performance. The EAP also offers a wide variety of presentations and workshops on such topics as stress management, gender issues, conflict resolution, and smoking cessation. The EAP also makes available a collection of books, videos, and audio tapes on workplace issues. The program is available free of charge. Usually employees refer themselves; however, a supervisor can refer an employee if job performance has been identified as a problem.

LANL leadership has also chartered a Science and Engineering Advisory Committee (SEAC) composed of scientists and engineers who advise senior managers about the status and future direction of scientific activities and programs at the Laboratory. DX-2 has an employee on the SEAC to provide employee input to the technical direction and operations of LANL.

For their physical well-being, many DX-2 employees use LANL's Wellness Center. The center offers equipment and specific areas for weight training and aerobic exercise in individual and group formats. Use of the

center for individual exercise programs is offered free of charge. The center also provides, usually for a small fee, a wide variety of exercise and health programs including stress management, healthy eating, aerobics, yoga, and cardiovascular fitness. The center offers individual fitness evaluations for a nominal fee. The center monitors daily use numbers and has completed user satisfaction surveys along with participant evaluations. DX-2 also has a small on-site exercise room with exercise machines and weights; an outdoor volleyball court; and trails for walking, running, and hiking.

Employees may choose between two basic work schedules, a traditional 8 day/40 hour week or a new 9 day/80 hour schedule which allows employees every other Friday off. In addition, DX-2 allows employees, with prior agreement of their managers, to use some flexibility in their regular work schedules to meet personal needs.

LANL provides employees and managers formal guidance on administrative reviews and grievances. In addition to this formal support, the institution provides responses to informal queries as well as guidance to employees or management on relations in the workplace.. Specific support is available on such subjects as counseling, sexual harassment, violence in the workplace, and interpersonal skills.

An Ombuds Office, available to any individual in the workforce, provides services including addressing work-related issues, assisting employees in obtaining services, or expediting actions. The Ombuds Office also provides a Mediation Center—available to all members of the workforce—which provides a structured approach and environment to resolving issues between employees or between management and employees.

6. Process Management

6.1 Process Characterization and Control

In addition to an internal desire to continuously improve operational performance, HR Division has additional customer requirements that make process evaluation and improvement necessary. Appendix F provides both a requirement and a mechanism to do process analysis and improvement. Formal operational assessments occur during quarterly, semiannual, or annual reviews (see Item 4.2), but leaders may also consider operation performance at any of their management meetings.

DX-2 leaders use the wide variety of data described in Item 4.1—including data from customers, employees, and operational reviews—to assess the performance of key processes. Representatives of funding organizations are involved in process evaluations through their input to the quality and usability of the final product. Employees provide operational evaluations through their input to the Checkpoint Survey and the Upward Appraisal. Both DOE and UC stakeholders are active participants in establishing performance expectations and in evaluating operational achievement through the Appendix F process (see Item 3.1).

The Appendix F process is one method by which division leaders may identify best practices and compare group performance with the performance of competitors. Although these comparisons usually exist only at the institutional level, the relevant information can be extrapolated and used by DX-2 as appropriate.

DX-2 understands regulatory requirements through the various DOE Orders, federal regulations, state regulations, and permitting

processes. NMED regularly conducts inspections for RCRA compliance. Formal review procedures have been established by DX-2, in conjunction with LANL's ESH Division, to assure compliance with the applicable regulations. One ESH coordinator and two waste management coordinators reside in the group (see Fig. 0-2) and are responsible for supporting environmental compliance. In previous years, ESH Division conducted assessments to prepare DX Division for NMED inspections. In November 1998, DX Division developed its own internal self-inspection program to improve RCRA compliance. The DX Division waste management coordinators, including the DX-2 waste management coordinators, conduct weekly inspections and a formal monthly inspection and report the results to the DX Division Director by the 10th of the following month. These division programs and the ESH assessment prepare the division for NMED RCRA inspections and assure compliance.

DX-2 is using participation in the Green Zia Environmental Excellence Program to focus on ways to reduce waste generation and resource consumption in group processes. DX-2 employees are identifying wastes generated and resources consumed, determining existing baseline performance information, setting priorities for potential areas for improvement, and then developing and implementing improvement action plans. This focus is producing specific, measurable results for actions designed to reduce waste, to lower consumption of resources, and to increase operational efficiency. In addition, the project gives all employees another avenue for providing input regarding the environmental performance of group processes.

6.2 Process Improvement

The cost of permitting, handling, and disposing of waste is a significant fraction of the group's operating cost so there is serious motivation to reduce the volume of waste generated. In general, DX-2 plans and manages environmental requirements through the DX Division Standard Operating Procedure Document SOP01, *Waste Management in DX Division*, which requires the evaluation of processes and procedures for waste minimization opportunities. The group evaluates new processes for waste minimization and material substitution opportunities. Using these systematic but informal methods, DX-2 has had some significant successes in waste minimization. These evaluations led to such actions as substitution of propylene glycol for ethylene glycol for laboratory cooling, extensive recycle of surplus and unwanted items, recycle of solder scrap, non-hazardous solvent substitution for TCE, reduction in machine coolant usage, recycle of cooling water, and reduction in material quantities used for performance tests. In an outstanding example of waste reduction, DX-2 was able to modify a process so that the number of manufacturing steps was reduced from 20 to 4 and waste generation was eventually reduced from 1200 kgs of waste per kg of product to 3.7 kgs of waste per kg of product. Item 7.1 discusses additional process improvements that have led to enhanced environmental performance.

In addition, DX-2 conducts risk assessments to assess the risk of generated waste according to the document *Hazard Control Plan, DX Division Operations, HCP-DX-98-01*. These systematic but informal procedures are the current basis for analyzing processes to identify environmental and safety improvement opportunities.

At the direction of the DX-2 group leader, the organization is working to formally establish both processes and behaviors to achieve waste

reductions beyond that required by compliance. The group has used the Green Zia tools to evaluate one manufacturing process and is beginning evaluation of another. Item 7.1 shows some results related to these efforts. Use of the Green Zia tools is a systematic continuous quality improvement process to upgrade processes on an ongoing basis. For product and service production/delivery processes, Green Zia creates a generalized evaluation and improvement methodology based on Deming's Plan-Do-Check-Act (PDCA) cycle (see Figure 6-1). PDCA forms a framework within which managers and improvement teams employ a variety of tools and techniques to address opportunities for improvement. The goal is to help managers most intimately involved with day-to-day operations have the flexibility to determine how best to maintain optimum process performance and meet customer expectations. This process ensures that, based on regular and frequent customer interactions, managers will select and monitor those key in-process measurement most appropriate for each individual project and process.

Once a process has been designated as needing improvement, based on frequency or number of complaints or on perceived inefficiencies, senior leaders charter a improvement team. Employees are frequently invited to volunteer for such improvement teams, and in some cases employees with specific process knowledge are appointed to the improvement team by management. The Green Zia improvement cycle uses a flow chart to identify key aspects of a process. The improvement team then analyzes problem areas, focusing on root causes and using tools such as a cause-and-effect diagram. Next the improvement team identifies possible alternatives and creates an action plan. Finally, the team selects and

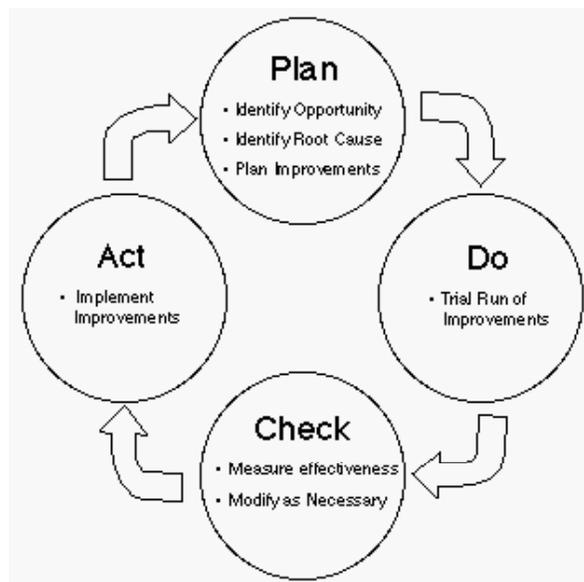


Figure 6-1. DX-2's PDCA Green Zia improvement cycle.

implements the most appropriate change and monitors the revised process to ensure the change produces the desired improvement.

7. Results

7.1 Environmental Results

Figure 7-1 shows the process map for one of the explosives manufacturing processes. This is typically how improvement teams characterize a process as the first step in the Green Zia improvement methodology. Figure 7-2 shows a cause-and-effect diagram the improvement team used to identify possible reasons for excessive waste generation.

Most DX-2 laboratory operations that generate wastewater involve the washing of chemical glassware. The washing of the glassware can be a very inefficient process resulting in a relatively large amount of water going to the collection system and ultimately to the HE Wastewater Treatment Facility (HEWTF). To minimize this type of wastewater, DX-2 submitted a pollution-prevention grant

application to ESO and received \$35,000 for the purchase of two chemical glassware dishwashers. The dishwashers significantly reduced the amount of wash water and created a substantial cost savings. In fact, the cost of the dishwashers will be paid back within two years. Added benefits are that the dishwashers do a much superior job of washing glassware and staff members spend less time performing this menial task.

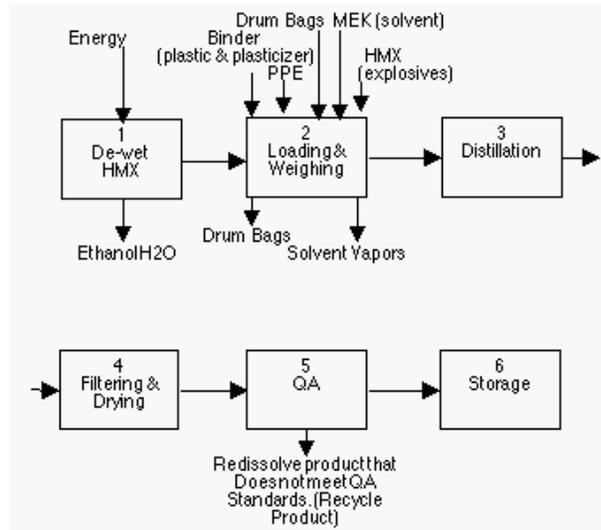


Figure 7-1. General process map for PBX manufacturing process.

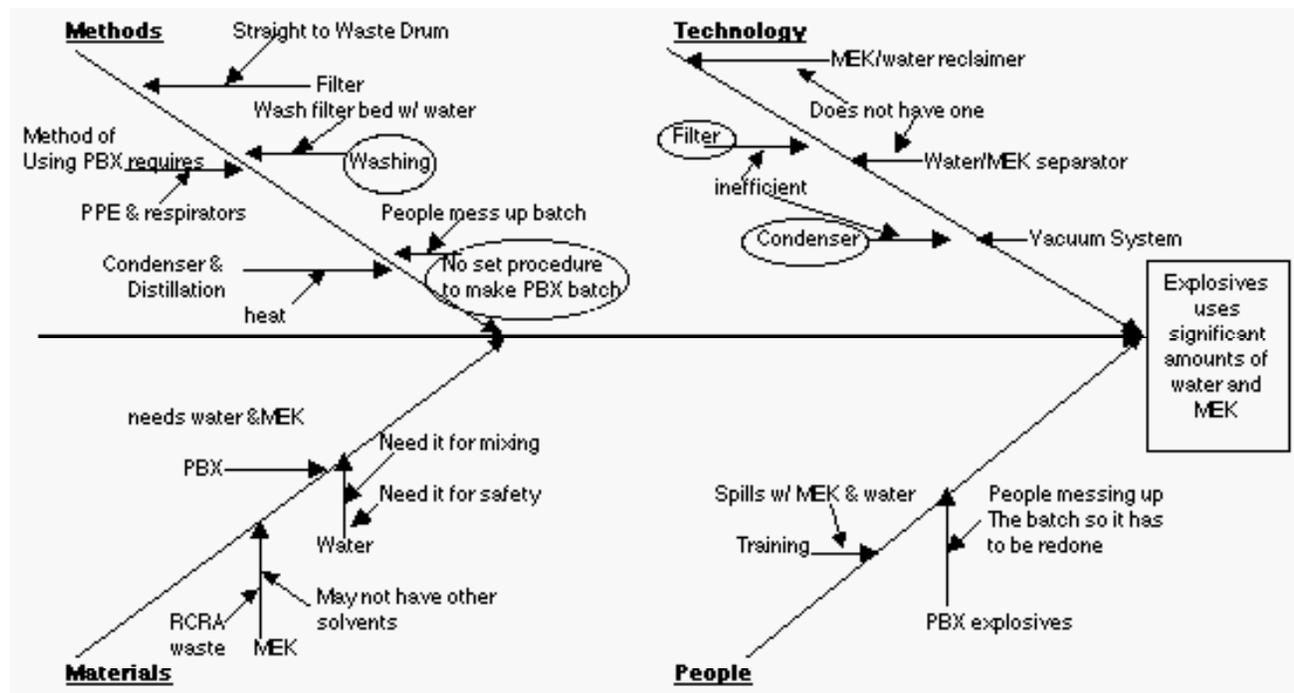


Figure 7-2. Cause-and-effect diagram used to diagnose pollution causes.

ESO also provided DX-2 with \$30,000 for installing data loggers on the sumps used to hold HE wastewater prior to its being processed at the HEWTF. These sumps had only a threshold alarm that, in the event of a large flow to the sump, would be insufficient to give enough notification to prevent an

overflow to the environment. The monitors and data loggers allows for continuous monitoring of the water levels, for the identification of other water sources (such as ground water) getting into the system, and for improving the efficiency of the overall wastewater collection process. The monitors

helped prevent stiff fines for contaminating the environment and eliminated the processing of non-industrial wastewater through the HEWTF. The monitors also have the added benefit of being able to be interrogated from any phone (call "Water Lily" @ 665-3298 and she'll politely tell you the levels in the sump and the storage tanks!) and are able to store data to give a wastewater flow profile over long periods of time (years).

Table 7-I shows recent DX-2 pollution-prevention/waste-minimization proposals that have been funded and implemented through teamwork with ESO.

Figures 7-3 shows DX-2's performance related to affirmative procurement. This is a LANL-wide effort to purchase products with recycled content. In 1998 the group's overall rate was 46%; for the first half of 2000 the rate has improved dramatically to 81%.

Table 7-I. DX-2 Pollution-Prevention/Waste-Minimization Proposals.

Proposal	Purpose
Dishwashers	Minimize potentially contaminated water
Vacuum Thermal Stability Replacement	Eliminate mercury contaminated with HE
Installation of Ozonolysis Equipment	Remove residual HE contamination from wastewater
Waste Water Storage Tank Level Monitors	Prevent spills of potentially contaminated waste water

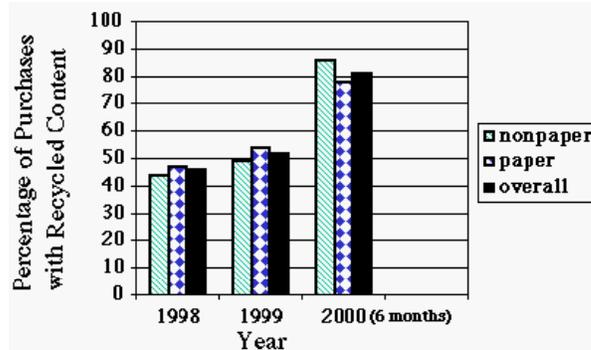


Figure 7-3. DX-2's purchase of material with recycled content.

Figure 7-4 shows LANL's overall score on the utilities/energy conservation measures of Appendix F. The scores were initially high, have maintained a steadily improving trend, and compare favorably to LLNL scores. DX-2 contributes to LANL's overall score, but current LANL infrastructure limitations prevent the group from identifying a unique, quantifiable contribution.

Figures 7-5 through 7-7 show the DX-2 scores in three areas of the Employee Checkpoint Survey: communication, job satisfaction, and safety. For the past three years group scores for all three area have remained consistent with overall LANL scores, although scores appear to have dipped in 1999. Input for the current year will be gathered in April 2000. These annual measures of employee satisfaction provide DX-2 group managers with direct input on employee concerns related to environmental issues.

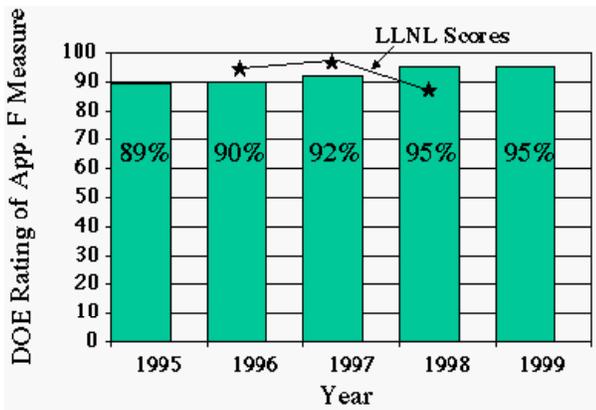


Figure 7-4. LANL's Appendix F scores related to utilities/energy conservation.

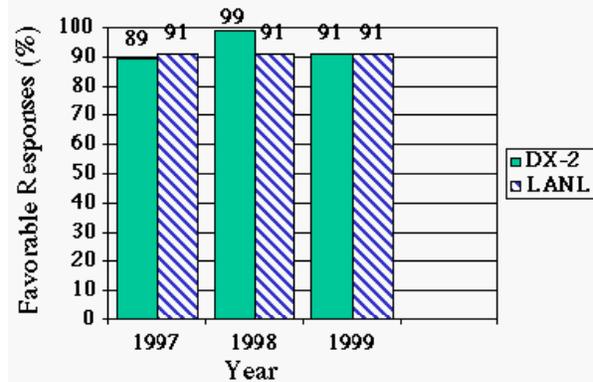


Figure 7-7. DX-2's Employee Checkpoint Scores related to safety.

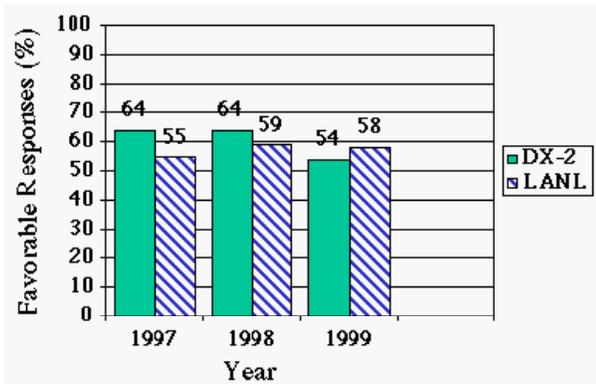


Figure 7-5. DX-2's Employee Checkpoint Scores related to communication.

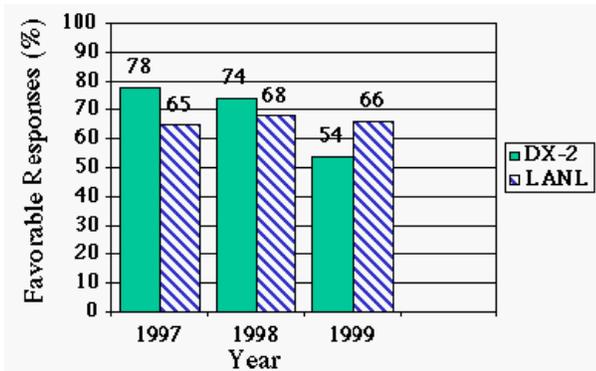


Figure 7-6. DX-2's Employee Checkpoint Scores related to employee job satisfaction.

Figure 7-8 shows the composite scores for DX Division managers on LANL's Upward Appraisal evaluation. DX-2's managers are included in this composite. While results for individual managers are compiled, personnel issues prohibit the release of specific identifying data. Of the twenty categories evaluated, nine have a direct impact on environmental performance. For the last three years the scores have generally remained at a steady high level and are very close to the average score for all LANL managers. Table 7-II provides another view of the data. Given the small variation in scores, it is impossible to establish a statistical trend.

DX-2 closely monitors its injury/illness rate through several measures. Figure 7-9 shows the number of total recordable incidents and lost workday cases for the past year for DX Division. Figure 7-10 shows a rolling 12-month average for TRI and LWC and compares DX Division's performance to overall LANL performance. Figure 7-11 shows the improving trend in LANL overall scores related to employee safety and health. Finally, Figure 7-12 shows the effectiveness of management safety walkarounds within DX-2. Senior leaders aim to accomplish 100% of the expected walkarounds; last year DX-2 leaders completed and documented

nearly four times as many workarounds as required.

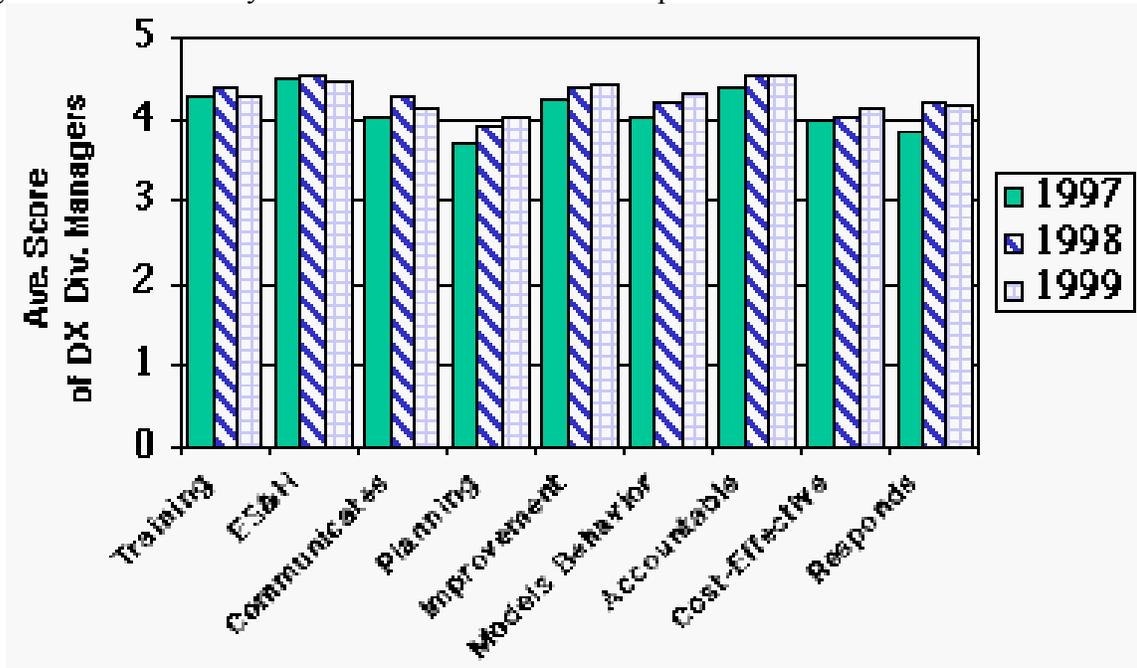


Figure 7-8. Three-year trends for average Upward Appraisal scores of DX Division managers.

Table 7-II. Average Scores for DX Division Managers on LANL's Upward Appraisal Evaluations.

Evaluated Characteristic	1997		1998		1999	
	DX	LANL	DX	LANL	DX	LANL
Actively implements ES&H policies/procedures	4.48	4.45	4.54	4.42	4.45	4.49
Communicates openly and honestly with employees	4.02	4.08	4.28	4.01	4.15	4.14
Supports training and development for employees	4.30	4.31	4.37	4.27	4.26	4.33
Involves employees in planning and decision making	3.70	3.77	3.92	3.75	4.01	3.88
Expects employees to continuously improve	4.23	4.33	4.39	4.29	4.42	4.37
Models behavior he/she expects in others	4.02	4.11	4.22	4.07	4.31	4.21
Holds employees accountable for their performance	4.37	4.42	4.53	4.43	4.54	4.47
Promotes cost-effective work practices	3.99	4.11	4.03	4.06	4.16	4.13
Responds constructively to employee ideas and concerns	3.86	4.07	4.22	4.04	4.17	4.12

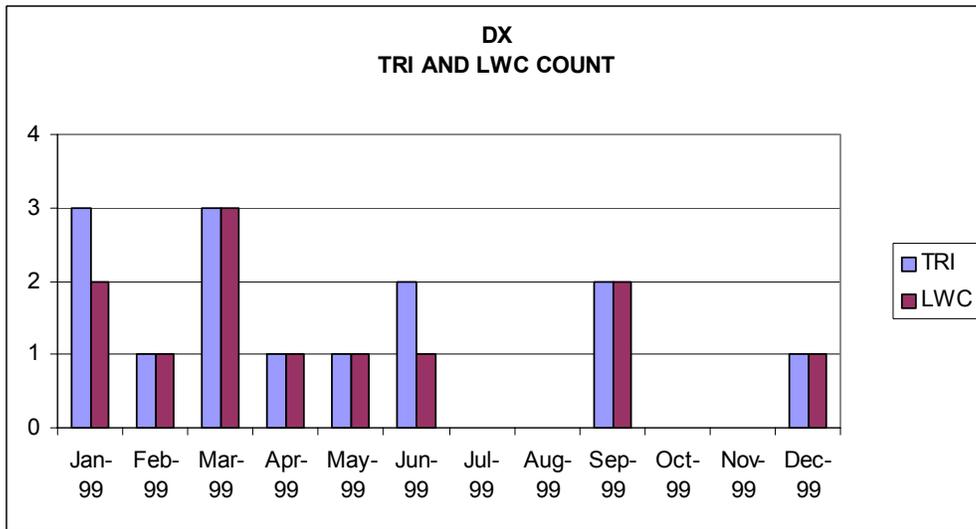


Figure 7-9. Total recordable incidents (TRI) and lost workday cases (LWC) for DX-2 for the past year.

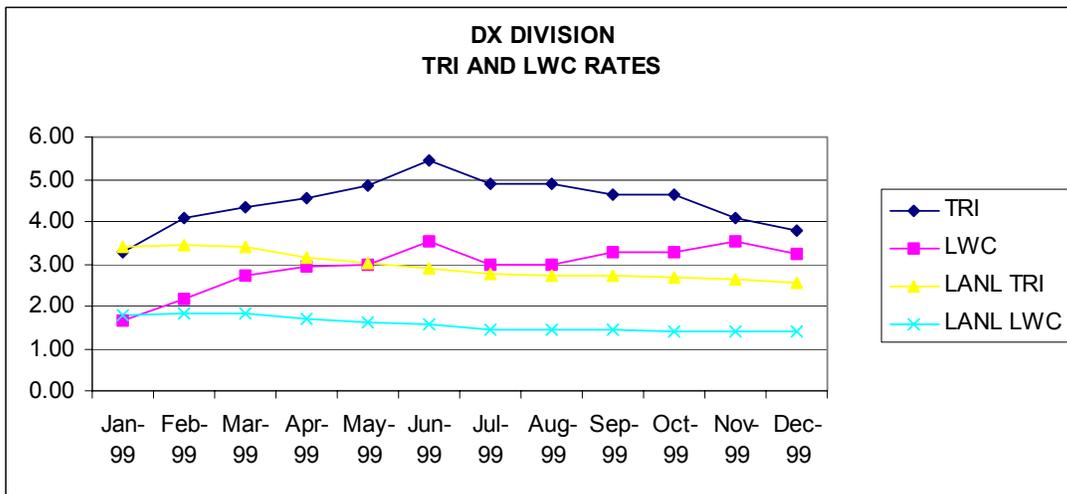


Figure 7-10. Twelve-month rolling average for employee injuries/illnesses.

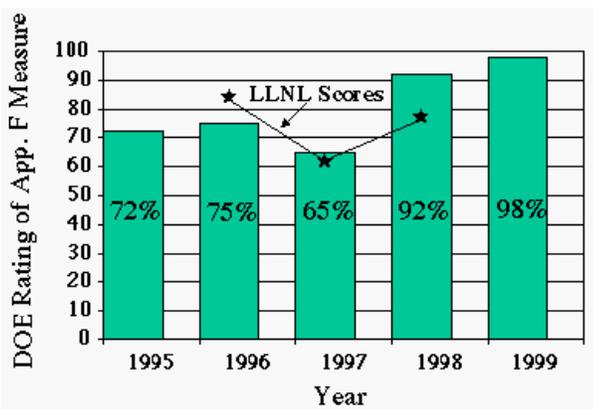


Figure 7-11. LANL overall Appendix F scores related to accident/injury prevention.

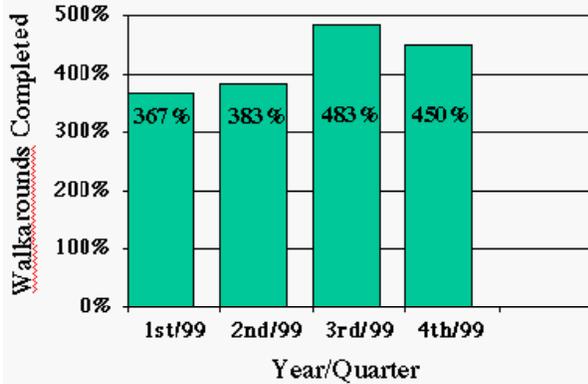


Figure 7-12. Percentage of required DX-2 management walkarounds actually completed.

7.2 Customer, Supplier, Employee and Other Results

DX Division and DX-2 use the Appendix F Process as a way to identify customer requirements and to gather feedback regarding customer perception of division performance. Figure 7-13 shows overall LANL scores from the science and technology evaluation of Appendix F. This is a direct reflection of DOE's evaluation of DX Division's performance, to which DX-2 contributes.

Other key customer results derive from specific administration and operations measures within Appendix F. Figures 7-14 through 7-16 show overall LANL performance, to which DX Division and DX-2 contribute, for recycling and pollution prevention, management safety walkarounds, and supplier performance.

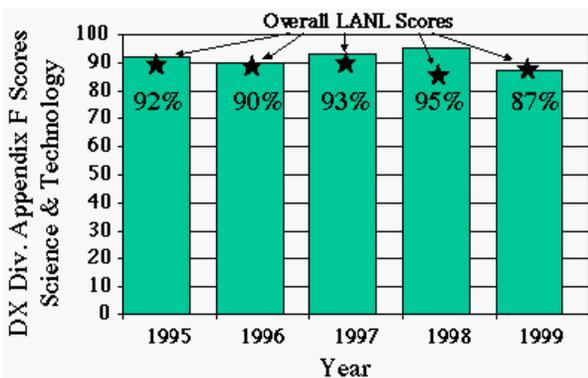


Figure 7-13. DX Division's rating on

Appendix F science and technology evaluations.

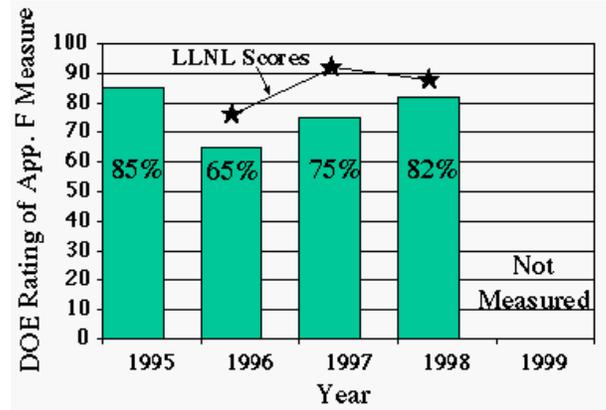


Figure 7-14. Overall LANL Appendix F performance related to recycling and pollution prevention.

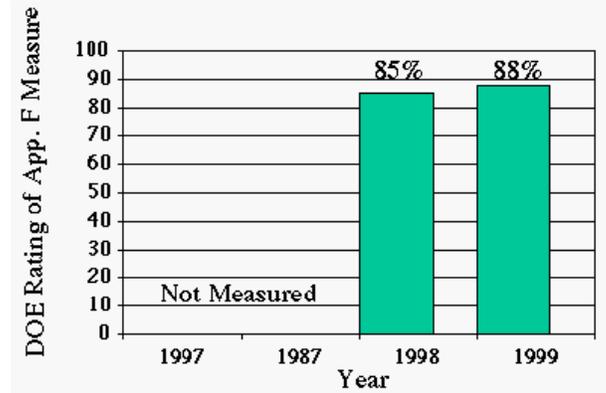


Figure 7-15. Overall LANL Appendix F performance related to management safety walkarounds.

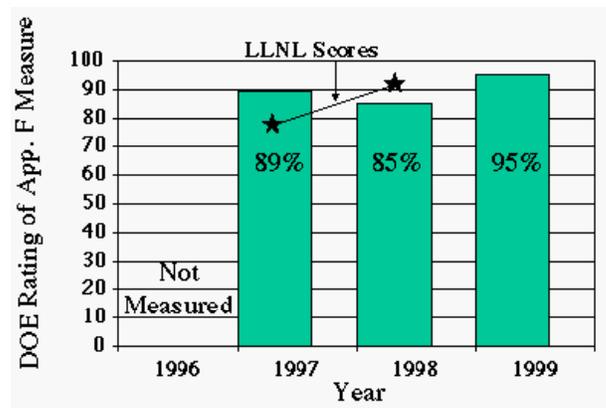


Figure 7-16. Overall LANL Appendix F performance related to management of supplier performance.

Item 7-1 presented results from two other significant Appendix F measures that also relate to this item. Figure 7-4 shows LANL performance related to utilities/energy conservation, and Figure 7-11 shows LANL performance related to employee injury/illness prevention.

DX-2 measures the number of refereed journal articles, conference proceedings, and external paper presentations/seminars prepared by group employees as an indicator of customer satisfaction. Figure 7-17 shows recent trends in these types of publications and presentations.

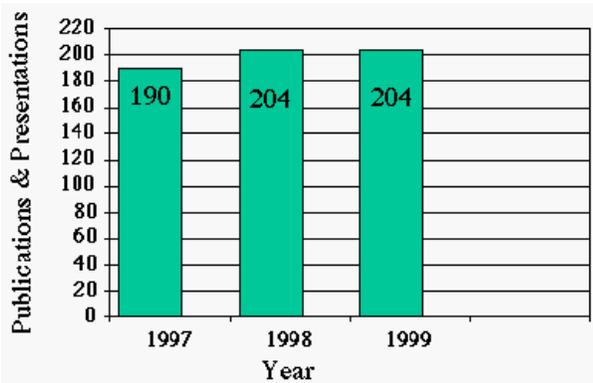


Figure 7-17. Numbers of refereed journal articles, conference proceedings, and external paper presentations/seminars by DX-2 employees.

Figure 7-18 shows trends in public perception of LANL's environmental performance. Information in this particular format is not available for 1999 because LANL changed the survey questionnaire temporarily. Information for this trend analysis resumed in February 2000.

Some of the data presented in Item 7.1 to demonstrate environmental performance also provide important information related to employee issues and well-being. For example, Figures 7-5 through 7-7 show employee satisfaction as expressed on the Employee Checkpoint Survey, and Figure 7-8 shows Upward Appraisal results. Figures 7-9 through 7-11 indicate levels of employee well-being related to safety and health.

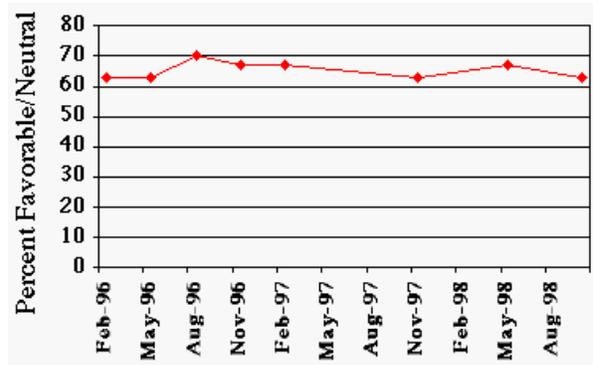


Figure 7-18. Percentage of NM residents who view LANL environmental performance as favorable or neutral.

A final key measurement that DX-2 senior leaders monitor to evaluate levels of environmental performance is the result of participation in the New Mexico Green Zia Environmental Excellence Awards Program. Results from 1999, the first year DX-2 participated in this program, serve as the baseline against which future performance will be judged.

Acronyms

BUS	Business Operations Division	HEWTF	High-Explosive Wastewater Treatment Facility
DoD	Department of Defense	ISM	Integrated Safety Management
DOE	Department of Energy	LANL	Los Alamos National Laboratory
DX	Dynamic Experimentation Division	LBNL	Lawrence Berkeley National Laboratory
DX-2	High Explosives Science and Technology Group	LLNL	Lawrence Livermore National Laboratory
E	Environmental Science and Waste Technology Division	LWC	Lost Workday Cases
EAC	Employee Advisory Committee	NMED	New Mexico Environment Department
EAP	Employee Assistance Program	NRC	Nuclear Regulatory Commission
EPA	Environmental Protection Agency	OSHA	Occupational Safety and Health Administration
ESH	Environment, Safety and Health Division	PDCA	Plan, Do, Check, Act
ESO	Environmental Stewardship Office		
HCP	hazard control plan		
HE	high explosives		

RCRA Resource Conservation and Recovery Act

RD&T research, development, and testing

SEAC Science and Engineering Advisory Committee

SOP standard operating procedure

TCG Technical Coordinating Group

TRI Total Recordable Incidents

TSCA Toxic Substance Control Act

UC University of California